FI:TCP/PAK/4559
Technical Report

TECHNICAL COOPERATION PROGRAMME

FEASIBILITY STUDY ON ESTABLISHING FRESHWATER PRAWN HATCHERY

PAKISTAN

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FEASIBILITY OF FRESHWATER PRAWN HATCHERIES IN SINDH PROVINCE

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Rome, 1996

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TECHNICAL REPORT:
FEASIBILITY OF FRESHWATER PRAWN HATCHERIES IN SINDH PROVINCE

Report prepared for
the Islamic Republic of Pakistan
by
the Food and Agriculture Organization of the United Nations

based on the work of

M. New
Freshwater Prawn Culture Consultant

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 1996

This technical report is one of a series of reports prepared during the course of the project identified on the title page. The conclusions and recommendations given in the report are those considered appropriate at the time of its preparation. They may be modified in the light of further knowledge gained at subsequent stages of the project.

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EXECUTIVE SUMMARY AND RECOMMENDATIONS

FAO responded to a Government of Pakistan (GOP) request for the services of an international consultant to carry out a feasibility study on the establishment of freshwater prawn hatcheries in Pakistan, especially in southern Sindh, by providing funds under TCP/PAK/4559. The consultancy commenced in November 1995 and was completed in January 1996; the results are presented in this report.

It is relevant to note that nearly 91 percent of the more than 35 000 t global production of farmed freshwater prawns (1993) was produced in Asia. The global farm-gate value of fanned freshwater prawns has been estimated at nearly $US 194 million. All recorded commercial production is from one of the Asian species, Macrobrachium rosenbergii. which has been transferred world wide. Recently, substantial production of this species has occurred in two of the nations of the Indian sub-continent, India and Bangladesh.

It is recommended that the development of freshwater prawn fanning in Pakistan should be based on the well-known technologies for the culture of M. rosenbergii. For immediate development in Sindh, a monoculture system is recommended. In assessing feasibility in Sindh in 1996, a potential average yield of 1.5 t/ha/year was estimated and an average farm-gate price of PRs 135/kg ($US 3.94/kg) was believed realistic.

Based on these criteria, on cost data collected during the consultancy, and on a single one-hectare pond constructed on existing land and operated under monoculture, prawn farming is viable in Sindh. The conversion of existing carp ponds to prawn monoculture would be more profitable than the establishment of new ponds. If land costs are included, the viability of a venture consisting of a single one-hectare pond is doubtful. However, economies of scale and the achievement of higher productivity than that utilized in the model costed in this report would improve feasibility. Additional revenue could be generated by existing fish farmers by polyculturing prawns with carp. The establishment of freshwater prawn grow-out facilities in Sindh would have no detrimental environmental impact. Initially, broodstock will need to be introduced from abroad but this should not be detrimental if international codes of practice are followed. Competition for natural resources with other freshwater Crustacea is unlikely to occur, should escapes from culture facilities take place. Prawn farming would not substantially affect the activities of those utilizing common resources and is most unlikely to cause any social conflict. Social consequences should be positive.

On balance, the establishment of prawn farming in Sindh is, in the consultant's opinion, believed feasible and advisable. The major constraints to its development are the lack of seed and the technological demonstration.

The report presents the various options for siting government hatchery and demonstration facilities for prawn farming. The Garho marine shrimp farm site is totally unsuitable for use for freshwater prawn culture. Demonstration facilities for prawn nursery and grow-out should therefore be established at the existing government finfish hatchery site at Chilya, which would not entail any major construction work, though management would need to be modified. Staffing levels would not need to be increased at Chilya but the government should consider providing incentives to motivate senior staff to work at the site.

The report contains a recommendation for the establishment of a prawn hatchery within, or adjacent to, the Marine Fisheries Department (MFD) marine shrimp and finfish hatchery site at Hawkes Bay. A secondary option would be to truck seawater from

Hawkes Bay to an inland hatchery sited within the Government of Sindh (GOS), Chilya site. A third option would be to establish the initial hatchery at Hawkes Bay and later to introduce a simple recirculation hatchery at Chilya. The latter option is attractive because it would demonstrate to prawn farmers that hatcheries can be successfully operated on inland sites, thus encouraging the establishment of private "back-yard" hatcheries.

Preliminary descriptive designs and a technology package for government facilities have been provided in this report. These have been geared to enable the production of sufficient postlarval prawns to stock nursery ponds to produce the juveniles necessary for private farmers wishing to stock up to 10 ha of ponds at 5 juveniles per m^2. The hatchery is also designed to produce enough stock to service the concomitant government nursery and grow-out demonstration and training activities. The demonstration ponds should also produce up to 3 t of marketable prawns annually. Design and technology packages for the private sector will follow on from successful demonstration. The establishment of large private hatcheries is not recommended; small-scale "backyard" hatcheries would be more appropriate.

Total construction costs for the development of government facilities at Hawkes Bay and Chilya are estimated to be PRs 4 152 000 ($US 121 226), while equipment costs are estimated at PRs 5 104 000 ($US 149 022) in 1996. The total capital cost should therefore be less than PRs 10 million ($US 292 000). Recurring costs are estimated to total PRs 1 674 000/year ($US 48 876/year), nearly 40% of which are staff costs. Apart from staff costs, the largest recurring costs would be feed and fertilizers (28%). The facilities could generate an income of PRs 905 000/year ($US 26 423/year). However, it would be unwise to rely on this income, since experimental work may reduce the production of marketable animals, and juveniles may initially be given away to new farmers to stimulate the development of the sector.

Following the consultant's debriefing in Islamabad, an application for Federal funding for a project to establish a freshwater prawn hatchery and grow-out demonstration farm in Sindh is being initiated. The establishment of a Federal project will offer several advantages for the ultimate success of prawn farming in Pakistan, and these are detailed in the report. An application for Federal funding for the establishment of a prawn hatchery in Sindh had already been tabled by Pakistan Agricultural Research Council (PARC). It is recommended that the GOP consider these two projects together, with the possible objective of combining them or, at least,ensuring that their activities are complementary. Continuing research, as well as developmental activities, is essential for sustainable development of prawn farming in Pakistan.

Training for project staff will be essential for the successful implementation of the project. Staff should not be sent abroad for this purpose but on-site training should be provided by individuals with detailed practical experience of modern hatchery technology, recruited from countries where prawn farming is already established, such as Thailand or Brazil. Such trainers should be on-site during at least one, preferably two complete larval rearing cycles. External development assistance should be sought to provide the services of a practical prawn hatchery technologist for this purpose, with a continuous duty period of not less than three months.

The Food and Agriculture Organization is greatly indebted to the organizations and individuals who assisted in the implementation of the project by providing information, advice and facilities.

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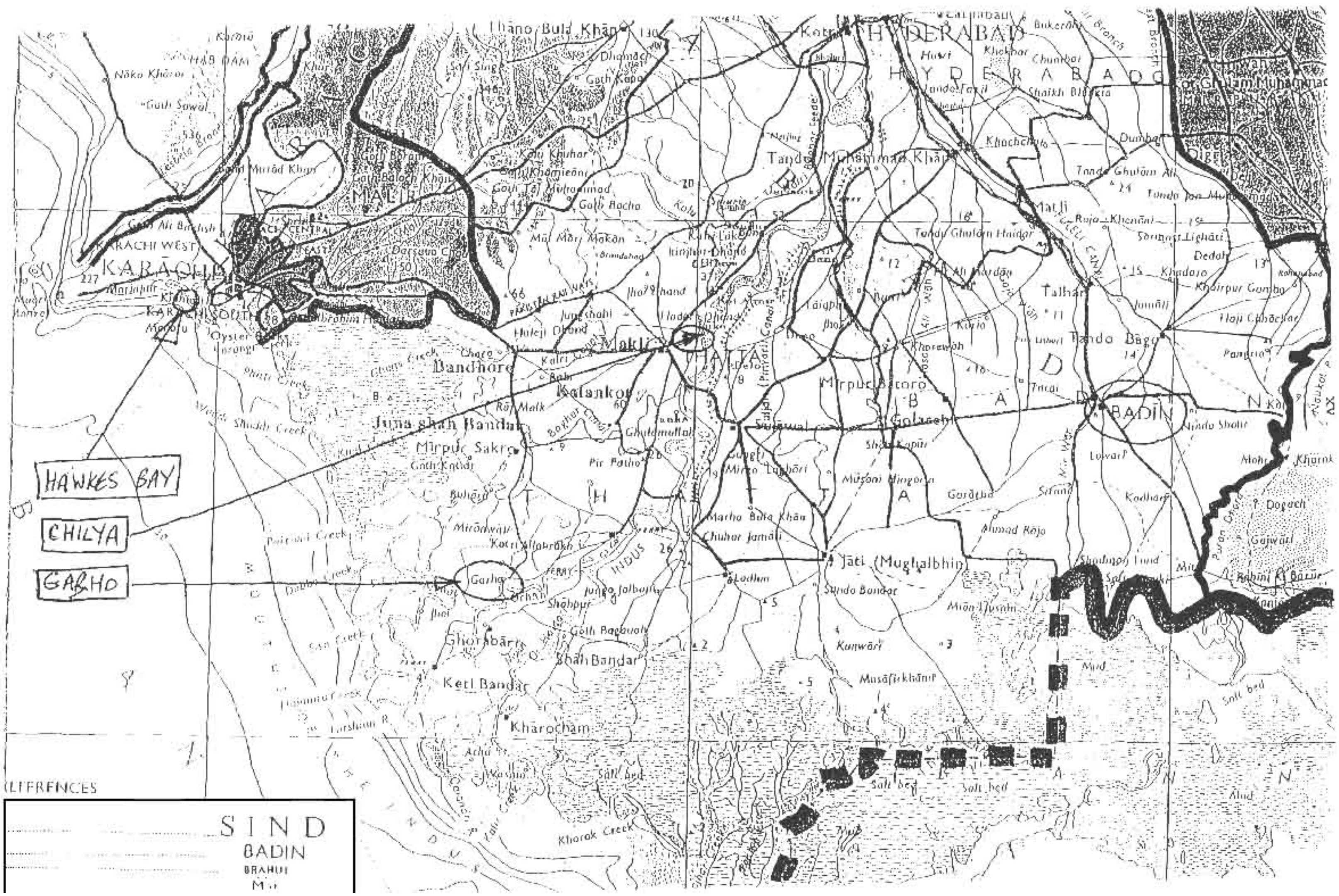
ABBREVIATIONS

AsDB	-	Asian Development Bank
AQUA	-	AquaService (Consultancy firm)
BOBP	-	Bay of Bengal
BSN	-	brine shrimp nauplii
b/w	-	brackishwater
FCR	-	Feed Conversion Ratio
f/w	-	freshwater
GOP	-	Government of Pakistan
GOS	-	Government of Sindh
MFD	-	Marine Fisheries Department, GOP (Karachi)
n.a.	-	not available
NACA	-	Network of Aquaculture Centres in Asia
NIO	-	National Institute of Oceanography
n.s.	-	not stated
PARC	-	Pakistan Agricultural Research Council
s/w	-	seawater


HAWKES BAY
CHILYA
GARHO
SIND
BADIN
HYDERABAD
KARACHI WEST
KARACHI SOUTH
MALIR
Tando Muhammad Khan
Matli
Talhar
Tando Bago
BADIN
Makli
THATTA
Bandhore
Kalankot
Juna shah Bandar
Mirpur Sakro
Mirpur Batoro
Sujawal
Jati (Mughalbhin)
Garho
Ghorabari
Shah Bandar
Keti Bandar
Kharocham
INDUS
Salt bed
Khorak Creek
Golarchi
Gharo Creek
REFERENCES