

9-13
WORKSHOP IN POLITICAL THEORY
AND POLICY ANALYSIS
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LOUISIANA UNIVERSITY
BLOOMINGTON, MISSISSIPPI 39205

IMPACT OF NEW TECHNOLOGY ON TRADITIONAL
FISHING COMMUNITIES IN BANGLADESH

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(Paper presented at the 3rd Common Property Conference
of the International Association for the Study of
Common Property, Washington D.C., September 17-20, 1992)

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BANGLADESH

IMPACT OF NEW TECHNOLOGY ON TRADITIONAL
FISHING COMMUNITIES IN BANGLADESH¹

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Abstract

Those engaged in fishing, that is, the fishing households are among the most disadvantaged communities in Bangladesh. They have no direct control over various water bodies (ponds, lakes, estuaries - rivers, sea etc. and other means of production including equipments to catch fish. Considering the importance of marine fisheries, various measures have been taken in Bangladesh like motorization, control of fishing gears, regulation of fishing, jurisdiction of commercial vessels, seasonal and area-closure and infrastructure development. However, the impact of new fishing technology on the poor fishing communities has rarely been analyzed. This paper examines the impact of new technology on the traditional fishing communities of coastal areas of Bangladesh based on case studies of two marine fishing villages - one village exposed to new technology and the other not. This allows us to analyze 'before' and 'after' situations of a village with respect to technology and also for a comparative analysis between two villages, Altogether 189 sample households have been covered. How could the improvement in the socio-economic status of fishing households be affected, given that the marine fisheries resources in their present form is a common property? How the technological interventions affected the artisanal fishermen? The paper comes up with some findings and recommendations. It is observed that access to new technologies has been very limited by the vast majority of fishermen. Policies and programmes to ensure access of the fishermen to water bodies, credit, boats, fishing gears and market facilities should be taken up and implemented through proper organizational set-up with beneficiaries' participation.

The views expressed here are the author's own and do not necessarily reflect those of CIRDAP. The paper is based on a research study conducted by CIRDAP during 1985-86 and sponsored by the Asian and Pacific Development Centre (APDC). The author is thankful to Dr. Mahbubur Rahman, Dr. Aminullah Bhuiyan and Mr. Mahfuzuddin Ahmed, members of CIRDAP study team.

1. Introduction

Fisheries comprise a major economic activity within complex interactions between human beings and water - 'the first among equals' of the natural resources. The other natural resources like soil and biomass become inert without water. The fishery resources also generally refer to the stocks of fishes, shellfishes and other aquatic and semi-aquatic organisms of commercial importance. Crafts, nets, gears which are utilized by man for exploitation of aquatic organisms are also treated as a part of fisheries resources.

Fish is an important element of traditional Bangladeshi diet, and the main source of animal protein particularly for the low-income group. It contributes 7% to agriculture and 3.5% to the total GDP and provides 80% of the animal protein requirements. Export of fish, particularly shrimp, earns over US\$10 million in foreign exchange every year.

About 1.5 million full-time fishermen in addition to about 11 million part-timers are employed, in fisheries sector. The table below reflects the contribution of different categories of fisheries to fish production in Bangladesh during 1985-86.

Table 1 : Annual Total Catch and Productivity
by Source (1985-86)

Sources	Total catch (M.tons)	Water area hec,	Catch/Area Kg/hec.
A. <u>Inland Fisheries</u>			
a) Capture			
1. Rivers including estuaries	181,140	1,031,563	176
2. Sundarbans	6,416	-	-
3. Beels	47,019	114,161	412
4. Kaptai lake	3,439	68,800	50
5. Flood lands	186,126	28,32,792	66
Capture total	424,140	40,47,316	-
b) Culture			
1. Ponds	155,012	146,890	1,055
2. Baors	1,321	5,488	241
3. Shrimp farms	27,172	108,280	251
Culture total	1,83,505	2,60,658	-
Inland total	6,07,645	43,07,974	-
B. <u>Marine Fisheries</u>			
a) Industrial fisheries (trawl)	10,353	-	-
b) Artisanal fisheries	222,928	-	-
Marine total	233,281	-	-
Country total catch	840,926	-	-

Source:

- 1) Fisheries Resources Survey System of the Directorate of Fisheries
- 2) Marine Fisheries Deptt.

Open water capture fisheries contribute most of fisheries production (61%) followed by marine fisheries (23%) and closed water culture fisheries (16%). The productivity in all sectors of fisheries is on the decline and specifically that of inland fisheries.

There is a general concern about the slow economic and social progress of the fishing communities in Bangladesh as in most of the developing countries. Various measures have been taken at various times in various places (e.g., motorization, control of fishing gears, regulation of fishing jurisdiction of commercial vessels, seasonal and area-closure, infrastructure development, etc.). This

study makes an evaluation of the impact of new fishing technologies on the fishing communities which will be useful in choosing various policy options and programmes designed to promote the welfare of the small-scale fishing communities of Bangladesh.

2. Marine Fisheries

The length of the Bangladesh coastline is about 480 km. and the declared exclusive economic zone in the Bay of Bengal extends upto 310 km. from the coast, covering an area of about 70,000 sq.km. Territorial water extends up to 19.82 km. from the coast line (Ali, 1985; MPO, 1985).

With the increasing pressure on land and inland waters by the fast growing population, the country would become more dependent on the marine fisheries in the long term. Thus, protection, conservation and judicious exploitation of marine fisheries resources is given emphasis in development plans of the government. Stress is laid on use of mechanised fishing boats fitted with appropriate gears, developing sheltered harbours as modern fishing villages with necessary landing, storage and transportation facilities and providing other basic facilities to the fishing communities.

3. Fishing Communities of the Bay of Bengal

People who are traditionally engaged in sea - or river-fishing in Bangladesh are known as 'Jaldas'. 'Jal' means water and 'Das' could mean either a slave or a fisherman. Either way the very word 'Jaldas' stands to mean people entirely dependent on water for their livelihood. By religion they traditionally belong to schedule caste (low caste) Hinduism. However, in course of time and for more practical economic reasons people from other religion including Islam are becoming more and more involved in this occupation. Fishermen belonging to different religions are now seen to live together forming a single community. The century-old tradition of these 'Jaldases' is now under a continuous pressure to break apart. This process has started since the mid-1960s. Before that the 'Jaldases' could control this occupation by themselves but now they can not do it for various reasons like modern concept of fishing, changed socio-economic conditions, and in some cases for environmental reasons, too.

These traditional fishermen mainly fish in marine, coastal, estuarine and river water. Sometimes, specially in off-seasons, they also indulge in lake fishing.

A general trend of maintaining a joint-family system can be observed among them although exception is not very hard to find. The general condition of the fishermen represents that of most developing countries. They can hardly meet their daily minimum requirements for food, health care and clothings. Almost all of

them are illiterate and can not afford to send their children to any formal or non-formal educational institutions. Due to their extreme poverty and illiteracy, they often become victims-politically, economically and socially to opportunist and greedy rural or urban vested interests. In such a complex situation it can hardly be expected that any governmental or non-governmental assistance programme, even if it is very much sincere in its objectives would succeed in uplifting the poor fishermen's lot unless proper and adequate measures are found out to streamline the assistance programme to suit their overall condition. For this reason periodic evaluations of the assistance programmes are very much necessary and should become an indispensable part of such programmes.

Considering the importance of marine fisheries in the national economy, various governmental and non-governmental agencies have come forward, specially after independence in 1971, to modernize the marine fishing technologies. However, the impact of these technologies on the poor fishing communities has hardly been analyzed.

Therefore, the major objective of the study is to gain a fuller understanding of the interrelationships between the adoption of fishing technology and its effects on the socio-economic conditions of traditional fishing households and communities. For this purpose case studies on two coastal villages in Bangladesh were conducted.

4. Methodology

(a) Site

Two fairly representative fishing communities from the coastal areas of the district of Patiya in Bangladesh were selected (MAPs : Annex 1 & 2).

(b) Approach

A comparison has been made between two communities with regard to the introduction of new fishing technology. That means a fishing community which has adopted the new technologies was analyzed. Another fishing community was identified which has not adopted new technologies.

Between the communities mentioned above, the first one is more exposed to the new fishing technologies (especially of marine fisheries) than the second one.

(c) Data Collection

d) Benchmark data were collected on background information through a socio-economic survey of the

village community and its people. Both structured and unstructured interview schedules were used to collect information. The methods of group discussion and participant observation were also applied,

- ii) Data for the community were collected through key informant approach.
- iii) First the benchmark data were collected. After that, periodic observation and collection of data from selected families of adopters and non-adopters were carried out, spreading over a period of six months.

(d) Field Survey

Village Karal and Uttar (North) Mohera together have been taken as the fishing community less exposed to modern technologies, in otherwords termed as a 'non-adopter'. Dashkin (South) Mohera and Maddhya (Middle) Mohera have been considered as communities exposed to modern technologies; these comprise the - 'adopter' community.

i) Village Karal

Karal has about 46 fishing households in Patiya district). It is a subsistence village mainly dependent on fishing. The fishermen do not own any trawler or mechanized boat though many of them work as hired labours in fishing trips made by trawlers in the Bay of Bengal and other surrounding areas.

ii) Uttar Mohera

Uttar Mohera village is a small one and has not adopted much of modern fishing technologies. There are about 35 households in this village.

iii) Dashkin and Maddhya Moheras

Dashkin and Maddhya Moheras consist of about 150 households. Dashkin Mohera which has about 70 households seems to be more exposed to fishing technology than the other neighbourhood. There are about 15 households in Dashkin Mohera who have their own trawlers. Traditional fishing boats are also used by this community. These two communities have been taken for our study as the one exposed to modern fishing technologies. The village of Mohera is situated on the bank of the Karnaphuli river near Kalurghat Bridge.

(e) Three Round Survey

A three round survey was conducted in both the communities; first from October 1985 to January 1986, the second during March - April 1986 and the third one during July - August 1986. Two types of interview schedules were administered: Schedule A (Household data), Schedule B (Village data from key informants).

Table 2 : Break-down of the Coverage of Households in the Field Surveys

Community	First Round		Second Round	Third Round
	Sch.A	Sch.B	Sch. A	Sch. A
<u>Less exposed</u>				
Karal	40	5	21	22
Uttar Mohera	20	5	11	11
<u>More exposed</u>				
Maddhya Mohera	74	6	42	25
Dashkin Mohera	55	5	20	22
Total	189	21	94	80

N = 189

5. Development of New Fishing Technology

With the advent of newer and sophisticated technologies a sharp distinction has emerged between the two major types of fishing - **traditional and commercial**. In Bangladesh, as elsewhere, traditional fisheries exist side by side with developing commercial fisheries. The traditional fisheries are mostly unmechanised and are mainly associated with inshore reef and demersal fishing. Plan for developing commercial fisheries, on the other hand, focuses on mechanised pelagic fishing and offshore trawl fishing of demersal species. The two fisheries are distinct, yet related. Some of the development problems of commercial fisheries involve the nature and future of traditional fisheries, problems such as choosing development priorities, ensuring local food supply, and estimating the effect of change upon traditional fishing. Development of commercial fisheries and the extent of adoption of technology in marine fisheries of Bangladesh is a very recent phenomenon, and the process is rather slow. Lack of government initiatives and the poor

adoption capacity of the fishermen due to their weak financial strength are major reasons for slow dissemination of modern fisheries technology.

This study was limited to the new technologies i.e., modern fishing trawlers, gears and crafts, used in the process of fish catching in the marine sector. Historically, fishermen in this country used to fish in the sea (not too far from the sea shore) with the help of paddle (oar) and sail boats. As a matter of fact, fishing in the marine waters of the Bay of Bengal was more of a artisanal rather than a commercial practice by the traditional fishermen. Therefore, fishing was carried out mainly for subsistence earnings. Technology-based fishing leading to a capital intensive commercial fishing was quite unknown, and the fishermen were unfamiliar with modern trawl fishing as a business venture until the independence of Bangladesh in 1971. After independence, Government offers, coupled with assistance offered by DANTDA, Swedish Government and others especially the Soviet Union, led to initial attempts to modernize the fishing techniques and physical inputs. The use of motorized boats was introduced in the marine fisheries sector. At this stage.(1972) the Soviet Union provided 10 large freezer trawlers which opened a new era in the fishing history of Bangladesh. Later came the idea of joint-venture approach in the field of fishing which also resulted in the introduction of a greater number of motorized boats and trawlers. Thus, gradual increase of trawl operations and use of motorized vessels in the marine fisheries exploitation are observed only in the seventies. **Side** by side, huge numbers of small and large sail and paddle **boats with** or without covering (canoe) **are** still seen to ply in coastal **areas**.

It is worth mentioning **at this** point that although mechanisation **of** vessels and introduction of trawlers together with an **increasing fishermen population have increased the** total fish catch but the **catch** per fishermen **did** not show any increase. In fact, catch per fishermen declined **from a** level **of** 0.48 metric ton in 1971-72 to **0.31** metric ton in **1982-83** (Bangladesh Statistical Year Book 1982) .

6. Socio-economic Characteristics of Study Areas

The study intended to understand and assess the impact of introduction of modern fishing technologies on the economic and social conditions of the fisherfolk in the small-scale fishing communities by comparing the status of the income generation and living conditions of the two communities, one more exposed to modern technologies and other less exposed. Therefore, the comparison in general is based upon the assumption that had there been equal access of the communities to modern technologies there would have prevailed almost identical situation or conditions in all these communities.

The total number of households covered in the less exposed community was 60, 20 from Uttar Mohera and 40 from village Karal. The average family size in this group was about 6 persons. In the more exposed communities average size of family was about 7 persons, the total number of households being 129 (Table 3).

Table 3 : Family Size and Structure in two Communities

Community	Family Structure (percentage)		Average family size	Total popula- tion	Total No. of house- holds
	Nuclear	Joint			
Less exposed	63	37	6.38	383	60
More exposed	65	35	6.98	900	129

N = 189

Almost equal number of nuclear and joint families were there in both types of communities.

Table 4 shows that out of 189 households covered for the purpose of study, a major portion of the population (64%) were illiterate. However, this percentage was significantly higher in the case of the less exposed one - 75 percent as against 59 percent of the more exposed one.

Table 4 : Level of Education of the Family members in two Communities

Community	Illiterate %	L i t e r a t e				Total No. of house- holds
		Formal educa- tion %	Primary School %	Secondary School %	College %	
Less exposed	75	6	15	2	0.26	60
More exposed	59	7	19	11	2	129

N = 189

Table 5 shows that in all the communities, irrespective of the nature of the community, males are in an overwhelming majority of cases the leader or head of the household or family. Advancement in life style, to whatever extent, due to introduction of modern fishing technology, could not change this trend.

Table 5 : Sex Distribution of Household heads of two Communities

Community	Household heads		Male as	Female as	Total No. of households
	Male	Female	% of total	% of total	
Less exposed	55	5	92	8	60
More exposed	121	8	94	6	129

N = 189

It was observed that on an average about 24 percent of the respondents remained idle without being involved in any kind of income generating activities during the period of study. A slightly greater number of people remained unemployed in the less exposed community (28%) than the more exposed one (22%). More people in less exposed group were self-employed (52%) than the more exposed community (41%). Majority of the self-employed in less exposed community were women.

Women have rather greater scope to involve themselves in other income generating activities for extra income. Table 6 shows the number and percentage of the women engaged in different kinds of subsidiary occupations.

Table 6 : Households according to the Types of Female Activities

Communi- ty	House-	Net	Household	Fish	Fish	Others	Total No. of respon- dent households
	hold work	making	works & net making	sell- ing	cat- ching		
(P e r c e n t a g e)							
Less exposed	18	41	5	30	5	1	60
More exposed	16	56	24	-	-	4	110

N = 170

7. The Impact Evaluation

To assess the impact of adopting modern fishing technologies a number of factors were examined. However, during discussion on the information obtained on the general background of households and respondents we have already stated some of the indirect impact of the modern fishing technologies on the fishing communities.

Table 7 shows the distribution of available respondents according to their quantity of fish catch. Sixty-nine respondents were available for interviews. Upto 900 kg. of catch-limit, both the groups were almost equal in their percentage distribution. However, above that limit only 11 percent of the less exposed fishermen could go, whereas this percentage in case of the more exposed group increased to as much as 26 percent, more than double.

Table 7 : Respondents according to the Quantity of Fish Catch (January - March)

Community	Upto 300 kg.	301-600 kg.	601-900 kg.	901-1200 kg.	1201+ kg.	Total No. of available respondents
Less exposed	44	37	7	-	11	27
More exposed	45	24	5	5	21	42

N = 69

Table 8 describes the distribution pattern of boat ownership among the fishermen. The broad classification is based on two categories, one in which the fishermen own the boats themselves, and the other category includes boats hired by the fishermen. It can be seen from the table that of the total number of boats, more boats (89%) are owned in the more exposed groups than the less exposed one (67%). Since the less exposed community has less or no access to credit or other kinds of assistance programmes, they were not in a position to own boats, rather they could go for hiring boats as is exemplified by the table where it is found that in the less exposed community a large number of boats (33%) had to be hired whereas in case of the more exposed communities this percentage is much less (only 11%).

Table 8 : Ownership of Boats according to their Size²

Community	OWNED						H I R E D						Total	
	SELF			COLLECTED			SELF			COLLECTED			Owned	Hired
	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large	Small	Med.	Large		
	(Percentage)			(Percentage)			(Percentage)			(Percentage)			(Percentage)	
Less exposed	4	34	29	-	-	-	-	29	-	4	-	-	67	33
More exposed	17	44	22	-	2	4	2	7	-	-	-	2	89	11

Understandably, only 1 boat (4%) out of 24, is motorized in the less exposed communities, whereas in the more exposed group 13 (28%) out of 46 are motorized. However, still a large number of boats, 56 (80%) of total 70, are operated manually (Table 9). Although the situation is somehow better in the more exposed communities, nevertheless, there are ample scope for their modernization in two 'more exposed' fishing communities.

² Small = Below 6 metre
 Medium = 6-9 metre
 Large = Above 9 metre

³ Total numbers of boat in less and more exposed communities are 24 and 46 respectively on the basis of which all the percentages are calculated.

Table 9 : Boats according to their Type

Community	MOTORIZED			NONMOTORIZED			TOTAL ⁴	
	Small	Medi.	Large	Small	Medi.	Large	Moto- rized	Non- motori- zed
	(Percentage)			(Percentage)			(Percentage)	
Less exposed	-	4	-	8	59	29	4	96
More exposed	2	9	17	17	44	11	28	72

To have a meaningful observation on income, it is better to look at the next table (Table 10) which provides a picture of income generated from both primary and secondary sources on annual basis rather than of a particular fishing season. Income per household and family member have been calculated, Response could be obtained from all the sample households. Annual Household income from primary source for the less exposed community is Tk. 23317 and in case of the more exposed one this amount is much higher being Tk, 37609, which may illustrate some positive impact of modernization of fishing operations in the more exposed community.

Table 10 : Yearly income from different sources per household and family member

Community	Income per household (Taka)		Income per family member (Taka)	
	Primary source	Secondary source	Primary source	Secondary source
	Less exposed	23317	1224	3617
More exposed	37609	1377	5365	197

N = 189

Total numbers of boats in less and more exposed communities are 24 and 46 respectively on the basis of which all the percentages are calculated.

8. Conclusion

The fisheries development plans have recently received increasing attention from both the government and non-government agencies. However, the fishing communities remain one of the most disadvantaged groups in the society. Specifically, the traditional fishing communities are facing lot of problems (socio-economic and technical) in improving their condition. In spite of several efforts made to improve their conditions the people of the fishing communities continue to live at the margin of subsistence.

The aspect of the artisanal fishermen in the small scale fisheries adopting new fishing technologies has to be looked in the context of survival strategies of the fishermen. Special attention should be given on understanding and fulfilling their basic needs and to impelenting programmes to increase not only the incomes of fishermen but also the quality of lives of their families and environment. Another aspect is the conflict between small scale and industrial fishermen exploiting the same resources or operating in the same area having social, economic and political implications. The poor fisherfolk in traditional fishing communities in Bangladesh are facing an unfavourable competition against rich entrepreneurs in fishery. As seen in the present study, modernization may therefore result in further impoverishment of traditional fishermen, if a comprehensive policy and programme package on modernization is not adopted.

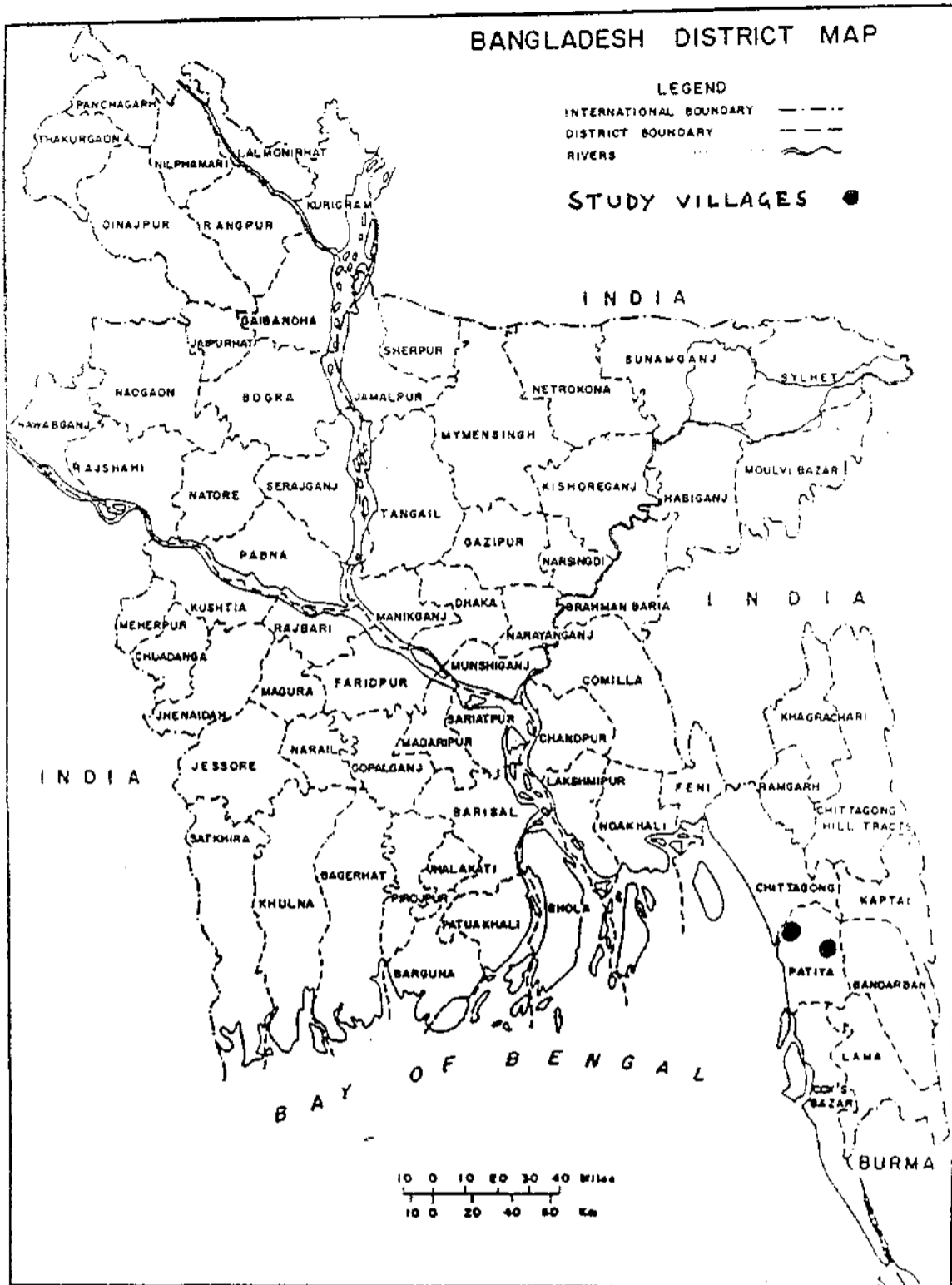
In the present paper we have observed that majority of the genuine fishermen **do not have access to water bodies, inputs and financial resources.** The new fishery management policy of the government aims **at establishing rights of actual fishermen (man behind the net) and exploitation and management of fishery resources commensurate with sustainable development of the poor fishermen. The objectives of this new policy is to eliminate intermediate interest obtaining between the government and the fishermen. Compared with the service and input delivery system in the other sectors of Bangladesh, the performance of the delivery system in the fishery sector is rather poor. The government and parastatal agencies in the fishery sector should improve their activities at the grassroots level.**

Based on the number of interesting findings of the present paper and also in view of the present and past experiences obtaining in the country, the following policy implications and recommendations may be made:

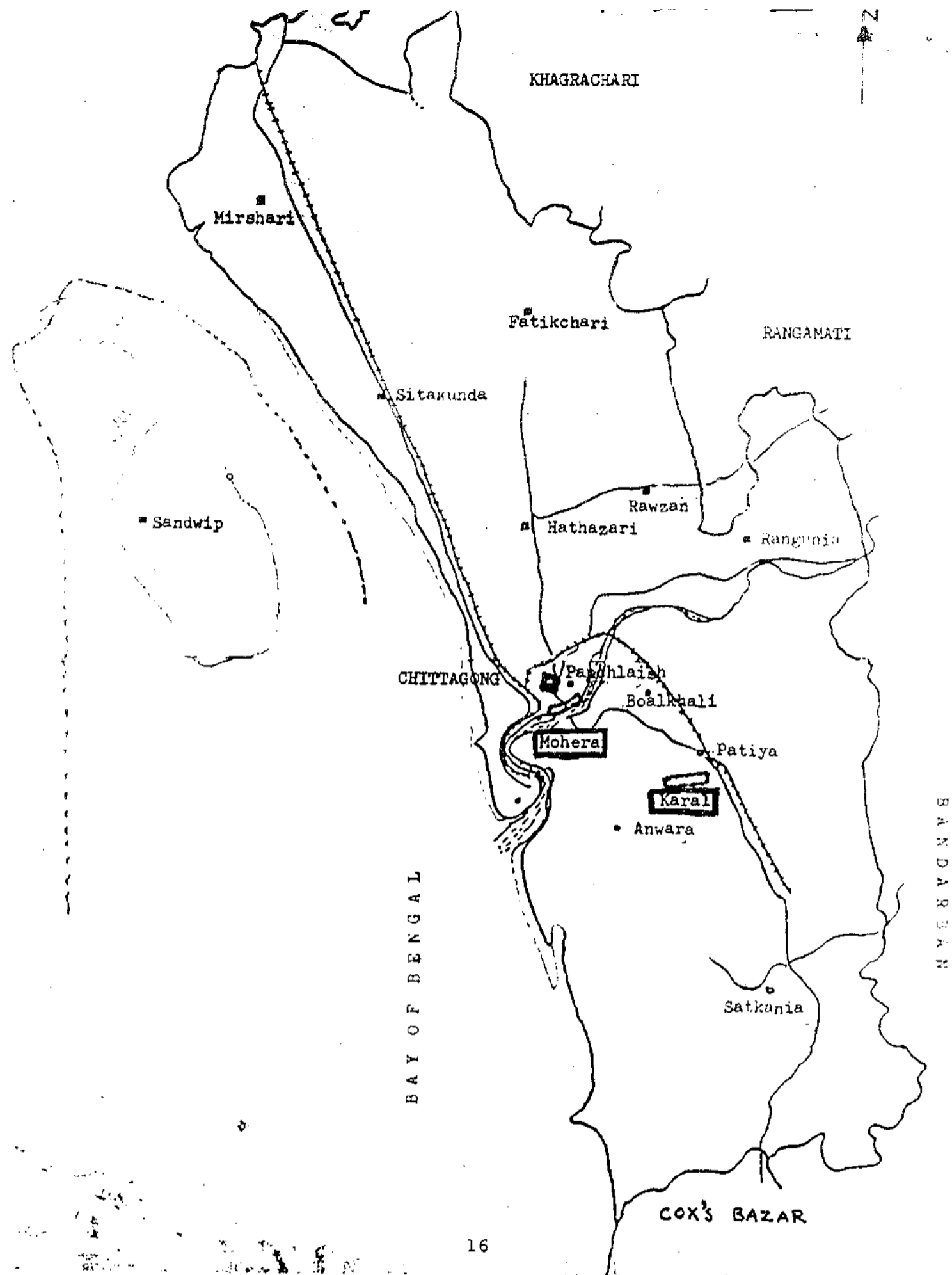
- (a) The optimum utilization of fisheries resources will require simultaneous and harmonized development of both small scale fisheries and large scale commercial fisheries,
- (b) For small scale fisheries, consideration has to be given to all aspects of the development process: resources and

environment; modern technology for harvesting, handling, processing, distribution and marketing; and socio-economic aspects including education, health and nutrition of the fishermen. Flexibility is needed to allow for adaptation of new technology to the needs and culture of each locality.

- (c) Active participation by the small scale fishing communities in identifying the needs, planning, and implementation of development programmes has to be ensured.
- (d) The fishermen should be organized in formal or informal groups in order to ensure steady and adequate supply of credit, inputs and services to them and to increase handling and marketing of fish by the fishermen themselves. In case of commercial fisheries, fishermen should be organized in groups in order to avoid exploitation of them by commercial entrepreneurs.
- (e) Marine and open water fishery resources should be recognized as "Common Property Renewable Natural Resources" and adequate legal, institutional and promotional measures should be taken by government to ensure adequate access of poor fishermen to these resources.



The boundaries and names shown in the map do not imply official endorsement by the United Nations.



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