

Blue Gold Program Innovation Fund



January 2020



Inspiring innovation fund projects: at a glance



Kingdom of the Netherlands



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List of abbreviations

BGP	Blue Gold Program
BGPIF	Blue Gold Program Innovation Fund
BHH	Beneficiary Households
BWDB	Bangladesh Water Development Board
CBOs	Community Based Organisations
CLSP	Community Livestock Service Provider
DAE	Department of Agricultural Extension
DAI	Digital Artificial Insemination
DLS	Department of Livestock Services
DoF	Department of Fisheries
FCDI	Flood Control Drainage and Irrigation
FFD	Farmer Field Days
FFS	Farmer Field Schools
GoB	Government of Bangladesh
HL	Horizontal Learning
LGI	Local Government Institutes
O&M	Operation and Maintenance
PC	Production Cycle
PWM	Participatory Water Management
SMKK	Sheba Manab Kallyan Kendra
SWIFT	Sustainable Water Management through Indigenous Finance and Technology
UDC	Union Digital Center
UP	Union Parishad
WMA	Water Management Association
WMG	Water Management Group
WMO	Water Management Organisation
WRM	Water Resource Management



About the Blue Gold Program

Timeframe: March 2013 to June 2020

Intervention areas: 22 polders in 3 districts in Patuakhali, Khulna, and Satkhira of southwestern Bangladesh

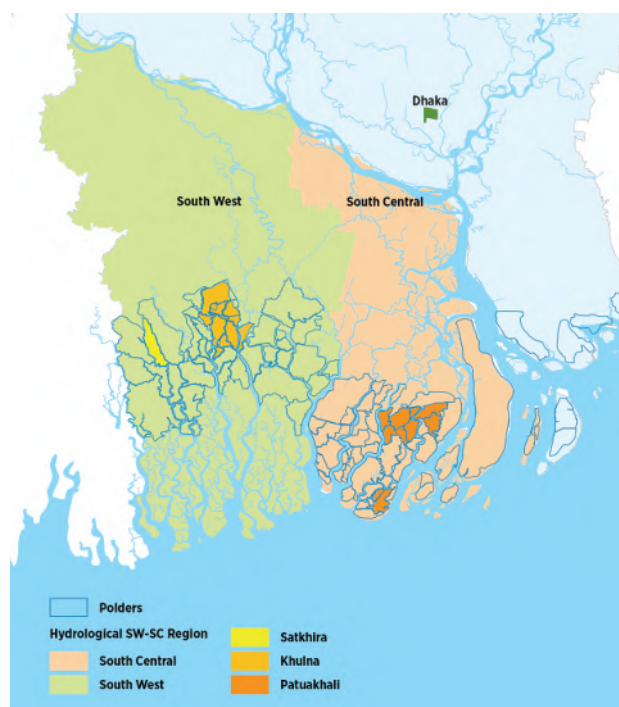
Total area covered: 120,000 hectare (ha)

Total number of households benefited: 185,000

Partnerships: rural communities, local organisations, local government bodies, technical agencies, and the Government of Bangladesh (GoB).

BGP, supported by the Dutch government, addresses poverty and vulnerability by developing local capacities to manage water resources, agricultural production, and access to markets. A number of government agencies have been integral to the implementation of the program.

BGP working areas



BGPIF at a glance

The Blue Gold Program Innovation Fund (BGPIF) supported the Blue Gold Program (BGP) to establish Participatory Water Management (PWM) and strengthened value chains.

Total budget of fund: €2.45 million

Total projects funded: 42

The BGPIF has funded innovative approaches and new initiatives for the socio-economic development of BGP's intervention areas. The solutions considered, therefore, were expected to contribute to BGP outcomes.

BGPIF objectives

- To promote the introduction and application of innovations, both technological and conceptual
- The innovations must be of relevance to the beneficiaries of BGP and the applicant implementing agency
- Innovations could be adopted from other projects and organisations working in Bangladesh, with Dutch knowledge institutions and private sector enterprises

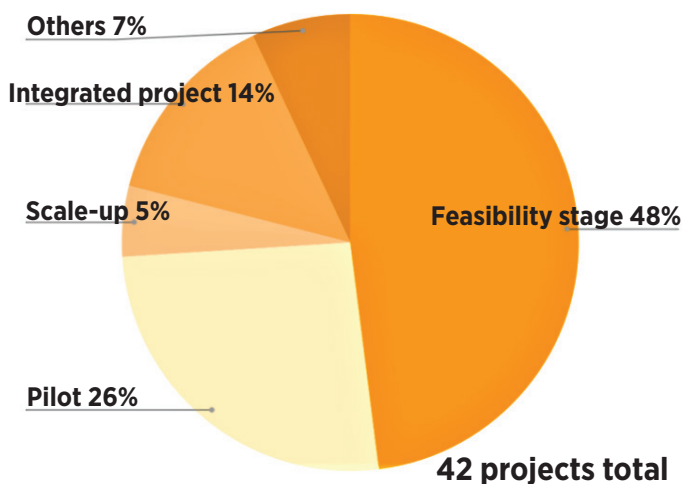
BGPIF tested the relevance and effectiveness of innovative concepts in their application and scale-up.

Types of applicants

- **Large organisations:** produced good proposals, but they did not necessarily understand the context of BGPIF. These proposals thus held no promise of realistic implementation
- **Academic organisations:** very enthusiastic and keen to pilot abstract concepts
- **Small organisations:** effective implementers with strong local networks, but weak in proposal development



BGPIF projects by type



Communications and awareness raising

Details, news, and knowledge management of BGPIF supported projects were made available primarily on the BGP website. Other sources of information included: announcements on sector relevant platforms, special events, newsletters, videos, and project booklets.

External communications should have been prioritised at the operations stage of the project in order to encourage the involvement of agricultural development practitioners.



Conceptual stage



Goal: idea identification

Activity: desk research

Funding: n/a



Feasibility stage



Goal: proof of concept

Activity: feasibility study

Funding: €5,000 - €20,000



Prototype stage



Goal: prototyping

Activity: pilot

Funding: €30,000 - €50,000



Commercialisation stage



Goal: implementation

Activity: scale-up

Funding: upto €50,000



Delivery



THE BGPIF INNOVATION CHAIN

The innovation funnel approach starts with a broad range of ideas, which are gradually refined and selected for development projects within BGP.



BGPIF lessons learnt



Improved Horizontal Learning (HL) between BGP and BGPIF projects

BGIF projects, when harmonised with the objectives of the BGP, ensured greater learning opportunities for development programmes in the southwest region.



Consortia-led projects proven most efficient

A solicited call for a specific topic for a larger contract has proven to effectively engage more local and international organisations in submitting concept notes.

The most successful projects were implemented by consortia. They were led by international NGOs, or Dutch companies, with local implementing agencies operating in the field.

Both parties learnt how to clarify needs, concepts, and approaches from each other.



Mapping of context, constraints, and uncertainties at an earlier stage would generate better results

The BGPIF should have been clearly marked as an integral part of BGP to ensure applicants targeted BGP outcomes through their innovations. This would have been supported by the BGP itself, planning activities with an innovation fund from its inception.

Clarifying what constitutes as innovative in such a programme would have generated more focussed ideas. Practitioners from a broader range of

organisations in the coastal zone would have been able to participate at an earlier stage in that case.

The planning should also have mapped uncertainties and gaps, and how to circumnavigate activities through that. This could then have allowed applicants to define activities more clearly.

More budget should have been retained for BGPIF applicants and team members to familiarise themselves with local conditions and problems.



Overhead and management costs reduced because of shared expertise

The advice of experts from the BGP team meant reduced management costs for BGPIF. This also established strengthened linkages between BGPIF and BGP.



Guidelines for projects to change activities when necessary

It is almost natural for innovation projects to be unable to implement all activities proposed during the planning phase. This conundrum requires flexibility from both implementing agencies, and funds from managers.

Problems arise when either party is too rigid and therefore become unable to react to threats and opportunities.

The BGPIF had attempted to avoid these pitfalls with contract addenda. These addenda attempted to compromise where entirely necessary, and ensured the efficient implementation of the grant.

“The feedback from Blue Gold is most valued by United Purpose, as it is informing and helping us to develop stronger and robust WBC, and shaping of the social enterprise connecting all of them. This is particularly important, as we are scaling up with promotion of 160 WBCs in the Chittagong Hill Tracts.”

- Sriramappa Gonchikara, Country Director United Purpose

List of BGPIF projects

Name of organisation	Project
Twynstra & Gudde (and EMM)	Long term perspectives for WMOs/ cooperatives
IWM	Community Based Water Management (CWM)
Deltares and IWM	Feasibility study for action research pumped drainage in polder 2
Imares	Pearl cultivation study
Nelen & Schuurmans	MIS & GIS portal
WUR	Opportunities for Moringa sector development in Bangladesh
Grey Shack Ltd.	Feasibility Study on Renewable Energy Supply
ICLARM	Small Pond Fish Productivity, Diversity and Resilience
Acacia Water Netherlands & Bangladesh JV	Aquifer recharge for agriculture
Deltares, IWM, NHC	The Study of River Bank Erosion Management in Polder 29, Khulna, low cost river bank protection.
Nice Foundation, Khulna	Kawra pig-rearing
Deltares	Feasibility study Water App
MetaMeta	Roads for Water Management and Flood Protection
Margen communication	Study to promote natural cold storage
FHRC	Community Based Integrated Water Management
JUST Farming Bangladesh	Increasing the quality in Mungbean production of small farmers
Aspire Bangladesh	Feasibility Study on Insects for Fish Feed
DNG / No.9	Web Campaign "Ondernemen in Bangladesh"
Practical Action	Cage Aquageoponics System
ICLARM / World Fish	Ecopond and Empowerment of Women (Ecopond II)
ICLARM/ World Fish	Relevant Actors for Sustainable Intensification of Tilapia Culture
United Purpose	Women Business Centre in Waterlogging Areas of Southwest Bangladesh
Social Business Youth Alliance	Blue Gold Innovation Challenge
Moringa Pvt. Ltd.	Market Study for Moringa Business
ProPortion & Grameen Intel	Feasibility study Agricultural services
United Purpose	Sustainable Water Management through Indigenous Finance and Technology Research (SWIFT)
Innovision Agro Service Ltd.	Augmenting homestead Pangasius aquaculture productivity in 3 Upazillas of Patuakhali through community participation
Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur	Aquaculture Intervention in Seasonal Waterlogged Areas in Southwest Region of Bangladesh
MetaMeta	Accelerating Horizontal Learning in Blue Gold polders: ICT as force multiplier
CIMMYT	Leveraging decision making to sustain climate & market smart mungbean advisory in Patuakhali polder communities
mPower	Breed Identification and Digital Registry of Cattle
Practical Action	Sustaining Sack Farming Practices through Agro-met Services in Coastal Polder Areas of Bangladesh
Khulna University	Development of value-added products from water hyacinth to support alternative livelihoods and ecological resilience in coastal villages of southwest Bangladesh

Breed identification and digital registry of cattle by mPower

Improving efficiency of livestock rearing



Background

The livestock sector of Bangladesh is renowned for low cattle productivity in comparison to that in other countries.

While artificial insemination is commonplace in many respects now, proper record of the improvement in genetic material of cattle breeds is lacking for the most part. The problem thus lies in the absence of proper breed cattle identification, and a reliable animal record system.

A challenge in record-keeping is in the identification of type and percentage of exotic blood present in a particular cow, which then leads to inappropriate artificial insemination.

Furthermore, in spite of the work done in the sector by the Department of Livelihood Services (DLS), farmers in remote locations are deprived of expert services due to the unavailability of skilled veterinarians, the remoteness of their location, and high service costs.

About the innovation

mPower developed and implemented various digital tools to share information services with livestock farmers, and members of BGP WMGs.

The project was implemented in five polders (2, 43/ 2D, 43/ 2A, 27, and 25) in 3 upazillas (Dumuria in Khulna, Satkhira Sadar, and Patuakhali Sadar) in southern Bangladesh.

Smallholder cattle farmers in the polders could access the following services offered through existing Community Livestock Service Providers (CLSPs):

- Digital registration and record keeping for cattle, with an easy to use app called Shurokkha
- Digital cattle breed identification and SMS recommendations for appropriate artificial insemination
- Digital Artificial Insemination (DAI) reporting and performance monitoring Dashboard
- E-learning modules and videos for capacity development
- Remote tele-veterinary services by experienced veterinarians
- SMS-based cattle husbandry alert services

mPower aimed to improve the quality of the livestock services by farmers and service providers, in the target locations through various digital interventions. The project also developed guidelines and strategies to ensure the long-term sustainability of the initiative.





Results

- Development of easy-to-use digital cattle breed identification application for community livestock service providers, utilising technical expertise from the field by experienced professionals through multiple iterations and field tests
- 6,138 livestock farmers received improved livestock services which included tele-veterinary, breed identification and AI recommendations and SMS-based advisory services
- Farmers and service providers now more aware of negative impact of inappropriate usage of AI
- Development of DAI Dashboard for DLS and AI service providers to monitor the effectiveness of their AI programmes
- 52 CLSPs trained on technical modules via digital e-Learning modules and videos
- 34 BGP WMGs engaged in all project activities
- Shurokkha is now publicly available on Google Play Store

Lessons learnt

There is a strong demand for tele-veterinary and breed identification services from farmers, local service providers, and community leaders.

Access to digital services improved the confidence and competency of service providers in treating livestock, and advising farmers.

With access to breed Identification

services, AI technicians are able to guide farmers on appropriate semen selection for cattle. There have, however, been some cases reported where AI technicians have provided incorrect information to farmers.

While CLSPs are eager to join the Shurokkha platform, they are deterred by the unwillingness of customers to pay, unless the case in question is complicated.



Potential to scale

The project has introduced a unique entrepreneurial model of tele-veterinary service, along with exploring avenues of revenue generation involving the DLS and livestock input companies.

mPower will continue work on the project and improve it where possible, and expand it if feasible for the benefit of the greater community of livestock farmers.

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Pangasius aquaculture by Innovision

Improving homestead Pangasius aquaculture productivity through community participation in Patuakhali



INNOVISION
AGRO SERVICE LIMITED

Background

Aquaculture plays an important role in the reduction of poverty in southern Bangladesh.

According to a feasibility study on Pangasius aquaculture in the Galachipa, Amtoli, and Kalapara upazillas in Patuakhali, farmers are interested in Pangasius farming, but are unable to access the technology required in the region. The study was conducted in BWDB polders 43/1A-2F, 47/3-4, and 55/2C.

While the water in most ponds studied was deemed suitable for Pangasius aquaculture, some ponds in Amtoli and Golachipa were overly alkaline and had high iron content.

About the innovation

The study maintained a stocking density of 100 fingerlings per decimal with eighty Pangasius, five carps, and fifteen tilapias (GIFT).

The cultured Pangasius were initially fed with pellet feed that was prepared in a local feed mill, and composed of only 16.04% protein. Ingredients of the feed included fish meal, auto rice bran, wheat bran, and oil cake at 6% biomass per day.

Innovision provided support in the production of high protein content feed, and in pond preparation techniques.

The programme also included a day-long training for 30 contact farmers, and an exchange visit to a Pangasius aquaculture zone in Mymensingh.

There were also three Farmer Field Days (FFDs) at the pond sites to demonstrate and share Pangasius culture practices.

Results

The new feed formula increased protein levels to 22% to 24% with production costs of BDT 34 to 36/ kg. Three fish feed pellet machines were installed by the project, and operated by beneficiaries.

Feed produced on the farm itself has protein levels of 20% to 23% and costs BDT 30/ kg.



Innovision Agro Service Limited conducted a pilot study to increase aquaculture production, especially Pangasius, in 30 homestead ponds through improved culture practices and technologies.





- Farmers from Golachipa had the highest aquaculture productivity of 13.33 tonnes/ ha and enjoyed gross profits of BDT 290,049
- The average fish production in Amtoli was 11.94 tonnes/ ha with a gross profit of BDT 194,662 after five months of fish culture
- Kalapara had the lowest average production of 9.54 tonnes/ ha, with gross profits of BDT 190, 710
- All seven women farmer produced 13 tonnes/ ha on average
- Individual average final harvest of Pangasius for ponds in Golachipa, Amtoli, and Kalapara respectively were 810 gms, 784 gms, and 727 gms. Farmers received BDT 90 to BDT 100/ kg for the fish
- The lowest and highest farm gate prices of Pangasius were BDT 85/ kg and BDT 113/ kg respectively. This was a marked improvement from sales prices at Mymensingh, where farm gate prices were below BDT 80/ kg

Lessons learnt for scale-up

In the pilot study, the marination of feed quality, particularly in terms of protein content, was identified as a major concern, as feed was being produced with unidentified ingredients. Reliable sources of seed should be ensured to scale the project.

Marketing of farmed Pangasius would rely on the development of solid transport linkages.

Farmers will also require strong backups to continue fish farming once fish have been harvested.

The up-scaling of Pangasius farming for a complete culture season in the region should be carried out in order to ensure sustainability of the small-scale aquaculture operation.

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Horizontal Learning by MetaMeta Accelerating Horizontal Learning (HL) in Bangladeshi polders using videos produced by WMGs



Background

Life in the polders requires different levels of water management, and the adaptation of traditional agricultural practices. These include:

- The management of sluice gates at water intake and outflow points
- The maintenance of drainage canals
- Building and maintaining drainage structures across roads
- Adapting to climate change in the utilisation of land and water

BGP training on these topics take various forms of Horizontal Learning (HL). The consortium of this project, including MetaMeta, Jagrata Juba Sangha, and Access Agriculture set out to boost these HL efforts, by leveraging the potential of videos on smartphones.

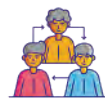
About the innovation


The consortium worked with members of WMGs in southwestern Bangladesh to produce videos on good agricultural practices using smartphones, and disseminating them for the benefit of other farmers. This included:


- 10 mobile video training, training 250 WMG members
- 2 video editorial training sessions for 35 Union Digital Centre (UDC) entrepreneurs and WMG members


- 10 rounds of video competitions that generated 122 WMG-produced videos with 30 prize winners
- 18 high quality videos on selected good practices
- 50 video screenings for over 1,700 members of WMGs
- A Facebook group of over 245 members (as of December 2019)


Results


 A critical mass of WMG members with the skills and interest in capturing and sharing good practices. This will promote good practices in agriculture, and water management

 122 videos produced

 Disseminated over 40 good practices to over 2,500 people

 At least 10 known cases of the adoption of these practices documented

 Template on videos boosting HL produced through a manual

 Facebook group acting as a successful platform to share good practices

Women's empowerment

The project has attempted to ensure gender balance amongst participants. Over 35% of the trainees were women, and a significant number from the group have been trained to produce videos.

The videos feature male and female farmers both. Both videographers and farmers inspire other women in their communities to improve agricultural and livelihood practices.

Three of the ten recorded cases of adoption of good practices were by women.



The project focus was on training members of WMGs to produce simple videos using smartphones. Participants have responded well to the training and will be able to continue producing more videos once the project has ended.

The UDC representatives trained under the project were provided advance trainings. They are members of the same communities, and will continue to support the WMGs.

Results of this project have been presented to 12 organisations specialising in water and agriculture in Bangladesh, all of whom expressed an interest in the incorporation of video-based HL in their own projects.

Potential to scale

The project proved that engaging farmers in the development of extension material accelerates the rate of adoption of good farming practices.

A standard procedure was identified based on the techniques that worked during the project. This can now be scaled up to a larger number of polders or WMGs.

The key to scale-up will be the conversion of some WMG members to farmer video producers. They can then continue to train and motivate others in the community to do the same.

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Water Resource Management by United Purpose

Sustainable Water Management through Indigenous Finance and Technology (SWIFT)

United Purpose 
Beyond aid

Background

The coastal district of Patuakhali is surrounded by the Andharmanik, Agunmukha, Payra, Laukathi, Lohalia, Patuakhali and Tetulia rivers. This leaves the region and its community vulnerable to various environmental disasters.

Reliance on agriculture as the principal source of income and livelihoods thus makes water management crucial to the locals of the region.

About the innovation

At the commencement of the project in May 2018, WMGs in Patuakhali were familiar with the routine of conducting monthly meeting, savings collections, and assisting in large-scale water management works.

Small-scale water management at a local scale, however, was limited. There was a need for the excavation of small channels and pipe culverts, and the construction of micro-dams, to maximise efficacy of larger constructions.

SWIFT works directly with 36 existing BGP WMGs in Patuakhali to remedy this. The project strengthens the capacities of the WMGs and local government bodies to generate funds for small-scale water management work and infrastructure maintenance.

The process involves sensitisation of

the community, along with resource mobilisation in the form of funds and in-kind labour.

SWIFT community partners include members of WMGs, farmers, and representatives from BWDB, DAE, BGP, and different LGs. Other activities under the project include:

- Small-scale demonstration infrastructure work
- Initiation of farm trials with innovative agricultural technologies in consultation with the DAE
- Training in the operation of small-scale infrastructure
- Training in irrigation techniques
- On-going support in the implementation and maintenance of trial infrastructure



United Purpose's Sustainable Water Management through Indigenous Finance and Technology (SWIFT) project aims to develop sustainable Participatory Water Management (PWM) practices to improve the livelihoods of communities in Patuakhali.

SWIFT commenced in May 2018. With the support of local implementing partner Sheba Manab Kallyan Kendra (SMKK), the project supports WMGs to initiate small-scale water management work by mobilising resources in the community.



Results

SWIFT has strengthened these communities to move beyond aid dependency, and find sustainable funding solutions to independently initiate small-scale water management infrastructure into the future by:



Reduced dependency on external support through the mobilisation of input from the community and Union Parishad



58 Flood Control Drainage and Irrigation (FCDI) schemes implemented through matching grants from SWIFT



6,371 acres of agricultural fields upgraded to multi-cropping land through irrigation and flood controls



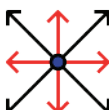
3,845 farmers directly benefitted with increased incomes due to reduced agricultural losses from flooding, and with increased crop diversity



High-nutrient agricultural products (citrus, fisheries, aubergine, etc.) introduced through on-farm trials



Networking and sharing platforms established amongst WMGs, Field Trainers, LGIs, BWDB, DAE, and DoF



15 field trainers trained to continue the expansion of target practices

Lessons learnt for scale-up

The engagement and contribution of communities became effective with once they were sensitised to the greater needs of, and benefits to the community at large.

Networking and building linkages with local government entities and leaders are crucial, and can be the determining factor in to meet targets and ensure long-term changes. The involvement of UP leaders was one such crucial difference.

The continuous engagement of the community throughout the process is critical to the sustainability of the initiative beyond the project period.

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Women’s Business Centers (WBCs) by United Purpose

Creating entrepreneurial opportunities for women in southwestern Bangladesh

United Purpose
Beyond aid

Background

Amongst entrepreneurs, women in Bangladesh are still a minority, forming only 2% of the group. Major barriers to this include discriminatory land inheritance practices, limited access to financial resources and institutions, and limited mobility. Labour wages for women are 50% less than those for men.

Women in Khulna face more adversities than most, as they also tackle annual natural calamities.

Successful women entrepreneurs, however, can significantly change the lives of other women, their families, and their communities.

With this in mind, United Purpose has established four Women’s Business Centres (WBCs) in Choyghoria, Rangamari, Raypur, and Bunarabad in southwestern Bangladesh.

agricultural practices and the management of crop collection from producers within their community. They received support on the usage of advanced business management and accounting tools, and on the establishment of social enterprise networks and linkages with relevant market actors. The WBCs offer the following goods and services:

- Solar-based IT and communication services which includes the preparation, printing, and scanning of documents
- Agricultural inputs and services including training and vaccination, input supplies, and marketing
- Collection, retail, and wholesale of agricultural products
- Retail sales of women’s products
- Groceries
- Preventive healthcare

An experienced gender specialist was hired to facilitate and strengthen the women empowerment process for the project. Various government departments trained women entrepreneurs and producers on different topics including to develop their skills further.

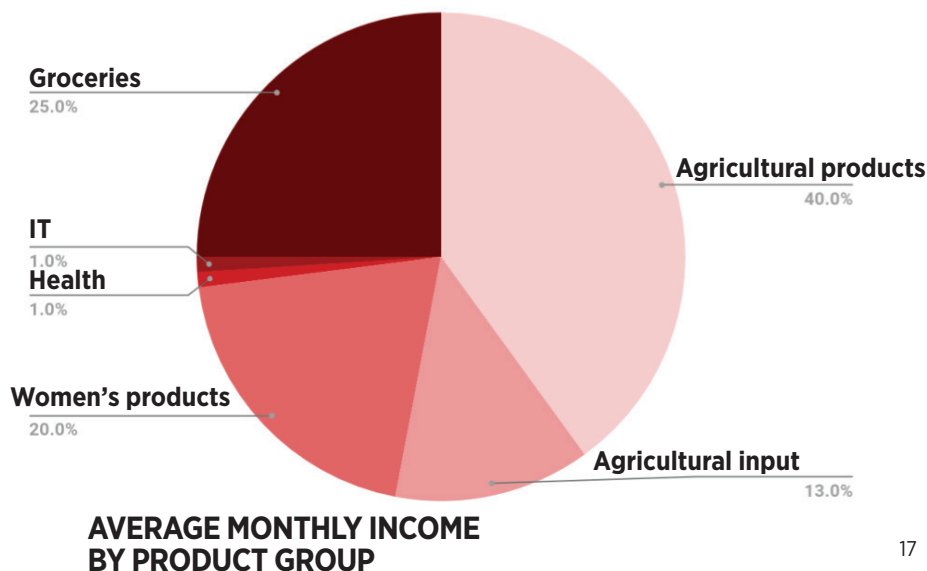
The WMG was run by women, and organised regular meetings and savings deposits.

About the innovation

Each WBC was established and managed by five female farmers and BGP Resource Farmers (RFs). A single WBC provided services to approximately 300 female producers, members of the WMG, and Farmer Field Schools (FFS).

The entrepreneurs were selected by members of the communities, and were trained to become community agriculture and business advisors.

They were also trained on specific





Results

The project has benefitted 20 female entrepreneurs and 1,110 female producers. Each WBC has a monthly average profit of BDT 19,043.

There are 4,440 indirect beneficiaries of the female producers.



Four sustainable and viable business centres established



WBC and market actor linkages established, allowing women to earn more with diverse products and services



Increased access to relevant and affordable information, innovative resilient technology, and services for rural women and WMG members contribute to overall business development of the WBCs

Lessons learnt

Climactic limitations and problems related to transportation have made it difficult for the entrepreneurs to enter local retail markets. This hindered the growth of WBCs at a pace previously anticipated.

The women entrepreneurs of the project have persevered, however, and found innovative ways to adapt the WBC model to bridge local market gaps.

This was possible, both because of the perseverance of the women, but also because of the incorporation of lessons learnt from previous initiatives.

Potential to scale

The WBC entrepreneurs have been supported on three different levels in the development of their business:

- Individual level business development for producers
- WBC level collective initiatives. This included common spaces and assets or equipment for collaborative business growth
- Community-level sharing of business experiences and linkages with markets

WBCs are sustainable and scalable at the local level. They will require minimal initial support, capacity building through existing resources, and support in forming market linkages.

The entrepreneurs have proven that they can establish market outlets in their own communities, and develop linkages with private and public organisations to expand their reach.

They still struggle to coordinate with markets beyond their locality. It is important thus to connect WBCs to coordinated social enterprises with access to reliable modes of transportation and larger markets.

Increasing numbers of WBCs increases their power within the market and their potential to scale-up the initiative.

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Sack gardening by Practical Action

Building resilience in agriculture in polder areas of Bangladesh

Practical ACTION

Background

Polders in southwestern Bangladesh suffer from waterlogging, floods, soil salinity, and erratic weather shocks. This then affects the production and consumption of fruits and vegetables, and results in a nutritional crisis.

Sack gardens have been successful in ensuring food security, nutrition, and household incomes of poor households in Uganda, Kenya, India, and Mozambique.

About the innovation

Practical Action have launched a sack farming initiative with 500 Beneficiary Households (BHH) in 2 polders in Kalapara, Patuakhali.

BHHs were trained on sack-soil material preparation, and crop selection. Each BHH had 5 to 30 sacks and grew sweet gourd, white gourd, cucumber, water gourd, sponge gourd, long-yard bean, red amaranth, Indian spinach, tomato, cabbage, country bean, and bitter gourd.

Eight to ten sacks of crops are expected fulfill the needs of one household.

Sack gardening can potentially be women-driven businesses, and add to the family incomes of poor households.

Results

There are two potential Production Cycles (PCs) per year for sack farmers.

BHHs in Production Cycle 1 (PC1) produced 9kgs of crops on average, and sold the crops from BDT 16 to BDT 56 per kg.

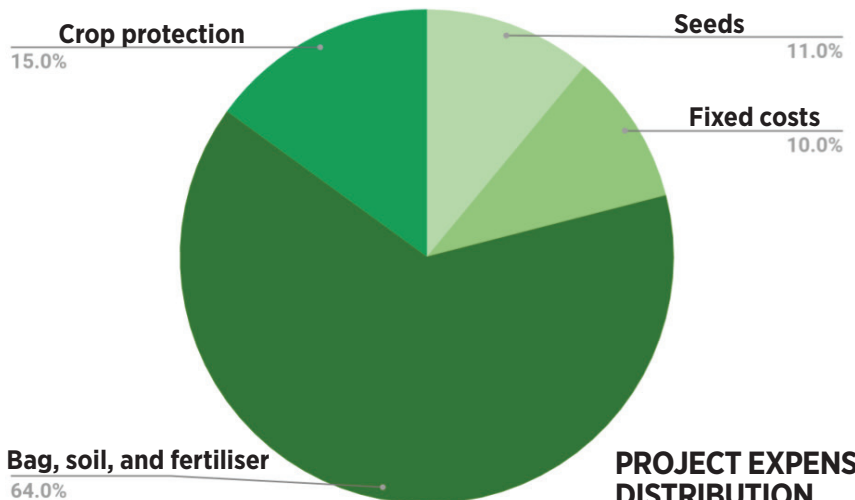
Total revenue per farmer from 15 sacks of crops was BDT 1,753 in PC1, with each farmer spending BDT 156 per sack in the cycle. Costs included payments for the sack itself, soil, organic matter, and items for crop protection.

Costs for the second PC (PC2) are expected to be lower, making the profit margin higher.

A sack garden of 2 to 5 decimals, not requiring the support of external labour, can earn a family of BDT 1,500 to BDT 2,000 per month.

Sack gardens, also known as bag or vertical gardens, consist of tall sacks filled with soil in which various forms of plants flourish. This is ideal for farms that require quick relocation, or in areas where there is little or no healthy soil.

Practical Action, with BGPIF, are promoting sack farming as a sustainable source of food and income in southernwestern Bangladesh.





Lessons learnt



Sack gardens have a reasonable cost-benefit return, and supplement the family incomes of poor households



Access to soil and seeds for flood-prone areas is difficult. Sack gardeners need to ensure storage of sufficient soil during dry seasons



A sack can be used for a maximum of 12 months. Sacks would therefore need annual replacements



Sack farming requires an adequate supply of water, especially during the dry season, to prevent the wilting of crops



Sack plants cannot be grown from seeds. Sack farmers thus need to ensure a steady supply of seedlings

Linking weather forecast to sack farming can inform farmers of raw material requirements, and provide greater economic viability for their business.

Potential to scale

In addition to being a solution for waterlogged and saline regions, sack gardens can be introduced in:

- Densely populated areas with a shortage of arable land which limits traditional gardening practices
- Areas with contaminated soil
- Disaster-prone areas
- Areas with inadequate ground-level sunlight to grow vegetables
- Areas prone to droughts
- School garden initiatives, showcasing gardening methods for urban region

This technology can be adopted in community development initiatives and programmes that strengthen communities.

Various sizes and shapes of sacks might be used for different requirements, testing the economic viability of each sack. The vegetables chosen are determined by the climate and market. This is integral to the sustainability of the initiative.

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Water hyacinth upcycling by Wageningen and Khulna University

Development of value added products to support alternative livelihoods and ecological resilience in Bangladesh

Background

Water hyacinths (*Eichhornia crassipes*) are populous in the rivers of Bangladesh, and is recognised as one of the worst aquatic weeds in the world. The weed results in severe ecological degradation and biodiversity loss, and results in socio-economic losses, and various public health problems.

Many programmes have attempted to eradicate or contain the spread of the weed, but have been unable to find long-term solutions.

To this end, a project entitled “Development of value added products from water hyacinths to support alternative livelihoods and ecological resilience in coastal villages of southwest Bangladesh” was undertaken by Khulna University, Bangladesh and Wageningen University, the Netherlands.

About the innovation

This pilot project worked with members of the WMG from BGP’s polder 25 in Dumuria, Khulna to produce value added products in the form of craft paper and compost from water hyacinth.

For this experiment, the fibres from the stem of this plant was extracted using locally available materials and simple machinery. Production of the pulp and compost on-site negate the need to dispose of the waste in a different location, which would risk the contamination of a different waterbody.

Methodology and objectives

Specific objectives of the study were to:

- Showcase a business model where value-added products in the form of pulp and craft paper would be produced from water hyacinths using a simple and tested system
- Produce compost for local usage from the raw water hyacinth and the by-products of the process
- Facilitate market linkages with relevant industries, artisan shops, and other interest groups

The two components of the project are the production of pulp for craft paper, and the production of compost from the by-products as an added component.

The leaves and roots of fresh water hyacinths are removed, and the petiole chipped and air dried. The plant materials are then cooked using KOH to produce pulp, and bleaching powder is used to whiten the pulp.

The handmade craft paper is then produced from both bleached and unbleached pulps with locally fabricated machinery. A black liquor is the by-product of this process.

The liquor is mixed with water hyacinth leaves, roots, and fresh water hyacinths to produce a compost rich in potassium and nitrogen, along with other minerals and humic substances.

Past attempts to eradicate water hyacinth had failed, making the concept of the “eradication through utilisation” approach the most feasible option.

The technology used was simple, in order for the community to easily adapt to it and engage in commercial production.

This technology is beneficial, both for the environment and for poor coastal communities, who are able to earn an additional income from this venture.



Results and lessons learnt

The optimal conditions for the process involved a 10% alkali charge, and 2 hours of cooking time. This generated a 33% yield.

WMG members successfully produced handmade papers of different qualities using the locally sourced machinery. The compost produced was supplemented with cow dung to ensure the best quality of fertiliser.

The following factors were critical to the success of the project:

- Participation and ownership of the local community, and their understanding of the value of these products
- The fabrication and installation of machinery from a local engineering workshop
- Motivation of the community to engage in production of their own accord once they were trained

Potential to scale

The project proved the ability of the community to convert the biomass of water hyacinth into handmade paper, and thus convert an ecological menace into a viable business opportunity. This opportunity changes the mindsets of people living in southwestern Bangladesh, and makes them consider previously unexplored options.

The product itself is attractive to a growing group of consumers who are concerned about sustainable and ethical production. The growth of this market has the potential to attract institutional investment, thereby improving opportunities for the water hyacinth craft paper industry to scale up.

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Disclaimer

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