

# University Links.

**No 2. August 2002**

## **Editorial**

It was gratifying for the Project to receive such a large amount of mail welcoming the first edition of *University Links* and many thanks for the responses. We would also like to thank those who forwarded their copy to colleagues.

The purpose of this outlet is not to publish the general activities of the SUFER Project but to establish the newsletter as a notice board for all researchers working on, fisheries related, pro poor issues. This edition includes information on new research projects funded by SUFER, extensions to existing work and abstracts from completed research. The Institute of Aquaculture at Stirling University was quick to respond to the offer of broadening this network of current fisheries research by sending their activities. These are included here with the principal investigator(s) and their e-mail address.

In June SUFER completed a research linkage with the MACH Project (Management of Aquatic-Ecosystems through Community Husbandry), a Government of Bangladesh programme supported by USAID and The Aquatic Resources Development, Management and Conservation Studies (ARDMCS) of the Fourth Fisheries Project, which benefits from a grant from the Global Environment Facility (GEF). They are combining with SUFER to fund or support research in aquatic biodiversity and conservation that have direct relevance to poor communities for whom sustainable fisheries are a major factor in their livelihood strategies. The first issue to be addressed is entitled; *The feasibility of community-based monitoring of biodiversity and environment*. A call for concept notes has been posted to 18 individuals with relevant expertise and interest in the five participating universities of Bangladesh. The deadline for submission is 31 August.

Three new partners and possible collaborators have been identified namely, TROPECA (Practical guidance for the estimation and allocation of environmental capacity for aquaculture in tropical developing countries), a three year research project funded under the DFID Aquaculture and Fish Genetics Research Programme, the South Asian Network for Development and Environmental Economics (SANDEE) based in Nepal and ICLARM in Bangladesh and Penang. MRAG and NRI (both UK) continue to play an active role in collaborative research with four university teachers supported by SUFER.

**Chris Morrice (SUFER Project Coordinator)**

**chris.sufer@fmsbd.org**

## Edited Abstracts from completed Research Awards

### Diagnosis and Control of Bacterial and Fungal Fish Diseases in Mymensingh Area of Bangladesh

Dr. M. Bazlur Rashid Chowdhury, Professor, Dept of Aquaculture, FF, BAU  
[mbrchow@royalten.net](mailto:mbrchow@royalten.net)

**(Purpose:** To develop simple and effective low-cost technology to diagnose bacterial & fungal fish disease & take effective measures against the disease before or after its occurrence.)

Studies were conducted to diagnose and control bacterial and fungal diseases of fish cultured in Mymensingh from October 2000 to April 2002. In total, 79 bacterial and 41 fungal isolates were recovered.

Of the 18 bacterial isolates challenged against experimental fish, *Aeromonas. hydrophila*, *A. veronii* biovar *sobria*, *Edwardsiella tarda* were found to be pathogenic. *A.veronii* biovar *veroni*, *A. schubertii* and *Pseudomonas* spp. were detected as pathogenic but with low infectivity. Of the fungi, *Aphanomyces invadans* Ap-1 was found to be more pathogenic than *Saprolegnia* sp. Sa-11 and *Achlya* sp. Ac-20. In histopatho-logical examination, mycotic granulomas, sometimes with fungal hyphae, were observed in muscle tissue, especially in the case of EUS infected by *A. invadans*. The new bacterial and fungal isolates were more pathogenic than laboratory stock. High survival of bacterial isolates, *A. hydrophila* Ah-11 and *Pseudomonas* sp. Ps-39 was observed in lake and pond water. Medium survival was seen in tap water, distilled water, physiological saline and salt water. Optimum survival was seen for *Aphanomyces invadans* Ap-1 and *Saprolegnia* sp Sa-11, in lake and pond water. Other water types did not support their survival.

*A. hydrophila* Ah-11 and *Edwardsiella tarda* E-40 were detected as highly virulent bacterial isolates in pond water (100% cumulative mortality with 80% lesions). *A. veronii* biovar *sobria* As-29 was medium virulent causing 90% mortality with 70% lesion in challenged fish. *A. veronii* biovar *veronii* Av-20 and *Pseudomonas* sp. Ps-39 were recognised as low virulent isolates causing 50% mortality with 40% lesions of the fish. For fungal virulence, *Aphanomyces invadans* Ap-1 was highly so (90% mortality with 100 % lesions of fish) compared to *Saprolegnia* sp. Sa-11 (70% mortality and 80% lesions). Drug sensitivity tests of aeromonad isolates were found to vary in their sensitivity to the six antibacterial agents tested. Among these, 25% isolates showed multiple resistance whereas single resistance was 42%. The prevalence of sensitivity to all of drugs tested was 33%. Salt and lime together were found to have a high suppressive effect on the fungal growth. Herbal extracts viz., neem, lalpata and marigold had moderate effect, but **Garlic** and **Creat** were found to be the most effective.

Antibiotics, renamycin (Oxytetracycline) and cotrim (sulphamethoxazole and trimethoprim) had a strong effect against experimental bacterial infection. Field trials with treated and non-treated ponds, a salt and lime ratio of 1:1 with a minimum dose (250 g of each) applied once a week for 4-6 consecutive weeks before start of winter was found to be most suitable at preventing the occurrence of ulcer type disease.

### Development of value-added fish products from by-catch and underutilized fisheries organisms and market test them to ascertain acceptability among rural communities

A. K. M. Nowsad Alam, Professor, Department of Fisheries Technology, Bangladesh Agricultural University, Mymensingh-2202. [nowsad@royalten.net](mailto:nowsad@royalten.net)

**(Purpose:** To develop affordable non-conventional new fish products such as; fish sausage, fish stick & fish ball from the by catch of under-utilized and unutilized fish, shell fish and cuttle fish. Promote these products among local people by incorporating local taste. Improve nutrition of the

*poor. Increase economic profitability of the harvest and involve women in homestead manufacture of these fish products.)*

Non-conventional seafood products, fish sausage, fish ball and fish finger, were developed from underutilized sea catfish, African catfish, cuttlefish and squid and consumer acceptance tested. The handling and processing of the products from each species optimized product quality as well as the appearance, taste and flavour of the products. Manufacturing techniques and treatment responses varied according to species.

Leaching of depot fat, enzymes and other gel-interfering components with increased water removal from the mince by washing techniques were researched by monitoring ionic strength and pH of washing solution, washing time (agitation and settling) and various chemicals. The techniques substantially improved the gel forming ability of all minces except squid. A 0.1% NaCl and 5 min. agitation time gave best gelling performance and product quality. Potato starch, mashed potato and boiled rice paste as gel-filler/enhancers were tested. Spices were tested to improve taste. Product shelf life at room and refrigeration temperatures was determined using sodium benzoate and potassium sorbate with the latter giving the best result. Fish sausage and fish balls were tested by a tasting panel, with spice-enriched products favored by all. Mince from squid could not transform into gel and products could not be manufactured. It was suspected that protease enzymes activated at incubation temperatures would be responsible for such degradation of protein during product formulation.

Market testing was done in 10 villages near Mymensingh and six coastal villages near Chittagong. A price of Tk.4/ fish ball Tk.8/ fish sausage was considered reasonable. This was much higher than the production cost of Tk.1.9 and Tk.4.4 respectively. An analysis of the cost and profit of production was done based on the price of product set by the people, the price of raw material in the market, tentative cost of productions and cost of transportation and storage. Consumer's acceptance and market tests revealed that fish ball was preferred over the fish sausage.

### **Fishing Communities of Kuakata (a remote coastal area of Bangladesh): strategies for their sustenance in an era of globalization**

Mahmudul Hasan, Associate Professor, Urban & Rural Planning Discipline, University of Khulna, Bangladesh. [urpku@ku.khulnanet.net](mailto:urpku@ku.khulnanet.net)

*(Purpose: To study the status of subsistence fishing communities in a remote coastal settlement of Bangladesh and develop strategies for increasing their benefits from tourism)*

Kuakata is a developing tourist resort and this work attempted to develop strategies to improve the benefits for fishing communities from tourism. Participatory Research Appraisal (PRA), Participatory Research Observation (PRO), case studies, interviews and questionnaires were key tools used. Field investigators collected information from 500 households in 12 villages of Latachapali Union. Thirty tourists were also interviewed. The main daily activities of fishermen were fishing, fry collection in the sea, share cropping, pulling vans and carts, labouring for construction work, working in hotels, restaurants and boats. Ninety percent were Muslim, 6% Buddhists (Rakhain Tribe) and 4% Hindus. The Rakhain community (originally from Burma) first inhabited Kuakata and introduced fishing. Today very few Rakhain families are left and Muslims dominate the area. Most fishermen stated that agriculture was the main occupation of their forefathers. Poverty, landlessness and unemployment pushed the people to Kuakata and availability of fish in the sea brought them into the fishing profession. Sea fishing is a risky occupation with cyclones, piracy, and loss of fishing gear making the lives of fishermen very uncertain.

Only people of the Kuakata resort and adjacent villages are involved in tourist related activities. The income pattern of the fishing community is poor. Income rises during the Hilsa (*Hilsia ilisha*) season (June

to September). However, from February to April, very few fish are available, yet they require large sums to buy fishing gear for the start of the next season in May. At this time, they borrow from moneylenders.

Tourism took off from 1998. The season is normally from October to April peaking in November with about 4000 tourists falling to 500 in August. There are 21 residential hotels. Fisheries and tourism at Kuakata are inter-related. Poor transportation is the major problem for development at Kuakata. Recreation facilities are also minimal. To support both the fishing community and promote tourism the study recommends that tourist areas be delineated. Fish processing industries can be set up in and around Kuakata with access to Kuakata improved by building more bridges. In addition, eco-parks could be developed. Fishermen should be provided with soft loans by banks or NGOs to buy fishing gear. Community service facilities such as roads, schools, *madrasas* and health centers should be established. Measures should be taken for profit sharing arrangements between moneylenders (*Dadandars*) and the fishing community.

### **Fisheries activities of Fishing communities in Kuakata, South Bangladesh**

Khairul Azam, Professor, FMRT Discipline, University of Khulna, Khulna-9208, Bangladesh  
azamku@bttb.net.bd

*(Purpose: To study and improve on, the traditional fish preservation and processing techniques of fishing communities in a remote coastal settlement of Bangladesh.)*

A field survey was conducted in 11 villages for whom fishing was the main livelihood strategy and 20 for whom it was not. Of 1,100 people investigated, 716 (65%) were engaged in fisheries activities. About 55% carried out fisheries activities and 3.6% were directly involved in fish processing (icing, drying, salting-drying, and smoking). Most (79.2%) fished in the sea and river. In one village, 97% of fishermen were directly involved in fishing. Overall, 0.2% were engaged in netting and 3% of fishermen were fish traders. About 10% and 4% were shrimp fry collectors and processors. Sixty nine percent carried out fisheries activities in partnership. In four villages about 80% of fishermen were involved in partnerships. Only 23% carried out fisheries activities with just their family members. Most fished along the beach up to 2 km. About 53% worked more than 24 days a month while 40% worked between 20-24 days. Most (86%) in all villages worked throughout the year. The rest carried out their fisheries activities seasonally.

Four types of fishing crafts namely dingi (small wooden boat), bachari (large wooden boat), engine boat and trawler were observed. Only 10% owned their boat. Amongst the fishing craft owners, 85% had one fishing craft whereas 13% had two. Only 2% had three craft. The five types of fishing gears used were Hilsa net, Behundi jal, Khuta jal, Long line and Tana jal. All fishermen used Hilsa net and long line for fishing. Most fishermen (77%) did not own their fishing gear.

Ice was usually used for preservation, though not appropriately. Icing, drying, salted-drying and smoking were the preservation and processing techniques used. Pre-processing was common for large fish that needed longer time for drying. Drying time (2 to 8 days) varied from species to species. For salting-drying procedures, the duration was between 6 to 36 hours. Rubbing on the skin was the only method of salting.

There were two fish landing centers, two local fish markets and 13 fresh fish *arots* (depot) with 11 located in the village of Alipur and two in West Kuakata. Total fresh fish production in the area was 6,95,475 kg. Cost-benefit ratio of nine fresh fish *arots* varied between 0.4 and 0.5. *Arots* working through the year had better a cost-benefit ratio. Kuakata sea beach and the estuary of Shibbaria River near Khajura and Gorakhal were identified as the fry collection zones. Fishermen generally preserved shrimp fry in earthen pots with salt water. They were unaware of how to keep fry in oxygenated water.

Credit was provided to poor fishermen through NGOs or *arotders* (Depot owners). Thirty seven percent were engaged with NGOs for credit and 41% sourced *arotders*, whilst 22% used their own capital.

## **Entrepreneurship Development in Fishing Communities of Bangladesh An Empirical study on Coastal Fishermen of Chittagong District**

Dr Mohammad Solaiman, Professor, Department of Marketing, University of Chittagong  
[Vc-cu@spnetctg.com](mailto:Vc-cu@spnetctg.com)

*(Purpose: To describe, analyze and understand the functioning of the credit system and the gender roles in coastal fishing communities and to develop recommendations on how to improve the livelihoods of the poor involved the fish community chain)*

The study focused on the potentialities of entrepreneurship development among the coastal fishing communities. Entrepreneurship development still remains a critical problem in the country as is reflected in low level of industrialization and underutilization of natural resources. Empirical investigation, however, reveals the prevalence of potentialities of entrepreneurship development among fishing communities in general and study areas in particular. But endeavor in the form package assistance programmes turned out to be inefficient and inadequate. Main problems in coastal fishermen entrepreneurship development have been identified to be the absence of social security, lack of infrastructure facilities, paucity of funds and ineffective training courses for the development of entrepreneurship in the study areas. Some recommendations were made for increased collaboration and cooperation among the concerned interest groups for the emergence and healthy growth of fishermen entrepreneurs in coastal areas of Bangladesh.

## **Current or recently completed Research Projects conducted by the Institute of Aquaculture, University of Stirling, UK**

**R Number:** R7052

**Title:** Improving freshwater fish seed supply and performance in smallholder aquaculture systems in Asia

**Contractors:** Dr. Little, Institute of Aquaculture (IoA), University of Stirling, UK & Dr P. Edwards, Asian Institute of Technology (AIT) Bangkok, Thailand.

**Collaborators:** Dr Demaine, AIT; Dr Tuan & Mr. Dan, RIA#1; Mr. Van Tu, College of Agriculture and fisheries, Vietnam; Mr. Innes-Taylor & Mr. Duangchit, Div. Agriculture and Forestry, Lao PDR; Mr. Turongruang & Mr. Supon, Udorn Thani, Thailand; Mr. Griffiths & Mr. Chowdhuri, Parbatipur, Bangladesh

**Start Date:** September 1997      **Finish Date:** September 2002

**Project Purpose:** Asian freshwater fish production sustained and developed through improved approaches to small-holder seed production, based on identified constraints in output, quality and supply.

**E-mail address:** [dcl1@stir.ac.uk](mailto:dcl1@stir.ac.uk)

**R Number:** R7064

**Title:** Small-scale farmer managed aquaculture in engineered water systems: critical design and management approaches

Contractors: Dr. Little, IoA, Stirling; Dr J. Gowing, CLUWRR, University of Newcastle; UK, Professor Bogahawatte, University of Peradeniya, Sri Lanka; Dr Ayyappan CIFA, Orissa India; Mr van der Hoek, IIMI. Colombo, Sri Lanka.

Start Date: December 1997 Finish Date: March 2002

Project Purpose: Sustainable yields from small-scale semi-intensive and extensive aquaculture systems increased through increased management.

e-mail address: [dcl1@stir.ac.uk](mailto:dcl1@stir.ac.uk)

**R Number: R7284**

**Title: Genetic improvement and utilisation of indigenous tilapia in Southern Africa**

Contractor: Dr G. Mair & Prof. Beardmore, School of Biological Sciences, University of Swansea; Dr I. Hoffman & Mr Khalid Salie, Aquaculture Programme and Mr D. Brink & Mnr. Paul Maiais, Dept. of Genetics, Faculty of Agricultural Science, University of Stellenbosch, South Africa; Mnr. J. Swart, Dept of Agriculture, Province Western Cape, S.A.; Mnr. G. Conradie, Agricultural Research council, Stellenbosch, S.A.

Start Date: December 1998 Finish Date: June 2002

Project Purpose: Higher yielding genetically male tilapia (GMT) developed for improved livelihoods in small-scale aquaculture in Southern Africa

e-mail address: [gcmair@ait.ac.th](mailto:gcmair@ait.ac.th)

**R Number: R7590**

**Title: Genetic status and Improvement strategies for exotic carps for low input aquaculture in Asia**

Contractor: Dr. Mair, University of Wales Swansea, Dr D. Penman & Prof. B. McAndrew, IoA, University of Stirling; Dr M.G. Hussain, BFRI, Bangladesh; Dr Y. Basavaraju, UASB, Bangladesh; Dr Tuan, RIA#1, Vietnam

Start Date: 1<sup>st</sup> April 2000 Finish Date: 31<sup>st</sup> March 2004

Project Purpose: Benefits for poor people provided by application of new genetical knowledge to production in aquaculture and enhancement fishery systems

e-mail address: [gcmair@ait.ac.th](mailto:gcmair@ait.ac.th)

**R Number: R7591**

**Title: Production of novel strains of growth enhanced tilapia, which are reversibly sterile**

Contractor: Prof. Norman MacLean, School of Biological Sciences, University of Southampton

Start Date: April 2000 Finish Date: March 2004

Project Purpose: Production and testing of novel strains of tilapia

e-mail address: [nm4@soton.ac.uk](mailto:nm4@soton.ac.uk)

**R Number: R7917**

**Title: Self Recruiting Species in aquaculture – their role in rural livelihoods**

Contractor: Dr D. Little, IoA, Dr A. Yakupitiyage & Dr Demaine, AIT, Dr K Lorenzen, Imperial College, London

Collaborators: Dr Siebert, Natural History Museum, London; Dr Riley, IACR, Herts; Mr Meusch, AIT outreach, Cambodia; Mr Turonguang, Udorn Thani, Thailand; Mr Gngwar, EIRFP, India

Start Date: 1<sup>st</sup> October 2000 Finish Date: 31<sup>st</sup> September 2003

Project Purpose:

Management approaches for poor groups to optimise benefits from self-recruiting small species in inland aquaculture

e-mail address: [dcl1@stir.ac.uk](mailto:dcl1@stir.ac.uk)

**R Number: R8093**

**Title: Risk Issues and Socio-economic impact associated with outbreaks of Bacillary Necrosis Disease (BNP) in *Pangasius* spp. farmed in the Mekong Delta, Vietnam.**

Contractor: Dr Margaret Crumlish, Institute of Aquaculture, University of Stirling, FK9 4LA UKMs  
Tu Thanh Dung, Can Tho University, Thailand.

Start Date: 1<sup>st</sup> October 2001 Finish Date: 31<sup>st</sup> March 2003

Project Purpose:

Livelihood risks/constraints of environmental, stock quality or aquatic health factors reduced in target systems through improved techniques and strategies for assessment, control and management.

e-mail address: [mc3@stir.ac.uk](mailto:mc3@stir.ac.uk)

**R Number: R8094**

**Title: Practical guidance for the estimation and allocation of environmental capacity for aquaculture in tropical developing countries (TROPECA)**

Contractor: Dr. John Hambrey, Nautilus Consultants Ltd, Edinburgh, UK .

Collaborators: Dr Telfer, IoA; Mr Van Tu, Vietnam National university, Vietnam; Mr Tuan, Univ. of Fisheries, Vietnam; Mr McAndrew, CARE, Bangladesh; Prof. Saifuddin Shah, Khulna Univ., Bangladesh, Dr Dung & Dr Villadsen, Support to Brackish water and Marine Aquaculture, Vietnam

Start Date: January 2002 Finish Date: December 2004

Project Purpose:

To ensure that aquaculture development in tropical developing countries does not exceed environmental capacity

e-mail address: [john@nautilus-consultants.co.uk](mailto:john@nautilus-consultants.co.uk)

**R Number: R8119**

**Title: The Impact of Aquatic Animal Health Strategies on the Livelihoods of poor people in Asia**

Contractor: Dr J Turnbull, Dr M. Crumlish, Dr K. Thompson & Dr F Corsin, IoA, Dr S. Chinabut, Dr Charatchakool & Dr Somsiri, AAHRI, Thailand; Dr Hao, RIA#2, Vietnam; Dr Mohan, UAS, Mangalore, India; Ms Dung, AFSI, CanTho, Vietnam; Prof. Morgan, University of Liverpool, UK; Dr R.L. Stirrat & Ms D. Rajak, University of Sussex, UK.

Start Date: January 2002 Finish Date: January 2005

Project Purpose:

Livelihood risks/constraints of environmental, stock quality of aquatic health factors reduced in target systems through improved techniques and strategies for assessment, control and management

e-mail address: [jft1@stir.ac.uk](mailto:jft1@stir.ac.uk)

**For further details see the AFGRP website [www.dfid.stir.ac.uk](http://www.dfid.stir.ac.uk)**

**New Research Awards and Extensions given under the SUFER Project  
June to August 2002**

<b>Title of Research Proposal</b>	<b>Purpose</b>	<b>Award Holder &amp; Organization</b>	<b>e-mail</b>	<b>Award Start Date</b>	<b>Status, partners/ links</b>
Quality of shrimp in the distribution channel: an approach towards improving livelihood of fishing community	Evaluate the status of fishing communities in the shrimp distribution network in Khulna region with the view of identifying constraints and offering solutions	Dr Khairul Azam Prof, FMRTD, KU	<a href="mailto:azamku@bttb.net.bd">azamku@bttb.net.bd</a>	1 Aug	
Feasibility study of using locally available terrestrial grasses and aquatic vegetation as feed in cage culture of grass carp ( <i>Ctenopharyngodon idella</i> ) through participation of poor farmers	To test locally available terrestrial grasses and aquatic vegetation as cheap feed in cage culture of grass carp. To analyse the economic feasibility of fish production by cage culture.	Dr Hossain Zamal Prof, Institute of Marine Sciences, CU	<a href="mailto:zamal@ctgu.edu">zamal@ctgu.edu</a>	Not started	NGO link to be established
Inhibition of reproduction in Tilapia using a natural compound (saponin) in culture condition	To test the feasibility of using saponin as a growth enhancer as well as inhibitor of reproduction in Tilapia.	Dr Md. Arshad Hossain, Prof, Dept of Aquaculture, FF, BAU.	<a href="mailto:silke@royalten.net">silke@royalten.net</a>	1 Aug	
Biology of population study of Chapila ( <i>Gadusia chapra</i> ) in Rajdhala Beel	To understand the biology of chapila, <i>Gadusia chapra</i> and the reason for its decline in the beel. Provide its management strategies for the exploiting the fishing community.	Dr Md. Mahfuzul Haque, Prof, Dept of Fisheries Mgmt, FF, BAU.	<a href="mailto:mahfuz@royalten.net">mahfuz@royalten.net</a> <a href="mailto:salehamk@bdcom.com">salehamk@bdcom.com</a>	1Aug	ICLARM/ CARITAS
Comparative studies on genetic variability between wild and hatchery stocks of catla ( <i>Catla catla</i> ) and implications of hatchery management practices	To establish whether the differences in performance of wild and hatchery produced fish seed are due to the genetic erosion that have taken place over years of poor management or	Dr Md. Samsul Alam, Associate Prof, Dept Fisheries Biology & Genetics, FF, BAU.	<a href="mailto:samsul@royalten.net">samsul@royalten.net</a>	1 Aug	Fourth Fisheries Project

hatchery management practices on its pond performances in the Jessore region of Bangladesh	due to environmental factors To improve quality of fish seed by hatchery operators.				
The potential of self-recruiting species in aquaculture for sustaining the livelihoods of rural poor in Bangladesh	Development of appropriate integrated management techniques for sustainable production and conservation of SRS with large cultured carp to ensure nutritional security, access and livelihoods of the poor households.	Dr Md. Abdul Wahab, Prof, Dept Fisheries Mgmt, FF, BAU.	<a href="mailto:wahabma@bdonline.com">wahabma@bdonline.com</a>	1 Aug	Stirling University/ ITDG
Alternative livelihood strategies for coastal fishing communities in Southwest Bangladesh	To assess the livelihood status of the community, understand the main problems they faced & identify alternative strategies for a improving their livelihoods.	Md Abdur Rouf, Assistant Prof, FMRTD, KU	<a href="mailto:roufku@yahoo.com">roufku@yahoo.com</a>	Not Started	No links
Management improvement of hatchery and brood stock of carps rohu, mrigal and catla	Grow on & compare spawning success & progeny performance of wild & hatchery stock from Phase 1	Dr M. S. Shah, Prof, FMRTD, KU	<a href="mailto:ku@bdonline.com">ku@bdonline.com</a>	Extend to May 2004	BARDS.
Development of fry/fingerlings Nursing/ Rearing technique of Pabda <i>Ompok pabda</i>	To establish fry rearing techniques, to ensure mass production of stockable sized fry of an uncommon but highly prized indigenous species using technology suitable for poor farmers to rear their own fish larvae to the fingerling stage.	Dr Md. Fazlul Awal Mollah, Prof, Dept of Fisheries Biology & Genetics, FF, BAU	<a href="mailto:ffbau@mymensingh.net">ffbau@mymensingh.net</a>	Extend to October 2002	No links
Population dynamics and management strategies of four indigenous fish from River Titas, Brahmanbaria	To survey gear & catches to determine population parameters of growth rates, fishing gear selectivity, spawning season, recruitment pattern, and CPUE throughout the life cycle of the target species. The long-term objective is to provide high quality	Dr Md. Sagir Ahmed, Assistant Professor, Dept of Zoology, DU	<a href="mailto:sagir@udhaka.net">sagir@udhaka.net</a>	Extend to May 2003	ICLARM/ PROSHIKA

	biological and fisheries information to assist in the development of an appropriate and sensitive management strategies for the River Titas and floodplain area.				
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### **Glossary of abbreviations**

BARDS	Bangladesh Aquaculture Research & Development Society
BAU	Bangladesh Agriculture University
BFRI	Bangladesh Fisheries Institute
CU	Chittagong University
DU	Dhaka University
FF	Faculty of Fisheries
FMRTD	Fisheries and Marine Resource and Technology Discipline
ITDG	Intermediate Technology Development Group
KU	Khulna University
NGO	Non Government Organisation