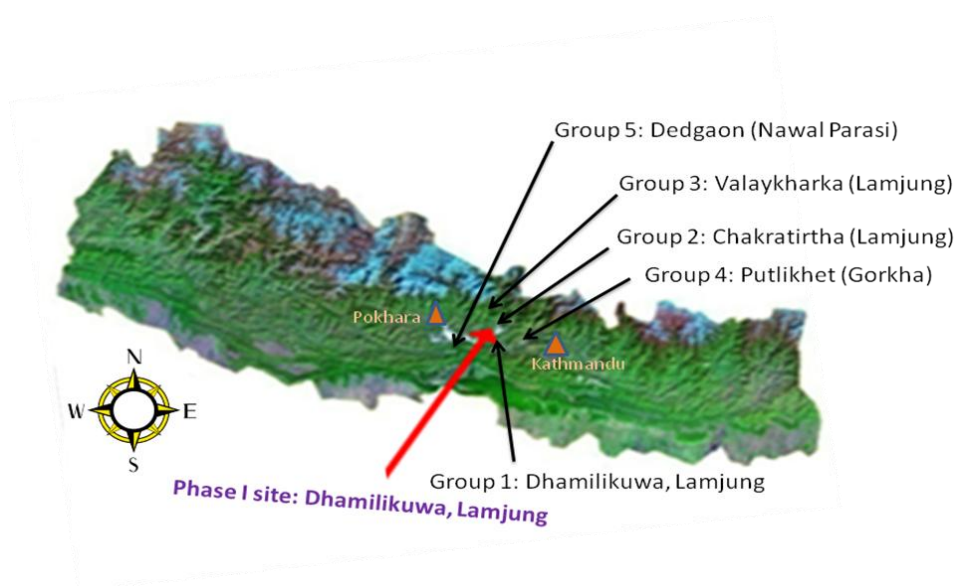


Final Report

Small-Scale Aquaculture Program

AwF-Nepal: Phase II

(1 April 2010 –31 March 2012)



**Prepared
by**

Ram C Bhujel¹, Madhav K Shrestha², Hare Ram Devkota³ and Agni Nepal³

¹Asian Institute of Technology (AIT), Thailand

²Institute of Agriculture and Animal Sciences (IAAS), Chitwan, Nepal

³Nepal Agriculture Research Council (NARC)

July 2012

Executive Summary

This report is the summary of activities and outcomes of the AwF-Nepal Project Phase II accomplished during the project period (1 April 2010 – 31 March 2012). This project is the extension and expansion of the 2-year AwF-Nepal project initiated in Rainas Tar, Lamjung in 2008.

Ninety (90) families were supported to incorporate small-scale aquaculture in their farming system in three districts; namely, Lamjung (Dhamilikuwa, Chakratirtha and Valayakharka), Gorkha (Putlikhet) and Nawal Parasi (Dedhgaon). Farmers were organized in five groups of 14, 15, 23, 22 and 16 respectively. Project was expanded to two locations namely; Valayakharka (Lamjung) and Dedhgaon (Nawal Parasi) in the second year after successful launching in three locations during the first year (2011).

Overall average size of the pond was 49m² with a range of 29 - 75 m². Total fish production per family ranged from 7.6 - 126 kg with the overall average of 37kg. Out of which over half (51%, range 18-61%) was sold. Without proper feeding, productivity of ponds remained reasonably high i.e. 7.2 ton per ha (range 1.9-21.2 ton/ha). Among the five groups, the group in Gorkha showed excellent results. Total production of the group reached to 1.9 to in 2010 which increased to 2.8 ton in 2011 with the productivity of 14.6 and 21.2 ton per ha respectively which demonstrated the possibility of earnings (up to US\$3.38 per capita per day) required to cross the poverty bench mark (1.25) set by the World Bank.

Results showed that small-scale aquaculture has a potential to supplement family income and contribute to reduce poverty in addition to producing animal protein at home.. The project has been successful in fulfilling the objectives; therefore, it should serve as a model and be expanded throughout the country as a national campaign.

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1. Introduction

1.1 Background

Nepal lies between rapidly growing two giant countries; India and China. Despite possessing huge natural and human resources, Nepal is lagging behind and is struggling to recover from the decade-long internal conflicts. Over 80% out of 30 million people still live in rural areas relying on subsistence agriculture. More than half of the rural population suffers from food shortages. Animal products are scarce; most people consume cereals and root crops as staple. Women and children suffer the most from food shortages and protein malnutrition. About 90% children suffer from one or more forms of malnutrition and under-5 mortality rate (8.2%) is one of the highest in the world. It is very alarming that about 1/4th people die before the age of 40; half of them are due to some forms of malnutrition.

In rural Nepal, migration of men to cities within the country or abroad to earn cash is a common tradition. In the recent past, the number has increased drastically. Government data show that over 1,000 people leave the country daily to work. They are mostly youngsters and males. Most women stay at home as housewives to take care kids, elderly and family farms. Agricultural lands are often left without farming in many areas due to difficulty for women to grow crops as it has to be done manually. It has also been difficult for those women to keep large animals which need proper care daily or even hourly. Therefore, women in rural areas are normally over burdened and work around 18 hours daily; 5 am to 11 pm. After realizing these problems, AwF Project Team has been promoting small-scale aquaculture since 2000 as a potential better alternative where water is available to fill the ponds. Demand for fish is high but catch from the wild is declining. Therefore, many farmers are attracted towards fish farming. People are becoming aware of the fact that fish is the best source of high quality protein as it contains well balanced amino acids without animal fats, most minerals especially iron (Fe), and some vitamins such as A, D and son on. The team is promoting small-ponds close to family house so that families can protect and can catch fish any time they like to eat, which means frequency animal protein intake increases. Therefore, simply support to have a small pond each family and culturing few hundred fish as a part of farming system can be one of the solutions to the cope with malnutrition. It can also help solve the problem of cash money required for household purposes such as children's fees buy clothes and celebrate festivals. AwF Team is making efforts on promoting fish farming integrated with vegetable gardening and animal husbandry in rural areas of Nepal so that farmers can utilize animal urine/manure to fertilize the ponds and utilize kitchen wastes; crop byproducts such as rice/maize bran and oil cakes and others available on-farm as fish feed for which they do not need to pay for.

AwF Team in Nepal is promoting small ponds to be constructed near the family house to avoid fish stealing and adjacent to the vegetable gardens so that vegetable leaves can be

pond inputs and green water from the pond can be used to irrigate vegetables. These activities can be managed by women with very little efforts. Experiences have showed that marginalized ethnic women have been found to be very enthusiastic in farming fish forming groups.

1.2 Goal and Objectives

The Goal:

The main goal of the project is to solve malnutrition and reduce rural poverty through aquaculture

Specific objectives of the project are to:

- produce high quality protein at home for family consumption
- generate supplemental income for the family from fish sales
- empower women in rural areas of Nepal by forming women's fish farming groups and cooperatives so that they can carry on their activities and also further expand fish farming by themselves
- help expand small-scale aquaculture to other parts Nepal
- test and further improve the productivity and efficiency of AwF-Nepal model of small-scale aquaculture
- to disseminate the project idea nationwide and also globally

2. Project Implementation

2.1 Project Sites

This report covers the activities of AwF-Nepal Phase II project which is the scale-up program of earlier phase implemented in Dhamilikuwa (Lamjung) where 70 families were organized in three groups. Out of them, 32 farmers are in a cooperative and the rest are growing fish in their ponds continuously even though they are not directly within the cooperative. During the second phase, one new group of 14 women was established in the same village and extended to two additional villages i.e. Chakratirtha and Valayakharka in the same district where Champawati and Pragati cooperatives have been registered respectively. The activities have also been expanded to two more districts; namely, Gorkha (Putlikhet) adjacent district in the east and Nawalparasi (Dedhgaon) as shown in the Fig. 1. All the project locations are in the mid-hills near the Annapurna range. AwF is funding this small-scale aquaculture program in mid-hills of Nepal started in Rainas Tar, Lamjung, Nepal in 2008.

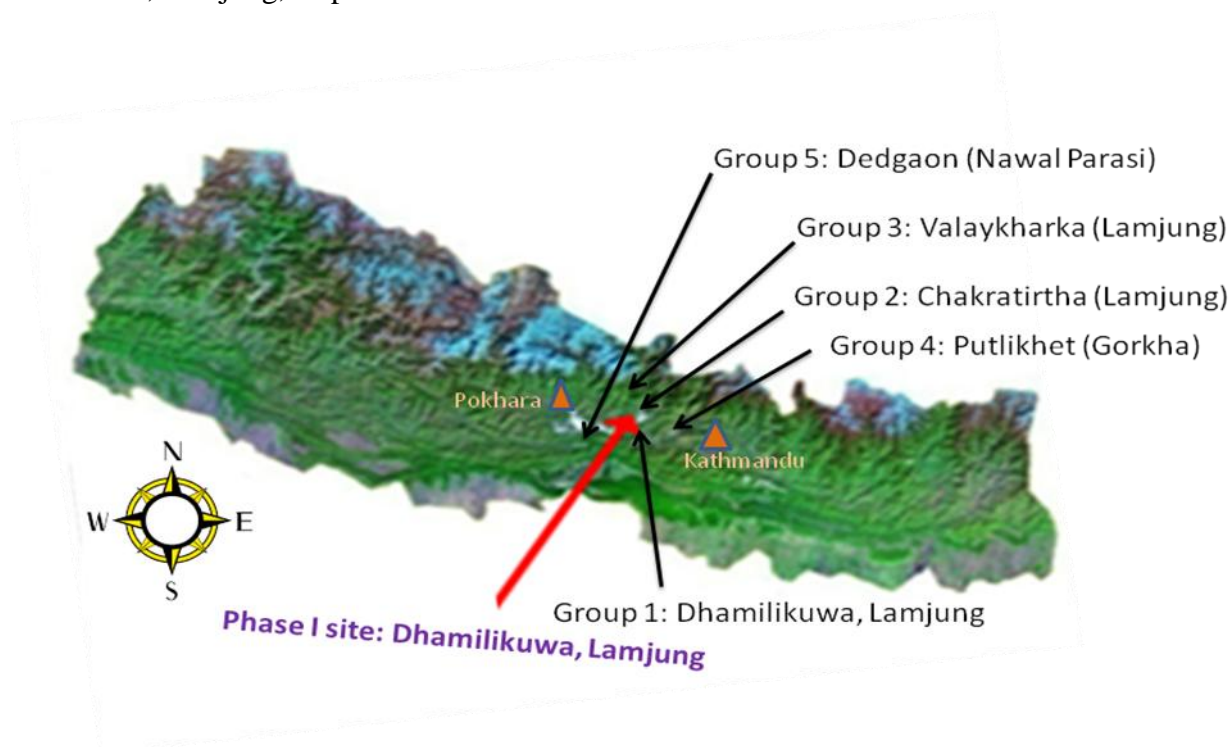


Fig. 1 Expansion of AwF Project in mid-hills of Nepal from three groups during phase I (2008-2009) to additional 5 groups during Phase II (2010-2011).

2.2 The Project Team and Organizations Involved

1. **Team Leader:** Dr Ram C. Bhujel (Asian Institute of Technology, Thailand)
2. **Country Coordinator:** Prof Madhav Shrestha (Institute of Agriculture and Animal Science, IAAS, Nepal)

3. **Project Manager:** Mr Hare Ram Devkota (Nepal Agriculture Research Council, NARC)
4. **Technical expert:** Agni Nepal: (Nepal Agriculture Research Council (NARC))
5. **Local Coordinators:** Mr Khagaraj Nakhola (Lamjung Fish Farmers' Association), Mr Krishna Raj Pandey (Gorkha and Lamjung), Mr Prem P. Pokharel (Lamjung Valayakhark) and some others.
6. **Associated Partners:**
 - a. District Agriculture Development Offices (DADO, Lamjung & Gorkha), Ministry of Agriculture and Cooperatives, Government of Nepal
 - b. Rainas Tar Development Committee, an local NGO
 - c. PASS-Nepal, a local NGO

2.3 Project Initiation

The AwF Nepal, Phase II project was initiated with a visit during April 12-14, 2010 when Dr Ram C. Bhujel was on a mission trip to Nepal for EU Aqua-Internship program. Detailed activities have been given in "Project Initiation Report available at <http://www.aquaculturewithoutfrontiers.org/projects/>. Basic framework mentioned in the report prepared by Dr Ram C. Bhujel and Dr Madhav Shrestha on 12th April 2010 at IAAS remained the same except some modifications and changes are highlighted as:

1. As planned, the project has been hosted by IAAS, Chitwan, Nepal and Dr Madhav Shrestha has served as Technical Advisor / Country Coordinator or PI for the host institution, IAAS.
2. Hare Ram Devkota who served as overall Field Coordinator joined Nepal Agriculture Research Council. His responsibility was given to Mr Khagaraj Nakhola who is the Chair of the Fish Growers Association.
3. The RDC Chair, Mr Babu Ram Chiluwal was responsible for RDC, Rainas Tar/Dhamilikuwa (previous AwF farmers and also one new group). He was assisted by Mr Krishna Raj Pandey who was also responsible for the group in Putlikhet, Gorakha (Site 3) where farmers have got extremely good results.
4. Agni Nepal together with Dr Madhav Shrestha and Jiyan Chaudhary took responsibility of Dedhgaon, Nawal Parasi (Site 5) where project was launched in the Year II.

2.4 Field visits and guidance

2.4.1 Visit to Chakratirtha VDC, Lamjung

The Project Team visited the village on 5th November 2010 including that of Mr Laxmi Bhatta who is facilitating the project activities including forming the women's group, training them and others. Most of the ponds visited had very green water. One of the farmers had water leakage problem because of presence of gravel

at the bottom of pond. Similarly, Mr Bhatta and his relatives showed problems of snake, and swimming water bug which attacks fish.

2.4.2 Meeting with Rainas Tar Development Committee (RDC) Officials

After completion of the meeting in Chakratirtha VDC, the Project Team (4 persons) observed more than 20 fish ponds constructed under the AwF-Nepal Phase I. Families were met and discussed about their experience of farming fish. Almost all of them expressed that they are benefitting from fish farming and there was indications that they will continue in long term basis, as most of the ponds are next to their houses (Fig. 2) which can be taken care of easily. For example, some farmers are already moving towards commercially integrated farming. Several farmers which we visited have bigger ponds than average and some farmers have small ponds with pig sheds. One of the remarkable progresses was seen common carp farming in paddy field.



Fig. 2 Ponds are built close to house so that they can through left over kitchen waste, drain urine from animal shed to the pond, grow vegetables on the dike or nearby, use water to irrigate, and safeguard their ponds in the night.

2.4.3 Training programs in Lamjung and Gorkha

A total of 15 enthusiastic women from Chakratirtha Village were gathered for one-day training in Sharada Lower Secondary School on November 4, 2011. Mr Hare Ram Devkota, Nabin Khanal (MS graduates in Aquaculture of IAAS were the main trainers. Mr Kishor Pant (Chief) and Kul Prasad Adhikary from District Agriculture Development Office were also present. Mr Pant also gave the benefits of working in group and as cooperative. During the training Prof Peter Edwards (AIT, Thailand) was present together with Dr Ram Bhujel. Both of them highlighted the importance of small-scale aquaculture and described the situations in other countries such as Bangladesh, Thailand, Vietnam and other countries encouraging them to move forward in group.

Similar training program (Table 1&2, Fig. 3) was also conducted to the women of Gorkha at Khoplang village in Gorkha on November 3, 2011. Twenty women received training. Resource persons were same as in Chakratirtha, Lamjung. Training manuals were supplied to the participants on both sites during the training.

Table 1. Training program organized for various groups.

Site	Date	Topics	Subject Matter Specialists (SMS)	Time
Gorkha	2 Bhadra	Opening	S Chiluwal	
	2 Bhadra	Water Quality Management	H R Devkota	10-10.30
	2 Bhadra	Fish Disease Management	A P Nepal	10.30-11
	2 Bhadra	Feed Management	H R Devkota	11-11.30
	2 Bhadra	Integrated Fish Culture	A P Nepal+ HR Devkota	11.30-12.30
		Break		
	2 Bhadra	Breeding (Common Carp)	H R Devkota	1-1.30
	2 Bhadra	Gender Mobilization	AP Nepal	1.30-2
	2 Bhadra	(Cooperative) - Closing	K.P. Pandey	2-2.30
Lamjung	3 Bhadra	Opening	S Chiluwal	
	3 Bhadra	Water Quality Management	H R Devkota	10-10.30
	3 Bhadra	Fish Disease Management	A P Nepal	10.30-11
	3 Bhadra	Feed Management	H R Devkota	11-11.30
	3 Bhadra	Integrated Fish Culture	A P Nepal+ Hr Devkota	11.30-12.30
		Break		
	3 Bhadra	Gender Mobilization	AP Nepal	1.30-2
	3 Bhadra	(Cooperative) - Closing	K Nakhola	2-2.30

Table 2. Training program organized for various groups in Lamjung and Gorkha

Time (2068 - 7-17-18)	9:30	10:30	11:00	11:30	12:00	12:30	1:00	2:00	5:00
subject	Form al progr am	Pond constr uction	Feed and feeding	Water quality	Fish disease	Integrated Fish farming technolog y	Role of gender in aquaculture commercia lization	Group mobilizatio n/ cooperative registration	Lunch and field observati on in Gorkha
Respon sibility	DFF A	HR Devko ta	HR Devkot a	HR Devko ta	AP Nepal	HR Devkota	AP Nepal	CLC ¹	
Subject	Form al progr am	Pond constr uction/	Feed and feeding	Water quality	Fish disease	Integrated Fish farming technolog y	Role of gender in aquaculture commercia lization	Group mobilizatio n/ cooperative registration	Lunch and field observati on in Lamjung
Respon sibility	DFF A	HR Devko ta	HR Devkot a	HR Devko ta	HR Devko ta	HR Devkota	HR Devkota	PASS ² Nepal	

¹. Basu Acharya Gorkha, President, Community Learning Center (CLC)

². Prem Prasad Pokhrel, President, Pass Nepal



Fig 3. Training program in Gorkha

2.4.4 Expansion to Dedhgaon VDC of Nawalparasi District

Dedhgaon VDC is situated in Nawalparasi district, which lies in the bank of Kaligandaki river basin, mid hills of Nepal. Dedhgaon is about 65 km north from Gaidakot of Nawalparasi (across West of Narayangarh, Chitwan), and about 30 km South from Khairenitar Bazar of Prithvi Highway (Pokhara-Kathmandu highway). Dedhgaon is an upland (Taar) area depends on monsoon for field crops. Small source of water can be used for irrigation until Feb-March. However, farmers were interested for fish culture. Few farmers could use tap water and small sources of water for small ponds. AwF supported the farmers to construct the ponds by using plastic lining, which holds the water easily for about 10-12 months. As the farmers were very keen in fish culture, AwF supported the farmers technically and financially covering partial cost to construct 50 m² ponds per family including cost of fingerlings. Farmers were trained on how to fertilize their ponds using manure and chemical fertilizers as well as what and how to feed the fish using locally available farm by-products.

The followings were the stepwise activities carried out for this group to be able to start:

1. First visit for discussion with farmers: 6 January 2011
2. Initial group formation and site selection: 31 January 2011
3. Pond construction training/demonstration: 6 March 2011
4. Training on fish culture: 19 April 2011
5. Stocking of Common carp fry (1200) : 25 April 2011
6. Stocking tilapia fry (600): 21 June 2011
7. Harvesting: Jan-Mar 2012

Table 3 List of group members in Dedhgaon who received training on fish culture

SN	Name of the farmer	Designation	Address
1.	Mr. Rameshwor Bohara	Chairperson	Dedhgaon – ward no. 4
2.	Mr. Hum Bahadur Thada	Vice-chair	Dedhgaon – ward no. 7
3.	Mr. Maniram Rana	Secretary	Dedhgaon – ward no. 6
4.	Mrs. Bhanu Maya BK	Treasurer	Dedhgaon – ward no. 4
5.	Mr. Ganga Ram Rana	Member	Dedhgaon – ward no. 4
6.	Mr. Rup Bahadur BK	Member	Dedhgaon – ward no. 5

7.	Mr. Mana Bahadur Nepali	Member	Dedhgaon – ward no. 7
8.	Mr. Lal Bahadur Nepali	Member	Dedhgaon – ward no. 5
9.	Mr. Chopi Ram Rana	Member	Dedhgaon – ward no. 4
10.	Mrs. Ghanisara Rana	Member	Dedhgaon – ward no. 6
11.	Mr. Tak Bir BK	Member	Dedhgaon – ward no. 4
12.	Mrs. Til Kumari Bohara	Member	Dedhgaon – ward no. 4
13.	Mr. Arjun Bohara	Member	Dedhgaon – ward no. 4
14.	Mr. Mahendra Bohara	Member	Dedhgaon – ward no. 4
15.	Mrs. Jyoti Bohara	Member	Dedhgaon – ward no. 4
16.	Mr. Khadga Bahadur Saru	Member	Dedhgaon – ward no. 4

Two persons have been constructed new ponds this year, they are:

1. Kaman Jit Darai
2. Thule Darai

2.5 Involvement of the Government

The Team Leader together with Local Coordinators visited the District Agriculture Development Office (DADO), Lamjung on April 14, 2010 to discuss about the possible collaborations. The Chief of the DADO, Mr Kishore Pant (Chief) and Kul Prashad Adhikari (SMS i.e. Subject Matter Specialist) provided the brief overview of the agriculture situation in the district and also highlighted the need of commercialization of agriculture. The purpose of visit was to discuss about the possibility of scaling-up of the aquaculture program in the whole district. More importantly, DADO as a government authority, has been asked to get involved more and take a responsibility of continuing the program after the AwF project beyond the project period. According to Mr Pant, Fish farming has been one of the interests of the office because of AwF program. The chief also mentioned that Government has a policy and plan for agriculture commercialization under which 5-6 fish AwF farmers will be supported to increase production towards commercialization so that others will also follow the same. This has happened Gorakha already. Similarly, it was also mentioned that transport of fry from government stations to the farmers groups can be supported/facilitated. Mr Pant and his colleague were present during the training when Peter visited the site. It indicates there are continuous supports from the government / DADO to the AwF project and its farmers. Farmers are not left out after AwF project and its supports while leaving to other districts for expansion.

A 2-day workshop was organized at District Agriculture Development Office, Besisahar, Lamjung on February 9-10, 2011 with an objective to discuss on the possibilities, opportunities and constraints of fish farming in hills and lower mountainous areas of Lamjung district. Dr Madhav Shrestha from IAAS presented a working paper. Workshop was attended by 42 participants. Participants were farmers interested for fish farming, representatives from NGOs based in Lamjung, District Agriculture Development officials and the Chief of the Lamjung Campus, a satellite college of IAAS, Rampur. The workshop was organized by District Fish Farmer's Association (DFFA) of Lamjung and

sponsored jointly by District Agriculture Development Office (DADO) of the same district and Institute of Agriculture and Animal Science, Rampur Chitwan. The workshop came out with the district fish farming program planning for the coming year. DFFA Lamjung published a Calendar for Nepali Year 2068 with information on fish farming for publicity purpose.

Similarly, in Gorkha (Putlikhet), five farmers have already been supported by government to increase their fish ponds as a part of commercialization. Under the “Mission Fish” program, government is encouraging farmers to produce large volume and providing subsidies such as those, either individually or in groups who produce a ton of fish will receive 100,000 NRs. Under that program a total of 20 farmers in Gorkha districts were supported by the government farm in Bhairahawa via District Agriculture Development Office (DADO), Gorkha. Out of which five AwF project farmers were selected and provided with 15,000 NRs (approx. US\$200) per family to increase the size of ponds to over 100 m², buy some locally available ingredients as fish feed, buy more fingerlings to stock in addition to the support provided by the AwF Team and Community Learning Center which was mainly training and initial partial financial supports.

3 Continuity and Dissemination (C&D)

A proposal has been developed and submitted to AwF along with this report requesting for major two activities;

3.1 Fund Raising for Continuity

Sales of the T-shirts (Fig. 4) donated by Ram and his wife, Sukanya has raised about US\$960 so far. Half of the T-shirts were sold during the Global Aquaculture Conference during September 13-15, 2010 in Phuket, Thailand organized by FAO/NACA. Some of the members of the Board of Directors helped by purchasing 10 T-shirts each. All the funds generated from the sales of the T-shirts with AwF logo will be spent for the expansion of the project activities in nearby districts which will be decided later.

The information about the T-shirt, booking and on-line payment can be found at:

<http://www.see-thailand.com/whcove.html>



Fig. 4 AwF-T shirts for fund raising (Price US\$30)

3.2 Continuity

Considering the suggestion from the field staff, farmer's felt-need and the shortage of fish seed in the area, a proposal has been developed and submitted to AwF to establish a Cooperative Fish Hatchery (**Co-Hatchery**), Cooperative Feed Mills (**Coo-Mill**) and a "**Farmer's School**" which will serve as technology support and community learning center. The center will organize training to the fish farmers charging nominal fees which will be a part of income. It will liaise with government agencies, NGOs and farmers organizations in addition to supplying fish fingerlings, other inputs and materials. A part of (such as 50%) of the profit of the hatchery and training will be used to promote fish farming in surrounding areas.

3.3 Dissemination

Country wide campaign and Dissemination: campaigning for country wide expansion via mass media (TV, FM radio, internet and social media). As part of this, a Facebook group called "Nepal Aquaculture Promotion (NAP) group:

[\(http://www.facebook.com/#!/groups/223016191061632/\)](http://www.facebook.com/#!/groups/223016191061632/) has been created and promotion of small-aquaculture has been initiated.

4 Results / outcomes

4.1 Project sites and beneficiaries

After launching the first phase of AwF-Nepal project successfully in Dhamilikuwa / Rainastar Village of Lamjung district supporting 70 families during 2009-2010, the project team expanded its activities to adjacent villages within the same district (Lamjung) and also to other districts, namely; Gorkha and Nawalparasi in the second phase during 2010 – 2011. During the second phase of the AwF project, a total of 90 fish ponds for 90 families, a pond for each family, were constructed over the period of 2 years, out of which 51 were constructed in the year 2010 and the remaining in the 2nd year i.e. 2011. Total direct beneficiaries or the family members were over 400 (Table 4 & Fig. 5). The farmers were in five groups range from 14 – 23 per group/ location. Three groups are in Lamjung district. A group of 14 additional farmers constructed ponds in during the first year (2010) of the project in Dhamilikuwa where 70 farmers were already in three groups in the Phase I (2008-2010) of project. Similarly, expanding towards northern part from Dhamilikuwa, a group of 15 farmers in Chakratirtha VDC ward no. 8 have registered as Champhawati Cooperative after forming a year of group establishment. Expanding further north 23 members have already registered a cooperative named Pragati Cooperative in Valayakharka. As a part of expansion plan project activities were initiated in Putlikhet of Gaikhur VDC, Gorkha considering the availability of good water resource (stream) and the interest of the farmers. Twenty two farmers are in this fourth group. Fifth group comprised of 16 farmers, was organized in Dedhgaon which is situated hilly part of

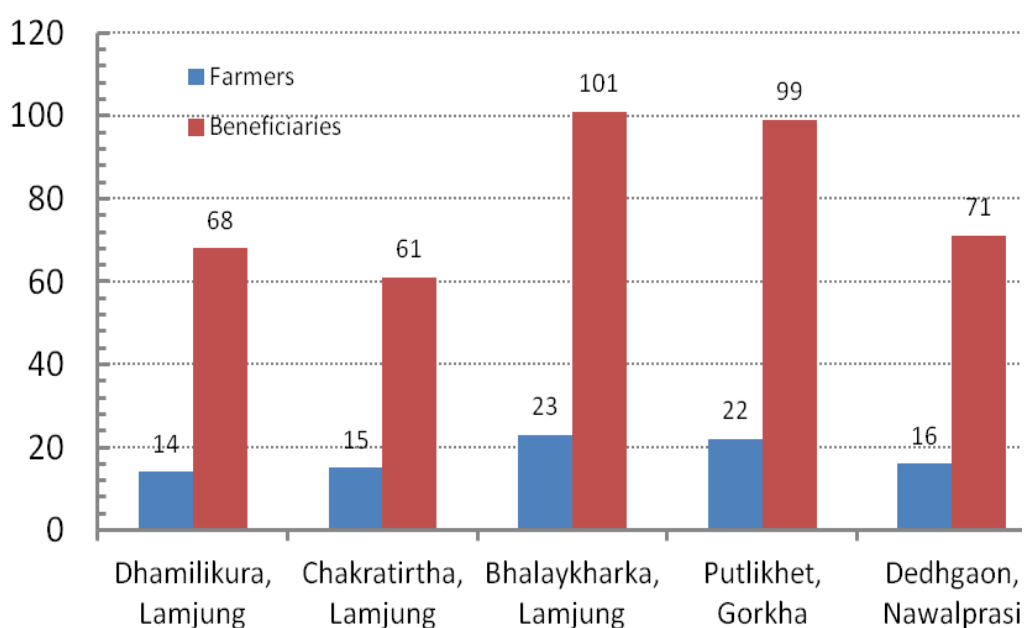


Fig. 5 No. of families and beneficiaries supported by AwF-Nepal

Nawalparasi district. Despite the target of 100 families, during this Phase II project period, 90 families were supported which means success rate can be considered 90% in terms of number of beneficiaries. Results showed that two groups in Lamjung and the group in Nawalparasi had fewer than 20 families that was set as target. Project Team considered the sustainability of the project and used the policy of voluntary participation rather than including farmers by force. More importantly, farmers' group was allowed to make decision in scrutinizing the farmers in each location keeping mind in long-term sustainability and the functionality of the group.

4.2 Fish ponds and production

A total of 90 fish ponds were constructed with the total area of nearly 0.5 ha with the average size of 49 m² with the range from 29 – 75 m². Almost all the ponds are very small (<50m²) except in Gorkha where 50% ponds are bigger than 50m².

Total production of fish reached nearly 6 ton with 36 kg average production per family (range 7.6 – 126 kg). Fish production in Gorkha has the highest values i.e. 86.2 kg and 126 kg per family as compared to other groups due to the larger size of ponds constructed, use of three species polyculture, adequate good water and better management as evidenced from the well organized group of farmers. In Lamjung Champawati Cooperative produced 20.2 kg per family which is more than double the amount in other groups of Lamjung i.e. 7.7 kg due to the same reasons. Although the size of ponds was almost double in Nawalparasi as compared to Champawati Cooperative in Lamjung, the amount of fish produced per family is almost half i.e. 11.3 kg of the amount produced.

4.3 Productivity

Highest fish productivity was achieved 21.2 ton/ha/crop in Gorkha in 2011 which was increased from 14.6 ton in 2010 (Fig. 6). In other districts / locations productivity remained reasonable, the range of which was 2 – 5 ton per ha per crop.

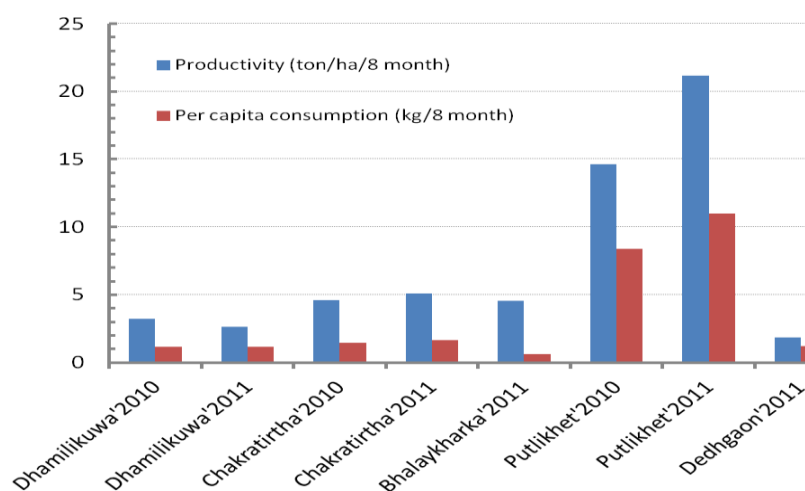


Fig. 6 Fish productivity and consumption per capita per season

Table 4. Families, Fish ponds and productivity (AwF-Nepal, Phase II Project: 2010-2011)

Districts →	Lamjung					Gorkha		Nawal Parasi	Overall	
Groups / Cooperatives	Dhamilikuwa		Champawati Coop. (Chakratirtha-8)		Pragati Coop. (Valaya Kharka)	Putlikhet		Dedhgaon		
Year	2010	2011	2010	2011	2011	2010	2011	2011	Total	Average
No. of families	14	14	15	15	23	22	22	16	90	18
Family size	4.9	4.9	4.3	4.4	4.4	4.5	4.5	4.4		4.5
Total beneficiaries	68	68	64	61	101	99	99	71	403	
Total pond area	409	409	670	621	679	1,540	1,540	1,200	4,498	884
Average ponds size	29	29	45	44	30	70	70	75		49
Total Fish Consumption (kg/yr)	78	80	86	100	55	830	1,086	81	2,396	300
Fish consumption per family/yr	5.6	5.7	6.1	7.1	2.6	37.7	49.4	5.4	26.6	17.0
Fish consumption per capita/yr	1.1	1.2	1.4	1.6	0.6	8.4	11.0	1.2		3.8
Fish consumption (%)	64%	75%	30%	33%	19%	44%	39%	41%		46%
Fish sales (kg/family/yr)	3.1	1.4	7	5	3.6	48	77	7.7	153	19
Per cent fish sale	36%	18%	34%	23%	27%	56%	61%	59%		51%
Total fish production (kg)/Group	115	107	304	300	284	1,896	2,773	181	5,960	745
Total fish production (kg/family/Yr)	8.7	7.6	20.7	21.4	13.5	86.2	126.0	13.1		37.2
Remaining in ponds (kg)		0.6	114	130	153				398	99
Productivity (kg/m2)	0.3	0.3	0.5	0.5	0.6	1.5	2.1	0.2		0.7
Productivity (ton/ha)	3.2	2.6	4.6	5.1	4.5	14.6	21.2	1.9		7.2

4.4 Fish consumption and sales

Out of the total fish produced, about half of the amount was consumed by the families which means, fish ponds considerably contributed to the family diet. Average fish consumption was 300 kg per group. Highest fish consumption was in Gorkha which was 830 kg in 2010 and 1,086 kg in 2011 (Fig 7) where per capita fish consumption reached up to 11 kg per year which is 5 times more than the national average. In other groups the per capita consumption ranged from 0.6 – 1.6 which is still lower than the national average. Families sold about half (51%) of their fish produced in an average; however, it was about 60% in the case of higher fish producing groups such as Gorkha and also in Nawalparasi, whereas the sales were less than one-third in the case of other groups.

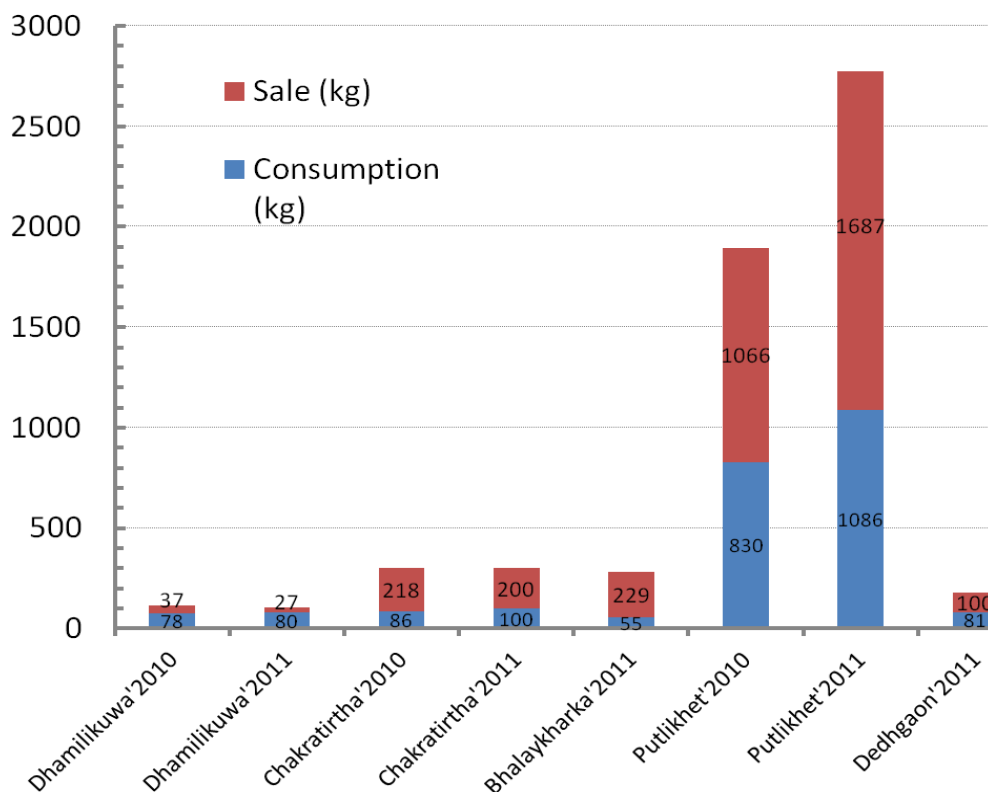


Fig. 7 Fish consumption and sale in various groups (kg / 8 months)

4.5 Income generation

Level of income generated through farming of fish is presented in Table 5 and Fig 8. Results showed that total value of fish produced within the project period (2 years) from all the groups is nearly US\$11,920 which is almost the total cash investment made on behalf of the AwF. However, half of that is from Gorkha; and that was in the second year alone where an additional intervention to increase production of five farmers was made by the government as a part of collaboration. The intervention increased production; the value of in turn increased their per capita income of more than US\$1.25 per day which is the poverty bench mark set by the World Bank. This shows that aquaculture has a potential of poverty reduction, if introduced / implemented in an appropriate way.

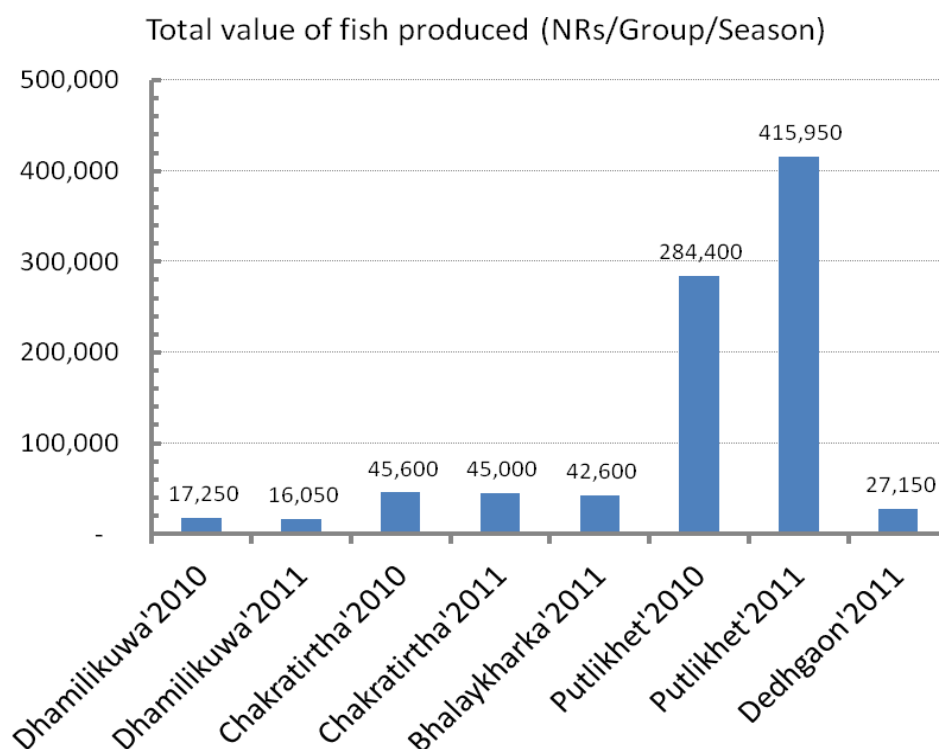


Fig. 8 Total value of fish produced (NRs) per group per season (8 months)

Table 5. Income generation (AwF-Nepal II: 2010-2011)

Districts →	Lamjung					Gorkha		Nawal Parasi	Overall	
Groups / Cooperatives	Dhamilikuwa		Champawati Cooperative (Chakratirtha-8)		Pragati Coop. (Valaya Kharka)	Putlikhet		Dedhgaon		
Year	2010	2011	2010	2011	2011	2010	2011	2011	Total	Mean
Income from fish sale (NRs)/family	463	204	1,040	750	543	7,268	11,502	1,155	22,924	2,866
Total value of fish produced (NRs)	17,250	16,050	45,600	45,000	42,600	284,400	415,950	27,150	894,000	111,750
Total value of fish produced (US\$)	230	214	608	600	568	3,792	5,546	362	11,920	1,490
Potential income (US\$/family/day)	0.6	0.6	1.7	1.6	1.6	10.4	15.2	1.0	32.7	4.1
Potential income (US\$/capita/day)	0.13	0.12	0.39	0.38	0.35	<u>2.31</u>	<u>3.38</u>	0.23		0.90

Price of fish is assumed to be NRs 150 per kg.

Average exchange rate in 2010 and 2011 was assumed to be 75 Rs per US Dollar

Per capita income with bold and underlined values are above the poverty bench mark of US\$1.25 / capita/day set by the World Bank.

5 Financial Report

The cost of the project is presented in Table 6. All the expenses are within the planned activities. IAAS, Nepal, the host of the project, has received two installments so far and yet to receive US\$1,605 as the final payment.

Table 6 Expenses of AwF Nepal II Project (April 2010 - March 2012)

Cost items:	Rate (US\$)	Total budget US\$	Year I Expenses		Year II Expenses		Total Expenses NRs
			US\$	NRs	US\$	NRs	
1. Personnel							
1.1 Project Leader (man-days)	Volunteer	-	-	-	-	-	-
1.2 Technical expert (man-days)	Volunteer	-	-	-	-	-	-
1.3 Field Manager (man-month)	200	4800	2,400	179,520	2,400	171,720	351,240
2. Travel							
1.1 Team Leader	-	-	-	-	-	-	-
1.2 Technical consultant	-	-	-	-	-	-	-
1.3 Project/Field Manager	100	1200	600	44,880	600	42,930	87,810
3. Women's group							
1.1 Revolving fund (for Coop.)	350	1750	-	-	1,750	125,213	125,213
1.2 Training expenses	100	400	400	29,920	-	-	29,920
4. Pond construction (50%)	40	3,200	2,080	155,584	1,120	80,136	235,720
5. Equipment and materials	500	2,500	1,500	112,200	1,000	71,550	183,750
6. Stationeries (per m)	20	480	240	17,952	240	17,172	35,124
7. Communication (per m)	30	720	300	22,440	420	30,051	52,491
8. Miscellaneous (per m)	10	240		-	240	17,952	17,952
Sub-Total		15,290	7,520	562,496	7,770	556,724	1,119,220
9. Overhead (5% for IAAS)		765	-	-	765	54,736	54,736
Grand total		16,055	7,520	562,496	8,535	611,459	1,173,955
Received		1,057,339	7,225	540,408	7,225	516,931	14,450
To receive (US\$)		1,605					

6 Monitoring and Evaluation

6.1 Visit by Peter Edwards

Ram organized a trip to visit AwF project site taking an opportunity of having EU project at IAAS. Prof Peter Edwards also joined the trip, who was also requested to visit AwF project site and prepare a report. He also has written an article (Edwards, 2011) in Aquaculture Asia Magazine published by Network Aquaculture Centers in Asia-Pacific (NACA). The visit was organized on November 4, 2010. On the same day, 15 women's group was having training. As seen in the Fig 9 at the back, he gave a brief speech (translated by Ram) to the trainee women.



Fig. 9 Above: Training of women's group (Champawati Cooperative groups) together with Prof Peter Edwards and Dr Ram C Bhujel from AIT, Thailand; Mr Kishor Pant, Chief of the District Agriculture Development Officer (DADO). Below: Students in a school library for which AwF project purchased books and scientific materials.

The training was organized at a Primary School which received some supports from the project. The School Headmaster (Mr Mohan Shrestha) and other teachers showed the books and other teaching materials for science and other subjects which have been stored in a room in a newly built Library building. The Library Building was built by the 'Room-to-Read (www.roomtoread.org)' an international NGO. Kids (Fig 3) and the staff seem to be happy with the support. Afterwards, Peter visited the old farmers of first phase of the AwF project site of Rainas Tar. He visited about 10 family ponds.

6.2 Visit of Nicolas Mazurier

A volunteer, **Nicolas Mazurier** from Spain visited the AwF project sites contacting through Dave Conley, Executive Director and then Ram C. Bhujel, Team Leader, AwF-Nepal program. He visited all the three AwF project sites in October 2011. Nicolas has 6 years professional experience in seafood processing was supposed to stay longer to help project team and at the same time, developing technical knowledge in aquaculture, and particularly sustainable aquaculture practices. Due to his sudden change in plan, he paid short visit and prepared a field report which serves as monitoring report, although his visit was not directly for that purpose (Appendix 6). In addition to the report, he has also produced eight video clips. According to the report, 80% farmers have been found to be satisfied with the project. However more has to be done towards empowering women and making impact in terms of increasing family income from aquaculture.

7 Conclusion

Within the limited project fund of US\$15,290 (+Overhead), a total of 90 fish ponds were constructed in two years' time to benefit more than 400 direct family members. Although, target was to reach 100, it is still 90% successful which is quite high. This shows project incurred only US\$170 per pond or per family which is considerably low compared to the investment made by any international partners for other development projects. Although, production of fish is quite low because ponds constructed by the farmers were quite small and pond inputs were very minimal as farmers were recommended to feed on-farm crop byproducts and to apply manures/urines of the animals owned by themselves. However, due to its low-cost in nature and better uses of locally available inputs, fish farming has been sustainable. For instance, among the 70 farmers, in the Phase I (2008-2010) of the project 90% farmers are still growing fish; 2 years after the project period ended. Only seven farmers stopped so far due to various reasons such as lack of fingerlings on time, lack of care, water leakage problem, and water shortages and so on. However, they are still keeping the pond and thinking that they can stock fish again.

More importantly, within the two year's period the output i.e. fish production was nearly 6 tons which is seven times more than the total production from the Phase I (Final Report AwF-Nepal (Bhujel et al., 2010). Similarly, the estimated value of total fish produced during this phase stands at around US\$12,000, which is more than six times higher than from the Phase I, and is approximately 80% of the cost recovered within the project period. Considering the high rate of sustainability, even if farmers do not expand, AwF Nepal project shows its worth is a lot more in the long run in terms of monetary value. More importantly, health benefits of fish consumption and social benefits of women as well as men working together in groups and cooperatives are tremendous.

At the same time, results from Gorkha has shown that if farmers could increase their fish ponds to 100m² or bigger and add more inputs i.e. stock more fingerlings and add some supplementary feed at least once a day, would be adequate to earn a reasonable income to come out of the poverty line from fish pond alone. Therefore, it is recommended to establish a small-scale fish hatchery to supply adequate fingerlings even for new farmers. Similarly, a model fish feed making machine using locally available materials such as combination of a plastic or aluminum drum for mixing and a mincer or pelletizer for making pellets which has been developed and used at IAAS, Nepal.

8 References

- Bhujel, R.C., Shrestha, M.K., Devkota, H.R. and Nepal, A.P. 2010. Final Report AwF-Nepal – Phase I (2008 – 2010)
- Edwards, P. 2011. Peter Writes on Rural Aquaculture: Visit to the AwF funded small-scale aquaculture project in Nepal. Aquaculture Asia Magazine vol. XVI no. 4, Oct./Dec. 3-11.

9 Appendices

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Appendix 1a: Farmers of Dhamilikuwa (Lamjung) second phase with production data (Year I / 2067 BS)

SN	Farmer's name	Pond area (m ²)	No of family member	Fish species	Consumption (kg)	Sales (kg)	Remaining (kg)	TotalKG	per person consumption (kg)	Productivity (kg/m ²)	Productivity (ton/ha)
1	Bhagawati Chiluwal	28	5	Carp+Tilapia	5	1	0.0	6	1.0	0.21	2.14
2	Bhagirathi Devkota	50	3	Carp+Tilapia	7		0.0	7	2.3	0.14	1.40
3	Bhaktta Kumari Pandey	34	7	Carp+Tilapia	10	3	0.0	13	1.4	0.38	3.82
4	Bimala Bk	18	12	Carp+Tilapia	2	1	0.0	3	0.2	0.17	1.67
5	Hasta B. Tamang	18	4	Carp+Tilapia	6	2	0.0	8	1.5	0.44	4.44
6	Hira Pandey	25	6	Carp+Tilapia	4	5	0.0	9	0.7	0.36	3.60
7	Ishowori Chiluwal	20	2	Carp+Tilapia	7	3	0.0	10	3.5	0.50	5.00
8	Ishowori Thapa	40	6	Carp+Tilapia	6	2	0.0	8	1.0	0.20	2.00
9	Januka Bistha	18	3	Carp+Tilapia	4	2	0.0	6	1.3	0.33	3.33
10	Laxmi Devi Chiluwal	40	6	Carp+Tilapia	5		0.0	5	0.8	0.13	1.25
11	Pramila Nakhola	62	3	Carp+Tilapia	7	7	0.0	14	2.3	0.23	2.26
12	Purnimaya BK	18	0	Carp+Tilapia	8	3	0.0	11		0.61	6.11
13	Sabitri Bistha	18	4	Carp+Tilapia	4	6	0.0	10	1.0	0.56	5.56
14	Sri Kumari Tamang	20	7	Carp+Tilapia	3	2	0.0	5	0.4	0.25	2.50
	Total	409	68		78	37	-	115			
	Average	29	4.9		5.6	3.1	0.0	8.7	1.3	0.3	3.2
	SD	14	2.9		2	2	0	3	1	0.2	2

Appendix 1b: Farmers of Dhamilikuwa (Lamjung) second phase with production data (Year II / 2068 BS)

SN	Farmer's name	Pond area (m ²)	No. of family member	Fish species	Consumption (kg)	Sales (kg)	Remaining (kg)	TotalKG	per person consumption (kg)	Productivity (kg/m ²)	Productivity (ton/ha)
1	Bhagawati Chiluwal	28	5	Carp	13	0	0.0	13	3	0.46	4.64
2	Bhagawati Devkota	50	3	Tilapia	7	7	0.0	14	2	0.28	2.80
3	Bhakta Kumari Pandey	34	7	Carp	9	0	0.0	9	1	0.26	2.65
4	Bimala Bk	18	12	Carp	0	0	0.0	0	0	0.00	0.00
5	Hasta Bahadur Tamang	18	4	Carp	6	0	0.0	6	2	0.33	3.33
6	Hira Pandey	25	6	Carp	3	4	0.0	7	1	0.28	2.80
7	Ishori Thapa	40	2	Tilapia	8	3	3.0	14	4	0.35	3.50
8	Iswori Chiluwal	20	6	Carp	3	0	0.0	3	1	0.15	1.50
9	Januka Bista	18	3	Carp	9	0	0.0	9	3	0.50	5.00
10	Laxmi Devi Chiluwal	40	6	Carp	2	3	3.0	8	0	0.20	2.00
11	Pramila Nakhola	62	3	Tilapia	8	2	2.0	12	3	0.19	1.94
12	Purni Maya Bk	18	0	Carp	0	0	0.0	0	-	0.00	0.00
13	Sabitri Bista	18	4	Carp	8	0	0.0	8	2	0.44	4.44
14	Sri Kumari Tamang	20	7	Carp	4	0	0.0	4	1	0.20	2.00
	Total	409	68		80	19	8	107			
	Average	29	4.9		5.7	1	1	7.6	1.6	0.3	2.6
	SD	14	2.9		4	2	1	5	1.2	0.2	1.5

Appendix 2a: Champhabati Women Fish Farmer's Cooperative Pvt. Ltd., Chakratirtha 8 Lamjung production record of Year I / 2067 BS (AwF - II)

SN	Farmer's name	Pond area	No. of family member	Fish Species	Consumption KG	Sales (kg)	Remaining kg	Total production (kg)	per person consumption (kg)	Productivity (kg/m ²)	Productivity (ton/ha)
1	Prasansha Kadariya	49	3	common	2	10	5	17	0.7	0.3	3.47
2	Hari Kumal	50	4	common	5	2	10	17	1.3	0.3	3.40
3	Min Badur Kumal	43	5	common	4	3	7	14	0.8	0.3	3.26
4	Gopal Pariyar	31	6	common	2	1	4	7	0.3	0.2	2.26
5	Saradha Khanal	66	3	common	5	7	12	24	1.7	0.4	3.64
6	Uttam K. Kumal	42	4	common	7	3	6	16	1.8	0.4	3.81
7	Midi Maya Kumal	49	2	common	4	10	5	19	2.0	0.4	3.88
8	Pakuli Kumal	35	5	common	2	8	5	15	0.4	0.4	4.29
9	Indra Kala Kumal	28	3	common	5	8	2	15	1.7	0.5	5.36
10	Dhan Maya Kumal	50	4	common	15	10	12	37	3.8	0.7	7.40
11	Bishnu M. Shrestha	73	4	common	17	15	13	45	4.3	0.6	6.16
12	Narayani Bhatta	42	7	common	10	8	2	20	1.4	0.5	4.76
13	Usha Bhatta	66	7	common	2	10	16	28	0.3	0.4	4.24
14	Sarasowati Devkota	22	4	common	6	4	3	13	1.5	0.6	5.91
15	Indira Bakhrel	24	3	common		5	12	17	0.0	0.7	7.08
	Total	670	64		86	104	114	304			
	Average	45	4.3		6	7	8	21	1.4	0.5	4.6
	SD	15	1.5		5	4	5	10	1.2	0.1	1.5

Appendix 2b: Champhabati Women Fish Farmer's Cooperative Pvt. Ltd., Chakratirtha 8 Lamjung production record of Year II / 2068 BS (AwF - II)

SN	Farmer's name	Pond area	No. of family member	Fish Species	Consumption (kg)	Sales (kg)	Remaining (kg)	Total production (kg)	per person consumption (kg)	Productivity (kg/m ²)	Productivity (ton/ha)
1	Prasansha Kadariya	49	3	common							
2	Hari Kumal	50	4	common	4	0	15	19	1.0	0.4	3.80
3	Min Badur Kumal	43	5	common	4	4	6	14	0.8	0.3	3.26
4	Gopal Pariyar	31	6	common	4	2	5	11	0.7	0.4	3.55
5	Saradha Khanal	66	3	common	8	6	12	26	2.7	0.4	3.94
6	Uttam K. Kumal	42	4	common	8	3	3	14	2.0	0.3	3.33
7	Midi Maya Kumal	49	2	common	12	4	5	21	6.0	0.4	4.29
8	Pakuli Kumal	35	5	common	5	8	3	16	1.0	0.5	4.57
9	Indra Kala Kumal	28	3	common	9	7	6	22	3.0	0.8	7.86
10	Dhan Maya Kumal	50	4	common	17	10	2	29	4.3	0.6	5.80
11	Bishnu M. Shrestha	73	4	common	10	7	19	36	2.5	0.5	4.93
12	Narayani Bhatta	42	7	common	0	9	20	29	0.0	0.7	6.90
13	Usha Bhatta	66	7	common	15	0	14	29	2.1	0.4	4.39
14	Sarasowati Devkota	22	4	common	4	5	8	17	1.0	0.8	7.73
15	Indira Bakhrel	24	3	common	0	5	12	17	0.0	0.7	7.08
	Total	621	61		100	70	130	300			
	Average	44	4.4		7	5	9	21	1.9	0.5	5.1
	SD	16	1.5		5	3	6	7	1.7	0.2	1.7

Appendix 3: Pragati Fish Farmers Agriculture Cooperative Pvt Ltd Bhalayakharkha Lamjung, production record of Year II / 2068 BS (AwF - II)

SN	Farmer's name	Pond area (m ²)	No. of family member	Support (NRs)	Fish species	Consumption (kg)	Sales (kg)	Remaining (kg)	Total (kg)	Per person consumption (kg)	Productivity (kg/m ²)	Productivity (ton/ha)
1	Sarasowti Bogati Ka	35	5	1,463	grass	5	5	3	13	1.0	0.4	
2	Sarasowti Bogati Kha	30	4	1,254	tilapia /grass	5	5	5	15	1.3	0.5	5.00
3	Kamala Adhikari	16	4	669	grass	2	5	2	9	0.5	0.6	5.63
4	Indira Pokharel	18	3	752	grass	0	3	2	5	0.0	0.3	2.78
5	Deuti Ghimire	28	3	1,170	grass	3	0	6	9	1.0	0.3	3.21
6	Basanta K. Dhakal	22	5	920	grass	2	3	2	7	0.4	0.3	3.18
7	Bhawani Pokhrel	18	5	752	grass	0	2	1	3	0.0	0.2	1.67
8	Chadira Neupane	14	6	585	grass	1	0	1	2	0.2	0.1	1.43
9	Hemraj Neupane	57	6	2,383	common	2	1	26	29	0.3	0.5	5.09
10	Rishikesh Ghimire	57	4	2,383	common	3	2	24	29	0.8	0.5	5.09
11	Chandra K. Adhikari	102	5	4,264	grass	7	3	28	38	1.4	0.4	3.73
12	Sashi Chhetri	12	5	502	grass	0	7	1	8	0.0	0.7	6.67
13	Kalpana Adhikari	20	5	836	grass	2	0	8	10	0.4	0.5	5.00
14	Krishna Maya Panthi	24	2	1,003	grass	2	12	2	16	1.0	0.7	6.67
15	Gita Panthi	24	5	1,003	grass	2	5	7	14	0.4	0.6	5.83
16	Buddhi M. Neupane	14	4	585	grass	3	0	3	6	0.8	0.4	4.29
17	Shanta Neupane	25	6	1,045	grass	3	3	12	18	0.5	0.7	7.20
18	Mankumari Devkota	32	5	1,338	grass	5	3	9	17	1.0	0.5	5.31
19	Lila Devi Adhikari	28	2	1,170	grass	2	5	5	12	1.0	0.4	4.29
20	Debaki Aryal	31	5	1,296	grass/tilapia	1	2	6	9	0.2	0.3	2.90
21	Nirmala Pokhrel	25	5	1,045	grass	5	10	0	15	1.0	0.6	6.00
22	Bimala Adhikari	27	4	1,129	grass							
23	Subhadra Panthi	20	3	836	grass							
	Total	679	101	28,382		55	76	153	284			
	Average	30	4.4	1,234		2.6	3.6	7.3	13.5	0.6	0.5	4.5
	SD	20	1.2	816		1.9	3.2	8.4	9.1	0.4	0.2	1.6

Appendix 4a. List of farmers in Gorkha District (Year I / 2067 BS: AwF-Nepal - II)

SN.	Name of farmer	Pond area (m ²)	Family member	Fish	Consumption (kg)	Sales (kg)	Total (kg)	Per capita consumption (kg)	Productivity (kg/m ²)	Productivity (ton/ha)
1	Kalpna Khanal	225	5	common grass silver	80	150	230	16.0	1.0	10.2
2	Sabina Luitel	30	4	common grass silver	40	4	44	10.0	1.5	14.7
3	Mina Bk	70	6	common grass silver	40	20	60	6.7	0.9	8.6
4	Ru K Kumari Luitel	100	3	common grass silver	60	60	120	20.0	1.2	12.0
5	Minmaya Luitel	50	5	common grass silver	50	30	80	10.0	1.6	16.0
6	Nirmala Bhujel	50	6	common grass silver	40	20	60	6.7	1.2	12.0
7	Sitadevi Luitel	70	2	common grass silver	50	140	190	25.0	2.7	27.1
8	Kalpna Devkota	40	8	common grass silver	30	15	45	3.8	1.1	11.3
9	Indra Neupane	25	4	common grass silver	20	2	22	5.0	0.9	8.8
10	Sushila Dhakal	12	6	common grass silver	20	60	80	3.3	6.7	66.7
11	Parbati Shrestha	30	5	common grass silver	60	5	65	12.0	2.2	21.7
12	Basanti Neupane	100	4	common grass silver	15	180	195	3.8	2.0	19.5
13	Junadevi Khatri	50	3	common grass silver	60	15	75	20.0	1.5	15.0
14	Umadevi Shaha	60	2	common grass silver	15	15	30	7.5	0.5	5.0
15	Rabina Neupane	90	5	common grass silver	20	180	200	4.0	2.2	22.2
16	Narmaya Lama	200	6	common grass silver	60	60	120	10.0	0.6	6.0
17	Tikadevi Shrestha	50	4	common grass silver	40	20	60	10.0	1.2	12.0
18	Bimala Acherya	50	3	common grass silver	30	20	50	10.0	1.0	10.0
19	Dhan Kumari Bhatrai	60	5	common grass silver	40	10	50	8.0	0.8	8.3
20	Sun Maya Thapa	100	4	common grass silver	50	60	110	12.5	1.1	11.0
21	Balaram Dhital	60	5	common grass silver	6	0	6	1.2	0.1	1.0
22	Ram Bahadur Devkota	18	4	common grass silver	4	0	4	1.0	0.2	2.2
	Total	1540	99		830	1,066	1,896			
	Average	70	4.5		38	48	86	9.4	1.5	14.6
	SD	53	1.4		20	59	65	6.3	1.3	13.3

Appendix 4b. List of farmers in Gorkha District (Year II / 2068 BS: AwF-Nepal - II)

SN.	Name of farmer	Pond area (m ²)	Family member	Fish	Consumption (kg)	Sales (kg)	Total (kg)	Per capita consumption (kg)	Productivity (kg/m ²)	Productivity (ton/ha)
1	Kalpana Khanal	225	5	common grass silver	100	200	300	20.0	1.3	13.3
2	Sabina Luitel	30	4	common grass silver	40	10	50	10.0	1.7	16.7
3	Mina Bk	70	6	common grass silver	50	30	80	8.3	1.1	11.4
4	Ru K Kumari Luitel	100	3	common grass silver	60	90	150	20.0	1.5	15.0
5	Minmaya Luitel	50	5	common grass silver	70	30	100	14.0	2.0	20.0
6	Nirmala Bhujel	50	6	common grass silver	40	30	70	6.7	1.4	14.0
7	Sitadevi Luitel	70	2	common grass silver	60	150	210	30.0	3.0	30.0
8	Kalpana Devkota	40	8	common grass silver	40	10	50	5.0	1.3	12.5
9	Indra Neupane	25	4	common grass silver	25	5	30	6.3	1.2	12.0
10	Sushila Dhakal	12	6	common grass silver	60	100	160	10.0	13.3	133.3
11	Parbati Shrestha	30	5	common grass silver	20	10	30	16.0	1.0	10.0
12	Basanti Neupane	100	4	common grass silver	80	200	280	5.0	2.8	28.0
13	Junadevi Khatri	50	3	common grass silver	20	30	50	8.3	1.0	10.0
14	Umadevi Shaha	60	2	common grass silver	25	20	45	40.0	0.8	7.5
15	Rabina Neupane	90	5	common grass silver	80	200	280	20.0	3.1	31.1
16	Narmaya Lama	200	6	common grass silver	100	300	400	6.7	2.0	20.0
17	Tikadevi Shrestha	50	4	common grass silver	40	100	140	7.5	2.8	28.0
18	Bimala Acherya	50	3	common grass silver	30	40	70	13.3	1.4	14.0
19	Dhan Kumari Bhatrai	60	5	common grass silver	40	30	70	10.0	1.2	11.7
20	Sun Maya Thapa	100	4	common grass silver	50	100	150	12.5	1.5	15.0
21	Balaram Dhital	60	5	common grass silver	50	2	52	1.2	0.9	8.7
22	Ram Badur Devkota	18	4	common grass silver	6	0	6		0.3	3.3
	Total	1,540	99		1,086	1,687	2,773			
	Average	70	4.5		49	77	126	12.9	2.1	21.2
	SD	53	1.4		25	84	106	9.1	2.6	26.2

Appendix 5. List of farmers in Dedhgaon, Nawal Parasi District (Year II / 2068 BS: AwF-Nepal - II)

SN.	Name of farmer	Pond area (m ²)	No. of family member	Fish species	Consumption (kg)	Sales (kg)	Total (kg)	Consumption/ person (kg)	Productivity (kg/m ²)	Productivity (ton/ha)
1	Mr. Rameshwor Bohara	450	2	Com + tilapia	20	30	50	10	0.11	
2	Mr. Hum Bahadur Thada	50	2	Com + tilapia	7	6	13	3.5	0.26	2.6
3	Mr. Mana Badur Nepali	50	5	Com + tilapia	-	-	Flooded	-	-	
4	Mr. Maniram Rana	50	5	Com + tilapia	5	7	12	1	0.24	2.4
5	Mrs. Bhanu Maya BK	50	4	Com + tilapia	3	1	4	0.75	0.08	0.8
6	Mrs. Tirtha Kumari Rana	50	5	Com + tilapia	3	4	7	0.6	0.14	1.4
7	Mr. Lal Bahadur Nepali	50	8	Com + tilapia	4	6	10	0.5	0.2	2.0
8	Mr. Ganga Ram Rana	50	4	Com + tilapia	5	-	5	1.25	0.1	1.0
9	Mr. Rup Bahadur BK	50	2	Com + tilapia	4	9	13	2	0.26	2.6
10	Mrs. Til Kumari Bohara	50	2	Com + tilapia	2	8	10	1	0.2	2.0
11	Mr. Tak Bir BK	50	8	Com + tilapia	7	5	12	0.88	0.24	2.4
12	Mr. Chopi Ram Rana	50	9	Com + tilapia	5	2	7	0.56	0.14	1.4
13	Mr. Arjun Bohara	50	4	Com + tilapia	4	8	12	1	0.24	2.4
14	Mr. Mahendra Bohara	50	4	Com + tilapia	6	4	10	1.5	0.2	2.0
15	Mrs. Jyoti Bohara	50	1	Com + tilapia	2	10	12	2	0.24	2.4
16	Mr. Khadga Badur Saru	50	6	Com + tilapia	4	-	4	0.67	0.08	0.8
	Total	1,200	71		81	100	181			
	Average	75	4.4		5.4	7.7	13.1	1.8	0.2	1.9
	Standard Deviation	100					11.0		0.1	0.7