



AN ASSESSMENT OF COMMUNITY-BASED ADAPTATION PRACTICES IN THE SOUTH- WESTERN REGION OF BANGLADESH



FINAL REPORT

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ACRONYMS

BINA	Bangladesh Institute for Nuclear Agriculture
BRRRI	Bangladesh Rice Research Institute
CBA	Community Based Adaptation
CBO	Community Based Organization
CCA	Climate Change Adaptation
CGC	Centre for Global Change
CODEC	Community Development Center
DAE	Department of Agricultural Extension
DOF	Department of Fisheries
DOL	Department of Livestock
DPHE	Department of Public Health Engineering
DRR	Disaster Risk Reduction
DTW	Deep Tube Well
GOB	Government of Bangladesh
IGA	Income generating activities
INGO	International Non-Government Organization
IPM	Integrated Pest Management
KII	Key Informants' Interview
LGED	Local Government Engineering Department
MOF	Ministry of Finance
NAPA	National Adaptation Plan of Action
NGO	Non Government Organization
PNGO	Partner Non-Government Organization
PSF	Pond Sand Filter
RO	Reverse osmosis
RVCC	Reducing Vulnerability to Climate Change
RWH	Rain Water Harvesting
SWR	South-western Region
TRM	Tidal River Management
UP	Union Parishad

GLOSSARY

Aman	A monsoon paddy which is generally grown between July and December
Bagda	A shrimp (<i>Penaeus monodon</i>) variety which is exported from the SWR
Batik	A form of designing a piece of cloth
Bigha	A local measure of land, equivalent to 33.3 decimals (i.e., 14,400 square feet)
Boro	A non-monsoon paddy, grown between December and May
CARE Bangladesh	A leading International NGO working in Bangladesh
Chui-jhal	It is (<i>Piper chaba</i>) a flowering vine in the family Piperaceae that is used as a flavour
Cuchia	A snake like eel fish, not at all popular within the country, however can be exported
Desi	Something which is local/indigenous
Dhan	It is the fruit of paddy (<i>Oriza sativa</i>) which is the staple for Bangladeshi population
Dragon fruit	A fruit belonging to cactus species (genus: <i>Stenocereus</i>), originated in tropical Asian countries
Gher	An artificial pond created on a floodplain with earthen dwarf embankments, which allow captive culture of shrimps and other fish
Golda	A large sized prawn, widely produced in slightly brackish water
Haari	The local arrangement for leasing a land for cultivation
Jagoroni Chakra	An NGO
Karchupi	A form of decorating clothes where dazzling beads and attached to a cloth following a design either by sewing or by the use of glue
Kewra	A brackishwater mangrove plant (pandanus), the extract of which is aromatic and used as food flavouring agent
Khal	A rivulet/canal that helps transport freshwater from river to the water-bodies and also helps discharge of water during monsoon
Khas	Something (referring to land) which is owned by the government
Lau	A white-flowered gourd (<i>Lagenaria siceraria</i>) grown throughout the year
Malta	A citrus fruit belonging to orange family
Maund	A local measure of bulk weight, approximately 40 kilograms equivalent
Mayuri	A motorized version of tricycle which is run by photovoltaic energy
Mele	A grass like reed which is used purposefully to produce mats
Mung	A vegetable protein, grown in Rabi season as a bean and seeds are used widely
O&M	Operation and Maintenance
Palong	A spinach (<i>Spinachia oleracea</i>) which is widely used in Bangladeshi cuisine
Paravet	A person who is trained to offer veterinary services
Pui	A leafy vegetable (<i>Basella alba</i>), every part of it above ground is eaten
REE-CALL	A programme which has been designed and implemented by Oxfam GB
Sajna	A vegetable (<i>Moringa oleifera</i>) which is harvested in spring season
Shak	Spinach (generic)
Shital pati	A reed-based mat which is widely used in rural Bangladesh as a bed spread
Taka	Bangladeshi currency, 1\$ = 81 Taka

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EXECUTIVE SUMMARY

CARE Bangladesh has recently decided to carry out a study to evaluate a few selected best community-based adaptation (CBA) practices which are being tested in the SWR of Bangladesh. Recognizing that CBA modalities have evolved and advanced primarily in the South-western region (SWR) of Bangladesh through the introduction of the RVCC project (2002-2005) by CARE Bangladesh, efforts have been made to investigate the state of implementation of CBAs involving a few NGOs operating in the SWR of the country. This report presents the perception-based assessments of currently practiced CBA modalities promoted by NGOs in the SWR.

Current CBA activities in several sub-districts in Satkhira, Khulna and Bagerhat districts have been analyzed by using a few selected (and agreed upon) criteria for understanding effectiveness of a CBA modality, through the perception of primary stakeholders (the beneficiaries including women), the promoters and national/regional level experts. Questionnaire surveys, field observations, KIIs and FGD, and workshops have been used/convened in order to capture the essence of stakeholders' perception regarding effectiveness of CBAs. Only the prioritized CBAs have been identified and brought under the analysis. In absence of specific indicators of effectiveness, aspects of effectiveness such as (a) technical feasibility, (b) financial viability, (c) social acceptability, and (d) gender-sensitivity have been used, so that the field-respondents can perceive such indicators and reflect upon their efficacy in their own contexts of vulnerability.

The results of the analysis have been presented by the following CBA categories:

- Resilient livelihoods development (considering on-farm crop production, on-farm non-crop production and off-farm activities);
- Resilient community well-being, disaster risk reduction and health care;
- Women's self-reliance;
- Youth development;
- Self-learning including peer-to-peer sharing;
- Policy advocacy; and
- Engagement in establishing good governance.

It is found that the top-most on-farm crop production related CBAs include (a) household vegetable gardening (including sac-bag/tower vegetable production and dike vegetable production), (b) extension of saline tolerant paddy variety, (c) integrated cropping (paddy-cum-vegetable along with non-crop production systems), and (d) high value crop production to exploit local market demand (response to choice and timing).

It is revealed that the prioritized on-farm non-crop based CBAs include (a) Small-scale fisheries in *ghers*/ponds, (b) advanced methods of goat (and sheep) rearing, (c) poultry production, (d) crab fattening, (e) livestock/dairy management, and (f) fruit orchard management.

It is found that in both the crop-based and non-crop production system, farmers/producers emphasize on land/homestead-based production as well as products with relatively higher market

price per unit of production. As a consequence, production *chui-jhal*, jujube, *sajna*, mango and malta (i.e., citrus sweet orange) is becoming increasingly popular even in highly saline prone areas.

It is found that a skillful person acquires more adaptive capacity than a non-skilled vulnerable person (within the same contexts of vulnerability to climate change), which is why vocational skills development is becoming more effective CBA modality than other modalities involving non-farm activities. Among a large pool of vocational trainings, training on *karchupi*/embroidery, computer operation, mobile/cell-phone repairing are more preferred than others by the training recipients. Youth are increasingly becoming interested in such vocational skills enhancement, while a few vocational trainings involving simple techniques (such as tailoring) and requiring little start-up investments are more popular among women. Women are found to exhibit preference on starting a small shop/grocery, which requires lesser technical inputs and ensures sustained financial returns, without having to disturb social norms and cohesion.

NGOs do not tend to invest much on resilient community well-being, disaster risk reduction and healthcare as CBA modalities, compared to livelihoods development activities. Only a small number of NGOs could manage to invest in (a) drainage capacity improvement by excavating/re-excavating *khals*, (b) arranging healthcare camps, and (c) raising awareness on the use of early warning systems.

CBAs targeted at enhancing women's self-reliance are also prioritized. The CBA modalities with high priority for women's self-reliance include (a) supporting livelihoods skills (including arrangement for initial start-up capital and linkages with micro-credit institutions and value chains, and (b) training on income generating activities (IGA). Most of the IGA options are, however, related to livelihoods development related CBAs.

Most of the youth development CBA programmes deal with vocational training and IGA support. Only a few NGOs have targeted programme on youth where awareness raising and the use of early warning systems are discussed in groups, in addition to vocational training and IGA support.

The NGOs which promote a wide range of CBA modalities involving on-farm production systems (crop and non-crop), they also promote farmers field schools in collaboration with formal extension services institutions such as the Department of Agricultural Extension, Department of Livestock and Department of Fisheries. Vaccination programmes for live animals and birds are also arranged as a part of the effective pool of CBA modalities.

Almost all the NGOs involve in CBA in the SWR understand the value of reforming existing policies in favour of the poor and the most vulnerable population groups, including women and people with disabilities. However, only a few has policy advocacy programme in order to push for a policy shift. Local level collective bargaining on access to certain livelihood resources is relatively more common than an organized policy advocacy at regional and national level.

Similar to those CBAs involving policy advocacy, NGOs are less active in promoting greater engagement of stakeholders in establishing good governance. The short-lived project cycle does not allow NGOs to maintain a human resource pool for gradually mediate through different tiers of governance process, which is found to be a limiting factor for not succeeding in such type of CBAs.

Recognizing that CBAs are generally context-specific, many of the prioritized CBAs in the SWR are replicable in different areas, with or without linking with climate change. The development co-benefits embedded in a few CBAs enable them to be tested elsewhere.

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1. INTRODUCTION AND BACKGROUND OF THE STUDY

Climate change is considered by international communities as the most difficult challenges faced by the human kind. Bangladesh is regarded internationally as one of the countries which is the most vulnerable to climate change. It is generally feared that the multi-faceted implications of climate change will affect the poorest the most, threaten food and water security of millions of people, tend to dampen economic growth and destabilize social harmony in Bangladesh.

A host of literature suggests that, the southwestern region (SWR) appears to be the worst affected region due to its complex hydro-geophysical realities and socioeconomic context of the people living there. The region has already exhibited the early signs of failed livelihoods and forced out-migration of climate change victims. These impacts are generally attributed to climate variability and change induced extreme events. However, the region has already become the 'living laboratory' for experimenting small-scale climate change adaptation measures that are particularly suitable for communities living in the region. Many such climate change adaptation (CCA) modalities are targeted at enhancing livelihoods and adaptive capacities of communities and are generally known as Community Based Adaptations (CBA).

CARE Bangladesh has been the pioneering organization to promote various approaches to CBAs since 2002. Its 'Reducing Vulnerability to Climate Change (RVCC)' has been the first ever adaptation project at the grassroots, from which the terminology of CBA eventually has emerged. Since the days of RVCC, the partner NGOs of RVCC have been continuing to innovate and leaving good CBA examples for wider replications. Many non-government organizations (NGO) have been trying to emulate a few good practices in a bid to promote CBAs in the country, particularly in the southwestern region (SWR) of the country. The SWR has therefore become a hot-spot for giving trials of CBAs within Bangladesh.

The Government of Bangladesh (GOB) has shown its commitment to address climate change – largely through institutional adaptation as well as low carbon development. The majority of the climate financing so far has been spent through the involvement of a few ministries and departments – all representing GOB institutions. Despite the early successes of CBA activities, there has not been any significant effort to understand apparent successes of those CBA practices and replicate those with GOB climate financing.

Despite the abovementioned efforts to promote CBAs in the SWR, no systematic efforts has been made to understand which specific CBA modalities have been providing the best context-specific solutions, especially in the backdrop of overall aspiration of the climate change affected communities. In a bid to learn from past CBA experiences and to integrate such good CBA practices in future programming, the CARE Bangladesh has intended to identify, prioritize and evaluate the effective and scalable adaptation options/practices in the areas of food security and sovereignty/agriculture, water access and sustainable livelihoods in South-west Bangladesh. To this end, CARE Bangladesh has recently decided to carry out a study to evaluate a few selected best CBA practices which are being tested in the SWR of Bangladesh. However, such an initiative is never complete without taking note of best CBA practices which have already been promoted by NGOs in the SWR.

This report is based on a field based research on CBA practices carried out by NGOs in the SWR. The research methodology, presented below, draws inferences based on perceptions of field-based actors who have been promoting CBAs in the salinity¹-prone and occasionally cyclone ravaged SWR and also the farmers/producers, who try out many different modalities to safeguard their livelihoods against common climate-induced hazards in the same region. In addition, the perception-based research highlight the priority of CBA practices, as such priorities are perceived by the both the groups mentioned above.



Figure-1: Map of the study area representing the South western region (SWR) of Bangladesh

¹ In general, the SWR is by and large affected by sub-surface and top soil salinity. The surface water in the creeks/rivulets and rivers are also salinity, owing to tidal hydrology of the region. However, salinity varies across geographic sub-regions. There exists a salinity gradient towards South and West: it is always more saline from North to South and also the same from East to West (Asaduzzaman et al., 2016; Ahmed, 2008).

2. METHODOLOGY APPLIED

The evaluation of each practice is, as mentioned above, perception-based². It is because, neither the NGOs nor the recipient of CBA services (i.e., the farmers/producers) maintain all the data (physical, social and economic) which might enable a complete analysis of inputs and out-puts, before and after the application of each CBA modality under a given vulnerability context. The timeframe of the study does not support any longitudinal analysis³ of potentially a large number of variables that are required to undertake a complete analysis. Therefore, the study tends to evaluate “effectiveness” of any identified/prioritized CBA modality by taking into consideration of number of aspects, understanding on each of which are needed to make a partial sense of effectiveness of the modality. In absence of specific indicators of effectiveness, aspects of effectiveness such as (a) technical feasibility, (b) financial viability, (c) social acceptability, and (d) gender-sensitivity have been discussed with the representatives of CARE Bangladesh, agreed upon and used, so that the field-respondents can perceive such indicators and reflect upon their efficacy in their own contexts of vulnerability. The criteria⁴ for using the four aspects of effectiveness in the field assessment are the following:

- In the context of climate change, if a CBA modality is robust enough to withstand climatic perturbation (say, higher surface temperature, higher rainfall variability, hazards that are associated with climate variability and change, etc.) and yet produce desired results, it is regarded as technically feasible and hence considered as “effective” in terms of technical issues. If a CBA is technically less challenging to handle by a farmer/producer/recipient of CBA modality and they can easily tweak as necessary during the course of the application of the technique/technology (without having to consult ‘external actors/specialists’ frequently, it is ‘technically effective’. CBAs that require lesser technical abilities to manage are considered as ‘technically effective’.
- If a CBA either is financially win-win (always brings financial gains at the expense of time, effort and cash) or does not require a heavy capital (in terms of economy of the concerned HH), then it is regarded as “financially effective”. Upfront capital investments, during implementation input costs, operation and maintenance (O&M) costs are part of the consideration for assessment of ‘financial effectiveness’ of a CBA modality. A technically effective CBA may or may not be simultaneously financially effective.
- If a CBA causes problems for women to handle it on a day-to-day basis, or create differential access for women (in a given social context) to the perceived benefits, then it is NOT effective in terms of gender-sensitivity. In contrast, a gender-friendly CBA should not create problem for women to manage/handle on routine basis (without frequent assistance from male counterparts in their respective operations) and/or which offer easy access for women to perceived benefits (material, cash and/or services) can be identified as ‘effective’ CBAs in terms of gender orientation. CBAs which do not inflict upon any stress on female-male relationships are also ‘effective’ in terms of gender sensitivity.
- If a CBA disrupts social cohesion, creates division among members of a community, etc, then it is NOT effective socially (even though the same may be highly effective in terms of technical aspects and economic feasibility).

² No effort has been made to test many pertinent issues related to a large pool of CBAs. For example, soil qualities, before and after certain agricultural intervention could not be accommodated, because the perception-based responses did not reflect upon such issues.

³ Long-term environmental issues, therefore, could not be included in the assessment.

⁴ Such criteria are proxy to indicator(s) which might have highlighted effectiveness. These were discussed and agreed upon with CARE Bangladesh before being applied in the field investigations.

Each of the aspects highlights an element of “effectiveness”, however individually cannot holistically represent the same. However, if an identified and prioritized CBA modality is found to be effective in all four aspects, generally that one is considered to be a “good practice”. The above provides for rationale for identifying the CBA practices that are perceived to be ‘good’ and recommended for wider replication by interested actors.

The generic approach to the task involved collection of both secondary/published information as well as primary information from major stakeholders regarding currently practiced CBA activities, with particular reference to southwestern region (SWR) of the country.

The following methodology was applied:

2.1 Collection and review of secondary information

An effort was made to collect secondary information on CBA, with particular reference to Satkhira, Khulna and Bagerhat districts. The Figure-1 shows the area including the three districts. Initially, a regional workshop was organized (organized by CARE Bangladesh), in Khulna, in order to facilitate a forum of major CBA actors representing various institutions who have been playing key roles in advancing and understanding CBA activities in the SWR. The workshop helped the identification and short-listing of a few key organizations, among a host of non-governmental organizations (NGO) that are involved in advancing and understanding CBA in the SWR.

Once the above was done, the collection of secondary literature (published as well as grey literature, documents and reports) was arranged, which formed the base for the secondary source of information. With the help of the field-level enumerators, mobilized by CARE Bangladesh (as agreed), necessary steps were taken for the collection of secondary information and data. Check lists were developed for the collection of information (institution-based) on CBA activities. Moreover, checklists were also prepared for conducting Key Informants’ Interviews (KII), which were conducted by the same enumerators who were mobilized by CARE Bangladesh. In order for the field enumerators to understand the tasks, a day-long training was arranged for the enumerators following the Initial consultative workshop.

The representatives from each of the above mentioned institutions/organizations, including CARE Bangladesh and its partners working in the SWR, are contacted for key informants’ interviews (KII). A formal set of questions have been asked to each of them for the KII. Such questions segregated CBAs involving household and/or individual level delivery (for example, activities to address household food insecurity, to increase production even under salinity, to increase income by means of acquiring and utilizing certain skills, etc.) and those CBAs which target activities for an entire community (for example, activities to address drainage congestion, to increase availability of non-saline drinking water, etc.).

The questionnaire which has been designed for the KII focused on activities that are technically feasible, economically viable and easy to be replicated by others (i.e., ‘ease of replication’, especially after observing their effectiveness). A few questions are asked regarding barriers (technical, financial, and social) and hindrances faced by each of the best performing CBAs. For CBAs targeting at activities for an entire community, the key informants are asked to reflect on their perception regarding level of capital investment intensity, degree of technical difficulties faced while implementing the modality, the degree of difficulties faced in terms of Operation and Maintenance (O&M) and O&M cost recovery for each modality, the difficulties involving post-management of

each technology, and whether or not land availability and/or participation of local government could be a limiting factor.

The questionnaire also included queries regarding modalities of delivering awareness-related messages to understand the best media to be chosen for enhancing awareness of target communities.

A few national experts, having adequate understanding regarding CBA in the SWR, were also contacted for conducting KII⁵. The outcomes of the KIIs formed the basis to double check the evidence base for the analysis of effectiveness of the CBAs.

Once the documents were received from CARE Bangladesh (through the involvement of the enumerators), the information were collated on CBA in the SWR and reviewed, primarily to understand the context-specific effectiveness of each individual CBA activity and also to identify the primary recipient stakeholders, whose views must be considered to further understand the implications of such CBA activities.

2.2 Primary Stakeholders' Interview

In order to triangulate the information base and the subsequent analysis of CBA effectiveness, an effort was made to visit actual places where direct beneficiaries have been practicing CBA activities under the guidance of various non-government organizations. Such field-level consultations, again facilitated by indicative check-lists, were supplemented by conducting field visits to a few key/representative field areas within the three SWR districts to further consult with local people who have been subject to such CBA interventions and/or have been practicing such CBA activities since their introduction. This step helped triangulate the information collected and provided a firm basis towards understanding social acceptance and gender sensitivity of each of the major CBA activities.

2.3 Final Analysis

In the last step, the good CBA practices were further reviewed within the broad framework of a holistic/ integrated CBA framework⁶ to understand how such CBA practices could be replicated by various actors and what additional steps should be considered by various actors, including CARE Bangladesh, in order to ensure sustainable livelihoods of climate change affected communities.

3. THE RVCC APPROACH AND DELIVERY OF CBA

A project titled "Reducing Vulnerability to Climate Change (RVCC)" was designed and implemented during 2002 and 2005. The RVCC project was designed with an overarching goal to reduce vulnerability of Bangladesh to (adverse impacts of) climate change and to increase capacity of communities to adapt to adverse effects of climate change. The RVCC Project was implemented in six districts of the South-western Region (SWR) by CARE⁷ Bangladesh. The Districts included Satkhira, Khulna, Bagerhat, Narail, Jessore and Gopalganj. The project envisaged that, vulnerability could be reduced by means of the promotion of sustainable development and the building of local-level (i.e., micro) capacity to adapt to the changes induced by climate change (CARE, 2003).

⁵ A list of Experts engaged/contacted in the KII is placed in Annex-1.

⁶ A commonly used CBA Framework with examples/indicators is placed in Annex-2.

⁷ With support of the Canadian International Development Agency (CIDA) through the Canada Climate Change Development Fund (CARE, 2002).

The RVCC project envisaged that it would have the following broad-based impacts:

- Vulnerable Bangladeshi communities understand and are better able to respond to adverse climate change effects.
- Local organizations such as non-government organizations (NGOs) and community-based organizations (CBOs) are better able to understand and explain climate change and have the skills and knowledge to advocate on climate change.
- Agencies of local and national government are sensitized to the need for strategic interventions to enhance adaptation to climate change for vulnerable communities.

The purpose of the project was to exhibit that communities and institutions in the SWR would demonstrate capacity to (a) raise awareness on climate change, (b) reduce climate change-induced vulnerabilities, and (c) influence relevant policy towards enhancing adaptive capacity of the SWR. The project chose six SWR Districts, which otherwise had been known as the most vulnerable districts of a country known to be among the most vulnerable on earth to climate change (Huq *et al.*, 1996). The Project considered four distinct approaches to deliver four different outcomes, which are explained below (CARE, 2002).

Approach-1: Vulnerable households and their representatives would be helped towards improvement of their capacities to innovate in their livelihood strategies so that they can reduce vulnerabilities to climate change.

The RVCC approach at the household level consisted of building the capacity of beneficiaries to cope with a particular vulnerability context (e.g. flood) as it impacted on a specific indicator of household well-being (e.g. income). The well-being indicators and vulnerability contexts were chosen on the basis of a participatory vulnerability assessment that was conducted early in the project (CARE, 2002; Schaerer and Ahmed, 2004). In order to address specific combinations of vulnerability contexts and well-being indicators, a number of strategies are identified. These included the following:

1. Increase food production through agriculture;
2. Increase income through alternative livelihoods;
3. Increase availability of food;
4. Improve health conditions and personal safety;
5. Increase access to safe water; and
6. Improve safety of housing.

RVCC was designed to promote a host of adaptation measures within these strategies. An indicative list of adaptation modalities are listed in Annex-3. These adaptation measures were selected for implementation based on the needs of grassroots people vulnerable to current climate-related complexities.

Approach-2: Communities would be assisted by enhancing their capacity to conceptualize, plan and implement community-level adaptation strategies.

Two community-level adaptation strategies, and corresponding measures, were identified that would complement the work being done at the household level. The community-level strategies were to:

- (i) Increase access to common property resources; and

- (ii) Reduce threats through community-based initiatives.

Access to common property was identified as a need for landless beneficiaries in order to implement measures under the agriculture and livelihoods strategies. Activities under this strategy supported local-level advocacy to ensure rightful access to these resources by beneficiaries.

For reducing threats at the community level, the approach was to work with elected Chairmen of Union Parishads (UPs), their members and community leaders to build their capacity to plan and implement community-level measures that would reduce threats from the vulnerability contexts of flood, salinity, cyclone and water-logging. An indicative list of adaptation modalities under Approach-2 are listed in Annex-4.

Approach-3: Local groups would be empowered and their capacities would be enhanced so that they might collect and disseminate information related to climate change, and begin advocacy with the government of Bangladesh (GOB) on climate change issues.

The majority of activities under this outcome focused on increasing awareness on current climate-related vulnerabilities, their linkages with the livelihoods of grassroots people in the southwest of Bangladesh, potential adverse impacts of climate change, and potential coping options available. The project was undertaking a number of activities to raise awareness, including grassroots cultural activities, working with local Eco-clubs for sensitization of mass people, dissemination of information for the literate population through newsletters and other publications, and the development of a school program on climate change, among others. Again, the focus primarily is on capacity building at local levels.

Approach-4: Project would promote partnership with agencies and groups in a bid to interact regularly with national level climate change stakeholders on policy advocacy issues.

A number of activities were considered under approach#4, which includes the following: contributing to the national level understanding on the needs for adaptation; carrying out an analysis of national policy regime to find out its relevance to adaptation to climate change; contribute to national capacity in terms of the formulation of the country's National Adaptation Programme for Action (NAPA); and encouraging national stakeholders to provide feedback on various activities under the project.

4. CURRENT MAJOR ORIENTATION OF CBA PRACTICES IN THE SWR

The current orientations of CBA practices in the SWR are not necessarily different than those in the very first attempt of CBA design under RVCC Project. Most of the CBAs have primary focus on improve productivity, defying salinity and water logging, and thereby attain household food security as much as possible. Interestingly, many new innovative production-oriented modalities have been introduced. Farmers are also found to be more willing to take part in such live experiments involving their time, resources (i.e., land and other resources), and efforts. The focus has shifted from paddy based production system to non-paddy crops, while diversification of production involving poultry, livestock, and fisheries has been continuing and strengthening.

The next orientation of CBA practices in the SWR is around non-farm production, which aims at improving household income streams from activities that are primarily not-affected by climate change induced hazards. Firstly, the market response of such products has to be high, with

assurance of profit-making. Secondly, the production system must not be interfered by hazards that often are found to be induced by climate variability and change. Such earning opportunities ensure sustained income for participating households, defying hazards that are climate induced and adverse affecting usual livelihoods. This is how, at least, economic resilience is being gradually enhanced in the targeted households.

Very few evidences are found where the target of CBA practices is to offer greater resilience for a community as a whole, not only limited to a few targeted households within the community. The most notable ones are dealing with attempts to supply drinking water. Various technologies have been given extensive trials, in response to the chronic salinity-related lack of access to drinking water throughout the SWR. It is also found that experimentation on effectiveness of various delivery mechanisms involving a costly but assured technology towards the supply of non-saline drinking water has been continued. Community efforts such as access roads, drainage improvement, creation of green belts etc. are still being observed, although such efforts are sporadic and not widely being practiced.

It is heartening to observe that, general gender sensitivity in the choices of CBA modalities has been increased throughout the SWR. Orientation of CBAs towards benefitting women as primary objective has been dominant. However, there have been a few cases where youth groups, persons with disability etc. have been given greater emphasis as recipient of support for the resilience building.

The other dominant trend is to extend production systems, both on farm and off farm production, into market linkage establishment. Production of products, even agricultural products (crop, livestock, fisheries and poultry included), are no longer intended for household consumption alone. Conscious and deliberate efforts are made to link sustained production systems with market forces, which in effect has been contributing towards gradual commercialization of the production systems in the SWR. Even smallholders' and women's productions are brought under value chains involving crop agriculture and horticulture, fisheries, and dairy.

5. THE BEST PERFORMING ON-FARM CROP PRODUCTION ORIENTED CBAS

It is beyond doubt that most of the NGOs delivering/facilitating CBAs in the SWR have been concentrating on addressing food security of target households, particularly by means of increasing farm-level crop production. This was the trend during the times of RVCC (Roy et al., 2010a), which appears to be still continuing throughout the SWR. An enhancement of own production, defying a host of climate change related issues, can effectively reduce household food insecurity (Neelormi et al., 2010). Therefore, the NGOs are mostly engaged in CBA modalities with a primary objective to increase on-farm food production. However, some of the products grown do have commercial importance, which go beyond subsistence and enable farmers to earn cash towards maintenance of household food security.

5.1 Technical feasibility

The analyses clearly suggest that, the top three 'technically feasible' CBA modalities are the following: (a) household vegetable gardening, (b) saline tolerant paddy production, and (c) integrated cropping (mostly vegetable). The other lesser important, but preferred on-farm crop related CBAs which are found to be technically feasible include the following: (a) dike cropping (vegetables grown on the slopes of the dikes), (b) production of various cereals (maize, burly, and

wheat), (c) seasonal cash crops such as sunflower, *mung* bean, sesame, turmeric, and (d) field-based seasonal fruit such as watermelon.

A further look into such technically feasible and successfully adapted crops reveals that, the most common vegetables are grown. Farming households are generally aware of such vegetables and their technical know-how are millennia old. However, NGO extension service offer little training in order to find low cost alternative methods to avoid salinity – the latter being the major problem that has been severely limiting the production of such vegetables. Such vegetables include cucumber, brinjal, snake gourd, water gourd (i.e, *lau*), bitter gourd, sweet pumpkin, tomatoes, cauliflower, cabbage, carrot, spinach (*palong shak*, *pui shak*, etc.), red amaranth, etc. Along with vegetables, chillis are also being promoted by the NGOs, which require little water to reduce the adverse effect of salinity. The NGOs introduce advanced varieties of seeds to the farmers, train them regarding optimal levels of inputs and plant spacing, integrated pest management techniques, etc so that the farmers can benefit the most by applying such advanced information and knowledge regarding vegetable farming. Subject to availability of land (and/or dike), farmers generally produce in excess of their household demand so that the excess, at least part of it, may be sold for fetching some cash.



The intensity of salinity increases during spring and summer days (Late-March till harvest in May). Therefore, the Boro paddy varieties suffer the most in the SWR. In fact, farmers generally relinquish the cropping season and find alternative crops that are tolerant to mild salinity, while in areas with high salinity the farmers often do not grow anything during that particular cropping season. Therefore, following the harvest of Aman paddy, the fields are generally left fallow and the farmers do not get any financial benefit from their lands.

In such a backdrop, an extension of saline tolerant varieties of paddy brings great opportunity to maintain production despite the seasonal built up of salinity profile. The successful harvest instantaneously gives household food security, while the extra harvest also offers some cash. The most technically feasible variety being BINA-8. In areas where the standing Aman crop also faces salinity, a varietal shift becomes important to avail the Aman cropping season. In such cases, BIRRI-Dhan 50 and BIRRI-Dhan-38 have been found to be not only technically feasible, but also high yielding and having other beneficial properties. Most of the above mentioned varieties, which are being put into extension by the NGOs, generally yield in the range of 17 to 24 *maunds* per *bigha* (equivalent to 1.7 to 2.33⁸mt/ha).

A few NGOs have been promoting integrated farming. Essentially, it is a combination of vegetable production as well as saline tolerant paddy production, however, carefully choosing varieties by each cropping season and supplemented by advanced agronomic practices such as selection of fertilizer dosages (based on land type, crop type and so on), application of supplementary organic fertilizers (compost, vermin compost, etc.) and integrated pest management (IPM), etc.



In the saline zones, a significant proportion of the lands are being used as shrimp enclosures (i.e., *ghers*). The *ghers* are generally separated by earthen mounds having inner and external slopes. These slopes are gainfully utilized by farmers to produce vegetables. Since the dikes are located next to water bodies, the root zone of vegetables can be easily irrigated even when salinity builds up on plain lands. This is how the farmers safeguard their vegetable plants and gain from the production of

⁸ In comparison with yields of popular Boro and Aman varieties, yields in non-saline lands appear 4.2 to 3.7 tons/hectare, respectively. While high salinity significantly reduces the yield in the fields of target beneficiaries, the lower yield is still regarded by them as a boon compared to complete loss of crop.

vegetables. On technical grounds, dike cropping is simple and can be practiced by landless farmers, although they require to have formal permission from respective land owners⁹.

In lesser saline zones, other cereal crops such as maize, burley and wheat has been given successful trials. Since these cereals are not staple food suppliers, these are generally grown as commercial crops. These crops have not been put into practice during RVCC. While some wheat can still be consumed as flour, the other two are totally commercial crops. Maize has high demand in the production of supplementary feed for livestock and as fish feed.



Seasonal cash crops have high market demand, as well as some household consumption potential. These are crops which have not been given trial under RVCC. Since the rise in soil salinity in the early 1990s, farmers of SWR have not been cultivating such crops in anticipation of crop loss under saline condition during Rabi season. Now the NGOs have persuaded the farmers to try out varieties (of oilseeds and lentils) those are released by BARI. Despite salinity, even in Debhata and Kaliganj Upazilas of Satkhira (where the soil salinity profile is much higher than elsewhere in the SWR during Rabi growing period), farmers found good yields. Oilseeds such as sesame and sunflower and lentil such as *mung* bean has been found viable under the prevailing soil salinity in the SWR.

It is observed from field trials that the salinity profile in the northern parts of Satkhira and Khulna districts during the Rabi growing season is not limiting for the cultivation of turmeric. Therefore, at least one NGO has promoted turmeric as a cash crop (after processing, it becomes a spice – an essential ingredient in Bengali cuisine).

⁹ Many land owners use their lands as shrimp *ghers* and do not care whether the land separators/dikes are used for vegetable production. The owners often live far away and give permission to use the dikes of their *ghers* without charging any amount.



Relatively larger scale production of watermelon in crop fields has not been given trial in the SWR during the time of implementation of RVCC project. Farmers themselves have started field trials in the sandy soils in the early 2000s. NGOs have been promoting the cultivation of this commercial product following the early success of farmers. It is found that, the prevailing salinity does not pose a technical limit to the cultivation of watermelon.

5.2 Financial viability

Vegetables which are generally grown in the SWR are short lived. Therefore, a number of vegetables can be grown in sequence in any given field. The opportunity for multiple harvest is the key for financial success of growing vegetables. Since the production of vegetables requires little inputs, and the technical requirements are minimal, the apparent costs of production per unit of produce appear low. Therefore, vegetables offer a perfect 'low-input low-output' CBA option for farmers having access to land.



Since most of the vegetables being grown are seasonal, the farm gate price varies significantly with time for the same product. In the beginning of the season, the unit price obtained by farmers is generally much higher compared to the average price towards the end of the season. Sometimes the end-of-the-season farm gate price is quoted by the middlemen so low that the producers do not find economic incentive towards harvesting their produce, especially if the field is some distance away

from the homestead! Tomatoes, cabbage and beans are among those vegetables which suffer significant price differential between the beginning of the season and end of the season.

The cost of vegetable production however increases significantly if the access to a land needs to be ensured by annual rental basis (locally called *haari*). The quick rotation of vegetable seasons, enabled by varietal modifications through relentless research by BARI, gives farmers adequate opportunity to pay for rent at the beginning of a given season and still make profit at the end of the rental period. This has given rise confidence to farmers to initiate commercial vegetable farming even in areas which are moderately saline. Among on-farm crop based CBAs, vegetable cultivation appears to be the most viable adaptation modalities in financial terms.



However, in homesteads of extreme poor households the cultivation of vegetable is still preferred, although the scale is significantly different. In homestead vegetable cultivation systems, commercial farming is not generally possible due to lack of adequate lands around homesteads. The homesteads where small-scale vegetables are grown (often for subsistence only), a number of options are promoted by the NGOs in a bid to reduce the adverse effect of capillary action of salinity ingress. In the RVCC project, hanging vegetable cultivation and tower vegetable cultivation have been promoted in saline prone areas. Not only those methods are still being promoted, an innovation came along where an earthen stack pile is created inside a sack, the sack is deliberately perforated to allow the stem of a vegetable plant to come through, and then the creeper is allowed to expand its branched on a bamboo-made support. Due to the stack pile, the salinity cannot increase much due to lack of evaporation and subsequent slow rise in capillary action, which eventually keeps the root zone of the vegetable plant out of danger of reverse osmosis. Consequently, the plant survives and the production of the vegetable is ensured.

Not only the technology is simple and requires little technical know-how, the cost of putting a sack bag and a bamboo-made platform is perceived to be low. In saline prone region, such a simple technology that assists vegetable cultivation has been found to be economically viable and highly popular. Since a farmer does not generally has to pay any rent for using slopes of a *gher*, dike cropping is also financially viable and quite popular.

Saline tolerant paddy is also found to be financially viable. However, the apparent financial return from paddy is relatively less compared to field-based or homestead vegetables. Paddy is both labour and input-intensive. While the former forces the male producer to work and relinquish any opportunity to sell labour (that is regarded as a financial loss to the male producer), the latter directly requires cash. Moreover, the sensitivity of paddy yield to moderate to high salinity (especially during Rabi growing period) is much higher, which reduces the average yield significantly. As a consequence, farmers find saline tolerant paddy less favourable in economic terms compared to vegetables.

In cases of integrated farming as a CBA option, financial considerations are perceived by farmers less important compared to the food security related gains. Moreover, the producers find the system useful because it allows year-round turnovers in small amounts, which is seen as a beneficial modality for the household. Since many of the poor households have micro-credit loans, such frequent but small returns from a variety of activities and products allow them to pay off against their micro-credit loans.

One of the important features of current CBAs is that, there is a general tendency to go beyond subsistence, which is why market-oriented cereals, oilseeds and lentils and commercial vegetables are grown. Moreover, there is also a distinct tendency to go for high value crops¹⁰. The farmers generally keep an eye towards demand¹¹ in local market(s) for certain vegetables and choose accordingly. The higher the anticipated value, the higher is the tendency to grow such products.

5.3 Social responses to on-farm crops

Crop agriculture is the most known and acceptable form of employment in rural Bangladesh, even when the relative contribution of the broad agriculture sector including forestry, fisheries and livestock to gross domestic product of the country has come down to a mere 15.35 per cent in 2015-16 (MOF, 2016). Because of the high social acceptance and direct contribution to households food security, crop production related CBAs are widely accepted among the beneficiaries throughout the SWR. Moreover, majority of the CBA beneficiaries belongs to farming communities.

Among various CBA choices involving on farm crop production, paddy cultivation appears to be the most socially acceptable modality. However, due to varied levels of salinity (that limits production) and increasing input costs per unit of land, such socially acceptable CBA option has not been replicated through autonomous adaptation. The situation has been compounded by potential risk of saline inundation in the monsoon, leading to water logging and lack of non-saline irrigation water in the Rabi growing period.

Vegetable production is the next most desirable modality of adaptation among all types of on farm crop agriculture. Due to relentless media interventions and emphasis placed in the school level

¹⁰ Actually crops which generally fetch higher amounts in comparison with traditional crops, that too in the context of local market responses.

¹¹ Sometimes such demands are time-specific. For example, cucumber and eggplants become high value crops only during Ramadan period, when their respective demands are very high due to cultural reasons.

curricula on benefits of vegetable consumption, the overall market demand has escalated throughout the country. The farmers who grow vegetables in their tiny courtyards/homesteads, they can at least have it along with rice. The excess production is generally shared with neighbours, and sold to middlemen at the farm gate. There is no social hindrance attached to vegetable gardening at the courtyard.

Those who has access to crop lands for cultivation, they grow vegetables for commercial reasons. While most of the produce goes to the market, thanks to the massive improvement of rural road network, a small portion is also consumed at household level. Since the promoted varieties of vegetables are technically feasible, economically viable and easy to replicate, neighbours come forward to learn from NGO beneficiaries and replicate on their own. Sometimes they consult with Sub-assistant Agriculture Officers deployed in their neighbourhood for further technical support, or even a champion vegetable grower in their neighbourhood to understand the dynamics of such production better. The champion growers believe that, their interests will not be harmed if they teach their neighbours to grow more vegetables. They have an assessment that the demand for such products is actually increasing faster than overall increase in production. They believe that this situation will continue along with the growth in urbanization. The growth in market demand is supported by available literature (Asaduzzaman et al., 2016).

Like vegetables, production of crops such as watermelon, *chui-jhal*, mete potatoes etc. has been fully socially acceptable. All these are market oriented crops, fetch good amounts of cash per unit of land. There is no social and/or cultural barrier that might undermine the marketing potential of such crops. As a consequence, the introduction of such crops has inspired many people to replicate in their respective fields/homesteads.

Non-paddy cereals, spices (such as turmeric) etc. are also becoming popular, since there is no social and cultural hindrance attaching to the farming of such crops.

5.4 Gender sensitivity regarding on-farm crop production

One of the important features of on farm CBA activities is that, most of the NGOs have targeted women as both producers and primary beneficiaries. Therefore, the capacity building training and input supports have been provided primarily to women. With an exception of paddy production, most of the other CBA modalities relating to on-farm crop production have been managed by women. Women are found to be happy in continuing with such production system.

The society in rural Bangladesh has been changing. Women are more exposed to the culture, norms, and practices outside their respective villages. The communication linkages have been established over the years, information on many issues are being shared through a variety of media, and their children attending to schools¹² have been sharing many things on which they had no prior information and/or experience. Women of SWR are no exceptions. They had been facing vagaries of nature. Their food security has been devastated due to increased salinity, owing to diversion of freshwater in the upstream at Farakka by India (Mirza and Sarker, 2005; Gain et al., 2014). Gradually, they have been observing other changes which are somewhat attributable to climate variability, if not change. In order to reconstruct their livelihood system, they possess a mental frame to accept the challenges and do something meaningful – even if it is ‘out of the box’ in terms of their past experiences and perceptions.

¹² In fact, the enrolment of children in primary level has been increased to 98% in Bangladesh, irrespective of gender and ethnic background. Such an achievement has been formidable in South Asian standard.

At this juncture, the NGOs came along with a participatory analysis of the situation around them and asked whether or not they would take up the challenge to reconstruct their livelihoods. They've shrugged off the apparent social barrier around physical labour in the crop fields and put a rationale saying "... it is better to work in public to grow something or earn, rather than wait in queue for some relief". With the help of NGO-driven trainings, inputs and exposure visits (if any), the women have started to grow more food, produce non-crop items (discussed later), take part in marketing such products, thereby earn respect of their respective male counterparts and the people in their immediate neighbourhoods.

Once the social norms around female's participation in crop production is overcome successfully, the target women beneficiaries of CBA projects did not feel that, in on farm crop production (also in off farm non-crop production) the available CBA modalities have any gender sensitivity. Although women are found to be confident in dealing with saline tolerant paddy varieties, in reality only a handful of women are actually found to be working in the paddy fields. Women are found to be generally shy in contracting an irrigation provider, finding the right fertilizer dosage and pesticides from the market places, etc. They also do not frequently take part in de-weeding the paddy fields. Such activities¹³ are still led by their male counterparts. Only for the women headed households, such activities are led by women.

With an exception of paddy production, women are found to be fully engaged in homestead as well as on farm crop production, including dike cropping. After receiving technical know-how, they participate in harvesting, even marketing. With the improvement in road communication in rural SWR, marketing of crops has been made easier – the middlemen now come to the villages and collect from the farm gates.

When asked whether women are given lesser rates for the same product or not, women equivocally reported that the days of such exploitation have been gone. They always find one or two women among themselves (i.e., within the community/village) who have attended school and they do the calculation on behalf of the sellers. Therefore, the question of financial exploitation does not arise.

The development of rural markets by the Local Government Engineering Department (LGED) and within such markets, the presence of 'women corners' enable many small-scale women sellers of fresh produce to safely market their products and get competitive price for such products. Following harvest, they use their cell phones to call on an 'easy bike'/'Mayuri', load their respective products and carry those to nearby women's corner – everything done by themselves. In many cases, their male counterparts extend their hands and support their activities. The additional income and also the newly earned confidence in handling cash have brought respect of their respective male counterparts. Gender sensitivity for on farm crops is generally very high, perhaps with an exception of paddy cultivation.

6. THE NON-CROP CBA BEST PRACTICES

In addition to crops, producers tend to produce many non-crop products – both for own consumption and also for selling those in the market. Such products are still produced within the farm (i.e., involving the lands on which they have temporary or permanent access, and also the lands around the homestead), having been profusely benefitted by the various resources associated with their respective farms. Many such efforts have been considered under the RVCC project (Roy et al.,

¹³ Social/cultural acceptance of such activities among women are low, owing to patriarchal social norms and practices.

2010b). However, a few innovative modalities have also been promoted, which deal with new and commercially lucrative products (such as jujube, malta, mangoes, etc.). Interestingly, the modification in approaches to produce known products (such as goat and sheep under elevated platforms and sheds) has gained much appreciation by the producers.

6.1 Technical Feasibility of on-farm non-crop products

Fish production in *ghers* has been continuing throughout the SWR since early 1980s. In the highly saline prone areas, people have been taking advantage of salinity and nurturing shrimps in captivity under salinity. Such practices have been common in the southern Upazilas of all the three districts. However, with the increased freshwater flow in Gorai river in critical dry periods following the signing of the Ganges Treaty in 1996, the northern reaches of Bagerhat and eastern part of Khulna districts have been experiencing a decrease in salinity in surface water. As a consequence, a suitable condition for Golda shrimp along with white fin fish culture has emerged, which is being promoted by the NGOs. Such practices are generally known as fish poly-culture, which is technically simple and easily replicable. Such practices have been promoted under RVCC project (Roy et al., 2010b). Fish poly-culture has been found to be the most popular form of CBA on technical grounds.

Crab fattening appears to be the second most preferred on-farm non-crop CBA practice, as promoted by the NGOs. During the days of RVCC, such practice initiated its journey in the saline zones within the SWR (Roy et al., 2010b). The ease of replication and simple marketing procedure enabled the producers to continue with such a profit earning CBA activity. Despite its continued promotion and autonomous replication, the CBA modality has been facing two significant technical challenges. Due to continued extension by the NGOs and requirement of small initial cash to start the activity in a small pond, many producers have come forward to nurse crab juveniles. However, the abundance of crab juveniles in the nature has been gradually declined compared to its overall demand, which has now become a limiting factor. The field observations and key informants' interviews clearly suggest that, there are not many crab juveniles in the wild to nurse them in captivity and sell those when those are adequately grown (i.e., fattened).

The other technical problem is legal in nature. The Environmental Protection Act 1997 dictates that no wildlife should be collected/held, which includes crab (GOB, 1997). But crabs are being collected indiscriminately for fattening and subsequent export. Although technically crabs are considered to be wildlife, the Government of Bangladesh (GOB) has not been very active towards putting a bar on their export. In reality, the export promotion bureau has been considering crab as an export earning product. This leaves a dilemma whether the successful CBA effort should be stopped or continued further.

Apparently, there is no straight forward answer to this. In view of its economic potential, the GOB is reluctant to apply the prevailing ban on its collection from the wild – despite clear legal provisions. The promising sub-sector could gain immensely if the GOB promotes the establishment of a hatchery (by providing for financial incentives to private sectors).

Goat and sheep rearing has also been promoted by NGOs as potential CBA modalities. Again, these are common livelihood practices in rural Bangladesh. Since both the types of animals can be fed with almost anything having nutritional value, these animals can be nurtured under any harsh condition. Salinity does not affect such living animals. With the availability of livestock officer in the vicinity, people find it technically feasible to manage a few goats and sheep. Moreover, the NGOs in the SWR have been promoting a small hut with shed for these animals, generally placed on an elevated level to avoid wet living condition. In addition, improved rearing techniques are being promoted in order

to ensure higher production and lower mortality rates. The technical innovation involving simple, low-cost hut placed on elevated plinth has reduced the possibility of sickness and death of both the animals, making their production highly viable under saline conditions. Technical challenges are largely overcome through the advice of locally stationed livestock officer and continued supervision by NGO personnel.

The fourth most significant and popular on-farm non-crop production involves poultry rearing. Rural people have been doing so since long. The technical difficulties in managing a small farm are very low. The only potential trouble with poultry rearing is disease management. In recent years, there has been a gradual increase in availability of trained people who can give vaccination services, which has significantly reduced the possibility of mortality of such birds. Recent market demand for indigenous chicken and duck has made the practice an attractive CBA proposition for poor households. A few NGOs have been promoting other birds such as quail and pigeon. These are managed with minimal technical know-how, which is why people are becoming attracted to such practices.



The fifth important non-crop product deals with livestock rearing. The RVCC project took advantage of the local know-how of such millennia old production system (Roy et al., 2010). Owing to the recent price hike of beef, the producers have been happy to adopt such practices with advanced technical know-how on cattle rearing. The concerned NGOs have taught the producers to arrange for fresh grass, cultivate very high yielding grasses such as Napier and Jamboo varieties, use supplemental feed for cattle, produce a mixture of straw and molasses to further supplement diet for quick fattening of cattle, etc. Despite the fact that, all these are quite demanding on technical ground, the producers have forced themselves to learn the techniques and came out victorious. The technical challenges are indeed overcome by a significant number of beneficiaries across the SWR.

In addition to cow fattening, milking cows have been brought under improved management practices in a bid to increase productivity. Although the extent of such activities is nowhere near the level reached in a few northern districts, however a positive change has already been initiated following the implementation of RVCC project (Roy et al., 2010b). One NGO has now initiated a group-based milk production system involving as many as 17,000 milk producers. Since grasses such as Napier and Jamboo can withstand certain levels of salinity, these are suitable for the prevailing soil conditions in the SWR. Moreover, owing to their respective high productivity round the year with minimal technical care, the coverage and production of such grasses have increased significantly in the past five years. With increased assurance of availability of green fodder, the technical feasibility of cattle rearing is likely to be continued and expanded throughout the SWR.

Livestock rearing also include pig rearing. It is also technically feasible. However, there are social and cultural barriers, which dominate the decision-making against such practices.

In addition to the above mentioned non-crop CBA modalities, there is an emerging tendency to establish orchards, primarily in the homesteads, but also in crop lands adjacent to homesteads. Mango, jujube, guava and citrus fruits are grown in orchards, with a commercial intent. Even in saline conditions, people are planting fruit trees. Non-fruit trees are also being planted for particular type of products. *Sajna* is a seasonal vegetable, which is grown in trees. In southern Satkhira, *sajna* cultivation has been heavily promoted by NGOs. All these fruit and non-fruit bearing trees can be nurtured with minimal training, which is why local farmers have been shown keen interest in establishing such orchards.

Under RVCC Project, a locally available reed called *mele* was promoted for cultivation, which used to be a raw material for the production of mats (Roy et al., 2010b). Mele production is still being promoted by one or two NGOs, however such CBA practice has not been gaining any popularity. In technical terms, it is easy to grow *mele* in non-saline conditions, along creeks/*khals*. No special nurturing is needed for *mele* during their growth. Yet, the simple production system has not been replicated by producers under autonomous adaptation.

6.2 Financial viability of on-farm non-crop products

Field observations suggest that, by far the best financial returns generally come from Crab fattening. The investment level is low. The crabs may be fed with mollusk, shell and commercially less attractive small fish – all being sourced from neighbouring wetlands at no extra cost (other than physical labour). A closer examination suggests that, there have been established marketing channels which are functioning under autonomous development in saline prone areas. For Satkhira, a major marketing hub has been established by the middle men. Live crabs are sold based on their size and the producers generally get good price for their live crabs. Since crabs are exported, the producers generally express satisfaction regarding the price they receive.

In financial terms duck rearing and the production of local varieties of chicken have been quite successful. Since the *desi* poultry are more resilient to ambient environmental condition than broiler chicken¹⁴, their mortality rates are much lower, which compensates for the lower productivity than those for the competing broiler (or layer) variety. Moreover, the producers do not require to feed these *desi* birds since these are scavengers, the cost of production is much less. Moreover, the

¹⁴ Productivity generally declines during hot summer days due to high temperature variability. Production of broiler chicken requires high initial investments for shed preparation, arrangement of electric fans, etc which are cost intensive and therefore, not immediately replicable compared to *desi* variety chickens.

market places higher preference on *desi* varieties of chicken, which is why their average price is much higher compared to farm-fed broiler variety. All such issues culminate into relatively high economic returns for local varieties of chicken. Similarly, local ducks can feed on their own in the wetlands and market response for duck meat is very good. These factors make the poultry rearing a major success on financial terms. However, there are social and gender dimensions to add to such favourable conditions (in following sub-sections).

The livestock market has been changed over the past few years, owing to the imposition of a ban by India towards exporting its cattle, mainly beef, into Bangladesh. This has limited the availability of cheap animals and boosted up the local cattle rearing efforts. Even without such market incentives, cattle rearing used to be a profit making proposition, even during the implementation of RVCC project (Roy et al., 2010). Now the altered market conditions create greater financial opportunities for livestock rearing. Moreover, due to proliferation of commercial farming of Napier grass in croplands has made the availability of fodder easier than it was before. The availability of paravets has also increased in rural areas, which is why the mortality rate for livestock has significantly reduced. All these have contributed to greater financial viability of the CBA activity.

As explained earlier, goat production on better living conditions has been found to make financial sense for the producers. Of course, it takes some capital investment to create a platform and a shed so that goats are not exposed to muddy and humid conditions and also to scorching sunshine. Such favourable conditions ensure that the animals will not face heat stress, exposure to incessant rainfall and diseases. Moreover, there are increased numbers of paravets these days in rural Bangladesh to offer critical health services to livestock, those are available at a nominal rate. Better livestock rearing techniques have become within reach, even to poor producers and women. All these have inspired the producers, including smallholders and women producers, to successfully adopt such a money-making CBA.

The entire SWR has been known to produce fish. However, during the 1990s till 2000s, shrimps were the most noticeable seafood supplied by the region. Following the promotion of Golda-cum-paddy and shrimp-white fish poly-culture under the RVCC project, many NGOs have been promoting such alternative livelihoods for the small holders. Since there is an established value chain and the farmers have been experiencing the benefit of input-based fish farming, introduction of carp and other popular fin fish variety hasn't taken time. Due to the existence of a very vibrant marketing channel, most of the products are taken to the market fresh, which eventually get good market price. The improvement of road network and transportation system also played a very useful supportive role towards marketing of the products from such CBA activities. The producers believe that, the SWR can indeed intensify the fish farming activities to increase its financial gains from such activities.

The only major challenge being faced by the producers is not having appreciable cool chain¹⁵ in the region (Ahmed, 2012). The investors do not find adequate financial incentives to invest in cool chain establishment due to non-availability of sustained supply of electricity in the region. Had there been better preservation opportunities, the producers would have converted many Bagda farms/*ghers* into white fish farms, thereby contributing to the overall sustainability of the fish culture activities. In recent years, the GOB has taken firm initiative to increase electricity production in the SWR, which is

¹⁵ Preservation opportunities would significantly enhance bargain power of the producers, while eliminating the possibility of rotting of harvested fish.

expected to increase the overall potential for establishing cool chain and make the fish farming activities even more economically viable.

Although fruit orchards are providing for good cash, the apparently successful adoption of the CBA is still not among the top ranked on-farm non-crop¹⁶ products. For each type of fruit, there may be a time lag between establishment of an orchard and harvesting for the first time. This becomes a limiting factor for many poor and landless households in the SWR. Smallholders often do not find logic in establishing an orchard in a leased land, primarily due to short-term leasing contracts and also in anticipation of violation of contractual agreement by the leasee. However, among the households having saline affected lands, such ideas of establishing orchards may be propagated. Products such as Jujube, mango (particularly in Satkhira district, even in moderate to highly saline prone lands), malta (citrus fruit) and guava (the highly popular Thai variety) have been gaining popularity due to high economic returns. Jujube and guava are obtaining hefty market prices, much higher than any vegetable. Orchard based products are now seen as high value products. Although orchard received an overall lower evaluation in terms of financial performance, compared to other products, the initial market responses indicate that it will become a major economic activity in future years.

In comparison to the products discussed in this sub-section, *mele*-based mats (i.e., *shital pati*) does not offer good economic return. True, *mele* production does not require any supervision. However, the average earnings from selling a mat does not generally compensate for the time a woman takes to produce a mat. Moreover, there are plastic based alternative to mats, which are also washable. Therefore, mats of biological origin cannot economically compete with such alternatives. This is why, despite NGO insistence, *mele* cultivation and subsequent production of mats are generally discouraged by the producers.

6.3 Social Acceptability of on-farm non-crop products

All the top performing on-farm non-crop products are socially acceptable. No one finds it socially derogatory if someone in their neighbourhood engages to produce any of these products. The production and marketing processes have been continued since ages, so the immediate society does not create any extra hindrance to the producers. It is the same crop producers who have been diversifying and/or introducing advanced techniques, which are being admired by the neighbours. Sometimes the neighbours come forward to learn from a current producer by examining the immediate financial gains from such activities. The beneficial contributions made by such CBA activities are becoming increasingly known to all, which makes people interested in engaging in such activities.

Goat and sheep production in a small hut (elevated platform and a shed) generally appears intriguing to onlookers and immediate neighbours. In the field visit, it is indeed found that a lady was gleefully exhibiting the hut of her goats, while her own living space was in a much dilapidated condition! Still she was happily showing the arrangement, keeping a view that with increased income she would be able to repair her own hut someday in near future. Her spirit was visibly being appreciated by her neighbours.

Coastal people often do not find crab meat so attractive. Not only they have alternative sources of food, the producers find it acceptable that such products will eventually be exported and the

¹⁶ Although the fruits are originated from trees and generally are seasonal products, these are unlike usual field-based crops. Their management, harvesting, packaging and marketing requires significantly different sets of skills and gadgets than usual crops, which is why these are separated from those of usual field-based crops.

creatures will not be consumed in the country. Like fish, crab is a socially accepted product. However, there are one or two products which are not socially so acceptable. For example, eel fish (i.e., *cuchia*; *Monopterus Chuchia*/*Monopterus Albea*¹⁷) is kind of fish which resembles with snakes. Therefore, not many potential producers would be interested to produce eel fish as a commercial product. The resemblance to snake makes the product socially unacceptable. Similarly, pig rearing is being promoted by an NGO. However, since the days of implementation of RVCC, pig rearing has never been expanded among the beneficiary groups due to religious guidelines against the consumption of meat of pigs. Therefore, the local market is next to non-existent and the economic viability is extremely low. While the local market for pig-meat cannot be excited in a Muslim majority society, eel fish could easily be produced and exported (Seraj, S., 2016). However, due to cultural and social issues, there is no point that such products be given high importance in promoting on-farm non-crop CBAs.

6.4 Gender sensitivity of on-farm non-crop products

In general, women are found to be confident in handling any production system (including the marketing of their produce) with exceptions regarding paddy and shrimp. They have been performing successfully in maintaining the production systems involving fish poly-culture, crab fattening (almost entirely by them), goat and sheep rearing, beef fattening/livestock management, dairy management and orchard management. With minimal training and incentives and without any previous experience, women are found to be ready to venture into new such territories of on-farm production systems. Like male farmers, they tend to share problem-related issues with fellow (women) producers, even talk to occasionally passing by government-deployed agricultural extension workers/officers, even contact agricultural input sellers/distributors in order to find solution to a production-related problem and try to solve. From field observations, it appeared almost obvious that they tend to remember how one such problem had been overcome in their neighbourhood and they tend to emulate the proven solutions.

Women are found to take care of living animals/birds/fish as if those are their family members. Although, they invest quite a lot of their time, in addition to handling household chores as the prime care giver for the household, in the process of nurturing these living creatures. However, they also admit that they do such things for the betterment of the entire family. In return, it is often found that they do not ask for monetary and/or material benefits from the financial profit being made, however they are found to like being recognized by their family members as important contributors in their respective households. Mrs Monira Akhter Maya of Haybatpur village of Shaymnagar Upazila (Satkhira district) said “I do not need anything for myself from the profit I make. I am happy that the little money is helping the family to overcome a few obstacles to our livelihoods. As long as this money is contributing to wellbeing of my family members, I shall be happy”. She was a beneficiary of Jagoroni Chakra Foundation a few years ago, as a member of a producer’s society (JCF, 2017). She has turned into a successful trainer. She is currently raising 22 *desi* chicken, two cows, one goat while offering training services for the NGO. Her earnings allowed her to purchase a camera for her husband so that he can work as an independent cameraman. Mrs Maya successfully diversified the livelihoods of her family, starting from on-farm non-crop production system.

¹⁷ Already given trials in Magurkuni village of Shaymnagar Upazila of Satkhira district.



Owing to the established marketing channels, as in the cases of vegetables, oilseeds, spices and lentils, women face little hindrance towards marketing of their products. Over the years, they developed an understanding that certain on-farm non-crop products have high demand and better market response during certain specific periods. For example, if a young bull may be fattened just before the Eid-ul-Adha or a goat may attain a good size in winter¹⁸, the market price will be relatively higher than other times of the year.

Since women have been nurturing local breed of animals/birds/fish since ages, they refresh their knowledge base with advanced training, if any. However, they admit that without the support of NGOs, they would not have dared to invest in managing an on-farm non-crop production system, especially with living creatures. They admit that the financial support offered by an NGO¹⁹ helped them overcome the mental barrier and enabled them to venture into such productive systems.

As in the cases for crop based production systems, the increase in level of education within a group has helped them negotiate better with middlemen, the latter coming and purchasing their products. Women are now confident that the middlemen would not be able to exploit them even if their male counterparts are not around during the time of payment.

Some of the NGOs are promoting other group activities. For example, some of the producer groups have group-savings. Those of whom are confident that they would take loan from such a fund at a nominal rate and still can expand their CBA activities, they receive loans and expand their respective activities. In such cases, as appeared from the field observations, they tend to diversify their economic activities further. Such additional investments are observed not only in non-crop production, but also in crop-based production. There are only a handful of women such as Mrs Maya, who borrowed money for helping her husband to purchase a camera so that the income opportunities are extended from agriculture based activities to non-agriculture based activities.

¹⁸ Indicating the season for marriage ceremonies and/or picnic parties when the relative demands for such products generally reach their respective peaks. They may not be aware of exact reasons, however they are aware of market responses.

¹⁹ Different NGOs offer different financial packages and the amount varies widely. However, among the research partners, the highest amount provided is found to be BDTaka 16,000 (approximately, US\$200) per household.

7. THE OFF-FARM SKILLSBASED CBAS

In an agrarian society, agriculture is part of the culture and therefore, if an activity is found to be economically viable, poor people adopt it and propagate rather easily. However, available literature suggest that agriculture-based livelihoods under climate change would face increased hardships and uncertainties – particularly in the south-western coastal zone. People with little access to productive resources need to extend their adaptive capacity by acquiring skills so that they may engage in non-agriculture based livelihoods in the long run. In shorter run, perhaps a mixed form of livelihoods involving all adult members of a vulnerable household may be ensured, where one or more members of the household consider measures to enhance skills for non-agricultural livelihoods. Such diversification of livelihoods is crucial towards risk pooling and spreading the risks and uncertainties associated with failing agriculture-based livelihoods.

Unfortunately for the rural poor in the SWR, having an exposure to new forms of livelihoods does not come easy. They lack social contacts and education, they have very limited ability to invest in something new – especially following sustained crop losses due to climate induced adverse effects and subsequent food insecurities faced by their respective household members. As a consequence, many of these ‘climate victims’ become frustrated and eventually are forced by circumstances to be displaced in search of a viable livelihood (Adri, 2013). If they end up being in urban centres, due to lack of urban-based livelihood skills, the males become either day labours or van/rickshaw pullers as those livelihoods do not require much skills while the females predominantly become housemaids. In this process, their economic solvency perhaps increases slightly, however they face different forms of hazards and well-being challenges (Adri and Simon, 2017).

CBA delivery therefore should have provisions to offer skills enhancement training to vulnerable people, with perhaps a focus on young females and males. Even during the implementation of RVCC, efforts were made to provide for skills through targeted training so that the recipients of training could find an alternative income generating modality. Such little exposures enabled training recipients to adopt financially viable livelihoods: local reed based mat production, production of pickle using *kewra* fruits, and commercial establishment of nurseries (Ahmed, 2010).

Over the past decade and a half since the RVCC experience, local NGOs have made tremendous progress in building human capital towards diversification of economy of climate-affected people. Although the piloting has been done involving only a small fraction of the overall population in the SWR, the experiences following the skills enhancement programmes have been exhibiting a snowball effect. In the SWR, a number of NGOs have established vocational training institutions where formal trainings are arranged, based on trade-specific curricula that are duly approved by the Bangladesh Technical Education Board. The graduates receive training and certificate following completion of the training. They are assisted for proper placement in formal employment sectors. In the SWR, formal vocational trainings on becoming electrician, welding operator, tailor, computer operator, and carpenter are provided to aspiring youths. It is to be mentioned here that, such formal trainings are not free of cost and the aspiring candidate must fulfill the trade-specific criteria before enrolment.



In addition such formal trainings, a host of other informal trainings have been organized, targeting at illiterate and extreme poor people. In such cases, there is hardly any specific requirement to be fulfilled prior to enrolment in a batch. People can acquire skills on mobile phone and computer repairing, motor cycle mechanic, production of useful household appliances using bamboo, tailoring, beauty parlor management, *karchupi* (beautification of women and children's cloths), block and batik works, production of caps and dolls, paper and plastic sheet based shopping bag production, etc. Training on the use of camera (to cover locally important events such as a marriage ceremony), printing any electronic file, management and use of soil testing kits to recommend fertilizer dosage, photocopying, running a grocery store, managing a courtyard-based wholesale vegetable marketing hub, (commercially) running a rural milk collection centre, etc are a few excellent CBA-oriented activities which are now found to be running throughout the SWR.

Many such trainings are informally propagated through establishing personal relationship and offering apprenticeship. In Satkhira Sadar, most of the shopping bags had to be procured by shop owners from far away places such as Khulna or Dhaka. The low cost alternatives are now marketed regularly by destitute trained women groups, located in Southernmost Union of Munshiganj under Shaynagar Upazila. The *karchupi* products and caps produced in Tala Upazila are marketed in Satkhira and Khulna, a group of women have accepted the challenge and completely diversified their economy. A group of girls in Shaymnagar are engaged in lengthy formal training on operation of computers so that they can enter into formal employment.



During the field visits, a host of recipients of both formal and informal training, mostly young and predominantly women (over 95%) have been met, often in action. Most of those training recipients have become self-reliant by means of applying their respective skills and linking up with markets. BY talking to individuals engaged in various different activities, it appears that the minimum monthly income is about BD Taka 7,000 (for a very small rural grocery store keeper), while the average is within the range of Bd Taka 10,000 to 12,000 per month. Clearly, such a monthly earning gives a financial edge for these households over those who generally run agriculture based livelihoods.

7.1 Technical aspects of skill-based livelihoods

The only major challenge is, one has to learn her/his trade very carefully so that skill acquired may be utilized in a professional way. Of course, many of the trades demand hands on learning. The more time one spends on a trade, the more likely that s/he would gain more experience and would be able to handle finer issues. Gradual technical capacity building gives one a professional edge over the others on the same trade.

For formal training opportunities, certain minimum level of educational qualification is needed for each trade. Perhaps tailoring requires the least level of education. Even the secondary level school dropouts may enroll in vocational training on tailoring. In such trades, the men to women ratio appears 2:1.

For non-formal trainings, there is no requirement as such regarding a minimum level of education. In non-formal training there are more women than men. Some of the trades such as *Karchupi*, block and batik, beauty salon operator, etc are more or less designated for women. These trainings not necessarily require day-long sessions and lengthy modules, which is generally preferred by women.

As such, it is difficult for the NGO questionnaire respondents to take part in evaluation of the most effective skills enhancement training, since no NGO generally runs all the trainings simultaneously. Based on response of training recipients, one may sense that technical requirements are generally applicable for all the trades. However, the degree of requirement and the intensity with which one has to receive the training significantly vary from trade to trade.

It is found that hand to eye coordination, patience and a sense of decent design are key technical requirements for the *karchupi* operators and the mobile phone repairing operators. Cap and shopping bag production requires little hands on training, the need for finesse is much less when the product is for local markets. The producers admitted that their inability to capture a market share in Dhaka may be linked with the level of finesse of their products. Dolls with higher level of finesse and finishing generally fetch higher price, as these products are used by children and they always prefer good looking ones.



A camera and/or a photocopier operator need to know the basics, where lengthy trainings are not at all needed. Managing grocery requires additional skills of keeping an updated inventory and sensing demands on certain products. For the management of both grocery and wholesale vegetable marketing hub, the entrepreneur must know accounting and simple arithmetic. Otherwise, their business will not be run successfully.



Those of whom are running a service oriented hub or a shop, they must have excellent interpersonal skills and acceptable social behavior. Without these virtues, people might go to other places. These technical as well as social norms must be fulfilled so that the skill acquired may be successfully marketed.

7.2 Financial viability of skill-based livelihoods

The highest amount needed to complete a vocational training is generally on the training regarding electrician and welding operator. However, such formal trainings are worth spending hard cash. Once a trained person finds right placement, s/he start to receive monthly salary and never looks back in financial terms. Welding operators who become experts of arc welding may get thrice the salary compared to a general welding operator. The best ones generally find international placement and remit handsome amounts to their respective family members.

The economic returns from non-formal skills enhancement trainings vary, subject to meticulous application of acquired skills, market linkages, hours being spent on the trade on a given day, and the demand of the product/skill – the latter changes with locality, seasonality, etc. Rural level tailors can easily earn BD Taka 4,000 to 6,000 per month, if s/he does not face steep competition. Since

karchupi is generally a skill for a higher end product, an average *karchupi* operator may get in the order of Taka 10,000 per month, without having to invest on raw materials. Generally, the contact person (i.e., the middle man/woman) supplies raw materials and the design and collects all the finished products. The operator does not require to invest. Similar financing arrangements are observed for Block and Batik works. However, for cap, shopping bags etc., the producer invests in terms of purchasing raw materials, make her/his products and carry those to the market.

Interestingly, the only producer of bamboo-based products informed during the field visit that he used to earn BD Taka 20,000 on an average month! However, he has to produce such products with good quality bamboo. He knows that, if the customers are upset due to inferior quality products, he would lose his business.

With more and more people becoming interested to know the quality of their agricultural top soils before committing to a certain crop agriculture, the service around examination of the soil and immediately recommending a balanced fertilizer dose involving nitrogen, potassium and phosphorous is becoming a booming business. The one-time cost is Taka 50 per analysis, which is done by using a disposable testing kit (just like checking level of sugar in blood samples). Generally, initially the wealthier farmers willing to invest for the wellbeing of their parcel of land have become interested in the application of such technology. The adoption of the same is still low among the poor farmers/smallholders. Both the training and the testing kit have been provided by an NGO. Since such a service is available at the doorsteps (without having to go to Dhaka for a proper testing, however at an exorbitant price per test) and the cost as well as the time requirement for the analysis is minimum, local large farmers generally prefer such handy services. Like paravets, women do handle it very well and make part of living of her household. However, the NGO experimentation with such soil testing kits involving women was extremely limited, which has not been replicated later in other areas. Financing for such initiative has been found to be a limiting factor.

It is heartening to see that in rural set up such skills have become highly useful and making good financial returns. Since none of these skills and the associated services are likely to be perturbed by climate induced hazards, these offer a set of CBA practices which will continue to help people to earn quality livelihoods. If a household can combine one such useful training with the homestead/land based productive system, the resultant financial package is likely to be more than adequate for an average family to sustain livelihoods, despite climate change.

7.3 Social acceptability of skills-based livelihoods

In rural set up, if a member of a household finds a formal employment following the receipt of a formal vocational training, the household perceives it as a graduation from subsistence to self-reliance. In rural society involving poor households, no success is sweeter than this. This gives a family a social standing, an identity that they have graduated from being nobody to somebody.

Even for the non-formal skills-applying households, with an escalation of household income, the social standing gradually increases. A smallest grocery owner/operator (in case of a rented shop) is socially higher placed than a destitute person. There is no stigma attached to any of the trades being promoted under skills-based livelihoods. Practicing women are relieved that they are contributing to household income which is noticeable and being noticed by both the respective husbands and in-laws. This has brought them respect, a recognition that they are to be heard and taken seriously. Not that they did not ever contributed to household economic conditions. However, the recognition was not there. With the newly acquired skills and their applications, the social acceptance increased manifold.

In a village (Uttar Hajipur under Nurnagar Union of Shaymgar Upazila, Satkhira) where there is a concentration of a few women working on *karchupi* and tailoring, the neighbours were asked during the field visit to comment on their activities. The neighbours expressed happiness that the skills were within their village, from which they would tend to learn from and address their poverty. The respect earned by the successful women taught the neighbours a lesson that they must also do something noticeable so that they would become self-reliant and might earn similar respect from their respective husbands.

7.4 Gender sensitivity involving skills-based livelihoods

It is already mentioned that most of these skills intensive IGAs are most suitable for women. Women are becoming increasingly interested in trades such as welding and electrical works, which have been dominated so far by males. Tailoring is almost 100 per cent designated trade for women. Similarly, *karchupi*, cap and bag production, block and batik – all these are most suitable for women and are being 100% taken up by women.

However, there are certain trades where women might not be interested to participate. In the field KIs, women informed that they might not be participating in trainings on wood works (carpentry) and or masonry. The latter sometimes require hanging on a bamboo pole to complete plastering an erect wall at high elevation, which is perceived to be highly difficult for women to accomplish given the social norms and the clothing they generally wear. However, young women have shown interests in becoming tiles operators, since they hardly require to climb up the wall and can spend most of their working time on horizontal floors.

The successful women operators/producers/shop owners have expressed satisfaction that the society has been kind enough to accept the changes and allowing them to participate in various activities. Although they all perform most of their gender-based duties in the household chores, however they cannot maintain the usual timeline for all those household chores. Their family members have also adjusted the new timelines, which made it easier for them to cope with. There is no denying the fact that the successful women work additional hours since the beginning of application of their skills and they do not have time to relax, however they expressed satisfaction that their hard labour has enabled them to empower economically, while they also enjoy the apparent enhancement of respect in the immediate family.

8. STATE OF CBAS THAT TARGET THE COMMUNITY AS A WHOLE IN THE SWR

It appears almost obvious that the current CBA practices primarily deal with individuals and households in a deliberate effort to build resilience. Since the most vulnerable households within a community are deliberately chosen as recipients of support, such targeted CBA activities, as in the case of RVCC (as briefly discussed in section 3 above), are still accepted as catalyzers towards building community level adaptive capacities to deal with climate change. However, in most cases, actions which might have reduced vulnerabilities and/or increased adaptive capacities of a community as a whole are not planned and delivered – even if the project planning processes encompass proper application of participatory community level vulnerability assessment methodologies.

Despite such general flaws in current delivery of CBAs in the SWR, a few NGOs have been taking keen interests in advancing adaptation agenda of communities, rather than the individual households belonging to those communities. The most common examples being the following:

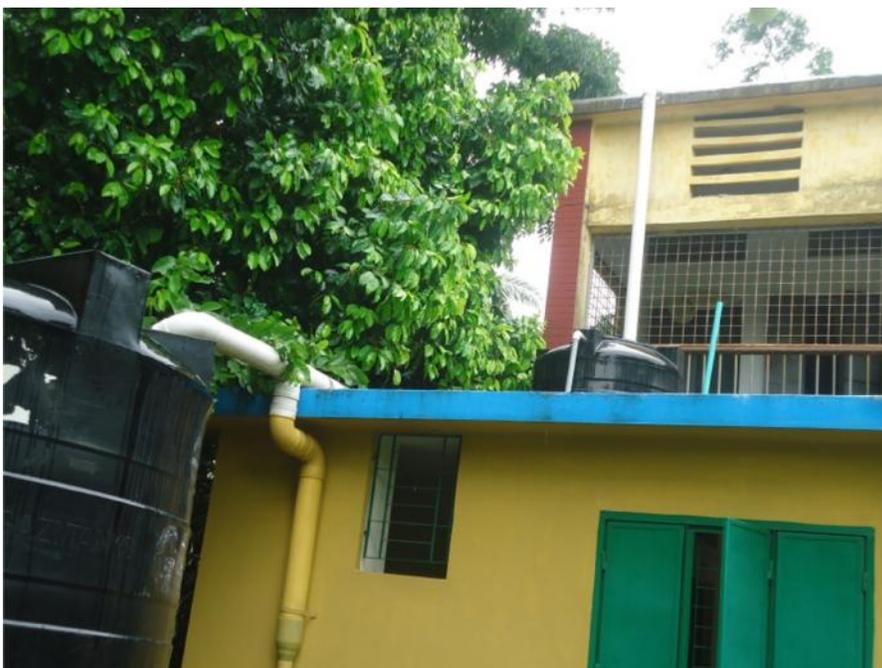
- Construction and functioning of (multi-purpose) cyclone shelters
- Promotion and effective implementation of Tidal River Management (TRM) as a measure to manage waterlogging in a sustainable way
- Excavation and re-excavation (i.e., dredging) of canals/khals to facilitate water logging
- Construction of a biological wind barrier (i.e., creation of a green belt) to reduce potential impacts of cyclones
- Recovery of khas lands so that landless people can gainfully utilize such lands
- Running a vaccination camp following an outburst of a disease induced by changing weather patterns
- Running a farmers' field school, along with establishment of a few demonstration plots allow peer-to-peer learning, cross-fertilization of ideas and help farmers understand environmentally-safe and sustainable (i.e., smart) agricultural practices
- Construction and functioning of community-based water supply system to make safer (non-saline) water available for all
 - (a) By excavating/re-excavating a pond for the community
 - (b) By designating an available pond as a water supplying pond and construct a pond sand filter (PSF) for safer water supply
 - (c) Installation of household and/or community based water harvesters so that the community in question can fetch drinking water starting from the beginning of monsoon till two to three months following the recession of monsoon rains
 - (d) Installation of deep tube wells (DTW) where available fresh water aquifers are available and may be tapped economically
 - (e) Installation and commissioning of available and proven desalinization equipment (i.e., Reverse Osmosis plant) so that salinity, arsenic and pollutant free safe water may be made available (a few comes with provisions for door to door supply of water)

From field experiences it appears that CBAs which are targeted at providing community-wide benefits are generally difficult to implement and perhaps even more difficult to maintain following the installation of hardwares. In most cases, the initial capital costs are quite high, which often discourage donors to offer a hefty support. Moreover, there is a perception that such activities are to be implemented with GOB support.

In water supply related CBAs, cost recovery from the beneficiaries appears to be the most difficult challenge for rainwater harvesting (RWH) systems and PSFs. While the second most difficult choice for community-level RWH is post management of the system, for PSF it is the high initial capital investment – the latter having connection with re-excavation of the available pond for increasing its year-round water holding capacity. Since most of the privately owned ponds in the SWR are predominantly being used as fish culture ponds, while many others also offer bathing and washing services to community members, it appears difficult to find ponds to be utilized as a year round source of water to be treated in a PSF before being distributed to community members.



Both simple desalinizers (i.e., reverse osmosis equipment) and desalinizers attached with piped water supply system are requiring large capital investments. However, in recent years the NGOs have been emphasizing their installation due to the fact that, once installed, such technologies offer not only non-saline water, also water without the trace of arsenic, iron and other forms of pollutants. However, the cost is still a deterring factor for such technologies. Moreover, recovery of cost for only the appropriation of recurring operational and maintenance (O&M) costs appears almost beyond the financial willingness to pay by the poor households. Furthermore, such desalinating technologies require community land to be established, a permanent structure for its installation, electricity supply and cost for such services, and linkages with technical back-stoppage services, which make the systems theoretically attractive but functionally discouraging.



By examining several models of operation of desalinizers throughout the SWR, it appears that not a single NGO has been recovering only the O&M cost and offering full subsidy in the overall installation of the units. However, the technologies are now locally available and NGOs can find back-stoppage services within a phone call away. The replacement of membranes needs to be handled by technicians, while the frequent washing and maintenance works can be delegated to a salaried supervisor with minimal training, the latter being provided by the technical people. When piped supply system is attached with a desalinizer, the initial cost is further escalated, requiring large scale subsidies towards offering the safe water supply. In general, the safe water supply system requires both technical support and large-scale financing for replication in areas where non-saline water is still not available.



The community-wide CBAs (where the entire population in a target community is the beneficiary) are not very common in the SWR. Unlike agriculture-based CBA modalities, community-side CBAs are not common among CBA-promoting NGOs in the SWR. A few NGOs have been dealing with pond excavation, PSF and rainwater harvesting (RWH) systems for providing drinking water, while only in the past two to three years, desalination involving the reverse osmosis (RO) technology has been tried by more than one NGOs. It is therefore difficult to generalize commonly perceived efficiency of various community-wide CBAs, owing to very small experience pools. The questionnaire survey also did not find any specific trends towards understanding of relative effectiveness of CBA-examples highlighted in this sub-section. If one NGO is found to have established one or more cost-intensive community-wide CBAs, they tend to indicate that it must be the most successful modality, whereas other NGOs try to prove various elements in the approach which might go wrong and do not support the initial findings. Therefore, it is very difficult to generalize effectiveness of any such community-wide CBAs, from which an entire community can benefit.

Despite such limited experiences, based on one-on-one KIIs and expert judgment, the perceived efficiencies in all four criteria are analyzed, as presented in the following table.

Table-1: Efficiencies of community-wide CBAs in SWR by NGOs, as perceived by the stakeholders

Community-wide CBA practices	Efficiency criteria				General comment
	Technical	Economic	Social	Gender	
Construction of cyclone shelters	H	L	VH	VH	Needs gender-sensitive design, initial costs are very high (beyond NGO financing)
Tidal river management	VH	VL	VH	VH	Requires excellent governance regime
Excavation/re-excavation of canals	VH	VH	VH	VH	Requires local-level participation in order to reduce the cost of implementation
Creation of green belt	VH	VH	VH - L	VH	Requires availability of/access to <i>khas</i> land, which can be tricky and highly engaging, takes time to motivate all the stakeholders
Relocation of poor in <i>khas</i> lands	VL	L - M	VH	VH	Local level good governance is a pre-requisite, which can be tricky and highly engaging
Running a vaccination camp	VH	VH	VH	VH	Requires doctors as volunteers (difficult to manage)
Running farmers' field schools	VH	VH	VH	M - H	Requires support from DAE, also requires knowledgeable staff,
CBAs for water supply					
Excavation/re-excavation of ponds	H - M	VH	VH	VH	Water quality maintenance can be a limiting factor, which increases overhead costs
Establishment of a PSF	H	VH - H	VL - L	H	O&M fails almost everywhere, most 1 to 2 year old PSFs are found inoperable
Establishing RWH systems	H	H - M	H - M	VH	Does not work throughout the dry season (Feb to May), HH-based systems are costly
Establishment of deep tube wells	L - VL	M	VH	VH	Safe aquifers do not exist in economically exploitable layers
Establishment of desalinizers (RO)	H	L - VL	VH	VH	VH initial investment and high O&M costs, water delivery systems are developing, cost recovery is being given high priority

Notes: Efficiencies indicated in a sliding scale: Very High (VH), High (H), Medium (M), Low (L) and Very Low (VL).

9. THE STATE OF INTEGRATED APPROACH

An integrated approach to deliver CBAs has been gradually emerging. From field visits and the workshop involving NGO personnel, it appears that NGOs are looking forward to a consolidated learning so that an integrated CBA programme may be designed. It is generally felt that, the initial experimentation phase has been elapsed and an evaluation of the experiments should be done to sieve out the elements of a potential integrated CBA approach.

The production oriented CBA modalities indeed offer a relatively simpler thread to a solution. The 'good practices' regarding on-farm production systems (crop and non-crop together) should be integrated with non-farm activities and skills so that a household can find a host of CBA options in their benefit to choose from, and thereby pool all the perceived risks for optimizing livelihoods, defying climate variability and change. Since such an approach should be responsive to individual households' existing access to/endowment of resources and capacity of individuals, a handful of activities can be chosen for each households based on specific contexts and ground realities around the households.

However, a few additional aspects should also be taken into consideration. For example, access to training, skills enhancement, and capacity building – each one tailor made under a standardized procedure. Again, the existing capacities of the recipients need to be taken into consideration. These should be supplemented with access to CBA financing, perhaps through the linkage with MFIs and other financing channels. Furthermore, the overarching linkages with institutional service delivery mechanisms need to be established so that there is no dearth of information and support.

For the production oriented CBA practices, exposure and linkage with established marketing channels generally appear highly useful. For dairy, local level collection centres have been emerged, which have significantly minimized the risk of rotting of milk. If cool chains are established and operated, it will immensely help social business at its microcosm. A project implemented by Solidaridad Network Asia²⁰ has successfully piloted product-specific collection centres across the greater SWR (SNA, 2017). These offer innovative additions to traditional marketing system, from which the future CBA can learn lessons.

For the non-farm production based CBAs (such as *karchupi* products, block-batik products, paper/plastic shopping bags, caps, etc.), in addition to skill enhancement training and continued support with innovative designs, assistance will be required for marketing of products. Efforts may be considered for establishing linkages with city-based fashion houses so that the products are easily marketed and the producers get a good price. It is already seen in the field that, some of the on-farm producers are also engaged in non-farm production oriented activities in a bid to increase household income. Especially women are more interested to participate in such activities. These can be perceived under an integrated approach of CBA.

Grass production as a fodder for dairy cattle/beef fattening is already a winning option. There is further innovation involving hanging plate-based hydroponic grass²¹. These are commercial activities. However, an optimal benefit may be obtained if one integrates such activities with beef fattening or dairy production.

10. GENERAL WEAK LINKS IN CBA PRACTICES IN THE SWR

Financing CBA in a target smallholder's household in the SWR is a major challenge. NGOs are aware that most of the target beneficiaries do not have the means to arrange CBA finance on their own. Most of the NGO driven projects therefore offer cash or kind support, as it has been repeatedly observed in the field visits. However, most of the NGOs do not intend to recover the finance. It is often meant to be a doul/grant from the project. Such a grant delivered in one or more than one installments after examining progress of grant utilization. There is no denying the fact that such a CBA financing is a prime necessity in order to inspire a smallholder household into a profit-oriented venture. Along with a grant-based financing, NGOs often provides for training, and if needed, inputs for the targeted production.

However, the approach appears to be weak due to obvious deviation from establishing a business model. As soon as the money is given (may also be in terms of material/equipment) away, the psychology of the recipient generally changes: the recipient often tends to consider the whole effort

²⁰ Uttaran and Jagoroni Chakra Foundation – the two SWR-based NGOs are working in partnership with Solidaridad Network Asia to pilot a few collection centres for horticulture and fisheries products, in addition to establishing dairy product collection centres. The innovations beyond RVCC project have been profusely successful in enhancing marketing of various products.

²¹ Uttaran has promoted a few under the SaFAL Project with support from Solidaridad Network Asia.

as a part of 'traditional relief work', as the poorest often being supported through various relief based activities. The immediate loss of motivation does not inspire the recipient adequately enough to become self-sustaining in the longer run and essentially give the initial financing back so that with the same amount, the other poor household can get a financing opportunity.

Although many NGOs have been promoting a good number of CBA practices that had brought good results since the days of implementation of RVCC, there is hardly any systematic monitoring to establish a database on eventual graduation of recipient households. Some of the NGOs have very strong presence in the SWR. They also have good number of field-offices and adequate human resources. However, in most cases the project related activities are completely closed as soon as a given project comes to an end. This has occurred in the case of RVCC. The same has been repeatedly occurring irrespective of project type and their proponents.

Part of the problem lies with the donors of such projects. There is hardly any finance to continue monitoring for a good duration following the implementation of a project. As a consequence, no one can evaluate whether graduation of a poor household can be possible or not, and what has given a successful household an edge so that the household may eventually graduate.

The CBA financing is often accompanied by training. However, such trainings are often organized in a hurry and there is systematic approach to trainings. For example, cow fattening is targeted by a number of NGOs. However, each NGO offers training differently than the other. Some follows GOB training criteria for the same, some develop on their own, some do not follow any guideline. There is no attempt to standardize a procedure in a bid to accrue optimal benefits. Although each organization starts with a participatory vulnerability assessment, the way RVCC has started its journey, no two organizations have the same procedure (content, duration of delivery, modality and criteria for engagements, etc.). However, in order to establish successful operational business CBA models, it is important that essential trainings are delivered following a standard procedure.

In the production oriented CBAs, linkages with micro-financing institutions (MFIs) and government service providers (such as livestock and fisheries health services, the service provided by the SAOs, etc.) are established. Again, once the recipients of NGO supports are exposed to these officials, there is hardly any follow up from the NGOs. The CBA practices are more successful when such monitoring and follow up activities are routinely done by the field personnel.

While there are sporadic efforts to linking MFIs and service provisions those are available around the producers (i.e., CBA practitioners), very little progress is seen in terms of linking producers with respective markets, especially with far away markets where good unit prices are generally offered. For certain types of production oriented activities such as organically formed products (vegetables, fruits, etc.), much higher unit prices than the locally offered prices could have been obtained by the producers had they been linked with big urban-based outlets. The extra effort of product certification, promotion is needed so that such niche products are placed and channeled through niche markets.

Value chains of fruits are functioning in Satkhira, while further value addition is easily possible by means of transfer of technology for improved sorting, grading and packaging. Mangoes are being exported from Satkhira. Similarly, the niche products such as *sajna*, *sapota* and *narikeli boro* (specific type of jujube which is available for a short time in late-January till end of February) could have been marketed following careful sorting, grading and innovative packaging. A greater linkage with packaging industries is needed so that the high value products can be marketed with greater care to fetch greater market price. It is observed that the urban consumers are ready to pay for such

niche products at par or even at higher rates compared to internationally imported fruits such as apples and pears/Asian pears.

11. ELEMENTS OF A SYNERGISTIC CBA PROGRAMME IN THE SWR

It is obvious that none of the CBA-promoting NGOs in the SWR has a holistic CBA Programme. They develop small scale projects, which are generally limited in terms of finance. Financing CBA projects depends largely on the terms imposed by the donor involved. Even if an NGO has six different CBA projects, there is hardly any complementarity due to inability to build synergies between projects with adequate concurrence from the respective donors. While intra-projects synergies are difficult to establish, inter-NGO CBA synergy remains a distant dream.

There are capital based International NGOs (such as CARE Bangladesh, Oxfam GB, Inter Corporation, Concern Worldwide, Islamic Relief, Christian Commission for the Development of Bangladesh, etc.), which are promoting CBAs in the SWR, in most cases delivering those in association with locally rooted Partner NGOs (PNGO). Although such CBA programming through an INGO-PNGO partnership is continuing for over a decade in the SWR (also elsewhere in the country), there has been little evidence that such vibrant partnerships have forged a synergistic model for CBAs.

Oxfam GB initiated a multi-year integrated CBA programme titled Resilience through Economic Empowerment, Climate Adaptation, Leadership and Learning (REE-CALL). REE-CALL was launched in October 2010 and ran until March 2017, which used to be the largest programme of Oxfam in Bangladesh. Part of REE-CALL was delivered in Satkhira district. The programme integrated rural development (livelihoods component involving group formation, savings, investment and training), resilience building (reduction of vulnerability and enhancement of various adaptive capacities), disaster risk reduction (i.e., DRR, involving risk awareness, dissemination of early warning and group-based community-wide risk amelioration), gender-equity (participation, advocacy, empowerment and mainstreaming) and youth advancement (training, group work and self-reliance). It recognized the complex, interrelated issues of poverty and lack of agency that make women and men more vulnerable to climate change and prevents them being resilient to its impacts. The programme built knowledge and capacity within communities to anticipate and cope with climate and disaster-related challenges. The integration enabled the programme to promote gender justice, good governance, access to services and economic empowerment, which have been considered as foundation blocks for building improved disaster preparedness and resilience.

The model left a legacy of its own to learn from, although similar models have not been emerged to foster all important synergy among various interrelated aspects of building a resilient society. Despite such examples, CBA programming in the SWR has been continuing in business as usual fashion.

The role of conducting a participatory vulnerability and capacity assessment should be treated as the first step towards understanding which prevailing livelihoods practices are subject to climate-induced hazards and perturbations, what alternatives are suitable for the altered contexts of vulnerability, the capacities and deployable assets in a target community including prevailing knowledge-base, the knowledge, technological and financial limitations and the ability of the CBA-promoting NGO to address such limitations and the potential gains from each of the perceived and discussed CBA modalities within the existing realities of the community in question. This step should be mandatory, in order to understand background realities existing in the target community.

Targeting is key to achieve good results. Women's particular needs, the same for youth and people with disabilities should be given high priority while developing a CBA. One needs to keep in mind for whom the CBA solutions are being sought, under which circumstances.

From the discussions in the preceding sections it appears that a synergistic CBA model should have the following key components (irrespective of climatic perturbation in and around the area):

- Component on resilient livelihood development, encompassing both on-farm and off-farm activities, having linkage with market mechanisms;
- Component on resilient community well-being, integrating both household-based and community-wide DRR, health (including healthcare, safe water supply and sanitation) and environmental issues
- Component on gender-equity, which should enable women to become self-reliant without having to sacrifice healthy personal and family life
- Component involving the participation of youth in order to groom them taking central roles in social development processes
- Component on self-learning and peer-to-peer sharing of good practices, along with strong knowledge management and advocacy for wider policy linkage
- Component on governance so that the above mentioned components are greatly facilitated through the provisions created by the government actors and institutions, accessed through the application of rights based approach and participatory processes

The good and apparently successful examples of CBA modalities from a large pool of examples presented in earlier sections need to be included under each of the above components.

The social and environmental safeguards must be analyzed against all forms of potential interventions so that none of the interventions can cause any harm to any aspect of the society and the adjoining environment. Efforts must be made forging partnerships and creating linkages with development processes that are led by the GOB service provisioning institutions. Crop/horticulture, fisheries and livestock development, with or without climate change, should not be integrated by NGOs with limited support personnel in areas where GOB service provisioning is largely absent. In order to emulate best practices, forging partnership with GOB institutions and local-level offices and also with champion NGOs is a prerequisite to ensure that the design of the programme/project might leave a lasting impression on the recipient communities.

It is to be borne in mind that, the apparent success of many of the CBA examples would not have happened if the general development processes in the backdrop would not be orchestrated by the GOB, complemented by general economic development of the country, urbanization processes, market development and many other game-changing conditions would not have culminated into a conducive socio-economic condition that enabled the CBA beneficiaries to perform well.

11. CONCLUSIONS AND RECOMMENDATIONS

Although the RVCC model and approaches have still being generally followed as the dominant CBA approach, there have been significant improvements over the years towards design and delivery of CBAs in the SWR. The dominant approach is still the production of food and maintenance of household food security among poor and climate-affected households, especially through on-farm crops and non-crop production systems. However, the promotion of off farm employment

opportunities by means of training has been gaining more popularity. Such skills enhancement trainings have been targeting at current market demands.

There are also some efforts towards preparing the vulnerable youth for future off-farm employment opportunities. The employment, often self-employment opportunities are rapidly expanding, owing to the overall socio-economic development of the country which has been expanding the market for various products, the rapid urbanization which requires specific skills for the provision of various services, etc. Since the RVCC days, the NGOs of the SWR have been embracing such opportunities, greatly investing in enhancing skills of vulnerable people, mostly young women, so that they get a chance to transform themselves from desperation to self-reliance. It is heartening to observe that the targeted training approach, in the name of CBA, has been significantly helping these training recipients to earn and contribute to their respective households and gaining social respect as a bonus – the latter further inspiring a host of other aspiring young males and females in the neighbourhood.

The on-farm CBA efforts are increasingly becoming integrated farming, while the integration is taking place among sub-sectors (say, crops with animal husbandry, crop-fish poly-culture etc.). A few NGOs have been working on creation of market linkages, while integration of household-based production system with GOB service delivery has also being targeted by a few NGOs. It is heartening to see that, both on –farm and off-farm CBA practices have been successfully integrated women as the target implementers of CBAs, which have been gradually giving confidence to those women and helping them to overcome challenges posed by climate variability and change.

Many of the production oriented CBAs are found to respond to market demands. Which is why, a few known CBA modalities such as mele-based mat production has largely been dropped for relatively low market response. On the other hand, excellent market responses for mete-potato, *chui-jhal*, jujube (particularly in Satkhira), dike vegetables (various types), non-shrimp fish, goat/sheep and embroidery/*karchupi* made such CBA practices as highly successful.

The summary of ‘effective’ CBA options is placed in the following table.

Table-2: Summary of ‘effective’ household/individual level CBA options by category

Sl. No.	CBA category	Examples of effective CBAs in the SWR
1	Resilient livelihoods development	
1.1	On-farm crop production	HH vegetable garden (sac-bag + dike vegetable); saline tolerant paddy; integrated cropping, high value crop production and promotion Supporting activities: Training, demonstration, linkages with micro-financing institutions (MFI); partnership with DAE/DOL/DOF
1.2	On-farm non-crop production	Small-scale fisheries; goat rearing (also sheep); poultry rearing; crab fattening; livestock/dairy production; fruit orchard Supporting activities: Training, demonstration, linkages with micro-financing institutions (MFI); partnership with DAE/DOL/DOF
1.3	Off-farm	Vocational skills enhancement (<i>karchupi</i> /embroidery, computer operation, mobile repairing, block & batik, tailoring, electrician/beautician, etc.); small trading/grocery; women’s cooperative for vegetable

		marketing Supporting activities: Certification, apprenticeship, placement support, start-up capital
2	Resilient community, DRR, healthcare	Drainage capacity improvement (<i>khal</i> /river excavation), healthcare camps, cyclone early warning, awareness
3	Women's self-reliance	Support for livelihoods skills; IGA training; connecting with micro-financing institutions, establishment of linkages with markets/value chain Supporting activities: Training, certification, apprenticeship, placement support, start-up capital
4	Youth development	Support for livelihoods skills (paravet included); IGA training; group organization; awareness on early warning system Supporting activities: Training, certification, apprenticeship, placement support, start-up capital
5	Self-learning and sharing	Farmers' field school; Supporting activities: Group discussion sessions; exchange visits
6	Policy advocacy	Collective bargaining on access to community/common pool resources; policy dialogue Supporting activities: Leadership training
7	Engagement in local governance	Inclusive and participatory hazard management planning;

CBA's which are targeted at providing community-wide adaptation benefits are very seldom being practiced by NGOs. Complex socio-economic and political realities generally discourage NGOs to venture onto such CBA practices. Given that NGOs often have small personnel pool, they cannot engage people to work with all stakeholders to negotiate/foster amicable solutions in a situation of conflict. Moreover, in cases of conflicting situations, local level leaders exert more power than what an NGO personnel deployed at local level can mediate. As a result, investments in community-wide adaptation are rather low.

In spite of such difficulties, due to lack of any viable solution to provisioning of safer and non-saline drinking water, NGOs are still trying to find technologically feasible and economically viable alternate solutions for the supply of drinking water. It is found that, for most of the available technologies, either the initial capital cost, or the post-installation management, or both are regarded as key barriers to find a suitable solution to address the drinking water related issues.

The lack of operation and maintenance (O&M) is a chronic problem in relation to promote community-wide adaptation practices. Since the recipients of such CBA modalities are often poor and marginalized people, the low level willingness to pay is a certain deterrent in prioritizing solutions that require major O&M costs and efforts. Management difficulties often lead to failure, which is intertwined with local politics and lack of governance. Even the involvement of GOB organizations such as DPHE²² could not stimulate successful adoption of CBA practices involving drinking water in the SWR.

Recommendations: There are a few gaps in the overall approach to deliver CBA's. Lack of proper planning and more importantly, lack of adequate financing do not often allow the NGOs to design a

²² Department of Public Health Engineering, the national agency with mandate to provide drinking water outside Metropolitan areas.

holistic approach, encompassing all aspects of development simultaneously. Although there are models being applied that brought an integrated approach, the learning hasn't been initiated involving non-partner/non-participating NGOs. ***It is recommended that the future actors may foster a synergistic approach to CBA.***

Livelihoods should be developed through the adoption of techniques which are easily replicable, requiring little know-how and capital investment (i.e., affordable), can be propagated through peer-to-peer sharing; technologies that are not so demanding (time and efforts required to handle it on a regular basis), highly effective in the changing context, locally availability (in terms of supply, including parts), cost-efficient, etc. Both the ***techniques and technologies must be producing/giving back more than what is needed to procure them, must not be climate- and gender-sensitive and not create social chaos.*** Those techniques and technologies may be targeted at enhancing on-farm as well as off-farm livelihoods.

The NGO that is interested to uptake the CBA approach should find modalities that ensure community well-being, including elements of disaster risk reduction, healthcare, safe water supply, sanitation, and an environment which does not pose any threat to anybody within the community.

Any CBA approach which aggravates gender-based inequity in the recipient community, the CBA modality must not be promoted. Targeting approach should focus women's particular situation prevailing in Bangladesh and carefully analyze each CBA modality to understand gender-specific issues and concerns. ***It is recommended that, while considering CBA for women, there should be associated/support activities in terms of target women's awareness raising and capacity building, skills enhancement, and access to both micro-financing and market value chains.***

The off-farm training for employment generation should be carefully chosen so that the target women, after receiving trainings, are not forced to live elsewhere against their will, thereby sacrificing their personal and family lives.

Targeting should also focus young and people with disability, as much as possible, keeping an eye on their respective vulnerabilities and capabilities. A careful selection is the key to meaningfully engage these target groups in CBA activities.

Wider alliance building with national institutions and champion NGOs, complemented by a robust knowledge management and policy advocacy can play vital roles in changing mindset and bringing in policy harmony. These aspects can be quite instrumental in wider promotion of successful CBA activities throughout the country. ***It is recommended that the NGOs should build alliance with national institutions and NGOs that are champions towards promoting successful CBAs.***

It is to be borne in mind that, many of the perceived best practices in the SWR are easily replicable, with or without the consideration of climate change. While climate sensitivity screening at the outset of the promotion/implementation of a particular CBA can still be useful and a community vulnerability and capacity assessment is still a starting point, all the other aspects of above-mentioned CBA modalities can be replicated elsewhere²³, even without the consideration of climate change. These, however, should NOT be replicated without understanding their contexts and location-specificity.

²³ Annex-5 and Annex-6 presents tables indicating replicability of each CBA type considered in the study.

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²⁴ Names organized in alphabetical order (ascending)

A CBA FRAMEWORK

Applicable level: Local institution/ community/ household/ individual level

Livelihoods are made climate-resilient

Indicators

- *Local institutions have access to climate information*
- *Local plans or policies support climate-resilient livelihoods*
- *Local government and NGO extension workers understand climate risks and are promoting adaptation strategies*
- *People are generating and using climate information for planning*
- *Households are employing climate-resilient agricultural practices*
- *Households have diversified livelihoods, including nonagricultural strategies*
- *People are managing risk by planning for and investing in the future*

Disaster risk reduction (DRR) efforts are considered, management established

Indicators

- *Local institutions have access to hazard risk information which establish links with climate-related causes and climate-induced hazards*
- *Local hazard/disaster risk management plans are developed and being implemented*
- *Functional early warning systems including dissemination modalities in place and being practiced*
- *Local government institutions has available capacities to respond to hazards (not allowing disasters to set in), including mobilization of human resources, finance, management mechanisms and technologies*
- *Every individual, including women and people with disabilities have access to early warnings for climate-induced hazards*
- *Households have protected reserves of food and inputs for well-being and restoration of livelihoods*
- *Households have secure shelter including approach roads and communication mechanisms*
- *Key productive and non-productive livelihood assets are safeguarded*
- *People have mobility (assistance, in cases of PWDs) to escape hazard-related risks*

Capacities of institutions/communities/households and individuals are adequately development

Indicators

- *Local institutions have capacities to monitor, analyze and disseminate information on current and future climate risks*
- *Local institutions have capacity and resources to plan and implement community based adaptation activities*
- *Financial services are available to households*
- *People have knowledge and skills to employ adaptation strategies*
- *People have access to seasonal forecasts and other climate information*

Underlying contexts of vulnerabilities are understood and addressed

Indicators

- *Social and economic safety nets are available to poor households and individuals (good governance in targeting) and free from elite capture*
- *Local planning processes are participatory and inclusive (i.e., women and other marginalized groups have a voice in local planning processes)*
- *Locally available state controlled/owned assets are deployed to create opportunities for the poor and marginalized*
- *Local policies provide access to and control over critical livelihoods resources for all*
- *Men and women are working together to address challenges*
- *Households have access over critical livelihoods resources*
- *Women and other marginalized groups have equal access to information, skills and services*
- *Women and other marginalized groups have equal rights and access to critical livelihoods resources*

Strategic Approaches Being Used by the RVCC project to Increase Household Level Adaptive Capacity

Strategy	Adaptation Measure	Brief Description of the Adaptation Measure
Household-level strategies considered by the RVCC project		
Increase food through agriculture	Drought tolerant crops/vegetables	Introduction of drought tolerant crops such as groundnuts, watermelon, etc. that can be grown under drought conditions
	Embankment cropping	Cultivation of beans, gourds, okra and other vegetables on the embankments between prawn ponds
	Floating gardens	Cultivation of vegetables on floating beds of water hyacinth (hydroponics)
	Homestead gardening	Cultivation of vegetables and fruits on homestead plots for consumption and market
	Low-cost irrigation	Demonstration of treadle pump and other simple technologies for irrigation
	Saline tolerant non-rice crops	Introduction of saline tolerant varieties of chili, mustard, maize and potato
Increase income through alternative livelihoods	Apiculture & honey processing	Beekeeping and processing of honey for market
	Cage aquaculture	Small-scale fish farming in cages, implemented in household ponds or common water bodies
	Cattle rearing	Raising cattle for consumption and market
	Cottage industries	Production of <i>mele</i> (reed) mats, recycled paper bags and bamboo baskets for market
	Crab fattening	Collection, rearing and feeding of crabs for a period of 15 days to increase their market value
	Drought-resistant tree plantation	Homestead planting of drought-resistant fruit and timber trees for longer term income generation
	Duck rearing	Raising ducks to produce meat and eggs for consumption and market
	Goat rearing	Raising goats for consumption and market
	<i>Mele</i> (reed) cultivation	Cultivation of reeds that are used to produce mats that are widely used for sitting and sleeping on
	Nursery & homestead afforestation	Establishment of community nurseries and distribution (with handling instructions) of indigenous varieties of tree saplings (mango, coconut, <i>sofeda</i> , <i>korai</i> , guava, <i>mehaguni</i> , neem, <i>kewra</i> , etc.) to beneficiaries for homestead planting
	Pig rearing	Raising pigs for consumption and market
	Poultry rearing	Raising chickens to produce meat and eggs for consumption and market
	Prawn fish poly-culture	Prawn and fish culture in fresh-water <i>ghers</i> (ponds)
	Saline-tolerant tree plantation	Planting of saline tolerant fruit and timber trees for longer term income generation
Shrimp fish poly-culture	Shrimp and fish culture in salt-water <i>ghers</i> (ponds)	
Increase food availability/ storage	Improvement of food storage	Promotion of indigenous techniques for protecting food stores from flood
	Introduction of cooking stoves	Promotion of flood-proof cooking stoves made of local materials
Improve health and personal safety	Improvement of hygiene and sanitation	Raise awareness about personal hygiene and sanitation and promote use of hygienic latrines

Strategy	Adaptation Measure	Brief Description of the Adaptation Measure
	Protection against cyclones	Work with communities to allow minority groups to access existing cyclone protection facilities
Increase access to safe water	Deep Tube Wells	Drill deep tube wells to provide safe water to households for cooking and drinking
	Household pond protection	Promote protection of small ponds to provide safe water for cooking and drinking
	Indigenous methods of water collection	Collection and sanitary storage of rainwater in earthen pots
	Pond sand filters (PSF)	Construction of pond-sand-filters to provide safe water for cooking and drinking
	Rainwater harvesting	Improved technology for rain water collection from roofs and storage in a tank
	Safe water & sanitation	Raise awareness about methods for collecting & storing safe water and sanitation
Improve safety of housing and other property	Safe havens for domestic animals	Establishment of safe havens for animals to protect from flood, storm and cyclone
	Storm-resistant housing	Promotion of storm resistant construction features, including local technologies
	Wind break tree plantation	Promote plantation of trees for protection against storms and cyclones

Strategic Approaches Being Used by the RVCC project to Increase Community-level Adaptive Capacity

Strategy	Adaptation Measure	Description of Adaptation Measure
Community-level Strategies		
Increase access to common property resources	Access to common property regimes within the waterlogged areas	Negotiations with locally -elected bodies and influential people to allow access by beneficiaries to common water bodies
Reduce threats through community-based initiatives	Canal excavation	Promotion of canal excavation for improved drainage to reduce water-logging/flooding
	Cyclone preparedness	Raise awareness about cyclone preparedness and promote the construction of cyclone shelters
	Raise height of embankments	Promote the raising of height of embankments in order to protect from flooding
	Tidal River Management (TRM)	Promote tidal river management to protect from water-logging

'Effective' CBA options in the SWR by category and their replication potential

Sl. No.	CBA category	Examples of effective CBAs in the SWR	Replication potential in non-climate change contexts
1	Resilient livelihoods development		
1.1	On-farm crop production	HH vegetable garden (sac-bag + dike vegetable); saline tolerant paddy; integrated cropping, high value crop production and promotion Supporting activities: Training, demonstration, linkages with micro-financing institutions (MFI); partnership with DAE/DOLS/DOF	All the CBA modalities have potential for replication (locational contexts have to be duly examined)
1.2	On-farm non-crop production	Small-scale fisheries; goat rearing (also sheep); poultry rearing; crab fattening; livestock/dairy production; fruit orchard Supporting activities: Training, demonstration, linkages with micro-financing institutions (MFI); partnership with DAE/DOLS/DOF	All the CBA modalities have potential for replication (locational contexts have to be duly examined)
1.3	Off-farm	Vocational skills enhancement (<i>karchupi</i> /embroidery, computer operation, mobile repairing, block & batik, tailoring, electrician/beautician, etc.); small trading/grocery; women's cooperative for vegetable marketing Supporting activities: Certification, apprenticeship, placement support, start-up capital	Having high potential for replication
2	Resilient community, DRR, healthcare	Drainage capacity improvement (<i>khal</i> /river excavation), healthcare camps, cyclone early warning, awareness	DRR is location sensitive, however CBA modalities have high potential for replication
3	Women's self-reliance	Support for livelihoods skills; IGA training; connecting with micro-financing institutions, establishment of linkages with markets/value chain Supporting activities: Training, certification, apprenticeship, placement support, start-up capital	Having high potential for replication
4	Youth development	Support for livelihoods skills (paravet included); IGA training; group organization; awareness on early warning system Supporting activities: Training, certification, apprenticeship, placement support, start-up capital	Having high potential for replication
5	Self-learning and sharing	Farmers' field school; Supporting activities: Group discussion sessions; exchange visits	Having high potential for replication
6	Policy advocacy ²⁵	Collective bargaining on access to community/common pool resources; policy dialogue Supporting activities: Leadership training	Having high potential for replication
7	Engagement in local governance ²⁶	Inclusive and participatory hazard management planning;	Having high potential for replication

²⁵ Also useful at institutional/community level.

²⁶ More applicable for community level/national level, however individuals need to participate and CBA programme must ensure individual's participation in collective actions.

Efficiencies of community-wide CBAs in SWR by NGOs and their replication potential

Community-wide CBA practices	Efficiency criteria				General comment	Potential for replication in non-climate change contexts
	Technical	Economic	Social	Gender		
Construction of cyclone shelters	H	L	VH	VH	Needs gender-sensitive design, initial costs are very high (beyond NGO financing)	Potential exists, however NGOs lack financial resources; only applicable for the coastal region
Tidal river management	VH	VL	VH	VH	Requires excellent governance regime	As above
Excavation/re-excavation of canals	VH	VH	VH	VH	Requires local-level participation in order to reduce the cost of implementation	Excellent potential exists throughout the country where drainage is becoming an issue
Creation of green belt	VH	VH	VH - L	VH	Requires availability of/access to <i>khas</i> land, which can be tricky and highly engaging, takes time to motivate all the stakeholders	Excellent potential exists throughout the coastal zone, particularly in SWR and South-central region
Relocation of poor in <i>khas</i> lands	VL	L - M	VH	VH	Local level good governance is a pre-requisite, which can be tricky and highly engaging	Excellent potential exists throughout the country where <i>khas</i> lands are available
Running a vaccination camp	VH	VH	VH	VH	Requires doctors as volunteers (difficult to manage)	Excellent potential exists throughout the country
Running farmers' field schools	VH	VH	VH	M - H	Requires support from DAE, also requires knowledgeable staff,	Excellent potential exists throughout the country
CBAs for water supply						
Excavation/re-excavation of ponds	H - M	VH	VH	VH	Water quality maintenance can be a limiting factor, which increases	No need for replication where adequate groundwater is

					overhead costs	available for tubewells
Establishment of a PSF	H	VH - H	VL - L	H	O&M fails almost everywhere, most 1 to 2 year old PSFs are found inoperable	No need for replication where adequate groundwater is available for tubewells
Establishing RWH systems	H	H - M	H - M	VH	Does not work throughout the dry season (Feb to May), HH-based systems are costly	No need for replication where adequate groundwater is available for tubewells
Establishment of deep tube wells	L - VL	M	VH	VH	Safe aquifers do not exist in economically exploitable layers	In haor region, this may a potential solution
Establishment of desalinizers (RO)	H	L - VL	VH	VH	VH initial investment and high O&M costs, water delivery systems are developing, cost recovery is being given high priority	Excellent potential exists in SWR and to a lesser extent in the South-central region; however still very costly solution

Notes: Efficiencies indicated in a sliding scale: Very High (VH), High (H), Medium (M), Low (L) and Very Low (VL).