



Conservation Corridors: How Local-Livelihood Enhancement Can Contribute

Stories of Change in Communities within Forest Ecosystems in Cambodia



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Conserving Biodiversity in Corridor: How Local-Livelihood Enhancement Can Contribute

The conservation of biodiversity in the last remaining forests of every country is always considered a priority. The reliance of local communities on forests and forest products is often the result of the need for communities in and around forests having to meet their basic needs for food, fuel, fodder and non-timber forest products. Any successful conservation effort is only likely to succeed if the well-being of these local communities are also achieved. Community level financing mechanisms and associated technical support and capacity building can deliver the needed changes for communities to shift their heavy reliance on forest resources. The Biodiversity Conservation Corridors Project (BCCP) commenced implementation in Cambodia in April 2010, with additional financing (BCCP-AF) provided in 2014 to support supplementary livelihood and small-scale infrastructure activities through a Pilot Program for Climate Resilience (PPCR). The BCCP-AF/PPCR is being implemented by two Executing Agencies (EAs), namely the Ministry of Environment (MoE)/General Directorate of Local Community (GDLC) and the Ministry of Agriculture, Forestry and Fisheries (MAFF)/Forestry Administration (FA).

The intended outcomes are sustainably managed and conserved biodiversity corridors in Cambodia. The project was designed to (i) empower communities to manage their forest resources through the demarcation of boundaries, support for forest management planning and by achieving legal approvals for Community Forests (CFs) or Community Protected Areas (CPAs); (ii) restore habitat and degraded forest lands by planting native tree species and agro-forestry that incorporates improved sources of non-timber forest products; (iii) improve livelihoods and income-enhancing small-scale infrastructure; and (iv) generate short-term employment for project households through project activities.

The International Institute of Rural Reconstruction (IIRR) and Cambodian Centre for Study and Development in Agriculture (CEDAC) as a joint venture, were designated as service provider. The two organisations were selected to undertake capacity building and associated demonstration and evidence building activities for System of Rice Intensification (SRI) and Drought –and Salinity Resistant Crops, a component of GMS BCC project. This is expected to contribute to achieving the Pilot Program for Climate Resilience (PPCR), under output 3, livelihoods improved and small –scale infrastructure support, including rain harvesting ponds with climate resilient high value crop productivity, climate resilient irrigation and system of rice intensification and drought – and salinity resistant crops.

This compilation of case studies help to chronicle the positive changes and the transformation in the lives of target farmers and communities under the output 3 of the project implemented by a team of front-line workers from IIRR and CEDAC in Koh Kong and Mondul Kiri provinces. This compilation consists of case studies on horticulture production, Village Development Fund Saving Groups (VDFSGs), chick and broiler production set up by the project. IIRR and CEDAC currently work in 40 villages across 16 communes in Koh Kong and Mondul Kiri province. Totally, 3,740 households are involved. These short case stories were generated initially by field staff themselves. They provide reason for hope that the poor can deliver effective and lasting changes in their lives. If provide the opportunities. The role of group based and community managed interventions surfaces as an important factor contributing to economic improvements at household levels. The group structures also provide a measure of assurance that both scale and sustainability can be achieved.

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Enhancing and Sustaining Semi-Commercial Vegetable Gardens: the Transformative Role of Small Irrigation System

Mr. Krun Tron, 52, lives in Pu Chhab Village at Dak Dam Commune in Oureang District, Mondul Kiri Province. He lives with his wife, two grandchildren, and three other family members. He and his wife, Ms. Pron Tres, 65, are both farmers. Their main farming area is located in a Chamkar, an upland area located outside their village. Because of limited access to water, they can only plant a few types of vegetables like wax gourd, sponge gourd, and mustard greens. Mr. Krun Tron invests a lot of time and labour for carrying water for their crops. This posed a challenge for him and his wife to grow vegetables all year round.

In 2017, Mr. Krun Tron was approached by the Biodiversity Conservation Corridors (BCC) Project. He attended trainings on vegetable growing and chicken raising. Shortly after that, he applied what he learned to his garden. He started doing row preparation for dry and wet seasons, selecting and planting drought tolerant crops, and using trellis nets to save labor and time. He also set up a sprinkler irrigation system with water pipes that linked his home (and that of 50 other partner farmers) to a natural stream located 500 meters away. With water now readily available and accessible, Mr. Krun Tron established a vegetable garden in front of his house (measuring 15 x 15 meters) and at his backyard (measuring 15 x 20 meters).



“Now that I have enough water, I can plant all year round. The project helped bring water from the natural stream, thus enabling me to plant vegetables for my family’s nutrition and income”.

Mr. Krun Tron and his wife did not incur any major expenses for expansion of his area. He used his own seeds and those provided by the project. He bought the water pipes for about 100,000 riels (25 USD) which he assumes are good for three to five years. He also did not hire laborers; he and his wife did all the work. His wife was involved in the daily operation and management of the garden while Mr. Krun Tron prepared the land, shaped the bed, and installed and managed the irrigation system. His wife markets 60% of their produce while the 40% is saved for their family’s consumption.



The table below shows the differences in Mr. Krun Tron's production system before and after he became part of the BCC Project:

Description	Before cooperating with the project	After cooperating with the project
Crop diversity	Plants only a few types of vegetable	Planting more than 10 types of vegetables Selected high nutrition crops for planting to benefit family's nutrition and income
Planting duration	Seasonal (November – January)	All year round
Water supply / irrigation	Need to carry water in buckets; More time and labour consumption	Using sprinkler system connected from the natural stream directly to the vegetable garden inside the homestead.
Size of the garden	20 x 20 meters	Garden 1: 15 x 20 meters Garden 2: 15 x 15 meters
Planting purpose	Mostly for family consumption and sold the surplus	Produces enough vegetable for family consumption; Increased income from selling vegetables .
Income	Mustard 50 kg x 2,000 riels/kg = 100,000 riels Consumption: 100 kg Total income: 100,000 riels	Chili: 50kg x 12,000 riels/kg=600,000 riels Bunching onion: 30 kg x 15,000 riels/kg= 450,000 riels Chayote (Sechiumedule): 20 kg x 2000 riels/kg= 40,000 riels. Total income: 1,090,000 riels Note: He has some other vegetables that have not been sold at the time this interview was conducted.

Mr. Krun Tron practices diversified crop production system which includes eggplant, chili, carrot, yard long bean, morning glory, amaranth, bunching onion, wax gourd, sponge gourd, and wing bean. Along the fence of the garden, he planted banana to create some shade. He noted that the eggplant and chili are both tolerant to drought and have good market prices.

He grows his vegetables without using any agro-chemicals to make sure that his young grandchildren consume only safe, healthy food. To improve his soil fertility status, he only uses organic matter, including cattle manure. Some of the challenges he encountered is the low germination of some of the vegetable seeds and insects like stemborers needed to be hand-picked. Yet despite these issues, he plans to continue growing vegetables all year round. He said, "I will continue planting vegetables even after BCC project ends. I can buy seeds myself, which are available at the district market". He plans to further diversify the vegetables they sell in e-markets and to continue experimenting with new and exotic vegetables. He is also preparing to improve his compost-making facility and to practice crop rotation to reduce insects and crop disease. Farmers from other areas have visited Mr. Krun Tron's garden to learn from his experience. In his village, three other smallholder farmers grow vegetables all year round thanks to the training provided by the BCC project.



A Migrant Worker Finds Dignity and Meaning on her Village Farm

Ms. Ngem Da, 49, lives in Prateal Village in Botum Sakor Commune, Botum Sakor District, Koh Kong Province. She is married to Mr. Som Phin, 57, and they have two daughters. One works in Thailand and the other works with her.

Ms. Ngem Da previously worked as a day laborer in Thailand for 20 years. She did a range of jobs like fruit harvester, being a rubber plantation worker, etc. When one of her daughters could work in Thailand and could send home remittances, she decided to return to her farm in her village. Eight years ago, MS. Ngem Da moved again, this time from her home in the village center to her farm.

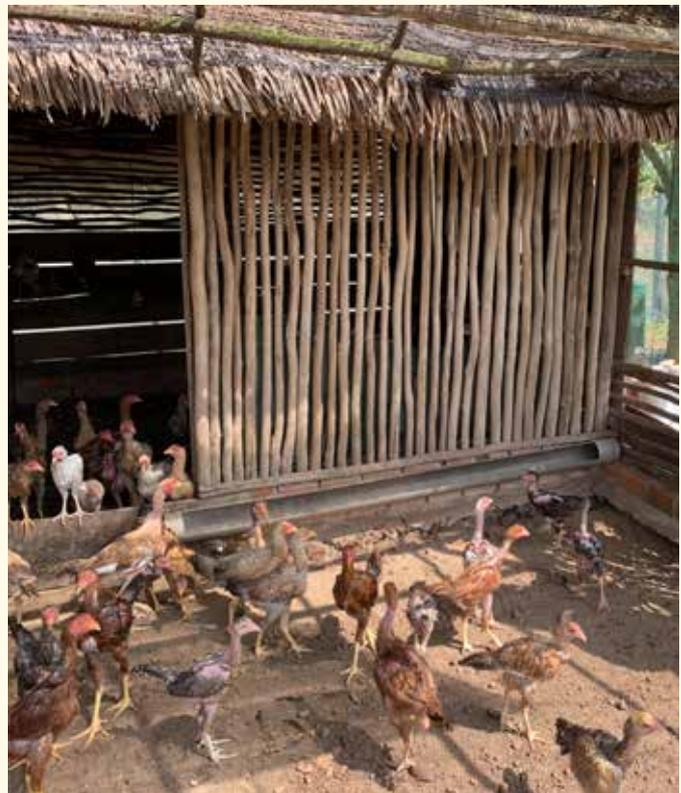


Ms. Ngem Da owns a six-hectare land where she grows durian (30 out of 170 durian trees are producing fruits now), rambutan (70 out of 150 Rambutan trees are already bearing fruits), and mangosteen (20-30 trees, not yet yielding). She also grows vegetables for home consumption and for sale.

Heavy rain is a challenge for her, especially between July to September every year. She observes that the rainfall pattern in her area is different from other parts she knows well: sometimes it rains continuously for 20 days a month and her crops do not get proper sunlight. Water logging made it difficult for her to grow crops successfully during the rainy season. Another worry for her is the predominance of pests.

She chose to do off season vegetable production in order to deal with the excess water issues during the rainy season. Her water source is a pond that is 30 x 20 meters wide and 8 meters deep but it is not enough to irrigate all her crops.

In 2017, she became part of the Biodiversity Conservation Corridors (BCC) Project. Since then, she learned about chicken raising and horticulture techniques, including vegetable and fruit tree growing. She has improved her broiler (meat chicken) production, learned how to manage chickens, how to prevent or treat chicken diseases, and how to formulate feeds locally. She now has 14 hens, 2 cocks, 40 adult chickens, and 100 chicks.



She has also picked up improved horticulture practices: she has learned mulching techniques and how to use a drip irrigation system (water use efficiency / water saving technique). In addition to the technical knowledge provided by the BCCP project trainers, she received some vegetable seeds or planting materials from the project. She now realized that the drip irrigation system can save a lot of water compared to conventional irrigation practices. She also learned that the mulching technique is good for weed control and in maintaining soil moisture, at the same time in returning nutrients to the soil.



She has improved her soil preparation techniques. To reduce waterlogging during the rainy season, she prepared raised-bed plots for growing vegetables. At the same time, she was able to produce and sell off season vegetables during the rainy seasons when prices are higher. While others farmers in the village could not produce vegetables because of waterlogging issues, she was able to maintain a steady source of income thanks to her raised beds. She grows vegetables typically between October to April although duration depends on the availability of water for irrigation.

Her vegetable garden is 40 x 80 meters and is planted with mixed crops such as yard long bean, cucumber, pumpkin, corn, etc. She normally plants different types of vegetables from those grown by other farmers in her village. By doing so, she is easily able to sell her products at a usually higher price.

She has also improved her management techniques for fruit growing to obtain optimum yields. She also improved her harvest and post-harvest management practices as result of the training she received from the project. For instance, she learned to how package Rambutan that is easier for transport and still maintain their freshness.



She produces compost for fertilizing and improving her soil. She micro doses her crops, wherein she applies a minimal use of purchased fertilizer to speed up the growth of crops in their early stages. She does not use chemical pesticides, though occasionally, and, on a need basis, she uses botanical formulations to control pests.

Her chicken, vegetables, and fruit tree enterprises help her produce enough for her family's consumption and earn income from commercial sales. Below is a snap shot of her income flows and expenses in a year:

Income flows from chicken, fruits, and vegetables across the year

Commodities	Description	Total (USD)
Chicken	Sales: 3-4 times per year	1,000
Vegetables	About 250 USD/month x 9 months/year	2,250
Durian	Buyer paid the money in advance before the harvesting season	1,600
Rambutan	200 kg x 2.5 USD/kg	500
Total		5,350

Expense for vegetable and fruit tree production:

No.	Expense	Total expense (USD)
1	Vegetable seed	50
2	Trellis net	17.5
3	Diesel for water pumping for vegetables and fruit trees (75 USD x 9 months)	675
4	Hormones for fruit tree planting	2,500
Total		3,242.5

Her total expense is USD3,242.5. This means that she could make a gross profit of $5,350 - 3,242.5 = \text{USD}2,107.5$ per year. This figure does not include the value of the products eaten at home, shared with friends and neighbors, and for social events.

The fruits are marketed through local buyers, villagers, and retailers in the commune or district markets. Currently, she does not sell to buyers from Phnom Penh or other places because of the limited volume of her produce. She targets local markets.

"Farming is tiring but it brings me pride," she shared. "I can produce enough for our family consumption so I don't need to buy from others anymore. We are also safe from the risks of chemical residues which are unhealthy. I hope that in the near future, my livelihood will significantly improve."

She is planning to improve her farm by carrying out the following activities:

1. Expand the water pond in order to collect more water for irrigation;
2. Find more market for her products. She needs different buyers for her production;
3. Expand her chicken enterprise. Chicken is sold to support the fruit production and daily expense of the family; and
4. Dig another pond for the fish raising.

Ms. Ngem Da does not regret leaving her job in Thailand because she can now live a life with dignity. She values living in her home village where her social ties are strong and local networks allow her to be an entrepreneur. She has no shortage of plans for the next year and is excited about her new lifestyle and livelihood



Ms. Ngem Da and her husband, and Durian in her farm

From Plantation Labourer to Successful Market Gardener

Ms. Suon Sreytouch, 34, lives with her husband and four children in Chhouk Village at Chi Khar Leu Commune, Srae Ambel District in Koh Kong Province. She and her husband migrated from another province to work for a rubber plantation company. They do not own a rice field or have access to a farm land so when they have saved enough money, they bought a 2,200 square meter plot in Chhouk Village. Her only main sources of food and income are vegetable growing and collecting non-timber forest products (NTFPs).

In July 2019, the International Institute of Rural Reconstruction (IIRR), through the Biodiversity Conservation Corridors (BCC) Project trained and enhanced the capacities of vegetable growers like Ms. Suon Sreytouch. In addition to technical training, project trainers followed up the farmers individually and gave them technical advice. The project also introduced vegetables growers to agricultural innovations.

Ms. Suon Sreytouch started to apply the vegetable growing techniques she learned from the BCC Project in her homestead garden. She practiced different vegetable growing methods, started raising chickens, and made her own compost. She was followed-up by project trainers 3-4 times per month. She received vegetable seeds from the project and purchased more to meet her seed requirements. The project also set up a drip irrigation system for her. A water tank with the capacity of 200 liters was installed to store water for irrigation. This helped her save water and reduce labour and time for watering crops. This allowed her to plant vegetables all year round. During dry seasons, she used water from dug wells for crop irrigation. The depth of the well is five meters and while available throughout the year it is not adequate during the dry season. Therefore, she only plants vegetables on a smaller area (625 square meters). During rainy seasons, she plants vegetable in her entire plot area and to address flood risks, she makes raised beds.



Ms. Suon Sreytouch's garden is 625 square meters (25 m x 25 m). She and her husband share equal work in growing vegetables. They constructed a trellis using a net, which helped them save labour and time. Within this small plot, she plants a diverse range of crops like corn, pumpkin, bitter melon, yard long bean, cucumber, sponge gourd, chili, banana, lemon, yam, and cassava (edible cassava, not for starch). The wide range of crops reduces risks from price fluctuations and seasonal variability. She practices short rotation crops during the beginning of the rainy season when the prices are higher and market demand is good. Through the trainings she attended, Ms. Suon

Sreytouch now knows appropriate vegetable varieties to plant for each season. She found the yard long bean, ridge gourd, and wax gourd grow well during the dry season.

Unlike other farmers in the village, Ms. Suon Sreytouch could produce vegetables for both consumption and sale, all year round. To sustain her garden, she plans to deepen the existing well in order to get enough water for domestic and garden needs. She is also starting to diversify her livelihood, starting with native chickens, in order to increase her family's income.

Income flows across seasons

During rainy season	During dry season
<ul style="list-style-type: none"> Earns 30,000 to 40,000 riels (7.5 to 10 USD) per day (USD225 to 300 USD per month) from home garden vegetables. Collects and sells non-timber forest products or wild vegetables (wild turmeric, mushroom, rattan, leafy vegetables) where she earns 30,000 riels (USD7.5) per day or approximately USD225 per month. 	<ul style="list-style-type: none"> From November to April, her income from home garden vegetables drops to around 10,000 to 15,000 riels (USD 2.5 to 3.75) per day or USD75 to 112 USD per month due to reduced water and planting area.



Safe and Healthy Vegetables from Homesteads for Family Consumption and Income Generation

Pu Loung village, Mondul Kiri Province

Mr. Chum Rith, 48, lives in Pu Loung Village, Romnea Commune, Senmonorum District, Mondul Kiri Province. His wife Pu Khet is 48 years old. He has 6 children. Four are studying in the provincial town and two staying with him. Farming is their primary source of food and income. They grow rice, vegetables, and tree seedlings. He has a total of 7 hectares of land. However, only 3 out of 7 hectares is utilized, including 1 hectare for banana cultivation and 2 hectares for rice production. The rest of the land is reserved for shifting cultivation or rotational farming. In addition, 52 % of the total area of his homestead, which measures 2,400 square meters, is used for home gardening.

He started to collaborate with the Biodiversity Conservation Corridors (BCC) Project in 2017 to improve his vegetable growing practices. He attended technical trainings on vegetable growing, botanical pesticide making, production of effective micro-organism-based liquid fertilizer, row preparation for dry and wet season production (adaptable to climate change and variation, and pest management methods. The project primarily relies on technical training rather than input support: the BCC project provided only small quantities of vegetable seed, trellis net, green net etc. Follow-up visits and technical advice were frequently provided by the BCC project trainers to encourage farmers in applying technical innovations.

He grows vegetables from November to April. During wet season, he faces difficulties growing vegetables because of waterlogging. Moreover, he is busy farming his upland farm or Chamkar . After the trainings provided by the project, he only uses organic matter to improve his land's soil fertility. No chemical fertilizer and pesticide are used in his home garden. He uses raised bed gardening methods to reduce waterlogging. He maintains soil moisture by adding organic matter.

Prior to his association with the BCC project he did not pay attention to techniques like water harvesting and storage for growing vegetables. After cooperating with the project, he worked on part of a small natural stream, near his garden, deepening it to store water. As the result, he could extend the duration of vegetable growing.

His wife who is mostly involved in managing and caring for the home gardening: she does the daily work such as weeding, digging planting holes, planting, harvesting, etc. Normally he and his wife spend only 2 hours everyday working in the garden. Prolonged drought, erratic rainfall and insect pests were the major challenges he faced in vegetable growing. To control pests, he sprayed botanical pesticide and used handpicking methods to eradicate them.





Cabbage and cucumber planted in the garden

In a typical indigenous family (Phnong), men are usually given more roles in decision making. For this family, however it is different. Both, wife and husband discussed and jointly made decisions on the crop selection and planting schedule. An important principle is to produce crops with high market demands and also benefits the nutrition and health of family members. The husband is typically the one who sells vegetables because of the distances of local markets. However, the market earnings are handed over to women to manage.

Up to 70% of the vegetables they produced are sold. His family do not buy vegetables from the local market anymore because their garden has enough and they worry about pesticide residues. The family is now nearly self-reliant for its vegetable requirements.

Comparison between situation before and after cooperating with the BCC project:

Description	Before cooperating with BCC project	After cooperating with the BCC Project
Planting Period and Duration	November to January	November to April
Crop diversification	2 types of vegetables (mustard green, Pok choy)	More than 8 types of vegetable (e.g. cabbage, Chinese spinach, pok choy, bunching onion, eggplant, cucumber, yard long bean, herb, etc.
Land cultivation	5 meters x 10 meters (2-3 rows)	25 meters x 50 meters
Row preparation	Vegetable rows were prepared without consideration of the planting season to avoid water logging and shortage of water.	Row preparation is designed according to the planting season. High row for the wet season and low row preparation for the dry season.
Water supply system / irrigation	No water supply system or irrigation	Water supply system set up connected from water source to gardens.
Income	Not for sale but for home consumption	Home consumption and selling for income Mustard: 138 kg x 4,000 riels = 552,000 riels

To manage the vegetable production enterprise, he spent 50,000 riels to purchase seeds and 186,000 riels for pumping irrigation water. His total expense was 236,000 riels per production cycle from November to April. His total income was 552,000 riels. Thus, a net income of 316,000 riels (approximately USD79) was derived per production cycle.



Income, expense, and net income per production cycle from November to April

The income figures presented above were from vegetables they sold in markets. The vegetables used for family consumption was estimated to be at 60 kg, valued at 240,000 riels (approximately USD60).

Ten local farmers visited his farm and one of them has already followed his practices. He believes that there is a good potential and opportunity to expand his family's vegetable production and to continue to supply healthy vegetables to consumers both locally and at the provincial market.

Mr. Chum Rith plans to continue planting vegetables, make solid compost, and to select short duration, early maturing and high value crops for future planting.



Local Financing Mechanisms Help Nurture a Market Orientation Among Family Farmers

Farmers in Cambodia, as in many other countries in the region, lack ready access to low cost credit services. This has been a major deterrent for families to invest in climate resilient livelihoods. The complexities associated with application procedures is another worry.

Farmer E Keo, 34, and his family live in Chhuk Village, Chikha Leu Commune in Srae Ambil District, Koh Kong Province where majority of the villagers depend on rice farming for livelihood. Rice cultivation is important since rice is the country's food staple. However, these seasonal rice farmers do not earn cash from their rice harvest. Farmer Keo and his family did not want to be totally reliant on rice farming, so they decided to raise local chickens and off-season crops, especially vegetables. For farmer Keo and his wife Ek Pon, this was a way for him to enhance his family's resilience to climate change impacts.

In 2019, Keo's family borrowed 2.6 million Riel (USD 650) from the Village Development Funds and Saving Group (VDFSG) established in his village in September 2016 through the Biodiversity Conservation Corridor (BCC) Project. His family used this loan to grow off-season watermelon and cucumber on his rice field. While the preceding rice harvest provided for his household's needs, the watermelon provided him a respectable income of 2 million Riel (USD 500) within three months. From that income and his earnings from the sale of chickens, the family was able to pay back their loan to the VDFSG.

As members of the VDFSG, Keo and his wife Ek Pon got to attend agriculture training activities of the BCC Project, which includes chicken raising. His family also received building materials and 100 small local breed chicks in May 2018, they started a demonstration chicken farm. His family also made cash contributions and provided labor to build the 6m x 6m chicken coop. The family earned a profit of 370,000 Riels (~90 USD) from the first batch of chickens (broilers) raised in three months. With that success, the family increased their production levels by purchasing 30 to 70 chicks every two weeks. Now, his family is able to sell 35-50 kg of chickens and to earn about USD100 a month.



Rather surprisingly, the market price of local chicken is very high in the province because of the consciousness for hormone and antibiotic free meat. There is a high demand and a corresponding insufficient supply. Consumers pay 25,000 Riel per kg (USD 6.25 per kg) for live chicken compared to the 16,000-18,000 Riel per kg paid in other provinces. This was a good reason for local family farmers to intensify their chicken production. This encouraged Keo's family to invest in expansion by building another chicken coop (5m x 10m in size) to raise a larger number of young chicks.



Aside from investing their savings the family took a new loan of 1.4 million Riel (USD 350) from the VDFSG for this expansion effort. Now, he has 20 hens and plans to have 50 hens in the next three months (July 2020). The enhanced housing can accommodate 50 hens and 200-250 chicks a month. Keo is confident he soon be able to meet and sustain his family cash needs. He will not have to forage in the forest for food or non-timber forest products anymore. In addition, Keo's family has savings amounting to 500,000 Riel (USD 125) in the VDFSG.

The VDFSG in Chhuk village currently has 68 members (82% women, 11 women-headed households), all local villagers and members of the Community Forestry group "Samaki Prek Chik". They deposit their savings on a monthly basis, and, borrow funds as and when needed (savings are a pre-condition for them to access the loan facility). This group has achieved impressive results: the total members' savings reached 62,290,400 Riel (USD 15,572.60). The group received a grant transfer of 79,122,500 Riel (USD 19,780.63) from the BCC project, raising the total capital to 141,412,900 Riel. So far, it has loaned 136,350,000 Riel (USD 34,087.50) to 40 members (75% are women including 9 women-headed households) with an interest rate of 1.5% per month. This is the same rate as that of formal finance institutions, however the borrowers prefer to take loans from the VDFSG because the requirements and application process is simple and there are no administration fees.



The VDFSG in Chhuk village is well on its way to becoming a viable local financing institution that will continue to serve its members, encouraging them to save, while also meeting their credit needs for livelihood projects. The Chhuk village will continue to work on broadening the scope of its climate resilient agriculture technologies. These plans include further improvement of the rice productivity under drought and saline conditions, the inclusion of native pigs and others agroforestry components. Change is only just beginning and there is a lot to look forward to.

Village Development Funds and Savings Groups Deliver Services to those not Previously Reached

Ms. Iem Lang, 60, and her husband Nob Eak, are farmers in Chi Klab Village in the Sokh Sant Commune, Koh Nhaek District, Mondul Kiri Province. They have two hectares of rice land but because of drought and uncertain rainfall, they earn very little from rice farming. However, the rice farm does provide the family with rice for home consumption, which is valued because of the food security it confers. Ms. Lang also runs a small grocery store at her home. This helps with cash needs to support four family members, including two grandchildren. Her husband, a traditional musician, plays music at local events / ceremonies. This further helps to supplement family income.



To strengthen the grocery store business, Ms. Lang decided to invest 4,000,000 Riels (USD1,000) to buy grocery items and other commodities. She used her own savings, then borrowed additional funds from the Village Development Funds and Saving Group (VDFSG) which was established in October 2016. She borrowed between 500,000-2,500,000 Riels at different times, each repayable in six months. The loans enabled Ms. Lang to expand her grocery and resulted in more frequent turnovers and increased net flow of cash for family needs. As a result, her daily gross income rose from 100,000 Riels to 150,000 Riels per day (a margin of 30,000 Riels a day). An active member of the VDFSG, she regularly deposited savings that has now accumulated to 1,208,000 Riels (USD302). She also occasionally borrowed money to pay for emergencies such as medication.

Ms. Lang said that the VDFSG benefits local villagers by providing easy access to credit/finance with low interest rate, and, simple loan procedures. Borrowers like her pay an interest of only 1.5% per month. There are no administrative fees unlike with the formal microfinance institutions. The interest rate is also lower than that of local money lenders (who charge up to 30% per month). Aside from the loans, she is also able to get into the savings habit, thus help build the families capacity to cope with the challenges of crop failure due to climate change and other natural factors.

The VDFSG concept was introduced by the Biodiversity Conservation Corridor (BCC) Project through the funding support of the Asian Development Bank (ADB) and executed by the Ministry of Environment and Forestry Administration. Capacity building and village development funds (grant) to the villagers through the setting up community-managed structures known as VDFSG in Community Forestry (CF) and Community Protected Area (CPA). This project was undertaken in Koh Kong and Mondul Kiri Provinces .



Ms. Iem Lang with her grocery stuff inside her house

Entrepreneurship Grows on Hee Kav

Mr. Hee Kav, 25, worked as a fruit juice salesman in Poi Pet, Banteay Meanchey Province. In March 2019, he gave up his job and returned home to Kampong Speu Province to take care of his sister's family. His sister passed away suddenly as result of an illness. Mr. Hee Kav's sister was the one of the first farmers in her village to join the Biodiversity Conservation Corridors (BCC) Project. Now, Mr. Hee Kav has taken over what she started, continuing and improving her chicken production enterprise in order to provide for his niece, nephew, and his parents.

The BCC Project supported the production of native chickens as they are climate hardy, suited to the local agro ecological conditions, being resistant to diseases, and ,invariably fetching a high price in local and provincial markets. Native chickens are in demand especially during local festivals and cultural events such as the Khmer New Year, Chinese New Year, Pchum Ben festival, etc.

Building on his sister's efforts, Mr. Hee Kav worked to improve the chicken raising and chick production methods , helping to further commercialize his enterprise and expand the business to provide income for his late sister's family and their parents. He not only raises chickens for meat and eggs but he also started to use an incubator to produce healthy chicks to supply to other farmers in his village and surrounding communities. Mr. Hee Kav regularly attends trainings on chicken raising and horticulture production organized by the project. Importantly, he frequently receives technical advice from project trainers.

In 2019, he was chosen as one of the delegates for an eight-day trip to Thailand organized by CEDAC and IIRR ,where he learned methods of organic vegetable production. This is where his new interest in market gardening was born. Upon his return, he established a few garden plots and started growing upland kangkong. The size of his homestead is approximately 0.5 ha and here he established a vegetable garden 600 square meters (20 x 30 meters) in size. To deal with labor bottle necks, he started planting vegetables after rice is harvested in November and when he had more time for other activities. He used the homestead land from December to May (he could not grow vegetables during rainy season due to waterlogging). The main source of water for his garden is a water pond (10 x 15 meters, 6 meters deep) located about 100 meters away from his home. He planted different types of vegetables such as morning glory, amaranth, eggplant, lady finger, and yard long bean. He used these vegetables for the family's consumption and as feeds for the chickens. He only bought commercial feeds for chicks aged less than 1 month. For the older chickens, he formulates his own chicken feed made from different vegetables, rice bran, corn, fish, etc. He sells the surplus vegetables to earn additional income.



Hee Kav is always looking for ways to intensify the use of his homestead. He started with the 528-egg hatching incubator provided by the BCC Project. Recently he upgraded that unit and bought a new incubator that has a bigger capacity for handling 704 eggs per cycle. The hatching rate is above 95%. He did this to respond to the high demand for quality chicks in local communities.

He currently has 60 hens and 12 cocks. On average, he collects 15 eggs for hatching every day. This is not enough to fill in the 704-egg

hatching incubator, so he also buy eggs from other farmers. He vaccinates his chicks before selling them, which is an important factor for the success of his business.



Even with this increased capacity he is still not able to produce enough chicks to meet the local demand. He estimates that 500-700 chicks are needed per month, but he is only able to produce 200-300 chicks per month. Therefore, he finds there is room to expand his chick production.

The broiler (meat chicken) has a particularly high market demand. Two potential buyers have already contacted Mr. Hee Kav: one buyer needs 50 kg of chickens within a week and, another buyer indicated he needs 50 kgs every 2 days for his restaurant/resort.



olio:

Major livelihood activities	Description	Income (USD)
Vegetable growing	40 USD/month x 7 months / year. In addition to home consumption and selling, vegetables are also used to make the chicken feed.	40
Own chicken raising (meat chicken)	30 kg sold per months x 7USD/kg = 210 USD/month x 12 months	201
Collect chicken from other farmers to sell to buyers	50 kg collected from farmers to sell to buyers. Buying in price is 5.25 USD/kg, selling price is 7 USD/kg, so profit is 1.75 USD/kg.	87.5
Chick production	250 chicks sold per months on average. The price is 1.5 USD per chick. Vaccination is provided for chicks in advance before selling to buyers (Newcastle and fowl pox).	375
Selling chicken feed	Sold 30 bags of chicken feed x 1.25 USD/bag (earning per bag)	37.5
Total		741

After deducting expenses¹, Mr. Hee Kav earned a monthly income of 517.25 USD. He uses this to provide for his family's needs and invest in his niece and nephew's education and for the expansion of his chick and broiler production.

Mr. Hee Kav says "By cooperating with the BCCP project, I gained knowledge and technical skills in chicken raising and chick production. These allowed me to generate income for my family. I have established a foundation for my life".

Summary of good practices:

- Prioritize native chickens as they are locally adapted, tolerant to disease and fetch high market prices;
- Chicks are vaccinated before sale to farmers to prevent disease infection
- Plant own vegetables to make chicken feed, and not to rely on feed from market. Feed from market is only provided to chicks aged less than 21 days;
- Provide technical advice and on-going technical assistance to farmers buying chicks
- Buy back chickens from farmers for sale. Provide better prices to those farmers (higher than normal collectors)
- Diversify income sources for his family by selling chicken feed (he buys chicken feed from market for sale in the village – feed for chicks below 21 days);
- Build good connections with potential buyers (e.g. restaurant, resorts, hotel...) to market this chickens. He use ITC or social media such as Facebook to promote his chickens and use FB messenger for communication with buyers.

¹ If his own labour will be quantified, Mr. Hee Kav works 3 hours per day. An 8-hour work day costs USD 10 so 3 hours a day equal to 3.75 USD, which is equivalent to 112.5 USD per month (3.75 USD/day x 30 days/month).

Nurturing New Business Opportunities for Economic Empowerment

Native chicken raising is emerging as an important healthy food option and a new business opportunity. The demand for quality native chicks is high, the price is good, and native chicks tolerate variable local climate conditions. These are the reasons that IIRR Cambodia, through the Biodiversity Conservation Corridors (BCC) Project funded by the Asian Development Bank (ADB), introduced native chick and broiler production in its 37 target villages in Koh Kong and Mondul Kiri provinces. Overall, 14 chick production and demonstration farms and 30 broiler farms were set up. Farmers were guided, provided technical assistance and mentored for more than a year. Key issues related to disease and feed management were addressed through on-site technical inputs and by using farmers as extension educators within their communities. The establishment of rural and community based incubators, managed by farmer experts, served to make breeding stock availability locally.

Ms. Mut Noeun, 40, is a chick production demonstration farmer in Chhouk Village, Chi Kha Leu Commune in the Srae Ambel District of Koh Kong Province. Ms. Noeun joined the BCC project in late 2017. She attended trainings on vegetable growing, system of rice intensification, and chick production—all oriented towards the diversification of her livelihood base. She also joined the community forestry tree planting drive. She is also a member of the village savings group supported by the project.

Ms. Nouen is very interested in chick production. She considers this a good income generation activity for her family given that there is high local demand for healthy chicks. She started chick production on September 2019. From a small incubator that can hatch around 100 eggs, she upgraded it to an incubator that can hatch 352 eggs per production cycle, costing 1,300,000 riels (USD325). She is happy with the achieved hatchability rate, ranging from 95% to 98%. Generally, she can produce 150 chicks per month on average. She is happy with the achieved hatchability rate, ranging from 95% to 98%. Generally, she can produce 150 chicks per month on average.



To produce chicks for hatching, she currently maintains four cocks and 20 hens, which are able to produce six to nine eggs daily. Even though her incubator can handle 352 eggs, she only places 150-160 eggs for hatching because of limited egg supply. She plans to raise more hens in order to increase the egg supply.

Her chicks are vaccinated for the Newcastle Disease and Fowl Pox, the common diseases in the area. The table below features the economic analysis of her business venture. The annual income was around USD 1,662 for the period of 12 months:

N	Description	Unit	Quantity	Unit price (USD)	Total (USD)
Income from chicks per month					
1	Number of chicks produced per month	Per chick	150	1.5	225
Total (A)					225
Expense for chick production per month					
1	Feed	Per kg	15	0.5	7.5
2	Vaccine	Per chick	150	0.05	7.5
3	Medicine	Lump sum	1	0.5	0.5
4	Incubator depreciation	Per month	1	13.5	13.5
5	Chicken cage depreciation	Per month	1	1.25	1.25
6	Own labour	Per day	30	1.875	56.25
Total (B)					86.5
Balance (A-B)					138.5

Note: the annual income from chicks is USD1,662 = USD138.5/month x 12 months

Ms. Noeun estimates that the local demand for chicks is around 300 chicks per month, but the number of chicks needed by the local farmers is 300 chicks per month. She now only produces 50% of the total demand. She noted that there is rising demand from farmers outside the village. She estimates that the total demand for chicks is at 500 chicks per month. Thus, she is confident that with that level of the demand for chicks, she has an economically viable economic enterprise.

She notes, however, that there are seasonality issues to contend with -the wet season being most difficult. During this season, it is difficult to maintain the needed temperature levels of the incubator, thus affecting hatchability rates.

In addition to income from baby chick production, she also earns from selling broilers. She produces about 300 broilers per year. The cycle is usually four months, which is shorter than the (local) conventional practices, which require five to six months. Improved practices of broiler raising, selection of good breeds, appropriate feed and feeding methods, and biosecurity/disease control helped shorten the production cycle for meat chickens.

The price of chicken meat has increased: it ranges from 28,000 riels to 30,000 riels per kilogram for female chickens and 23,000 riels per kilogram for male chickens. She sells broilers 3 times per year, at least 100 chicken each time, or 300 broilers per year. The average price of a broiler is 26,500 riels per kilogram. Thereby, she earns an income of 795,000 riels (USD1,987.5) per year from the broilers (300 chickens sold at 26,500 riels).

Ms. Noeun is now excited and confident about her future and opportunities for her family. As a woman agricultural entrepreneur, she is now widely respected at her local community and among her relatives. This opportunity to raise chickens has overall been an empowering experience for her.

Group Saving Mechanisms Can Deliver Inclusive Development

The poor especially women, in Chhouk Village in Koh Kong province, have always had difficulties accessing loans from microfinance institutions (MFIs) and banks. Unable to provide supporting documents and collaterals they are usually deprived of credit opportunities. Farmers have little contact with local authorities, lacking access to information opportunities, and technical resources. Climate change has adversely affected crop production, making crop-based agriculture a risk-prone activity. Drought, dry spells, erratic rainfall, and pest infestation are common climatic problems encountered by farmers. The severity of drought, especially from November to March has increased in recent years. Dry spells have become longer than usual. Farmers who plant in the beginning of the rainy season (May-June) encounter prolonged dry spells can that last until July or August. The onset of heavy rains in August and September cause flooding of rice fields. Rice yield losses are estimated at 40% from drought and 70% from floods. Erratic rainfall poses another problem to the farmers: no rains come in October when rice is at a critical stage that needs water. Pest infestation hits its peak in August to October.

In 2016, the Biodiversity Conservation Corridors Project (BCCP), through the IIRR-CEDAC partnership, supported the establishment of the Family Development Savings Group in Chhouk Village in Koh Kong Province. The goal of the BCC Project in Cambodia is to promote sustainable livelihood for people living in Community Protected Areas (CPA) and Community Forestry (CF) areas. Savings and credit are two key activities supported by this project. The purpose is to reduce the dependency of people living in CF areas on natural resources by diversifying their income sources from agriculture and small businesses.

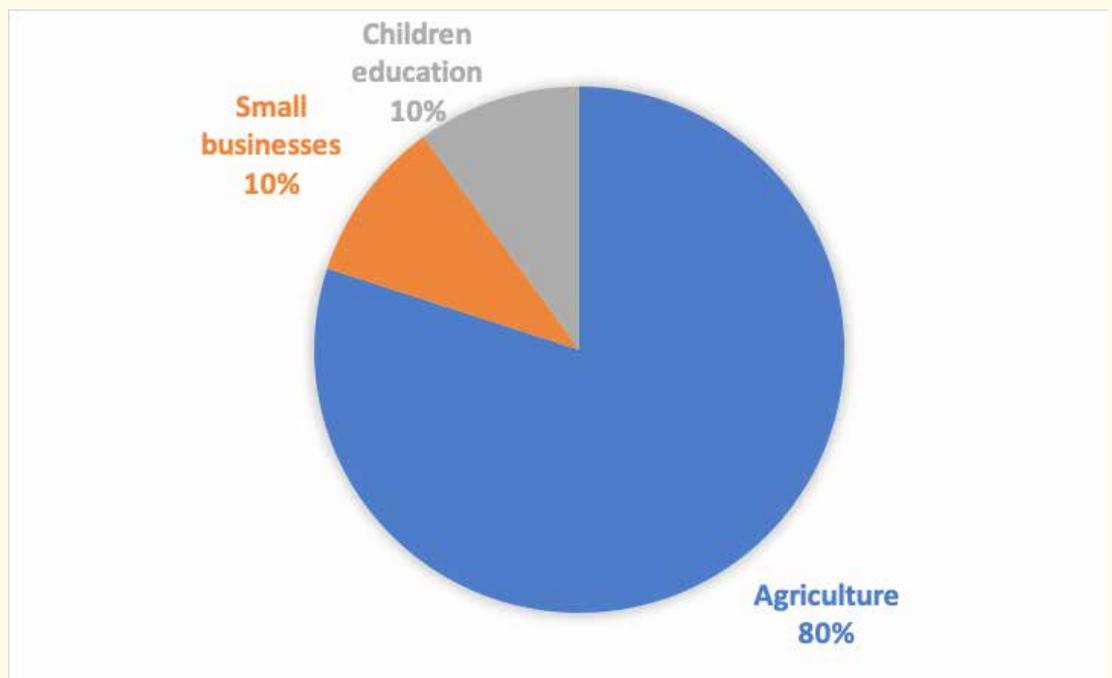


The savings group in Chhouk Village was set up on 01 June 2016. The number of members have since increased from 37 (including 28 women) to 59 (including 46 women). This constitutes about 16% of the 360 families in the village. In setting up the savings program, the group established its own committee members managed by the chief, deputy chief, treasurer, and secretary. The committee members are responsible in managing the daily operations of the savings group, including the following major activities:

- Monthly meetings and closing of entries every 30th of the month;
- General assembly with group members to pay out dividends and collect saving contributions
- Informing and gathering group members to attend BCC Project trainings on nutrition, chicken raising, horticulture (vegetables and fruit trees), and System of Rice Intensification (SRI).

Savings are collected and recorded every month. The monthly savings of each member vary from 5,000 riels to 500,000 riels per month, depending on how much they can afford to set aside. As of March 2020, the total capital of the Chouk Village savings group had reached 158,887,500 riels (USD 39,721.88), plus 74,358,500 riels (USD 18,589.63) in the form of savings and 63,606,400 riels (USD 15,901.6) from the BCCP project. The matching fund from the BCC Project was provided in 3 stages based on the group's performance assessment results. The grant from the project was subsequently increased to 84,529,000 riels (USD 21,132.25), inclusive of the earnings from the interest.

The total amount of outstanding loans provided to 43 group members is 141,895,900 riels (USD 35,473.98). This is 89% of the group's total capital. The maximum duration of a typical borrowing is 12 months, the minimum being 3 months, and the average being six months. The interest rate is 1.5% per month. Majority of the loans were used to support investment. About 80% were used for agriculture. For example one member borrowed 1 million riels (USD 250) to grow watermelon, earning 5 million riels (USD 1,250) within 65-70 days. Some members used their loans to raise chickens. They sold live female chickens for 29,000 riels (USD 7.25) per kilogram and live male chickens for 23,000 riels (USD 5.75). Other members spent their loans to finance small businesses, pay for children's education, build and/or renovate houses, and pay for health emergencies.



The table below highlights the strengths and weaknesses of the saving group as provided by the committee members:

Strength	Weakness
<ul style="list-style-type: none"> • Regularly organizes monthly meeting • Regular loan payments from group members or borrowers, neither late payment nor write-off • Management committee members strongly cooperate and support each other to fulfill their tasks • Clear internal rules and regulations with members complying with the rule • Management committee members are able to make a good presentation in meetings with various stakeholders • Member can communicate with local authorities (e.g. village chief, commune chief) • 13% of the earning is allocated for the management committee members. 	<ul style="list-style-type: none"> • Few management committee do not know how to do computer assisted closing entries. Now, only chief of the group know how to use the computer program for closing entry. • Level of saving is still small. Some members saved small amount, but wanted to borrow big amount.

Since the establishment of the savings group, members have gained improved access to credit services. They have stopped relying on MFIs, banks, and private money lenders that charge very high interest rates (10% per month). Instead, members have increasingly applied for loans in the savings group, which reduced the outflow of interest earnings to outsiders. More importantly, the group members have reduced their dependency on natural resources and have created more sources of income from agriculture and small businesses. The savings group plans to create a community market where members or villagers can bring their agricultural products to sell to buyers. It also plans to create a new savings group for additional farmers to save money. Members find it better a better option than to increase members because it is easier to manage.

Around 7% of the group's total earnings is allocated to natural resource conservation, like patrolling activities. Some are also allocated for charity. Recently, the savings group provided two group members who had accidents 300,000 riels each for treatment.



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The Asian Development Bank (ADB) supported Cambodia BCC project takes a multi-purpose, sustainable, biodiversity landscapes approach. The Project covers 22 communes (12 in Monduliri and 10 in Koh Kong) located across 10 districts with a total population of approximately 68,048 (2008 census) in both provinces and households numbering just over 14,000. The Project in both Koh Kong and Monduliri provinces is predominantly in mountainous areas covered with protected forests, national parks, and wildlife sanctuaries. An estimated 2,600 households will benefit from the Project with diversified livelihood assets and/or income generating opportunities.

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