Aquaculture without Frontiers (UK)

Patron: Professor M.S. Swaminathan, FRS
Company Registration # 5138073 *Charity Registration # 1107062*
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SECTION 1: Project Outline

Project title:	**Up-scaling of AwF – Nepal Project in mid-hills of Nepal through empowering women**
Proponent's name:	Dr Ram C Bhujel
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Email:	Bhujel@ait.ac.th
Proponent's organisation:	Asian Institute of Technology (AIT)
Project Number:	Assigned by AwF
Country/ies:	Thailand

Funding request (totals for each year)

Year 1 (1st instalment)	**Year 2** (2nd instalment)	**Final settlement**	**Total**
7,225	7,225	1,605	16,055

Project Duration:	**24 months**
Proposed Start Date:	April 1, 2010
Proposed Finish Date:	March 31, 2012

Key Contacts:

Project Leader: Partner Country	
Title and Name	Dr. Madhav K. Shrestha
Position	Associate Professor, Aquaculture Department
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Collaborators:	
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Position	Teacher
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SECTION 2:
Project Summary

The AwF-Nepal project launched jointly by AIT and IAAS in Rainas Tar village of Lamjung, a district in the mid-hills (1,500-2,000 ft) of Nepal has made tremendous impacts on women's empowerment. Within two year's time, the project with a small grant from AwF funding, more than 70 women have been trained and 70 new ponds have been constructed. In addition to producing over half a ton of fish in two seasons by the project activities, it has created tremendous awareness about small-scale fish farming among women in the entire district as well as in neighboring districts. There is huge interest and the scope for small-scale, rural aquaculture in mid-hills of Nepal.

Table 1 Outcomes of AwF Nepal project (2008-2009) launched in Rainas Tar village of Lamjung.

Particulars	**Figures**
No. of ponds	70
No. of women supported (=families)	70
Direct beneficiaries	300
Total fish production (kg)	658
Consumption	516
Sale	142
Total value (NRs)	131,674
Total value (US$)	1,804

Source: Final Report AwF-Nepal (Bhujel *et al*., 2010).

Using the same idea and experience, the Project Team, consisting of three aquaculture experts, would like to propose for scaling-up of the pilot project to two more villages in Lamjung (one in the east and the other in the west). Similarly, it is also proposed to expand to other two districts; namely, Gorkha and Kavre. Gorkha is adjacent to the current district, Lamjung while Kavre is adjacent to Kathmandu on the north eastern side. Preliminary feasibility study visit has revealed that provisionally selected sites have good source of water and women are working in groups for vegetable farming. Therefore, idea of fish farming has been well accepted.

A group of 20 women farmers will be formed in each of the selected four locations. As in the pilot project, women will be trained on fish farming with vegetable gardening, and full technical and partial financial (i.e. 50% of pond digging cost) supports will be provided. The project team will also assist in procuring the fish seed and help in harvesting as well as marketing. The village will be developed as a "Model Village" for mid-hills in which women's group will play active roles. Upon the successful implementation and completion of the proposed project, it is expected to produce fish for consumption (>50%), generate supplemental income by utilizing un-used land, labour and farm byproducts. In addition, the project aims to bring some social change and develop as a gender balanced society. Attempts will be made to disseminate the idea via TV, FM radio, magazines, newspapers, internet and other mass media so that it would go country wide as a campaign.

SECTION 3:
Project Justification and Methods

3.1 Background and Justification

Over 80% people in Nepal live in live in rural areas relying on subsistence agriculture and 60% of them suffer from food shortages for 4-6 months each year. Due to limited employment opportunities and income generating activities, majority men migrate to cities in or outside the country. Women stay at home struggling to feed their babies/kids/other family members get enough food. They grow rice and vegetables, and also raise animals. Due to decline in pasture land, raising animals has become difficult as it consumes considerable time (e.g. collecting fodder, fetching water and feeding) and gives high pressure to women. As a result meat is becoming more scarce and expensive. Cereals and root crops are the main food items of regular diet. Of the total protein intake, a person should get at least 33% from animal sources for good health but it was only 16.3% in 1989/90 which declined alarmingly to 12.4% in 1994/95 and now is about 10%. UNICEF data shows that more than half (51%) of the under-five children are suffering from moderate to severe stunting. Other reports show that 90% Nepalese children suffer from one or more forms of malnutrition. A report has showed that about one-fourth Nepalese die before the age of 40 years and half of the deaths are associated with malnutrition. The women are less aware about the family planning. They don't think how an additional child can add economic burden to the family and also affect the nutritional status of whole family members. More than half (57%) of the women are still illiterate and the proportion is even higher in rural areas due to which they are left behind. Their situation became more critical due to "decade-long internal conflict". In fact, the root causes of the conflict were rural poverty, lack of food security and exclusion of these rural minority groups from the development processes and societal/political activities. There is an urgent need to address these problems and initiate inclusive developmental activities from the beginning of the post-conflict as rural Nepalese have a big hope from on-going peace process. If these are not addressed there is a danger of repetition of such conflicts.

It is true that small-scale aquaculture or rural aquaculture has played significant role in accelerating rural development in many countries. Unfortunately, Government of Nepal did not realize its role in the past. Promotion of aquaculture was tried earlier in 1980s with ADB funding with the recommendation of 2,000 m^2 as minimum pond size thought to be economically profitable. The idea could not reach to the rural areas and to the poor people as the recommended size of the pond was too large and was difficult to manage by the resource poor families. By learning lessons from the past, our team is promoting small-scale aquaculture recommending 200 m2 ponds ($1/10^{th}$ in size) which can be constructed by the side of the family house. This idea has been tested forming groups of vulnerable women in rural villages, organizing training and arranging monthly meetings. All of these have increased women's participation and helped to enhance their capacity to help themselves. In the past, the role of small-scale aquaculture was not realized in Nepal. But in Bangladesh, it has been well-established in the form of "Fisheries Model Villages" which serve as demonstration fields or information sources. Current development of Aquaculture in Bangladesh has been considered the advancement of mini ponds of $10m^2$ or smaller ponds promoted in 1970s. The basic requirement of small-scale aquaculture is

small ponds with 200 m2 each and less water surface area. Other benefit of small-scale aquaculture is labor efficiency, as the pond is nearby the elderly and children can utilize their spare time for feeding and take care of the pond. Malnutrition, especially shortage of protein and vitamins, is a serious problem in rural Nepal. Various reports show that about 90% children suffer from one or more forms of malnutrition. Women work hard but still their value of work has not been recognized.

The first AwF-Nepal project has served as model for mid-hills of Nepal which serves as an expansion of the idea of small-scale aquaculture program initiated by the Project Team in two southern districts of central Nepal. It has been a successful beginning in rural mid-hills towards solving the problems of malnutrition and food security, and lack of participation of women in social activities. The Project Team therefore plans to expand its activities to wider areas as much as possible using the experience gained.

3.2 Objectives

The main objective of the project is to improve rural food security, supply animal nutrition and generate supplemental income through small-scale aquaculture by empowering women using the AwF-Nepal project as model for expansion

Specific objectives of the proposed project are to:

- assist women's fish farming group formed under AwF-Nepal project to develop and run as "Cooperatives" so that they can carry on their activities and also further expand fish farming by themselves
- expand small-scale aquaculture using the experience of AwF-Nepal project to other parts of the district
- expand small-scale aquaculture to neighboring and other districts
- test and further improve the productivity and efficiency of AwF-Nepal model of small-scale aquaculture
- disseminate the project outcomes/findings as widely as possible throughout the country via mass media

3.3 Project Context (relationship to other activities)

The Project Team initiated and successfully implemented an AwF-Nepal project over the last two years at Rainas Tar Village in Lamjung district approximately 150 km west from Kathmandu. Based on the results shown above, this project has been regarded as one of the most successful intervention projects as it established three groups of women and trained them on farming fish. Initiation of this project has very good impacts on women empowerment and family nutrition. The women are very much enthusiastic. There is tremendous opportunity in Nepal for this kind of programs. The wealth of good experience gained by the Project Team while launching this project should be the asset for the aquaculture community and also it should serve as model for the country.

The three newly formed women's groups under the AwF project activities are still in infancy. Their fish ponds are small; therefore, production of fish is quite low. Their groups need to be strengthened technically and in terms of management. With this

proposed project, they will be encouraged to move forward adopting integrated approach for the development of their village. As in our previous projects in Chitwan and Nawalparasi, these groups will be registered as Women's Fish Farming Cooperatives under the local government's regulations and provisions. This collective voice will help them bargain with the government for any support they may have. It also allows them to act as bank to lend accumulated fund to its members. A revolving seed fund; therefore, can be a very vital. Members of the cooperative interested to start or expand in fish farming or any other related occupations can get loan at reasonable rate which they agree and fix by themselves.

Integration of fish farming other component of agriculture will be further strengthened, for an example, growing fish in rice fields to utilize space and water. So far, only 0.3 ha has been used for fish culture. Rainas Tar (plain land) has about 850 ha of irrigated lands. Fish can be cultured in most of the rice fields either making a small trench or modifying a plot. Similarly, attempts will also be made to integrate vegetable gardening and livestock farming e.g. pig, goat and chicken adjacent to or above the fish ponds wherever possible.

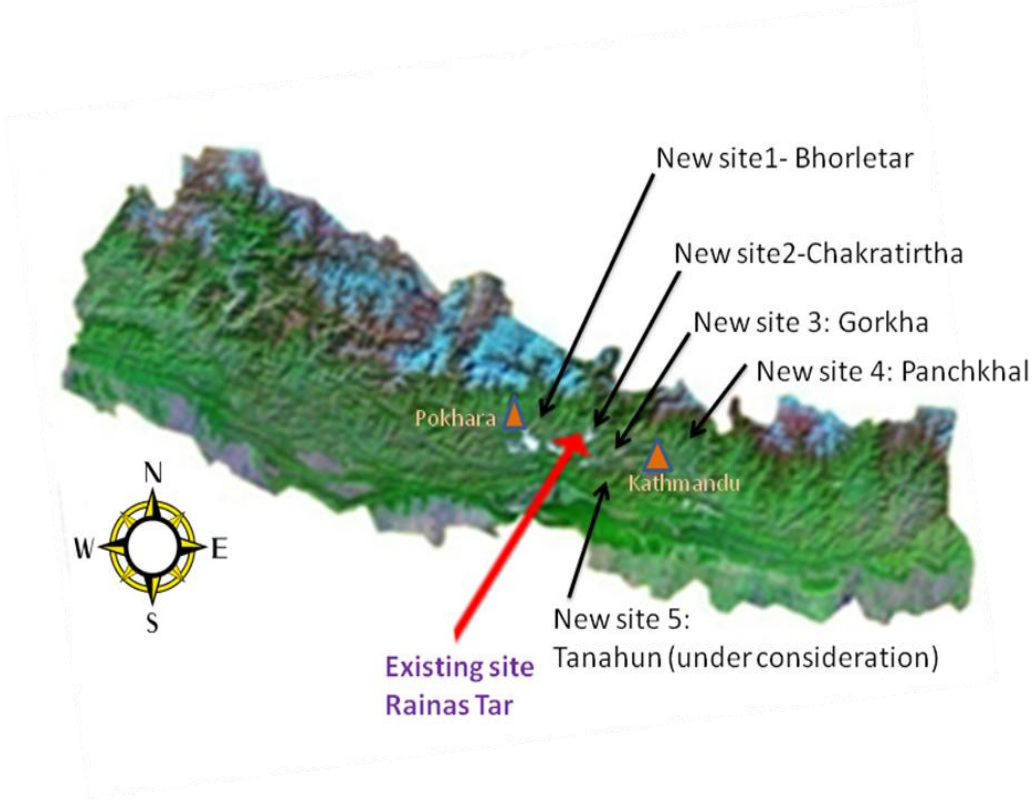

Fig 1. Existing AwF-Nepal project site and proposed new sites for expansion.

The Project Team is planning to expand fish farming to other parts of Lamjung district; namely; Chakratirtha and Bhorletar VDCs (Fig 1). The first one is eastern part of the district located on the north from the on-going project site while latter is on the west side of the district. These two have been recommended by the District Fish Farmer's Association (DFFA) of Lamjung. There is a possibility that WorldVision may join to expand the fish farming activities in other parts of the district with the technical assistance of the Project Team in their project areas such as Besisahar (district headquarters) and its surroundings, and Tarku village.

The Project Team has also done a preliminary discussion with various key persons and brief feasibility study visit of potential sites for expansion. At least three potential sites in other districts have been identified; namely, Gorkha (Chyangli/Deurali) and possibly Tanahun (Bhansar, Satrasaya/Yampa Phant). Selection of the best sites will be done during the kick-off meeting planned at the beginning of April.

3.4 Detailed Methods/Strategy

The project will be launched by AIT and IAAS in cooperation with local organizations and individuals as shown in Fig 2. A field manager, possibly the IAAS graduate who served as Intern Manager and assisted in implementing the on-going project will be hired on full-time basis to be based at IAAS.

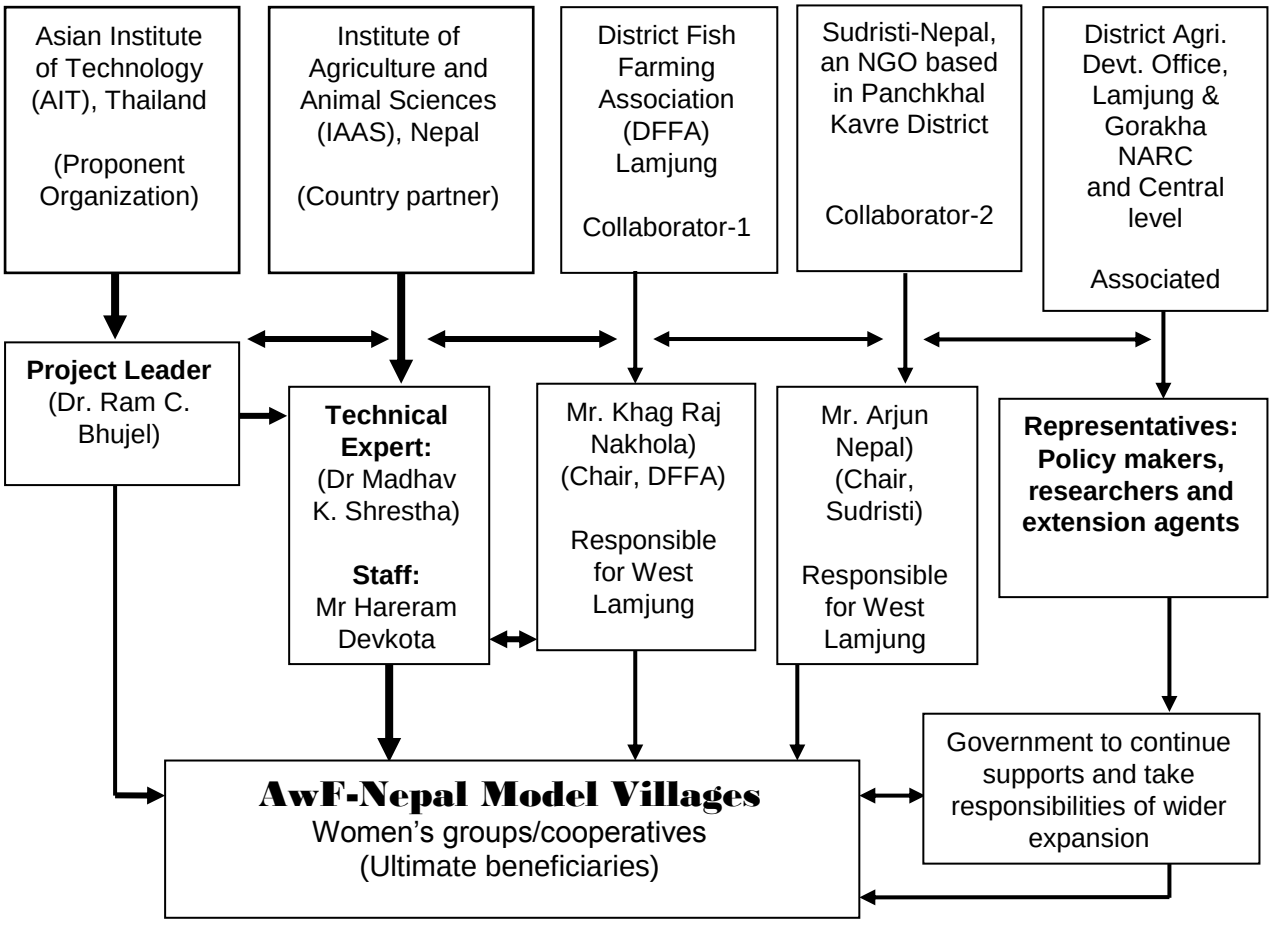

Fig 2. Organizational structure and linkages with organizations to be involved

The Team Leader, along with the Technical Expert and the representative from the local organizations will attend the project kick-off meeting in the local village and will be in contact via telephone and email with the Field Manager and Technical Expert who will be visiting the village more frequently. In addition, an option will also be kept open for any interns to get involved from IAAS or abroad who can spend their time in the village to assist the community and work on their thesis projects.

The Project Team will use the previous experience gained, especially the current one from Lamjung in mid-hills of Nepal. The similar methodology and approaches will be used for this proposed project but to test the idea in expanded area s of geographical and socio-economic conditions.

Month 1: **Kick off meeting/activities and women's group formation**

Two villages have already been identified to develop as the "Model Village". Project will be started by signing an MoU between AIT (Thailand) and IAAS (Nepal). Project Team will visit the selected potential sites (Fig 2) to create awareness and form women's group. A kick-off meeting/workshop will be organized IAAS involving all the project steering committee members and other peers to be involved in the project activities in order to further discuss on the strategies/methodologies and also prepare specific plans for each activity. Immediately after the meeting, at least four women's groups comprising at least 20 members in each group will be formed in different locations.

Month 2: Training and pond construction

The Project Team will provide training to women in groups visiting by the Project Team. At least 80 copies of the fish farming manual will be produced to distribute to the women members during training. The manual covers all the aspects of small-scale fish farming as:

- methods of construction of pond and its preparation,
- transporting fry,
- nursing fish fry in hapas,
- pond fertilization and feeding,
- stocking and taking care of fish e.g. growth monitoring etc.,
- farming fish together with other agricultural components e.g. vegetable garden, rice paddies etc. and use of kitchen wastes, farm byproducts for fish,
- overall management of fish pond and keeping the records of inputs, outputs and health related indicators

After the training women will be asked to construction fish ponds of the size they want. They will be assisted in constructing the ponds financially (50%) and technically.

Month 3: Fry transportation and fish stocking

Once the ponds are ready, Project staff will assist in procuring the fish fingerlings from either government farms or private farms as per the convenience and availability of large size fingerlings of desired species. Fry or fingerlings will be nursed for about a month in hapas if they are small. Stocking of fish into ponds will be done as soon as possible so that grow-out period is at least 7 or 8 months before winter starts in December. Farmers will be allowed multiple harvesting or partial harvesting for home consumption or sell after about 3-4 months of stocking whenever they want/need to do so, but they will be asked to keep the records in their log-books.

Month 4-10: Fish Grow-out

Farmers start final fish harvest in groups rotationally. The Local staff and community leaders will assist and monitor the activity and keep the records. All the data from their log-books will be collected and compiled. Stakeholders' meeting/workshop will be organized and pre-reports will be presented. Final report will be prepared and submit to the AwF and other concerned authorities.

3.5 Activities and Outputs Table

Objectives	Activities	Outputs	Timeline
1. Form women's fish farming groups	Kick-off meeting, RRA/PRA at the village to initiate and select families based on the area or cultural background	At least 4	within 1st month
2. Provide training to women in small-scale fish culture	Group training and demonstration on pond construction/preparation, manuring, fry stocking, feeding, harvesting and recording all inputs and outputs	80	within 6-month
3. Produce fish farming training manual (in local language)	Revising and reprinting of the manual used for training for the existing project farmers and distribute during training	80	within 6-month
4. Construct fish ponds	50% cost to support by the project and women to work in groups or mobilize family labour to construct their ponds	80	within 6-month
5. Produce and supply fish for family consumption or sale	Stocking and growing fish for about 8 months, partial harvesting as per the need but they will keep all input and output records in a log-book provided	10-20 kg per family	Within 12-month
6. Generate income	Sell fish in local market whenever cash is needed for the family	~US$50 per family	within 22-month
7. Improve women's participation	Arranging monthly meetings, encouraging women to organize agriculture or fish fairs and other social activities	Increased social activities	within 12th month
8. Women's Fish Farming Cooperatives	Strengthen the women's groups and develop as Cooperatives	5	Within
9. Establish model village	Expanding the project activities in other sectors and creating a value / feeling of team work for the development of the village	5	within 24th month
10. Disseminate project outputs	Articles in newspapers, magazines, conference presentations, news on TV, FM Radio, brochures/flyers or other publicity materials	As many as possible	within 24th month

3.5 Travel schedule

Person(s) or position travelling	Approximate dates of travel	From / to	Purpose	Duration
Dr. Ram C. Bhujel / Ms Sukanya Buranrom	April 10 - 19, 2010 October, 2010 February 2011	AIT-Nepal	Project initiation and technical supports	2 weeks/ visit
Dr. Madhav Shrestha	April 14-19, 2010 Mid-May, 2010 October, 2010 February 2011 Mid-May, 2011 At least 2 more visits – dates depend on the local situation	IAAS – Lamjung, Tanahun, Gorkha	Project initiation and Training and technical supports	3-4 days/visit
Mr Agni Nepal	April 14-19, 2010 Mid-May, 2010 October, 2010 February 2011 Mid-May, 2011	FRC, Pokhara to Kavre	Project initiation and Training and technical supports	3-4 days/visit
Mr. Hareram Devkota and Khagaraj Nakhola	Live in Project Sites	-	Work as Field Managers	Most of the time spend in the field

3.6 Project personnel

(i) List of participants involved in the project

Name	Sex M/F	Agency	Position	Time in project (%)	To be funded by
Dr. Ram C. Bhujel	M	AIT	Team Leader PI at AIT	20%	EU / AIT
Dr Madhav Shrestha	M	IAAS	Aquaculture Expert & PI at IAAS	10%	IAAS
Ms Sukanya Buranrom	F	Khon Kaen University	Gender Expert	10%	Own Project
Mr. Hareram Devkota	M	Local School	Field manager	75%	AwF
Khagaraj Nakhola	M	DFFA, Lamjung	District Coordinator	50%	AwF
Mr Agni Nepal	M	FRC, Pokhara, NARC	Technical expert	10%	FRC, Pokhara, NARC

3.7 Capacity, skills and role of each participant and agency

3.7.1 Asian Institute of technology (AIT)

Established in 1959, AIT as a post-graduate institute, it has over 50 year experience in launching research and development programs especially in Asia. Although aquaculture program was started in 1981, it has good visibility in SE Asia and beyond. Outreach and various other capacity development programs of national and local organizations were the main foci. Ram Bhujel, the author of Statistics for Aquaculture (Wiley-Blackwell Science), will serve as the Team Leader of the project, on behalf of AIT. He teaches post-graduate courses in aquaculture and aquatic resources management and has more than 15 years experience of designing and managing research and development programs.

3.7.2 IAAS, Nepal

Institute of Agriculture and Animal Sciences (IAAS) offer post-graduate program in aquaculture in its Aquaculture Department which has five experts with post-graduate degrees. IAAS also has long experience of launching small-scale aquaculture programs in Nepal. Madhav Shrestha, who has over 20 years experience of teaching and research in aquaculture, will serve as the Technical Expert and will be responsible for the training of women's groups along with the other Field Manager. Mr Hareram, who served as Intern Manager for the first Phase of the AwF – Nepal project, will serve as a part-time Field Manager for the project. Other faculty members of IAAS will also serve as part-time consultant for the project whenever needed, especially during training and field visits.

3.7.3 Local organizations

The District Fish Farmers Association (DFFA) is newly established organization; however, some of its members including the President was involved in AwF project in Rainas Tar. Therefore, it will be easier to launch the project in two selected location of the district and also to expand throughout the district. In other districts, farmers are working in groups for other purposes such as vegetable farming. Therefore, including fish farming as a new component would not be any problem. More importantly, the student who was assigned as intern manager will be hired as Field Manager who will assist local organizations.

3.8 Communication and dissemination strategies

Findings will be presented organizing the stakeholders meeting and during national and international conferences near the end of the project. Similarly, attempts will also be made to publish articles in news papers and magazines. Wider dissemination of outputs will be tried by developing internet website, and by broadcasting on national radio, TV or at least local FM radios.

3.9 Intellectual Property and other regulatory compliance

AwF, AIT and IAAS will have access/rights of using data for project reports and other forms of publication. Any issues in using data for publication will be discussed among the partners / stakeholders so that there will be no issue of intellectual property and any other regulatory compliance.

SECTION 4:
Project outcomes and adoption

4.1 Social benefits

Formation of women's groups is the beginning of working together for their common cause and towards solving problems of various kinds. There is a saying that educating a woman is educating the whole family and the society. Training to be provided will enhance their skills and understanding of the farming system and how a fish pond can improve their nutritional health. Stunting is the main problem of Nepali children which is due to shortage of protein consumption especially the animal protein. Raising fish increases frequency of consumption of high quality animal protein which is the easiest solution. As a result, the community might get rid of the problem which has been the national problem. They will be proud of being the part of a campaign against the national problem i.e. stunting.

In addition, participation of women in training, other project activities and group meetings would enhance the status of women in the society. Increased income through fish and vegetable sales would further add value to their time and activities thereby the team work. The notion that "women have no income" will be changed to "women also can earn some income" while working at home. This will help reduce discrimination against women. The proposed project will also encourage women to get involved in other social activities which would bring about some social changes. The women's groups raise their images or status in the society. Simply having a fish pond can raise the status of a family in the society. Ultimately, the whole village would benefit from being a Model Village for neighboring areas.

4.2 Economic benefits

Fish ponds are constructed using unused family labour which could be wasted otherwise. Once ponds are constructed, very little efforts (10-15 min per day based on the AwF-Nepal project) are enough to manage it compared to raising animals which consume a lot of time everyday collecting, fetching, preparing and providing water and fodders. Women can save considerable time to take part in social activities. Families can catch few fish for family consumption or for sale at any time and any day without the need of gathering of a whole village to slaughter a goat/swine. Culturing fish in ponds by the side of family house increases the amount and frequency of animal protein intake in their regular diets and saves the expenditures on buying goat or chicken meat. Fish has often been considered as "Living Cash" and pond as "Saving Bank" because women can catch their fish any time they want and sale whenever they need cash, especially to spend for child education (fees and uniforms) and during festivals e.g. food items, buying new clothes. Through culturing fish, the pilot project in Terai has showed that up to US$50 per family per crop (8 months) from surplus fish is possible. Therefore, culturing fish together with vegetables and livestock will considerably the income. Many of them might be able to move forward by becoming commercial farmers (expanding the size of fish pond or constructing few more pond s) which is happening in Chitwan, previous project site.

4.3 Environmental benefits

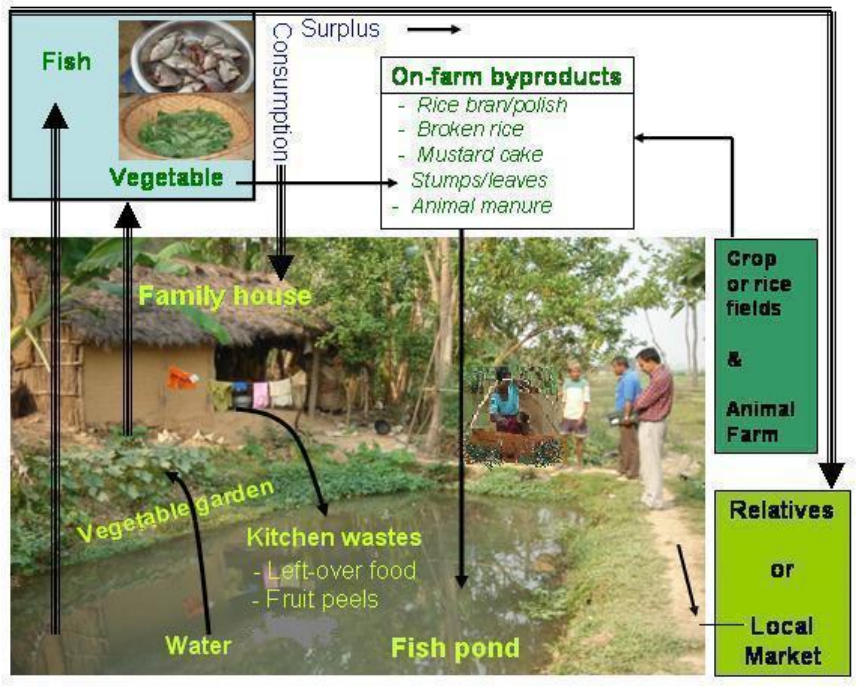

Fig. 1 Model tested in Chitwan, Nepal. The project team wants to test the same model and expand it in hilly areas which cover about two-third of Nepal.

The small-scale fish farming will be introduced into the existing farming system integrating especially with vegetable gardening which has been successfully tested. In this system (Fig. 1), nutrients are re-cycled, otherwise could be wasted, within the farming system avoiding the need of external inputs. Fish are fed with kitchen wastes and farm by-products. Pond water is fertilized using goat/chicken/cow manure to grow planktons which serve as natural food for fish. Ponds serve as storage for fertile water which can be used to irrigate vegetables grown on the dikes and also nearby the land. Vegetable leaves/stumps/peels can be used as inputs for fish ponds. As mosquitoes lay eggs in stagnant water and fish can eat their eggs/larvae, fish culture in ponds have also been used as one of the control measures for malaria.

4.4 Enhancement of capacity

The project idea will be implemented by creating groups of poor women in rural villages, organizing training and arranging monthly meetings. These increase women's participation in social activities, promote the notion of helping each other. Therefore, it helps to enhance their capacity to help themselves. The project women's groups serve as models for team work and the villages themselves serve as a "Model Villages", and good examples for other neighbouring areas. More importantly, testing a technology in clusters makes individuals to be cohesive and provide better chances of getting help from each other leaving no space for failure. The producers in clusters also get more strength/bargaining power for their products and more chance be connected to the value chain market. Once they become a part of the market they will be capable to sustain in the long-run.

SECTION 5:
Budget

5.1 Budget estimate and requested from AwF (US$).

Cost items:	Rate	Units	Total	Year I	Year II
1. Personnel					
1.1 Project Leader (man-days)	Volunteer basis				
1.2 Technical expert (man-days)	Volunteer basis				
1.3 Field Manager (man-month)	200	24	4,800	2,400	2,400
2. Travel					
1.1 Team Leader	Other sources				
1.2 Technical consultant	Other sources				
1.3 Project/Field Manager	100	12	1,200	600	600
3. Women's group			-		
1.1 Revolving fund (Cooperatives)	350	5	1,750	438	1,313
1.2 Training expenses	100	4	400	200	200
4. Pond const. support (50%)	40	80	3,200	3,200	-
5. Equipment and materials	500	5	2,500	2,500	-
6. Stationeries	20	24	480	240	240
7. Communication	30	24	720	300	420
8. Miscellaneous	10	24	240	240	-
Sub-Total			15,290	10,118	5,173
10. Overhead (5% for IAAS)			765		
Grand total			**16,055**		

	Total	**Year I**	**Year II**	**Final**
Requested from AwF		**45%**	**45%**	**10%**
	16,055	**7,225**	**7,225**	**1,605**

AIT contribution	Rate	Units	Total	Year I	Year II
1. Airfare	727	1	727	364	364
2. Per diem / honorarium	300	20	6,000	3,000	3,000
3. Local travel	100	2	200	100	100
4. Report writing/printing	500	2	1,000	500	500
5. Communication	50	6	300	150	150
			8,227		

SECTION 6:
Additional Documentation
(Short CV of the Key Persons)

DR. RAM C. BHUJEL - Project PI (AIT), Thailand

Address: AARM, Asian Institute of Technology (AIT),
PO Box 4, Khlong Luang, Pathumthani 12120, Thailand,
Contact: bhujel@ait.asia

Academic qualification:

D. Tech. Sc. and M. Sc. (Aquaculture) from AIT, Thailand
B. Sc. (Animal Science) from Institute of Agriculture and Animal Science (IAAS), Rampur, Chitwan, Nepal.

Teaching and student supervision: teaching post-graduate level since 2003, served/serving as thesis committee member of more than 10 post-grad students.

Research / Projects: has over 15 years experience in research and project implementation at Aquaculture and Aquatic Resources Management (AARM), AIT which include:

- Project Coordinator - Aqua-Internship project in Cambodia, Nepal and Vietnam, funded by EU (Euro 959,157), Sept 1, 2007 – Aug 31, 2010.
- Project Manager - Curriculum Development project in Cambodia, Nepal and Vietnam funded by EU (Euro386,957-Sept 2005-Aug 2008).
- Team Leader - Women in Aquaculture in Nepal funded by German NGO (2000-2004 and Budget ~US$60,000).
- Advisor, AARM Tilapia Hatchery – manage a commercial activities with turn over of 45,000US$/yr, carry out research and technology transfer to private and public sectors, e.g. private farms in India and Thailand.
- Other projects –AARM Joint Venture project (5 years, approx. ~US$100,000), Exotic Aquaculture Species: Problem and Prospect in SE Asia funded by SIDA (US$30,000).

Publication:

- Author of "Statistics for Aquaculture" published by Wiley-Blackwell Science.
- Co-authored a monograph entitled "Rainbow trout culture in the Himalayan Kingdom of Nepal: a success story" published by APAARI, FAO
- Authored two edited conference proceedings or book chapters
- Co-edited "International Mechanisms for the control and responsible use of alien species in aquaculture ecosystem" published by FAO
- Published more than 10 referred journal articles, over 30 popular articles, attended and presented more than 40 papers presented in international conferences/workshops
- Serving as a Reviewer for Journal *Aquaculture* published by Elsevier Science

Professional memberships/contributions:

Gold Award (2009) by Asian Fisheries Society for Contribution to Fisheries Education
Member - World Aquaculture Society-Asian Pacific Chapter (WAS-APC), US Aquaculture Society (US-AS), Asian Fisheries Society (AFS) and Nepalese Fisheries Society (NEFIS) and currently serve as Director of WAS-APC.
Serve as international conference organizer, key note speaker, expert panel member.

Others: Listed in Marquis Who'sWho in the World – 27th Edition 2010.
Gold Award from AFS (2009) for contribution to Aquaculture Education
Scholar of United Mission to Nepal (6 yrs), Scholar of British Government for MS degree (2 yrs), Narai / Nam Sai Farms Co. Ltd., for PhD (5 yrs).

2. **MADHAV K. SHRESTHA – Project PI at IAAS, Nepal**

Gender : Male
Date of birth : August 4, 1954
Nationality : Nepalese

EDUCATIONAL BACKGROUND:

Doctor of Technical Science: Aquaculture, Asian Institute of Technology (AIT), Thailand, August 1994.
Master of Science: Aquaculture, AIT, Thailand, Aug 1989.
Master of Science: Zoology, Tribhuvan University, Kathmandu, Nepal, 1979.

EMPLOYMENT HISTORY:

Aug.1999–Present Associate Professor, Department of Aquaculture, Institute of Agriculture and Animal Science (IAAS), Chitwan, Nepal.

Dec.1996-Dec.1997 Research Specialist for PD/A CRSP/USAID project at Agricultural and Aquatic Systems Program, AIT, Thailand; Postdoc researcher.

Apr.1994-May1994 Technical Trainer, Integrated Aquaculture in Asia, Aquaculture Short Course Unit, AIT, Thailand.

Dec. 1993-Mar.1994 Technical Trainer, Water Quality and Pond Soil Management for Sustainable Aquaculture, Aquaculture Short Course Unit, AIT, Thailand.

Sep.1989-Nov.1989 Research Associate/Technical Trainer, Regional Aquaculture Training '89, AFE, AIT, Thailand.

Jun.1987-Jul.1999 Lecturer, Fisheries and Aquaculture Department, Institute of Agriculture and Animal Science (IAAS), Chitwan, Nepal.

Apr.1982-Jun.1987. Assistant Fisheries Development Officer, Fisheries Division, Department of Agriculture, HMG, Nepal.

Dec.1979-Apr.1982. Assistant Lecturer, Zoology, Institute of Agriculture and Animal Science (IAAS), Chitwan, Nepal.

TRAINING:

04/85 - 08/85. Participant in Training Course on "Integrated Fish Farming" Asian-Pacific Regional Research & Training Center, Wuxi, China.

02/99 - 03/99. Participated in Training Course on “Intensive Aquaculture Farming” International Training Center, CINADCO, Shefayim, Israel.

SELECTED PUBLICATIONS:

1. **Shrestha, M.K.** and C.F. Knud-Hansen (1994). Increasing attached microorganism biomass as a management strategy for Nile tilapia (*Oreochromis niloticus*) production. Aquacultural Engineering 13: 101-108.
2. **Shrestha M.K.** and C.K. Lin. (1996). Determination of phosphorus saturation level in relation to clay content in formulated pond muds. Aquacultural Engineering 15: 441-459.
3. **Shrestha M.K.** and C.K. Lin (1996). Phosphorus fertilization strategy in fish pond based on sediment phosphorus saturation level. Aquaculture 142: 207-219.
4. **Shrestha M.K.** and C.N.R. Yadav (1998). Feeding of napier (*Pennisetum purpureum*) to grass carp in polyculture: a sustainable fish culture practice for small farmers. Asian Fisheries Science 11: 287-294.
5. **Shrestha M.K.** (1999). Summer and winter growth of grass carp (*Ctenopharyngodon idella*) in polyculture fed with napier grass (*Pennisetum purpureum*) in subtropical climate of Nepal. Journal of Aquaculture in the Tropics 14 (1): 57-64.

6. **Shrestha M.K.** and R.C. Bhujel (1999). A preliminary study on Nile tilapia (*Oreochromis niloticus*) polyculture with common carp (*Cyprinus carpio*) fed with duckweed (*Spirodela*) in Nepal. Asian Fisheries Science 12: 83-89.
7. Lin C.K., **M.K. Shrestha**, Y. Yi and J.S. Diana (2001). Management to minimize the environmental impacts of pond effluent: harvest draining techniques and effluent quality. Aquacultural Engineering 25: 125-135.
8. Mandal J.K. and **M.K. Shrestha** (2001). Effect of feed supplementation on growth and production of Nile tilapia in mixed size culture system. J. Inst. Agric. Anim. Sci. (2000-2001), 21-22:141-149.
9. **Shrestha, M.K**. (2002). Country report: Nepal. In: R.A.R. Oliver (ed.) Sustainable fishery management in Asia. Asian Productivity Organization, Tokyo. pp. 226-249.
10. **Shrestha M.K.**, A.K. Rai and N.P. Pandit (2004). A preliminary study on the growth and survival of fresh water prawn (*Macrobrachium rosenbergii*) in Chitwan Nepal. J. Inst. Agric. Anim. Sci. 25: 75-78.
11. Yi, Y., J.S. Diana, **M.K. Shrestha** and C. K. Lin (2004). Culture of mixed-sex Nile tilapia with predatory snakehead. In: R. Boliver, G. Mair, K. Fitzsimons (eds.) New Dimension in Farmed tilapia, Proceedings of 6th International Symposium on Tilapia in Aquaculture (ISTA 6). pp. 544-557.
12. Chaudhary, S.N., **M.K. Shrestha**, D.K. Jha and N.P. Pandit (2008). Growth performance of silver barb (*Puntius gonionotus*) in mono and polyculture systems. Our nature 6: 38-46.
13. Bhujel R.C., **M.K. Shrestha**, J. Pant and S. Buranrom (2008). Ethnic women in aquaculture in Nepal. Development, 51: 259-264. (www.sidint.org/development)
14. Batajoo, R.K, **M.K. Shrestha** and N.P. Pandit (2007). Possibility of rainbow trout (*Oncorhynchus mykiss*) culture in Phewa lake of Pokhara. J. Inst. Agric. Anim. Sci. 28:115-120.
15. Yadav, R.K., **M.K. Shrestha** and N.P. Pandit (2007). Introduction of Sahar (*Tor putitora*) in cage-cum-pond integrated system of mixed-sex Nile tilapia (*Oreochromis niloticus*). Our nature 5: 52-59
16. **Shrestha, M.K.** and N.P. Pandit (2007). A text book of Principles of Aquaculture. Department of Aquaculture, Institute of Agriculture and Animal Science, Rampur, Chitwan, Nepal. 114 p.
17. **Shrestha, M.K.**, N.P Pandit, Y. Yang, C.K. Lin, and J.S. Diana. 2009. Integrated cage-cum-pond culture system with African catfish (*Clarias gariepinus*) in cage and carps in open pond. In Cage Aquaculture in Asia: Proceedings of the Second International Symposium on Cage Aquaculture in Asia (ed. Y. Yang, X.Z. Wu and Y.Q. Zhou), pp 150-161. Asian Fisheries Society, Manila, Philippines, and Zhejiang University, Hangzhou, China.

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