Traditional management of artisanal fisheries in North East Nigeria : a research framework

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Abstract

The Traditional Management of Artisanal Fisheries in North East Nigeria project (TMAF) has been funded by British Overseas Development Administration (ODA) to investigate the possibilities for designing a more effective management system for fisheries of the Sub-Saharan Savanna region using a community-based approach. The need for a new approach is based on the general perception that the region's fisheries are threatened with overexploitation.

A major aim of the project is to investigate the existing management systems from a socio-economic perspective. Special attention has been given to traditional systems of management, which have in the past, been successful in controlling the utilization of the highly complex and dynamic fisheries resources. A preliminary typology of fisheries management was identified from TMAF research in 1993 and 1994. This was used as the basis for the development of two complimentary research themes to investigate and monitor systems of fisheries management in Northeast Nigeria: an Investigation of Fisheries Management Systems (IFMS) and a Fisheries Information Monitoring System (FIMS).

The key objective of the TMAF project is to enable comparisons between assessments of individual systems of fisheries management. This paper presents the research framework, which was developed to guide the IFMS and FIMS and the methodology which was used to reveal the complex and sometimes sensitive issues underlying the exploitation of common fishery resources. The main conclusion of the paper is that the research framework and methodology have been successful in investigating the complexities of fisheries management in North East Nigeria. It is suggested that the research framework could be adapted for investigations of fisheries management in other contexts.

1. Introduction

The Savanna latitudes contain some of the most productive inland fisheries in Sub-Saharan Africa[1]. Alongside fanning, fisheries are an important component of the rural economy in certain regions. The perception that heavy exploitation of inland fishery resources threatens a loss of socio-economic benefits to local communities and their governments, has prompted the Traditional Management of Artisanal Fisheries research project (TMAF). The project's ultimate objective is to investigate the need and potential for designing more effective fisheries management systems using a community-based approach.

Traditional systems of natural resource management are disappearing throughout the Sahel (Bromley and Cemea, 1989; Moorehead, 1989; Toumlin, 1989). This has been attributed to overlap with post-colonial administrative structures and to increased-levels of interaction with the market economy. It is suspected that these may have led to overexploitation within the fisheries. Through a greater understanding of such processes it may be possible to find a means by which traditional systems might be modified in order to co-exist within the modernizing economies of the region. The likely beneficiaries of improved management will include the fishing communities in countries with major Sahel-Savanna fisheries: Nigeria, Niger, Chad, and Mali.

The TMAF project has been sponsored by the UK government Overseas Development Administration (ODA) for four years from 1993 to 1996. TMAF research has been undertaken by the University of Portsmouth UK, in collaboration with the University of Maiduguri Nigeria, and the Federal University of Technology Yola, Nigeria, and has operated in three regions of Northeast Nigeria. The study regions are the Upper River Benue, Lake Chad and the Nguru-Gashua Wetlands (see Figure 1). Each region differs in important respects: in their aquatic environments, and in their ethnicity, history and recent development. However, they are similar in the paucity of information on fisheries and their management. The TMAF research framework has been developed to address the dual challenges of information scarcity and diversity posed by the fisheries of Northeast Nigeria. The objectives of the TMAF project are:

1. To provide base line data set for the three study regions identifying landing sites and their importance along with information on key socio-economic variables.

2. To study the operation of the fisheries in the three study-regions over a calendar year to identify their seasonal characteristics and to provide parallel data on major socio-economic variables.

3. To develop an on-going monitoring system designed to provide data useful to management.

4. To develop a database relating to the formal and informal management systems in existence in the three study-regions.

5. To compare and contrast management systems of the three study-regions and in particular to consider how different systems resolve the principal management problems and to analyze the impact of the development of a market economy on such systems.

6. To evaluate the potential for community-based management systems in the three regions and to make recommendations concerning the potential for future development of such systems.

This paper presents the research approach which has been developed to meet these objectives. The diverse nature of both the fishing systems of Northeast Nigeria and the issues involved in understanding their management necessitated an innovative approach. Previous research methods have been tailored to specific management models, which do not encompass the variability or fisheries management in Northeast Nigeria. It is anticipated that the TMAF approach could provide valuable experience for investigating fisheries in other regions where their management is characterized by complexity and diversity. The paper follows the structure of the TMAF project

which is outlined in Table I. A synthesis of the research approach concludes the paper.

Figure 1 : Map of Nigeria (*The TMAF study regions are circled and shaded*)

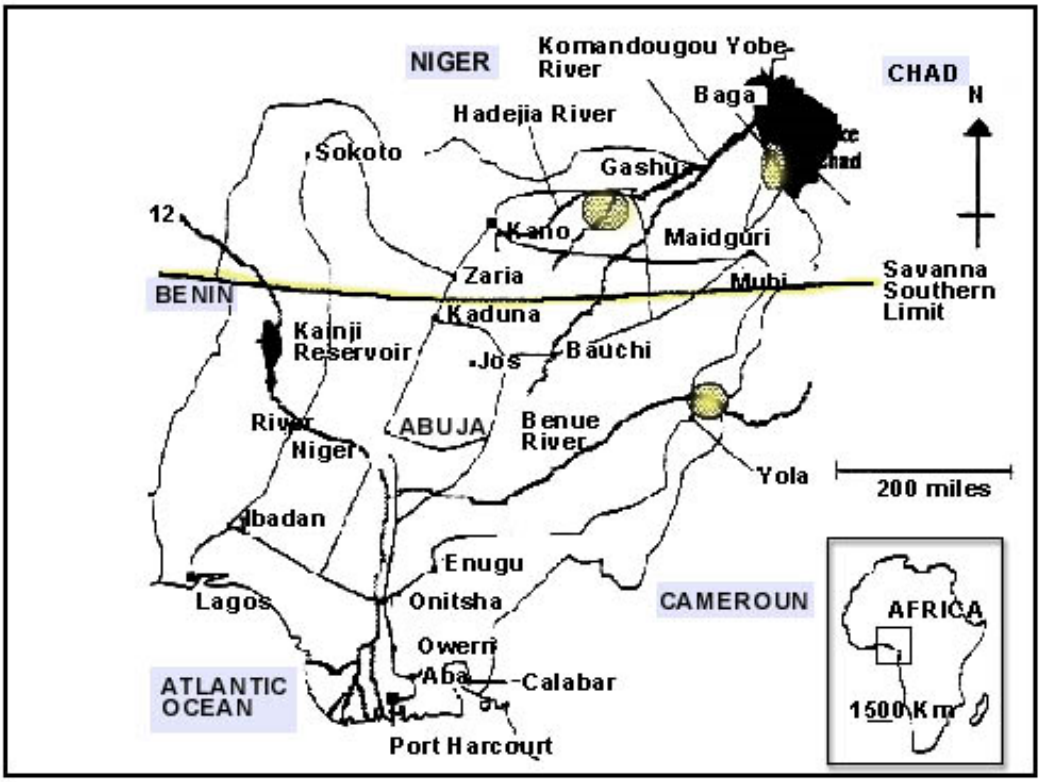

Table 1. Structure of the TMAF Research Approach

Year	Research Phase	Research Theme	
1993	I	Methodological review	
		Surveys	*The importance of fishing to local communities and their economies; establish data set on fishing grounds.*
1994		Methodological development	
		Review	*Existing knowledge and gaps in the understanding of fisheries management within local communities*
1995	II	IFMS	*Local systems of fisheries management compared in their operation and evolution*
		FIMS	*Status and performance of the fisheries*
1996		IFMS	*Supra-village level perspectives of fisheries management*
	II	Reporting	*The need and potential for community-based management of local fisheries*

2. Research Phase 1

The first phase of TMAF was undertaken in the UK and Nigeria. After reviewing previous research experience in Northern Nigeria, the project has moved to Nigeria to initiate the project there: project resources were assembled, survey teams trained and links with local administrators, researchers and fishers established. These having being achieved, the first research tasks were to establish a sampling frame and gauge the importance of fishing in local communities and their economies (TMAF objective 1). The review of research experience in Northern Nigeria had revealed that although settlement patterns were relatively well understood there had been no published data on who lived where since the 1961 census. A priority for this first phase of research was to gather available information on fishing settlements and to establish a sampling frame. The initial phase of research was conducted in three stages during 1993: firstly, exploratory appraisals of fishing villages in each study region were conducted with key fishing personalities and community leaders in each study region; secondly, the research team met with village leaders and discussed a range of issues including village structure, occupations, sources of income, work patterns and recent changes in the community: and thirdly, a multi-stage random sample survey of household heads was undertaken.

The Sampling Frame

The exploratory appraisals revealed several sources of information on the villages within each study-region: The National Population Commission 1991 Census, traditional administrators such as village and district heads in each region, lists of households compiled and regularly updated by local primary health centers along the Upper River Benue, the Lake Chad Fishermen's Welfare Association, and the North East Arid Zone Development Program (NEAZDP) reports in the Nguru-Gashua Wetlands. In addition to these, many villages for potential inclusion in the frame were visited by the study team. Each source provided a list of villages which were amalgamated for each region and a sampling frame of villages were selected on the basis of their location, size and that they were a fishing village (i.e. home to some fishers). The lack of demographic data prevented an estimation of the variance amongst fishing communities and as a result, the sample size was as large as resources would allow. This was ultimately estimated to range between 1.8% and 4% of households in each study region (see Table 2).

The Sample Survey

The 1993 sample survey interviewed 1,316 household heads and 66 village heads based in 66 randomly selected fishing villages. The household sample was not restricted to fishing households, rather household heads from across each village were asked to participate in order to gauge the importance of fishing as a source of household income. The sample represented a total population of 48,500 sedentary households in 194 villages throughout the three study regions. Although, a sizeable proportion ranging between 42% and 70% of households in each region earned an income from fishing, very few relied entirely on fishing income and many households earned no income from fishing at all (see Table 3).

Table 2. **Sampling Frame** of **Fishing** Villages **in North** East Nigeria

Study region	**Villages in sampling frame**	**Households in sampling frame**	**Villages sampled**	**Households interviewed**	**Sampling fraction of households**
Upper River Benue	80	10000	29	403	4.0%
Lake Chad	49	27500	9	484	1.8%
Nguru-Gashua Wetlands	65	11,000	28	435	4.0%
TOTAL	194	48500	66	1,318	2.7%

Source: compiled from 1993 TMAF survey results reported in Neiland. A.E., and Sarch, M.T., with Madakan. S. Ladu. S., Jarfry. S. Cunningham. S. **A socio-economic analysis** of **artisanal fisheries in North East Nigeria- Report.** *CEMARE Report no R26 a, b and c.* 1994

Table 3. Importance of Fishing in Local Economies, North East Nigeria

Study region	% fishing households	Mean % fishing household income from fishing	Mean % fish catch sold	% villages with master fisherman	% villages with exclusive access to fishing grounds
Upper River Benue	70	37	67	78	78
Lake Chad	42	54	81	100	77
Nguru-Gashua Wetlands	61	37	77	83	71

1. fishing households were defined as those which earned some income from fishing. (Source: compiled from the 1993 TMAF survey results reported in Neiland. A. E. and Sarch. M.-T. with Madakan. S-. Ladu. B.. Jaffry, S- Cunningham. ***S, A socio-economic analysis of Survey of Fishing Grounds***

In addition to revealing the importance of fishing in the three study regions, the 1993 surveys revealed that most of the villages sampled had exclusive access to local fishing grounds and usually, a senior member of the community had specific responsibilities regarding access to fishing. This confirmed that local systems of fisheries management were widespread. The next stage of the research was to document these (TMAF objective 4). A survey of the fishing grounds was undertaken with the aims of identifying and mapping the fishing grounds of the villages sampled in the 1993 survey and investigating the roles of traditional and modern systems of administration in their operation. 53 villages were visited in 1994 and in each, a discussion group of the community leaders and elders were asked to draw a map of the village fishing grounds and describe their fishing activities[2]. Different agencies, ranging from the local government to the "native water controller' claim jurisdiction over the fisheries in the study regions and the

[2] This was facilitated by the links built up between the TMAF teams and the village communities during he previous year's survey work.

survey revealed wide diversity in the systems of operation in each village[3]. The results of the survey were used to identify a broad typology which was used to categorize local systems of fisheries management according to the relative influence of the modern or the traditional system in their administration (see Table 4.1.)

[3] Native Waters Controller is the term used by the traditional sub-district head lawan of Baga, Lake Chad, when authorizing fishing permits.

Table 4. The Role of Traditional and Modern Administration in Local Fisheries

	Upper River Benue (n = 19)	Lake Chad (n = 9)
Fishing restrictions are predominantly operated by the traditional administration	14	3
Fisheries are regulated within a combination of administration	4	5
The traditional administration has no influence on the exploitation of fisheries	1	1

(Source: derived from 1994 TMAF survey results reported in Neiland, A.E; .Weeks, J-Madakan. S., Ladu. B.

The community-based fisheries of North East Nigeria, *CEMARE Report no R28.* 1994)

Review

Overall, the TMAF research results and where available, other research findings, have revealed that there are two broad groups of management systems in operation within each study region. One system operated through traditional administration and a second through modern systems of State administration (for example, see Thomas et al, 1993. Marriot, 1991. Moschetta, 1991. Yerokun, 1983). Each system has a hierarchy of individuals and organisations, which play a part in fisheries management. In addition to these systems, there are also other modern organisations, which also have a role in the operation of the fisheries. These include the Federal Government, State Government agencies in addition to their fisheries departments, Local Government Areas (LGA), agricultural development programs and at Lake Chad, the army and police.

A review of previous analyses of fisheries management revealed a range of approaches, which in a similar way to other natural resource management efforts, fall within a spectrum. “Top-down” state management approaches characterize one extreme and “bottom-up” community-based approaches the other (Hassett, 1994. Sarch, 1994 a). The articulation of key issues within fisheries management, such as definitions of management, and management objectives differed according to the proximity of a particular approach to the extremes of the spectrum. For example, a “top-down” state-managed system may have as their objectives optimizing yields and, maximizing the economic rent from the fishery and will be based on allocating a total allowable catch to achieve these. Whereas, a “bottom-up” community-based system may have as its objectives the socio-economic well being of the fishing community as well as the sustaining fishing livelihoods.

Explicit in the articulation of different management objectives is met their achievement and thus the success of various management strategies is dependent on different outcomes. A 'top-down' strategy may measure its success in increasing profits and revenues from the fishing sector, whereas a 'bottom-up' strategy may consider its impact on individual fishing communities. Implicit in these objectives is the way such outcomes should be appraised. A central government revenue maximization objective will require macro-level statistics to appraise its management strategy whereas a community-based socio-economic objective will require individual case-study information to appraise the success of the management strategy. Thus, the diverse management objectives contained within differing fisheries management systems can imply differing methods of appraisal.

In order to address the potentially differing research requirements of varied management, careful methodological development was undertaken. This involved a review of documented methodological approaches to investigating natural resource management and small-scale pilot testing in each of the study regions throughout 1994 (see Neiland, Madakan, Ladu and Garrod, 1994; and Sarch, 1994 a, b and c). The research framework developed by TMAF involves two concurrent research efforts, the Investigation of Fisheries Management Systems (IFMS) and a complementary Fisheries Information Monitoring System (FIMS). They have been designed to allow for an evaluation of systems of fisheries management based on a range of criteria which emanate from the whole 'top-down' to 'bottom-up' spectrum of management

approaches (see Table 5).

Table 5 Criteria for Evaluating the Performance of Fisheries Management

Criterion	Source of information for evaluation
Are the objectives at each level of [he system met?	BFMS and FIMS
How much conflict is associated with the system?	IFMS
Is their compliance with management measures?	IFMS and FIMS
How robust is the system to change?	IFMS
How biologically productive is the system?	FIMS and IFMS
How financially productive is the system?	FIMS and IFMS
How economically productive is the system?	FIMS

(Source: derived from Sarch. M. T. **Traditional management of artisanal fisheries, N.E. Nigeria:**

Investigating fisheries management systems. *CEMARE Research Paper no P80.* 1994a)

3. Research Phase H

The approach for the second phase of TMAF research emerged from the process of review and methodological development undertaken at the end of the initial research phase. The review of TMAF findings and other work on fisheries management revealed the need for an approach, which could encompass different models of fisheries management and enable comparisons between systems with potentially differing objectives (see subsection 2). Criteria were identified for the ultimate evaluation of management systems and the most suitable method for investigating and assessing management systems was sought (see Table 5). Pilot trials of various methodologies enabled appropriate research techniques to be identified and the scale at which they could and should be applied (see Table 11).

A dual research approach was developed from this process, the Investigation of Fisheries Management Systems (IFMS) and the Fisheries Information Monitoring System (FIMS). The IFMS and FIMS have been designed to overlap in some areas in order that findings from each may be cross-checked and confirmed with each other, for example in assessing whether the objectives of management are met in a particular location (see Table 5). In other areas, such as the time scale of inquiry, the IFMS provides a long-term relative perspective while the FIMS provides current quantitative data on, for example, the financial and biological productivity of local management systems. The specific objectives, the research themes and the methodologies for each the IFMS and the FIMS are explained in this section.

Investigation of Fisheries Management Systems

The Investigation of Fisheries Management Systems (IFMS) has been designed to compare and contrast management systems and to contribute to the evaluation of the potential for community-based management systems (TMAF objectives 5 and 6). Implicit in these tasks was the need to identify systems of fisheries management for comparison and an important issue arising from this was how to compare and evaluate systems which may have different objectives. A review of natural resource management and of current knowledge of fisheries management revealed a range of approaches to management, which encompassed differing management objectives (Hassett, 1994. Sarch, 1994 a).

The prominence of one system rather than another, and its associated management measures varies considerably from village to village. The review of preparatory research phase findings has shown that each system is likely to have different objectives and if they were conceptualized using existing theories would not be best placed within the same management model or strategy. The aim of the research methodology designed for the IFMS was to allow a comparison of management systems, which was independent of their objectives. Durand's definition of fisheries management was used to identify management systems through four key components: management objectives, methods of management, decision making authorities, and their level of application (Durand. 1993)[4].

The FMS acknowledges that while management systems can have different

objectives, it is possible to assess them according to criteria, which are independent of specific management objectives (see Table 5). The IFMS was designed to investigate management systems with respect to four criteria, which were identified in accordance with the TMAF project objectives. These are: Are management objectives met? Is there compliance with methods of management? How much conflict is associated with fisheries management? And how robust are systems of fisheries management to change? The complementary fisheries information monitoring system (IMS) will provide information to assess management systems with respect to their biological, economic and financial productivity (see below).

The IFMS has been designed to accommodate the existing knowledge of fisheries management in North East Nigeria, reveal the gaps in the understanding of fisheries management and allow for impartial comparisons between different management systems. A series of detailed case studies were conducted in twelve fishing villages throughout each study region. The villages were selected from each of the management categories identified during the preparatory research phase (see Table 4). A combination of interviews with key individuals, group discussions and participatory research techniques have been used to reveal information about the intricacies and evolution of fisheries management in individual villages. Investigations into fisheries management at a district and regional level are currently ongoing. An outline of the framework which has guided the IFMS is presented below. The research techniques utilized for each stage of the framework are outlined in Table 6.

Box 1 A Framework for the Investigation of Fisheries Management Systems

Systems of Fisheries Management

The following key questions were used to define the system of fisheries management in each case-study village (Durand, 1993):

1. *Who or what are the individuals or organizations involved?*
2. *What level do they operate at?*
3. *What are their objectives?*
4. *What methods of management are used, how do these link the key players in fisheries management?*

The answers to these questions were used to identify a management hierarchy in each village (see Figure 2).

Figure 2 Fisheries Management Hierarchy

	Traditional	Modern
National	Sultan	
Regional	Emir	State Fisheries Dept
District	District Head	State Fisheries Offre LGA Secretariat
Village	Village Head	
Monitor Fishers	Master Fisherman	State Fisheries Officer LGA Officer
Fishery		

Context

The management hierarchy forms the 'building block for the IFMS. A concurrent theme of the research framework is to consider the context of fisheries management and its connections with the wider socio-economic and natural environment in each location. Difference in elements of the broader context may explain different management systems. Tables 5 and 6 show a range of key indicators which were investigated to help understand differences between fisherie s management in different locations.

Table 7 Village Indicators

Village Size	no. of households
Status	Village or hamlet?
Facilities	social investment
Commun -ications	ease of access from outside
Ethnicity	no . & diversity of ethnic groups
Natural Resources	what resources are exploired?

Table 8 Fishing Strategies

Fishing Strategy	Full or part time
Age group	of Fishers
Gender	OF Fishers
Residency	Sedentary or migrant
Ethnicity	OF Fishers
Well- being	are FISHERS rich or poor

Change

A further concurrent theme of the framework was investigating the evolution of fisheries management in each location. This allowed an understanding of how management systems have developed and responded to change and/or problems in its wider environment. Four key questions guided the investigation here:

1. *What key events have occurred in the recent past?*
2. *What was the nature of the management hierarchy during these periods?*
3. *What was the status of the wider environment at these times?*
4. *Have there been any conflicts in recent*

Conclusions

So far the research framework has allowed a comparison of management systems. a further objective of the IFMS concerns the evaluation of such systems. This requires assessing the performance of the systems in operation at each location. The IFMS allows for an assessment on each system on the basis of four criteria:

1. *Are the objectives of management met?*
2. *Is there compliance with management measures?*
3. *How much conflict is associated with the system?*
4. *How robust is the system to change?*

(Source: Sarch, M. T., Neiland, A. E., Madakan, S., Ladu, B. An investigation of fisheries management systems in North East Nigeria, vol.I. Overview. *CEMARE Report no R32a*, 1995)

Table 6. Research Techniques used for the Investigation of Fisheries Management

Level	**Sources of information and research techniques**		
National	Review of Federal law and policy concerning Inland fisheries, Lake Chad Basin Commission policy and other international arrangements		
Regional District	Review of state and local government laws. Interviews with staff of state fisheries departments. local government and members of the traditional administration based in state and district fisheries offices. Interviews with other key actors, e.g. market traders.		
	Management Hierarchy	***Context***	***Change***
Village Monitors Fishers	Review of secondary information, semi-structured interviews with key individuals in community administration, group discussions of fisheries management, participatory diagrams	Review of secondary information, group discussions, participatory maps, transect walks, venn diagrams, ranking of occupations, wealth ranking, semi-structured interviews	Review of secondary information, semi-structured interviews with key informants, group discussions with village elders, historical timeline diagrams, historical transects.
Fishery	Review existing information, Fishery Information Monitoring System (FIMS)		

source: Sarch, M. T., Neiland, A. b., Madakan, S., Ladu, B. An investigation of fisheries management systems in North East Nigeria, vol. I. Overview. *CEMARE Report no R32a,* 1995)

Fisheries Information Monitoring System

The Fisheries Information Monitoring System (FIMS) has been designed to provide a near real-time assessment of the status and performance of the fisheries, within the three TMAF study regions, over a calendar year (TMAF objectives 2 and 3). More specifically, FIMS has been established to provide a parallel and complementary view of the operation of the local fisheries management systems, which have also been studied by the IFMS (see Table 5).

Research into the design of FIMS has included a desk-based study of the experiences of other fisheries monitoring systems in tropical fisheries, the identification of key issues (e.g. data cost and pertinence and methodologies (e.g. data types and sampling strategies), field trials of prototype FIMS designed in 1994/95 plus external reviews, and an analysis of the results and experiences of earlier TMAF surveys (Neiland, Madakan, Ladu and Jaffry, 1995).

The final design of FIMS centres on the collection of multi-disciplinary data (see Table 9) covering the economic characteristics of the fishery, the social attributes of the fishing communities, the biology of the fishery resources, features of the natural environment, and also aspects of local fishery institutions, primarily fishers interaction with fishery management systems. As much as possible, data have

been collected within locations where different types of management system are operating in order that the impact of the management system on the fisheries can be determined.

FIMS data collection consists of 5 information sub-systems: Environment, Fish Markets, Active Fishermen, Model Fishermen, and Head Fishermen (see Table 9). Each sub-system uses a particular methodology with data being collected at regular periods each month. The basis of the approach is to collect data from 5 different sources using a range of survey techniques in order to gain an effective overview of the fishery. Information from one source is used to validate and complement information from another one.

Table 9. FIMS: The five information sub-systems

Information sub-system	**Survey methodology**	**Data types**
Active fishers (AF)	• Bi-monthly random sampling of 100 fishers in each fishery Interview schedule (questionnaire) at landing site to record information on fishing trip just completed by fisher.	• Characteristics of fishers (social/economic data) • Characteristics of fishing trip (catch; inputs) • Fishing assets Compliance with regulations
Model fishers (MF)	• Bi-monthly enumeration of 10 hired fishers in each fishery • Interview schedule (questionnaire) to record information on fishing trip directed by project team, including assessment of catch using data sheet format.	• Characteristics of fishing trip; • Characteristics of catch (catch assessment data);
Fish markets (FM)	• Weekly observations in major regional markets • Observations and key interviews on market activity; data sheet completed	• Marketed fish commodities by weight/price/destination
Head Fisherman (HF)	• Bi-monthly interviews of 34 people in each study region; • Key interview; notes and synthesis of key information	• Observations on activity in fisheries; • Discussion of key relationships and trends in the fisheries;
Environment data (ED)	• Daily observations; • Observations recorded on data sheet.	• Rainfall; air temperature and flood state

source: Adapted *from* Neiland, A. E., Ladu, B., Madakan, S., Jaffry, S. **the design of a fisheries information monitoring system for North East Nigeria,** *CEMARE Report* no *31,* 1995)

The analysis and output of the FIMS data will take place at two levels:

At level 1, the data will be used to generate descriptive summary statistics and key indicators on a quarterly basis to provide an early overview of the status and performance of the fisheries, stratified according to specific regions within each study site (these are reported quarterly in Neiland, Jolley, Kudaisi, Madakan, and Ladu, 1995 a, 1996 a and b). The information will be used to generate a brief overview report highlighting key trends and relationships within the fisheries (see Table 10). At level 2, more sophisticated analytic techniques will be used to investigate relationships within the fisheries such as the determinants of fisher performance as measured by catch or income.

Ultimately, the opportunity will also be taken to investigate the impact of particular management systems through appropriate comparisons and synthesis of the results from the two analytical levels proposed. Key research questions to be addressed will include: Do fishers participating in particular management systems have certain operating characteristics or achieve particular outcomes such as better catches or incomes. This approach will be used as much as possible to assist the evaluation of fisheries management system based on the criteria in Table 5 above.

Table 10. FIMS Output - Output categories, key indicators and source of data

Output categories	**Key indicators**	**Origin of data/information**
Environmental data	• Fishery locations • Biotope characteristics • Flood conditions • Air temperature/rainfall trends	AF AF/HF ED ED
Social data	• Fishers' profile • Geographical mobility • Income sources	AF/HF AF/HF
Biological Data	• Catch composition • Catch diversity • Catch returns by species/gears • Production estimates	AF/MF AF/MF AF/MF AF/MF
Economic data	• Employment • Financial/economic returns • Profit AF/MD • Incomes • Market profile	AF/HF AF/MD AF/MD AF/MD MD
Institutional data	• Participation in management systems • Fisheries • Compliance with regulations	AF/HF AF/HF AF/HF

4. Synthesis

The preliminary typology of fisheries management identified from TMAF research

in 1993 and 1994 was used as the basis for the development of two research themes to investigate and monitor systems or fisheries management in Northeast Nigeria: an Investigation of Fisheries Management Systems (IFMS) and a Fisheries Information Monitoring System (FIMS).

The IFMS has conducted a series of detailed case studies in selected fishing villages throughout each study region. A combination of interviews with key individuals, group discussions and participatory research techniques have been used to reveal information about the intricacies and evolution of fisheries management in individual villages. Investigations into fisheries management at a district and regional level are currently ongoing.

The FIMS has operated surveys of fisheries productivity, market prices and environmental change in a range of biotopes in each study region on a quarterly basis from June 1995 to June 1996.

The results of these parallel research efforts provide a quantitative and qualitative understanding of systems of fisheries management in Northeast Nigeria and allow for their assessment from a range of perspectives, whether 'bottom-up' or 'top-down'.

Although developed for understanding inland fisheries management in Northeast Nigeria, the ability of the TMAF research approach to investigate and evaluate a local systems of fisheries management which differ in their objectives, users, controllers, evolution, and in the aquatic resources on which they are based, strongly suggests that the TMAF research framework could provide valuable experience for investigations of fisheries management in a wide variety of circumstances.

Table11. Summary of the Traditional Management of Artisanal Fisheries (TMAF) Research Approach

	Phase	Research Theme		Research Methods	Scale of inquiry	Outputs (see References)
1 9 9 3	I	Planning		Literature collection & review	3 study regions in North East Nigeria	.Bibliographic databases .CEMARE Report 24
		Surveys *How important is fishing in local economies?*		Random sample surveys; participatory mapping	1500 households in 66 fishing villages; fishing grounds in 53 villages	.Base-line socio-economic data .CEMARE Report 26 .CEMARE Report 38
1 9 9 4		Trials *What is the best method to investigate local fisheries?*		Pilot income-expenditure survey; pilot catch monitoring	1 village and fishing ground in each study region	.CEMARE Research Papers 78, 79 and 80 .CEMARE Report 29
		Review *What is known & what questions need to be answered?*		Prepare research framework	desk based	.CEMARE Research Paper 80
1 9 9 5	II	Local systems of fisheries management compared in their operation and evolution		Participatory appraisals	12 village communities (4 in each region)	.CEMARE Report 32a and 32b
		I F M S	F I M S	Environmental monitoring	3 key locations (1 in each region)	.CEMARE Report 31 .TMAF FIMS Quarterly reports
1 9 9 6		I F M S	*Status and performance of the fisheries*	Market survey Survey of fishermen	3 markets (1 in each region) c.100 active fishermen, 10 model fishers and 3-4 head fishers in each region	.Database of fisheries information
			Supra-village level perspectives of fisheries management	Key actor interviews	All fisheries agencies operating in each region	.Report forthcoming
	III		*What is the need and potential for community-based management of local fisheries*		Analysis of results and reporting of findings	.Recommendations forthcoming .Final Report forthcoming

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[1] savannah latitudes are considered to lie between 9 and 13 degrees north for this purposes of this research