

COUNTRY STATUS REPORT

ON

NEPAL *

CONTENTS

	<u>Page</u>
1. Introduction	186
2. Scope of Aquaculture Development	187
3. Policy	187
4. Organization	187
5. Status of Fish Culture	187
6. Cultivated Species and Culture Practices	189
7. Institutional Organizations	191
8. Constraints in Small-Scale Fisheries Development	192
9. Conclusions	193
10. References	194
11. Acknowledgement	195

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1. INTRODUCTION

Geographical condition

Nepal is a land-locked mountainous country with an area of 145 689 square kilometers. Geographically, as well as climatically, the country is divided into three regions: e.g. mountains, hills and terai. The mountains and hills cover two-thirds of the country's area, while terai (flat lands) occupies only one third. The cultivable land ratio in hilly and terai regions is 38:62.

Climate

The climatic change from the south part to the north part of the country directly correlates with the change of the altitude ranging from sub-tropical in terai to alpine in the mountainous area.

Population

Nepal's total population was 11 289 000 in 1971. The present rate of population increment is 2.2% per annum. On this basis it is estimated that the country's population will exceed 23 million by the end of this century. The density of population is much higher in the southern flat land (terai) than the hilly areas.

Agriculture

Nepal is an agricultural country where 94% of the population are engaged in agriculture. About two thirds of the G.D.P. is derived from agriculture while 80% of the export commodities come from the agricultural sector. The major crops are paddy, maize and wheat as cereals and jute, oil seeds, sugarcane, potatoes and tobacco as cash crops.

Livestock

Though the livestock holding of the country is 5.8 heads of animal per household yet the livestock product is low because of unproductive breeds as well as poor management.

Fisheries

Fish as a protein-rich diet is acceptable to every level of the population unlike the other animal proteins. The demand for fish is partly met by domestic production and the rest by importing from neighbouring countries. Fish consumption by domestic production is very low as the domestic production is only 2 750 m. tons.

2. SCOPE OF AQUACULTURE DEVELOPMENT

Being a land-locked country production of fish totally depends on the proper utilization of inland waters. Visualizing the country's existing water resources and its future increment, there is great scope for aquaculture expansion and its intensification to maximize the fish production in the country has been tabulated (Table 1).

A projection of man-made reservoirs increment in the country by the end of this century either for irrigation or for hydropower is enormous. A preliminary feasibility study on Gandaki Basin alone adds reservoirs of 44 785 hectares while a reservoir of 24 200 hectares is expected to be added in the Karnali River system.

3. POLICY

As an agricultural country, agriculture always rates the highest priority in the national development plan policy. Recognizing the importance of aquaculture in providing nutrition to the people through increasing production of fish from available water resources of the country, His Majesty's Government has given high priority for the development of aquaculture. The given priority has been encouraged by launching crash programmes over and above development plans and programmes, as well as by extending technical services as a step to protect and support small-scale fish farming.

4. ORGANIZATION

The Directorate of Agriculture has 11 technical divisions as a supporting hand to supervise the activities of respective technical fields throughout the Kingdom, while the plan and programme is implemented administratively by the respective regional directorate and its secretariat in the four development regions of the country. Fisheries Development Division is one of the technical divisions under the Department of Agriculture and is technically responsible for the implementation of fisheries activities in the country.

5. STATUS OF FISH CULTURE

Early history

In the early sixties only pond fish culture practices were initiated in Nepal and thus fish culture activities still are in artisanal scale. For the rapid development of aquaculture, intensive programmes have been implemented with high priority in the various potential parts of the country by mobilising internal resources as well as with the assistance of various international agencies, e.g. FAO/UNDP. Realizing the importance of aquaculture His Majesty's Government has decided to develop a national aquaculture development programme (to be executed under the assistance of FAO/UNDP and under the loan of Asian Development Bank) for implementation in potential areas of the country with a view to increasing fish production.

Since the early sixties, eleven fish farms have been established in the public sector in different parts of the country to render technical services to the private sector. Up till now, the public sector fish farms have been taking responsibility for producing and distributing the pure fish-seed of various cultivable fish species to the private sector.

Traditionally farmers used to stock their ponds with fish-seed collected from rivers, but the public sector serviced pure fish-seed to the private sector. Fish farmers now realize that the stocking of pure fish-seed increases their production. Thus the public sector farms are under high pressure from the private sector to produce fingerlings.

The private sector fish farmers initially practise mostly small-scale fish farming. To expand small-scale fish culture practices as well as to intensify the scale, His Majesty's Government has launched an intensive fish culture programme in various districts of the potential tarai regions. To support such intensive programmes, as well as to smooth the supply of inputs and aid proper extension work, a survey of potential water surface area has been worked out in several potential districts. Implementation of intensive fish culture programmes in several tarai districts has already exhibited higher production and higher economic benefits to the fish growers and this has attracted many people to adopt fish culture as a profession.

Strengthening of public sector fish farms

With interest increasing in fish culture amongst the people the demand of fingerlings is increasing every year. To meet the increasing demand of pure fish-seed in the private sector His Majesty's Government has strengthened the existing fish farms considerably to increase fingerling production by expanding the production area, providing hatchery facilities and by training the manpower under bilateral as well as under the technical assistance programme of FAO.

Establishment of hatchery in the private sector

In spite of various measures taken by HMG to increase the fingerling production from the public sector, the fish farms have been unable to meet the increasing demand for fingerlings from the private sector. Therefore an alternative solution was exercised to train some selected fish farmers in common carp breeding. Today, there are eleven private sector fish breeders producing fingerlings of common carp, and thus helping to minimize the pressure of fingerling demand in the public sector.

In the longterm plan, a policy has been adopted to hand over the responsibility of fish-seed production to the private sector gradually. Experience shows that private fish breeders need full technical as well as

financial support from the public sector for the establishment of breeding facilities (breeding ponds, brooders and hatchery, etc.) besides training and supervision for one or two years. Moreover, the market guarantee of fish-seed must be extended to the private sector as an incentive in the early period.

Fish production

Fish culture is on a small-scale but the water surface coverage in the private sector is significantly increasing especially in those districts of tarai where an intensive fish culture programme has been launched. It is estimated in the year 1978-79 over 700 ha. of water surface was under fish culture producing over 700 m. tons of fish.

Of course the production of fish totally depends on the farmers' experience but attempts are being made to increase the present level of fish production by adopting intensive polyculture as well as by integrating fish culture with animal husbandry (ducks and pig raising) and agriculture.

6. CULTIVATED SPECIES AND CULTURE PRACTICES

Cultivated species

The fish species used for fish culture are as follows:

(A) Exotic

i) Common Carp	<u>Cyprinus carpio</u> (Linn.)
ii) Grass Carp	<u>Ctenopharyngodon idellus</u> (Valenciennes)
iii) Silver Carp	<u>Hypophthalmichthys molitrix</u> (Valenciennes)
iv) Bighead Carp	<u>Aristichthys nobilis</u> (Richard.)

(B) Indigenous

i) Rohu	<u>Labeo rohita</u> (Ham)
ii) Catla	<u>Catla catla</u> (Ham)
iii) Mrigal	<u>Cirrhina mrigala</u> (Ham)

At present public sector fish farms are producing fish-seeds of all cultivable fish species while private fish breeders are producing common carp fish-seeds only.

Emphasis is being given to adopt an integrated fish farming system as well as polyculture in order to maximize fish production per unit water surface areas.

Fish culture practices

The various cultural practices adopted in Nepal are as follows:

Pond fish culture

There is ample scope to expand as well as to intensify small-scale fish culture activities in the large number of existing and productive old village ponds of the tarai region. In these ponds monoculture as well as *polyculture fish farming system has been carried out by the farmers. Generally the fish ponds are cleaned before stocking the new fish-seed either by draining or by using fish poison to kill the predators i.e. Channa sp., Wallago sp., Mystus sp. etc.* In drainable ponds, quick lime or lime is also used at the rate of 200-300 kg/ha and dried under sunlight for a month or less for better sanitation. After the bottom soil cracks, the pond is filled with filtered water to a desired level. With the fertilization of pond either by organic or inorganic means or both, the pond is stocked with common carp fingerlings followed by Chinese and Indian major carp fingerlings. There is no cheap commercial fish food so supplementary food is seldom given but ample grass is provided to grass carp which further fertilizes the pond water. Thus fish production ranges from 0.6-1.2 m. ton/ha in the country.

In addition pond fish culture is encouraged to integrate with live-stock (duck and pig) to maximize the production with least inputs. By adopting this method the farmers get higher economic benefits as the fish production cost is curtailed drastically by the use of manure from duck and pig.

Integrated fish culture

(a) Fish-cum-duck farming

Fish-cum-duck farming is new for Nepal. Integrated fish culture with duck-farming has been found beneficial as this type of farming system increases fish production by more than 10% and ducks grow to an average of 2 kg. each within 50 days from the day of hatching, at the stocking rate of 500 birds per hectare of water. The rapid growth of Pokin duck within the limited time has shown promise in the future to increase the production of duck by multiple cropping from the same water surface.

(b) Fish-cum-pig farming

The study on integrated fish culture with pig-raising has distinctly shown an increase in fish production per unit water surface area and has also drastically lowered the production cost by curtailing the input expense on supplementary feed and fertilizer.

Integration of fish culture with livestock has further opened the horizon to integrate even biogas to maximize the utilization of livestock wastage for generating power (light and gas) for domestic use as well as for cottage industry in the rural areas. Moreover, the sludge of biogas is also considered the best manure for fish ponds.

Development of cage fish culture

In 1971 cages were introduced as a holding unit for the breed fishes in the Phewa Lake of Pokhara Valley. But with the implementation of the Integrated Fisheries and Fish Culture Development Project assisted by FAO/UNDP in 1975, cage fish culture was carried out as a demonstration-cum-study unit in the Lakes Phewa and Begnas. The result of such studies have shown big possibilities for expansion since the trial study has shown a result of 6 to 10 kg. per cubic meter of the cage without any feed (besides the cage and fingerlings cost).

The major fish used for cage fish culture in Begnas and Rupa Lakes are Silver and Bighead carps as these lakes are very rich in phytoplankton and zooplankton respectively. Still studies on efficiency among the different types of cages are under study. The results of cage fish culture have attracted local fishermen, to whom 63 cages were distributed with a total capacity of 3,200 cu.m. under the Agriculture Development Bank's loan and have already produced 3.2 m. tons of fish.

7. INSTITUTIONAL ORGANIZATIONS

Credit facilities

Although commercial banks are also responsible for rendering financial assistance in the form of loans for production programmes, the Agriculture Development Bank of Nepal is also a well-organized financing agency in Nepal. These banks finance interested farmers with long, medium and short term production loans. The long-term loan includes even the construction of new ponds (production as well as fish hatchery) while in the medium and short term loans renovation of ponds and operational cost are included at the rate of 11% interest.

Compared with the interest of people in fish culture, the present investment of banks for aquaculture development in the country is considerably low. Therefore attention of the bank has to be drawn to extend to the private sector funds for the rapid development of aquaculture in the country in order to enhance fish production.

Harvesting and marketing organization

The demand of fish is much higher than the production; therefore there is no marketing problem, but the bulk supply of fish at the same time in the villages or district markets becomes a problem since those markets have

low consumption capacity. On the other hand densely populated areas have less supply of fish compared to its consumption thus resulting in fish becoming one of the expensive dishes. Although urban areas have high demand for fish the small fish growers of the rural areas are handicapped by difficulties to transport their perishable fish products to bigger markets. The local market also lacks the preservation facilities. This condition favours very much the middle men for making higher profit as compared to the producers. Therefore studies are being conducted to bring the small-scale fish growers under one organization, e.g. Fish Growers' Association, especially from those districts where an intensive fish culture programme is implemented. This Organization is aimed to develop a system of fish harvesting and supply for marketing to the adjacent urban areas with the assistance of concerned technical and financial agencies. It is further visualized that the Organization will be able to protect the benefits of the artisanal fish growers and maintain a constant supply of fish of stable price throughout the year.

Procurement and distribution of inputs

So far, pure fish-seed is mainly produced and distributed by the public sector while in the private sector, some of the fish breeders are lending a supporting hand in the production of fingerlings. These small-scale, private fish breeders have shown encouraging results which have attracted more fish farmers to grow fish-seed. Thus the higher involvement of private fish growers as fish breeders under good technical supervision is sure to meet the increasing demand for fingerlings in the future.

Besides the fish-seed, other inputs, e.g. fish poison and fertilizer etc., are procured and distributed by the Agriculture Input Corporation of Nepal. However the present international trend of increasing prices has made these essential inputs expensive, which raises the cost of production of fish thus providing the fish growers with only a marginal profit. Thus the culture practices become less lucrative.

8. CONSTRAINTS IN SMALL-SCALE FISHERIES DEVELOPMENT

The constraints of small-scale fisheries development have been identified as follows:

Training

As aquaculture is a new field of agriculture the small and medium level farmers are mostly unacquainted with the practical methods. Therefore the rural farmers are in urgent need of training in fish culture practices to implement as well as to increase production from their village ponds.

Marketing

In the villages of terai districts the fish farming scale is small but due to its increasing popularity the coverage area is increasing annually

while the marketing of the table fish in these villages is limited to the small local market. Moreover artisanal fish farmers are financially as well as technically handicapped to transport their products to the bigger markets.

Inputs

Slack supply and unavailability of essential inputs of fish culture, e.g. fish-seed, feed and fertilizer and long distance transportation of the inputs has been identified by artisanal farmers as main constraints to the rapid development of fish culture.

Loans

Although production loans are provided by the banks yet to the un-schooled rural fish farmers even if they are very interested the loan procedure seems not only to be lengthy but troublesome. The artisanal fish farmers are mostly landless and without any fixed assets making them ineligible for loans to start even small-scale fish farming.

9. CONCLUSIONS

Training

Traditionally the farmers are acquainted with crop farming and livestock raising while fish culture is new to them. Therefore there is urgent need to train the farmers as well as the extension personnel as a motive to attract the farmers to explore the potentialities of aquaculture. Moreover it is more urgent to convince the mass of farmers about the merits of the integrated farming system - aquaculture, agriculture, livestock and horticulture for higher production possibilities and higher economic benefits per unit area as compared to single farming. Therefore for the adoption of beneficial farming system by the people, priority has to be given to demonstration of such farming systems in rural areas. At the same time the training programme for the farmers has to be carried out with top priority as a trained farmer becomes a permanent extension personnel in the locality to develop activities. It has been experienced practically that if the farmer has seen demonstrations and has been convinced of the benefits of the farming system, then he starts on a small-scale to observe its economic viability as a socio-economist and after being convinced he gradually increases his scale with his increasing practical experience. Moreover experience has shown that the proper training (basic and higher level training) of farmers helps to curtail the cost involved for the mass extension personnel in follow-up programmes.

Marketing

Since the rural small fish farmers are handicapped in facilities to bring their product individually to the bigger distant markets the middle men

exploit them. Therefore proper steps have to be taken immediately to bring these small farmers under one umbrella or to institutionalize them and make them able enough to manage the production, harvesting and marketing system by themselves with the assistance and support of local technical and financing units. To carry out this work the public sector plays a vital role in organizing these farmers into an association (Fish Growers' Association) and moreover in training them and making them able enough to handle the marketing system also. By doing so the small farmers will be protected from the lions share of middle men and they will be more encouraged in fish farming as they get more economic benefit.

Inputs

For rapid expansion as well as for intensification of fish culture there is need to increase the production of various fish-seeds in both the private sector and public sector. Therefore the public sector must take the full responsibility to extend the technical and financial support to encourage the private sector in the establishment of hatcheries and production farms, as well as supplementary industries such as commercial fish-feed, fish poison, etc.

Loans

The financing agencies should take solid steps to provide production loans in the shortest time and easiest way to the rural farmers to promote even small-scale fish farming, by which the production of fish can be increased in the country.

We recommend that Banks consider relaxing their collateral requirements to allow more landless farmers and fish harvesters to qualify for bank loans.

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Table 1. Country's water resources and estimated area

Types of water resources	Estimated area (ha)	Additional projected area by 1985 (ha)
1. Natural waters		
a) Rivers	395,000	-
b) Lakes	5,000	-
c) Irrigation and hydro-electric reservoirs	550	4,000
2. Ponds	5,000	500
3. Irrigated paddy field	117,490	146,000