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ARTISANAL FISHERIES DEVELOPMENT  
IN PAPUA NEW GUINEA

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**MOMA COASTAL FISHERIES DEVELOPMENT PROJECT (MCFDP)**

**ARTISANAL FISHERIES DEVELOPMENT  
IN PAPUA NEW GUINEA**

**- A CONCEPT FOR PROJECT IMPLEMENTATION -**

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## ARTISANAL FISHERIES DEVELOPMENT IN PAPUA NEW GUINEA

### Introduction

The MOMA Coastal Fisheries Development Project (MCFDP) is implemented jointly by the Division of Fisheries and Marine Resources of the Department of Morobe, and the Fisheries Branch, Division of Economic Services of the Department of Madang, with the assistance of the Deutsche Gesellschaft fuer Technische Zusammenarbeit (German Agency for Technical Cooperation - GTZ) under a bilateral technical assistance programme between Papua New Guinea and the Federal Republic of Germany. National counterpart institution is the Department of Fisheries and Marine Resources (DFMR).

Fishing activities in Morobe Province in general are carried out irregularly and on a part-time basis. The major economic activity of the approx. 35 000 people living in about 110 coastal villages is subsistence gardening. Strong social, cultural and religious obligations further affect the pattern of fishing. Fishing effort is highest between September and March, but somewhat reduced during the southeast monsoon period (April to August) or rainy season.

Typical fishing crafts are traditional paddled dug-out canoes and modern fibreglass (FRP) dinghies with outboard engines. Fishing is done mainly by hook and line (hand line, trolling line, pole-and-line). Net fishing (beach seine and set net) only contributes about 10% of the total fish production. Fishing grounds are the coastal inshore waters (estuaries, lagoons, and reefs), but fishing is also carried out on the deep shelf and slope areas beyond the reef. Access to the mainly demersal fishing grounds is governed by a very strong system of traditional fishing rights.

Most of the surplus catch from artisanal fishing is transported to and marketed at the only major urban centre, the coastal town of Lae (110,000 inhabitants). Maximum distances between fishing grounds and market reach up to 200 km. Fish is usually transported gutted and chilled on ice using insulated containers.

The catch composition varies considerably; more than 100 fish species are landed regularly. The Timor snapper *Lutjanus timorensis* (17%) and jobfish of the genus *Pristipomoides* (19%) are the dominant taxa. Aside from the lutjanid species, the carangid (*Caranx*, *Carangoides*), scombrid (*Katsuwonus pelamis*, *Rastrelliger*), lethrinid (*Lethrinus*, *Gymnocranius*) and serranid (*Epinephelus*) families are also important in the landings.

Total marketed landings in 1994 amounted to 140 t, originating mainly from coastal areas to the southeast of Lae (southern Huon Gulf). About 190 fishing groups from 45 coastal villages were involved in this artisanal fishery. Based on estimates for the annual per capita fish consumption of 12 kg (excluding canned fish), approx. 450 t of fish were harvested in addition for subsistence consumption.

The original project idea and request for assistance was based on the conclusion that the coastal fisheries resources of Morobe and neighbouring provinces were underutilised and therefore able to sustain a substantial increase in exploitation rates. By 1985, total fish production of Morobe Province (subsistence and marketed production) was estimated as approx. 500 t/year or 2.5 kg/ha\*year, harvested from a total shelf area of more than 200,000 ha. Less than 70 t of the total production were marketed.

Hardly any additional information or data on the target population and the sector were available at the onset of the project. In the absence of any significant agricultural cash crop it was expected that development of the artisanal fisheries sector by providing infrastructure would create employment opportunities and generate income to coastal villages. At the same time the increased fish production should satisfy the increasing demand for fresh fish, supplying quality protein nutrition in the traditionally vegetable and starch crop dominated diet. A contribution to

the substitution of imports (both canned fish and frozen fish) was also expected.

It soon became evident that the opportunity driven approach, focussing mainly on the exploitable fish resource, did not address the major constraints for fisheries development. The provision of necessary and required facilities, e.g. ice making machines or transport equipment, did in itself also not provide sufficient incentives for increased production. Since the facilities were usually operated by government services, their availability proved inconsistent and unreliable. It was also shown that the socio-cultural and -economic context was insufficiently taken into account.

There was a need to develop a concept which addresses not only technical but organisational and (socio-) economic issues as well. At the same time it should generate sufficient information to design, test and implement appropriate measures and monitor their impact. This concept places the acting members of the target group at the centre of its considerations, but also accounts for the constraints and weaknesses of the implementing bodies and other characteristic features of the sector.

The project commenced in September 1987 with a three-year orientation phase. It is now in its second implementation phase which will be completed in 1997. To assure sustainability after the completion of the foreign assistance, MCFDP is fully integrated into the cooperating implementing provincial fisheries division of the Department of Morobe and the fisheries branch of the Department of Madang.

The assistance provided under the bilateral agreement covers the secondment of several

long-term and short-term technical advisers, the provision of materials and equipment, counterpart training, as well as a financial contribution for the establishment of the necessary infrastructure.

Since 1993 the project purpose of MFCDP is the elaboration of a **concept for coastal artisanal fisheries development for Papua New Guinea and the application of key elements of this concept by both the coastal fishing population and the fisheries administrations of Morobe and Madang Provinces**. The sustainable use of the renewable marine resources should generate income for the target population and thus contribute to the overall goals socio-economic development of coastal communities improved and DFMR uses concept elements in other provinces and regions as a guideline for artisanal fisheries development.

Major concept elements identified, tested and applied in Morobe and Madang Provinces include among others:

- *defining the role and functions of the public sector at national, provincial and district levels*
- *strengthening provincial fisheries administration accordingly*
- *monitoring fisheries development and framework conditions*
- *supporting the private sector to provide infrastructural requirements and services*
- *providing a needs oriented extension and training service*
- *supporting and advising credit and loan programmes of the Rural Development Bank for the fishery sector*

### **DEFINING THE ROLE AND FUNCTIONS OF THE PUBLIC SECTOR AT NATIONAL, PROVINCIAL AND DISTRICT LEVELS**

Government should not be directly engaged in commercial activities but must provide the suitable framework conditions that motivate the private sector to invest and be involved in the fields of production, transporting, marketing, supplies and services of the

fishing industry. Operational linkages between the provincial fisheries administrations and the national DFMR are of great importance and in need of improvement. They will be largely dependent on the creation of functional regional coordinating offices within the DFMR

and the definition of DFMR's role in the provinces. It is the task of the national line department DFMR to assist provincial fisheries offices in cooperation with other provincial institutions in the development of the fishery industry in the provinces.

Appropriate linkages and communication schedules need to be established with other provincial divisions and non-government organisations who are also implementing activities in coastal villages to improve co-operation and coordination whenever and wherever possible. Socio-economic development in rural areas is the goal of projects and programmes of many divisions, organisations and institutions. In order to assess the original conditions and measure changes, baseline data and information from impact monitoring are required. Intersectoral task forces headed and coordinated by the provincial planning unit must be established

within the provincial departments to carry out the tasks of baseline surveys and impact monitoring.

Major project activities:

- preparing and publishing papers;
- informing DFMR on progress made;
- training of regional DFMR personnel;
- assisting other divisions of provincial departments in planning workshops and in the preparation of workplans;
- providing seminars and workshops on monitoring issues; initiating and supporting M & E units for provincial departments;
- linkages and communication schedules between provincial divisions and non-government organisations involved;
- improved coordination between provincial and national fisheries administration.

### **STRENGTHENING PROVINCIAL FISHERIES ADMINISTRATION**

The role and functions of the fisheries division respectively branch of the provincial departments as well as those of the district fisheries offices were defined, job descriptions drafted for each functional position, and fisheries officers were appointed according to staffing needs. District fisheries personnel does not respond directly to the provincial fisheries administration, but to the respective District Secretary. Since district staff have a very important role to play in the implementation of extension and related duties, agreements on coordination and cooperation are essential to carry out these functions efficiently.

Existing provincial development plans using Resource Management Support (RMS) were made operational. The associated planning documents range in scale from monthly work plans for individual fisheries officers to the overall plan of operation for a three-year project phase. Annual work plans are evaluated half-yearly, comparing targets with the actual situation. Re-planning and necessary adjustments are done on the basis of these evaluations.

Staff training both in-house (on-the-job) and at identified training institutions within PNG and abroad was and is provided based on identified needs. Weekly or fortnightly staff meetings are conducted as a means for better communication and coordination within the division/branch. Staff is working under close supervision of their respective section heads.

Major project activities:

- staff training;
- regular staff meetings;
- improved staff supervision and communication;
- coordination and formal cooperation between provincial (headquarter) and district level;
- introduction of a structured planning method (goal oriented project planning or GOPP) with realistic targets and indicators suitable for monitoring and evaluation.

## MONITORING FISHERIES DEVELOPMENT AND FRAMEWORK CONDITIONS

Any project or programme with a certain degree of complexity requires the continuous and regular gathering of specific, structured information (monitoring). This information is used to observe and compare planned targets with actual situations (assessment), to steer and re-plan, if required, and to assess the impact of measures introduced to the beneficiaries (evaluation). M & E with its steps of information gathering, analysis, assessment and decision making is an important management tool. An essential step in the logframe planning method is the definition of suitable indicators to assess or evaluate progress and achievements of targets and objectives. These indicators need to be valid, reliable, relevant, sensitive, early timely and cost effective. At the same time they must be defined in terms of quality, quantity, space and time. Examples of indicators used by MCFDP are given in the Appendix.

The approach of MCFDP is not production centred, but places emphasis on income generation for coastal villagers. Monitoring of general living conditions or the economic situation of target groups through **base line surveys and impact monitoring** was given priority. Information on the village baseline situation is of importance for all institutions or organisations dealing with community development, therefore it is advisable that these data are gathered by a provincial, intersectoral team and the processed information then made available to all parties concerned. MCFDP works towards this goal.

MCFDP initiated the establishment of a regional DFMR M & E unit. This unit has not yet become fully operational, but a M & E officer of DFMR is seconded to MCFDP in Lae. The tasks of this officer not only include the monitoring of DFMR activities in the region, but also to provide the much needed linkage, coordination and communication between national and provincial fisheries administrations.

**Sector information and framework conditions** have to be monitored on a regional basis. Since data needs for this type of information are similar for several provinces, monitoring is the responsibility of the regional DFMR M & E unit. Data in this area include the import statistics of several food commodities, e.g. different types of meat products and fresh, frozen and canned fish products. These data are available from the National Statistical Office. Locally produced fish to some degree is competing in the market with these imports.

Monitoring and updating of input supply information forms a major basis for extension activities. Prices for fish and fuel, and the cost of major inputs like fishing boats and gears, as well as insulated fish boxes are updated at least twice annually. A different area of input supply information is the update of bank loan and credit conditions.

Both **activity and financial monitoring** can be considered two different aspects of performance monitoring. These were introduced by MCFDP as part of the institutional strengthening process. Budgets are prepared not only on an annual basis, but are also available per cost centre (line item) or activity.

The monitoring of fish landings, resulting from the activities of the target group, is the central part of **resource monitoring**; fish sales monitoring forms its equivalent in the area of **market monitoring**. Landings and sales at the official landing site are recorded on a census basis; fish transactions by-passing (i.e. direct sales) are assessed by sampling or estimated. Ice purchases by fishermen are likewise recorded; the ice:fish ratio is computed to monitor and control the usage of the subsidised ice. A fish category system was introduced for the census record of fish landings, since time consuming fish identification can not be maintained on a routine basis.

The fish landing census by category is supplemented by a taxonomic sampling survey every 8th working day. During sampling up to 90 different taxa (species and species groups) are recorded separately by weight and numbers. This survey forms the basis for the ranking of important fish taxa. At the same time, landings per species can be quantified according to season and fishing ground.

Fish landing or catch records do not provide sufficient information for fisheries resource management. Catch and effort surveys with the aim to establish and monitor catch rates per unit effort are carried out at regular intervals in selected fishing villages. Data are collected by district fisheries (extension) personnel and/or trained fishermen. Catch rates are established on the basis of season, gear and fishing ground. The information is used as a basic tool for monitoring of resource exploitation, and also to assess the catching efficiency (economic efficiency) of existing and newly introduced fishing gears.

Major activities:

- *design and introduction of a code system covering fish producers (fishermen), traders, and fish taxa for provincial, regional or national use;*
- *design and introduction of a data recording system suitable both for manual (system card) and electronic (database) processing.*

*design and implementation of a functional M & E system covering the following areas:*

- *activity and performance monitoring, using the GOPP planning method and monthly as well as biannual evaluation meetings;*
- *financial monitoring of annually prepared budgets according to cost centres and activities;*
- *resource monitoring, using fish landing data recorded according to broad ecological categories, taxonomic samples and catch and effort data;*
- *market monitoring, relating fish landing to ice production and sales data, and also covering fish wholesale data;*
- *sector and framework monitoring, consisting of coastal population census data, fisheries baseline information, import data of fish and meat products, fish and food price developments, export prices and quantities of important agricultural products, as well as input supply information;*
- *baseline and impact monitoring of 11 indicators, covering income and expenditures, asset ownership and housing situation, health, education, social stratification, division of labour and income, as well as the degree of organisation and integration of a coastal village.*

**SUPPORTING THE PRIVATE SECTOR**

An important feature of MCFDP is the encouragement of the active participation by the private sector and the mobilisation of the self-help potential of the coastal villagers. Government should provide the suitable framework conditions for the operation of private enterprise in fish production, transport, marketing and related fields.

With the exception of some parts of Madang Province, where a coastal road link exists, fish

transport between producer or fishing ground and the market has to be done by sea. Transport costs are the major cost factor in the fish production. Relatively low production volume and irregular frequency of production contribute to the problematic situation.

The availability of ice for cooling of fish between capture and marketing is a necessary precondition for all activities in the fish production sector. Past experiences have

shown that reliable and economic ice production and supply cannot be maintained by government stations. Therefore ice making equipment both in Lae and in one of the districts (Morobe) was leased out to private operators. Leasing fees received from the private operator are used to subsidise the cost price for ice to a level generally acceptable to fishermen. The usage of these subsidies for the intended purpose, i.e. artisanal fish production, is monitored regularly by computing the ice:fish ratio of the users.

The retailing of fish by government fisheries officers was abolished through MCFDP. Fish retail is handled by a private businessman, who operates under close supervision. Fish wholesale as well will be privatised in June this year. The government owned fish marketing shed and equipment (e.g. chill room and flake ice maker) will be leased out and operated commercially. Users (both fishermen and traders) are charged with landing respectively sales fees. These revenues finance the operation of the market facilities.

This form of privatisation (leasing model) whereby government retains ownership and therefore control of the assets assures that the sector is served more efficiently. At the same time continuous operation is ascertained even at times of serious cuts in government expenditure.

### **PROVIDING NEEDS ORIENTED EXTENSION AND TRAINING**

The provision of extension and training is a central function of a provincial fisheries administration. Considering the structure and size of the artisanal sector, fisheries extension cannot be offered by the private sector at the present time.

MCFDP conducted a series of in-house workshops to assess the existing approach and concept for extension. Extension contents were identified from the review of field observations during a number of patrols conducted and from information received during discussions with target group members at the fish landing site. The poor performance of the extension system was the result of a

number of weaknesses: the lack of follow-up and monitoring, lack of content and concept, lack of planning and coordination, lack of supervision and training, limitations of personal qualifications, inadequate information about the sector and target groups, and last not least the expectations and attitudes of the target group - and of the fisheries extension officers themselves. A problem or needs oriented extension service cannot be carried out successfully, if the target group has been used to and continues to expect the "supply of goods and services" in form of free hand-outs.

#### Major activities:

- *leasing and monitoring of government owned ice production facilities to capable private operators while retaining control over the assets and assuring their continued availability for the sector;*
- *use of leasing fees received to finance the timely replacement of equipment and/or to subsidise ice production cost to the level acceptable and affordable to the sector;*
- *leasing out of government owned fish marketing facilities to private entrepreneurs, who are covering the operating expenses for fish marketing and the leasing rates through the introduction of fish landing and sales fees;*
- *supporting entrepreneurs in all fields of managing and organising their business*
- *promoting marketing of fish and fish products*

Extension by patrol has proven costly and in many cases of limited value, e.g. reaching only

small fractions of the target group at any given time. MCFDP proposes to include training for artisanal fishermen in the identified relevant extension contents into the curricula of selected Vocational Training Centres (VTCs). Fisheries training will become an integral part of the two-year agricultural courses and will be offered in form of several block courses of 3-4 weeks duration each. Trainees will be the regular VTC students, but it should be tested if these courses can be made available as "refresher" or "continuing education" courses also to adult members of the target group. Courses will be taught jointly by specially prepared fisheries extension officers and existing VTC staff.

In the fishing sector women are active as gatherers of shellfish, beche-de-mer and other marine products as well as in marketing. Extension advice relating, but not limited, to these fields, with emphasis on post-harvest aspects (handling, preservation and marketing), forms an integral part of extension under the nationwide "women in fisheries" programme. Extension contents developed for village women differ from those made available to urban target groups.

Proper coordination of field work between different government departments, and also with non-government organisations (NGOs) needs to be introduced and maintained. This requires the establishment and regular use of both formal and informal communication channels. An integrated approach, combining extension activities in several sectors (e.g. fisheries, forestry, education, health) will have the highest chance in contributing to improved livelihood of rural people.

Major activities:

- identification of problems and weaknesses of the formerly practiced extension service with regard to contents, approaches and expectations of the target groups;
- formalised steps (check list) for the preparation and implementation of

*extension field work (patrols), including improved supervision and reporting;*

- coordination of an integrated, intersectoral approach to extension among different government departments and non-government organisations (NGOs);
- initiative to supplement fisheries extension with formal training in selected fields (course modules) of artisanal fisheries as part of the agricultural curriculum at selected Vocational Training Centres (VTCs);
- identification of appropriate extension contents:
  - fishing gear construction and fishing methodology;
  - fishing boat and engine handling and maintenance;
  - fish preservation and appropriate processing methods;
  - fishing group organisation and financial management of small-scale fisheries related enterprises and businesses;
  - improved fish preservation and quality control of fish products for domestic consumption;
  - selection of appropriate equipment for fish production and transport (fishing gear, boats, engines) as well as fish storage (tested insulated fish boxes);
  - technical and economic advice on the organisation of fish transport from fishing ground to the urban consumer centres (Lae and Madang);
  - technical and economic advice on the marketing of fish and processed products in town and further inland (Highlands);
  - increased participation of women, especially in fish preservation, processing and marketing;
  - resource management and conservation.

## SUPPORTING CREDIT AND LOAN PROGRAMMES

Fishing groups and fish transport entrepreneurs buying fish in coastal villages are advised not only in the choice of suitable equipment but also on issues of transport economy and schedules. Advice is made available for the setting-up of new fishing groups/businesses and for a basic accounting or record keeping system of both new and already existing operations. A "financial assessment form" was developed to screen loan applicants and to assess economic viability of proposed operations and of those encountering problems in their present operations. This form also sets the scope for the minimum amount of data or records to be kept and monitored. The screening of loan

applications, based on realistic quantitative data, is a necessity to reduce the number of failing or non-performing bank credits in the artisanal fisheries sector. This also includes the monitoring of the status of approved and granted credit.

### Major activities

- *elaboration of a computerised financial assessment form for fishing projects;*
- *negotiations with the Rural Development Bank;*
- *monitoring of debt services for fisheries loans.*

## CONCLUSION

This report provides a brief outline of the approach for artisanal fisheries development adopted by MCFDP. It also summarises the various activities conducted in Morobe and Madang Provinces. All measures in organisational, technical, economic and other fields were designed to suit the situation and conditions of the project area. They are certainly relevant also in other regions of Papua New Guinea, but may need to be supplemented or require modification.

The strategy followed by MCFDP consists of a combination of measures which are to be introduced and implemented concurrently. Activities in all fields are interrelated and often interdependent. The efficient implementation of extension is based on the information gathered through monitoring. The operation of an extension service, like all other activities of the fisheries offices is itself subject to monitoring and evaluation. Institutional strengthening is required to enable the administration staff to carry out their functions properly. By giving up commercial operations

such as ice production, fish buying and selling the fisheries divisions can stimulate the growth of the private sector and allocate more manpower towards appropriate extension.

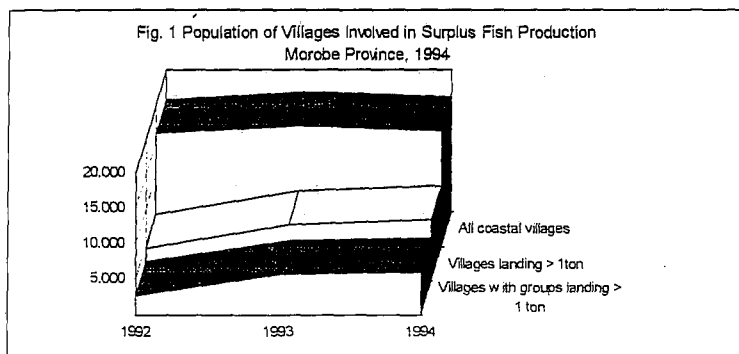
Fisheries administration can save funds as well as labour which are both required in the original government fields of policy guidance, planning and monitoring of the sustainable use of marine resources thus improving the nutrition situation in the country, generating income for the rural poor involved in fisheries activities and creating employment opportunities. Through the growth of the private sector in fisheries the possibilities of import substitution are strengthened with a positive impact on the foreign exchange situation.

Development based on behavioural changes of target groups is a gradual and necessarily slow process. Persistence and perseverance are required by the management and implementing personnel to achieve success.

## Appendix

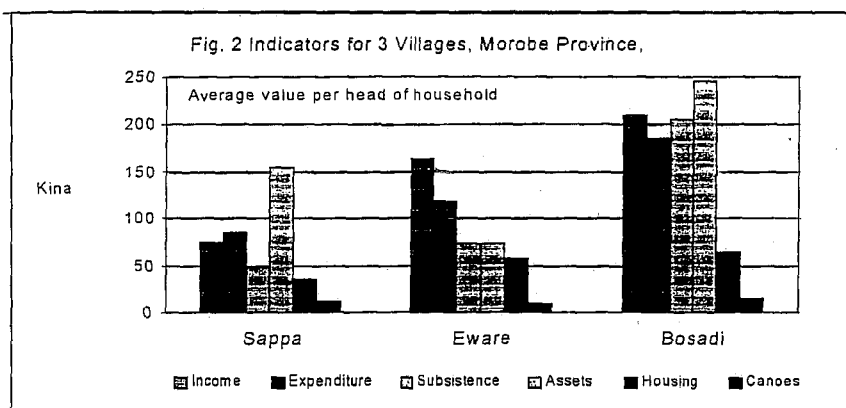
## MONITORING DATA OF THE ARTISANAL FISHERIES OF MOROBE PROVINCE

Major task of Monitoring & Evaluation is the processing and presentation of data collected. Since 1991 information and statistical data of target groups, fish and ice production, transport and marketing as well as framework conditions are compiled and published as annual reports. Some important indicators and data are presented in this appendix.

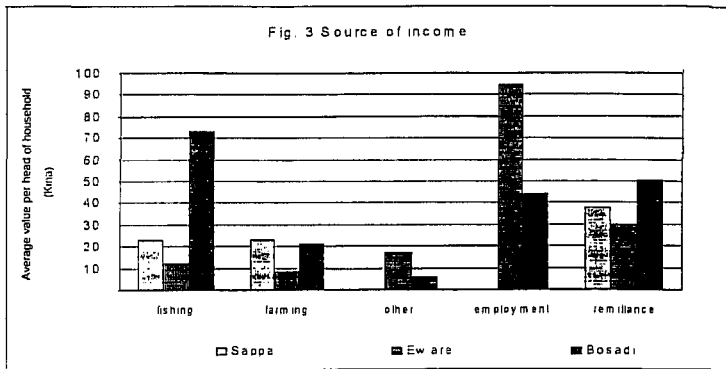


More than 200 fishing groups from 45 coastal villages are involved in the artisanal fisheries of Morobe Province. These villages represent a population of about 16,300 (1994). The number of people in the villages producing more than one ton of fish per year is an important measure for the size of population potentially benefiting from artisanal fisheries development. 23 villages with a population of about 8,500 fall into this category. Fishing groups landing individually more than one ton a-year are considered the direct target groups and respondents to development initiatives. In 1994 these 30 groups are based in 15 villages with a population of 5,000

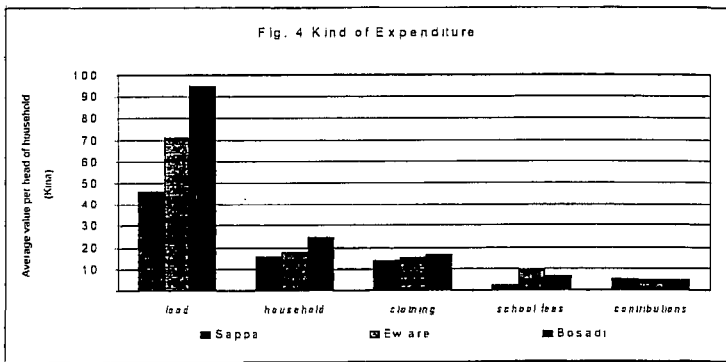
Baseline surveys are conducted in selected villages with different degree of involvement in fishing. The surveys are repeated regularly to monitor impact. Household specific data are collected from samples of up to 10 households.



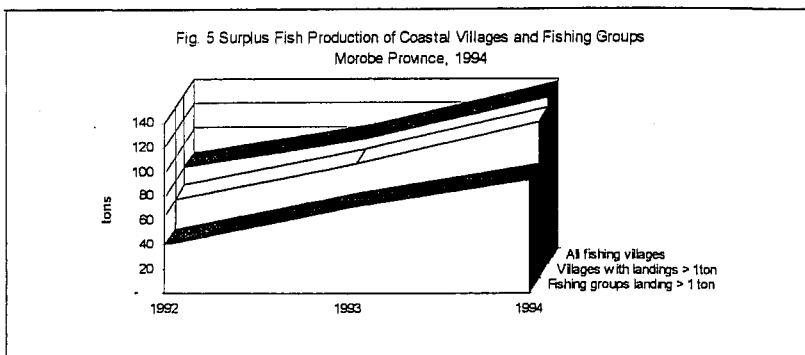
Several parameters are used to describe the economic situation of village households. Figure 2 presents an overview of the average value per head of income, expenditure, subsistence, assets, housing and canoes.



There are five major sources of cash income. Figure 3 shows the actual amounts and their relative importance.

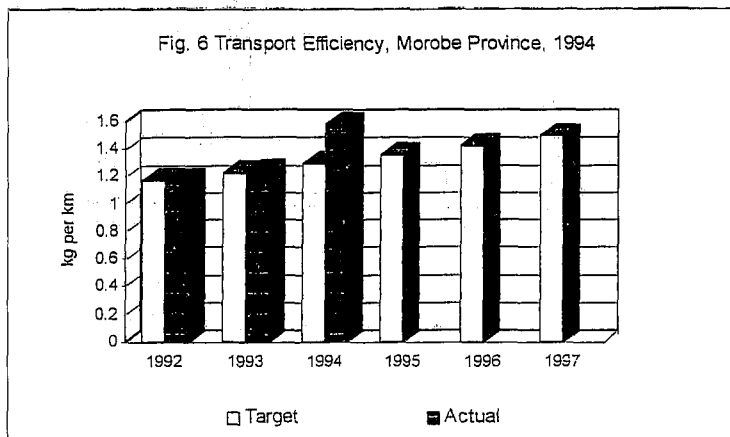


Despite the relatively high subsistence production in the coastal villages cash requirements are mainly for food supplies (imported items like rice, canned fish, etc.). School fees only constitute a minor cash expenditure even though it is often claimed to be the reason for cash income requirements in the villages.

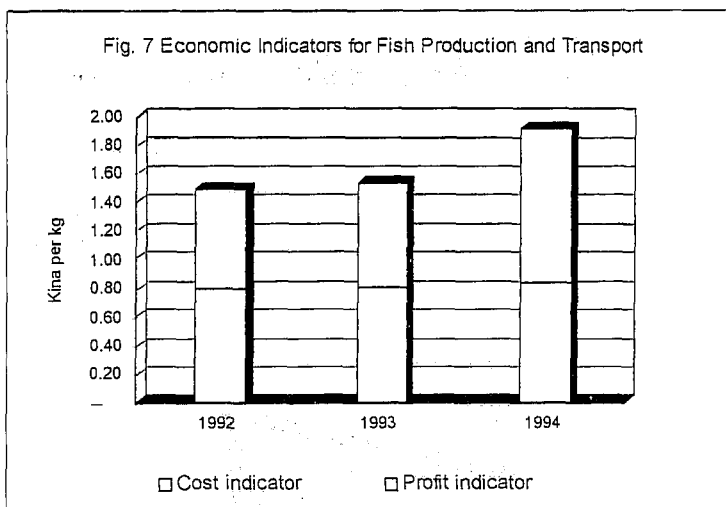


Fishing groups landing more than one ton per year (15 % of the total number of active groups) produced nearly 70 % of total landings. It is a characteristic of this fishery that it is carried out as an irregular part-

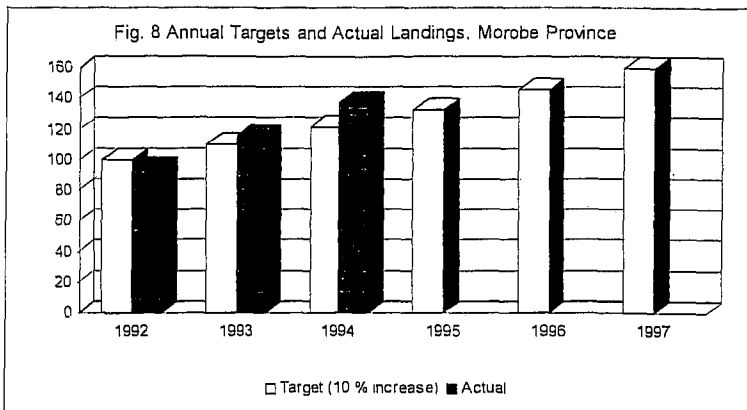
time activity; garden work appears to form the major occupation throughout the year. The tendency towards an increase of professionalism is monitored.



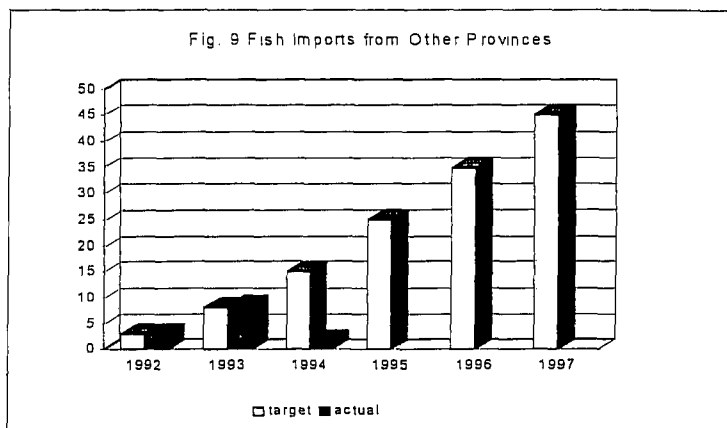
Transport cost of fish contributes significantly to the cost of fish production. Efficiency of transport is measured in kg per km transported and monitored for the most productive groups (1,020 out of 2,185 total marketing trips).



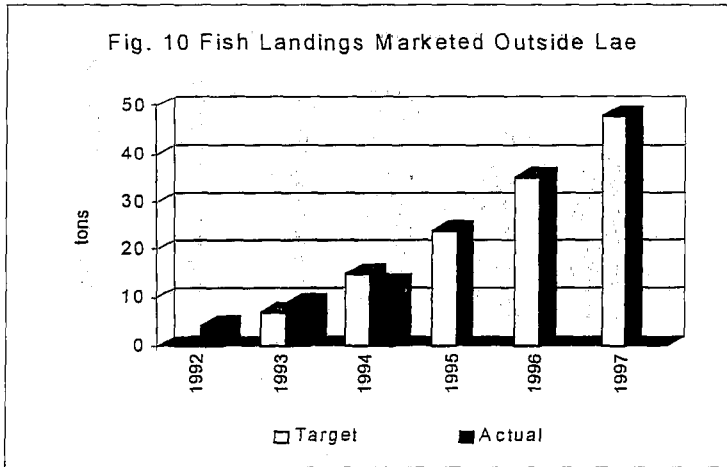
Returns from fishing are the indicator for income generation. MCFDP computes and monitors cost per km travelled based on the most common transport equipment used (19 feet dinghy with 40 HP outboard engine) and returns based on the average weighted fish price to determine profitability in fish production.



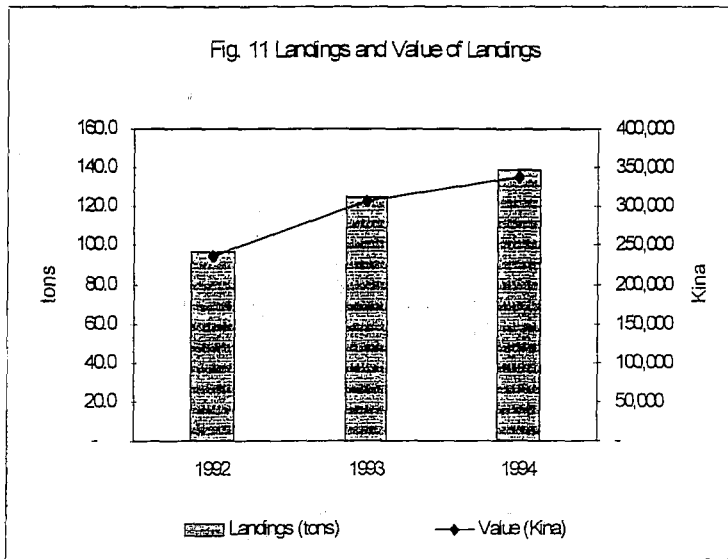
Total annual surplus production landed and marketed at Voco Point, Lae in 1994 amounted to 137 tons (12 % increase over 1993). Based on projected landings of 100 tons in 1992, annual total landings originating from Morobe Province are expected to increase sustainably by 10 % per year. This indicator, like all further production data, is monitored and evaluated on a monthly basis. Fish is landed generally gutted and on ice; therefore all reported weights refer to gutted weight. Between 10 and 20 % should be added to estimate the equivalent amount of whole (round) fish.



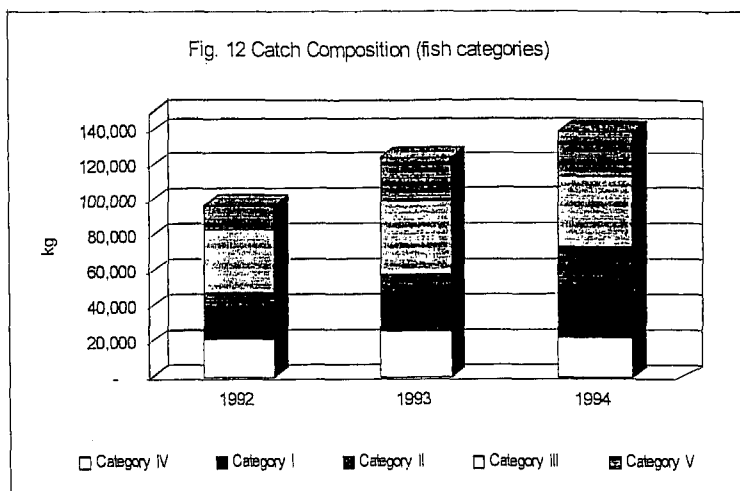
In order to achieve rentability of the privatised market facilities additional fish landings from other provinces (West and East New Britain, Oro Province, Manus) are required. This also helps alleviate marketing problems in these provinces. Figure 9 shows that a problem exists in this area and that corrective action is needed to improve this situation.



Even though the market in Lae is not yet saturated the project started to systematically develop fish marketing to the highlands. This additional marketing area is required when landings increase beyond 160 tons per annum.



Projections for the commercial operation of the fish market facilities are based not only on increases in weight but also in value of landings (and corresponding landing and sales fees). Fluctuations in value of landed fish indicate changes in catch composition (different price categories) and/or changes in supply and demand.

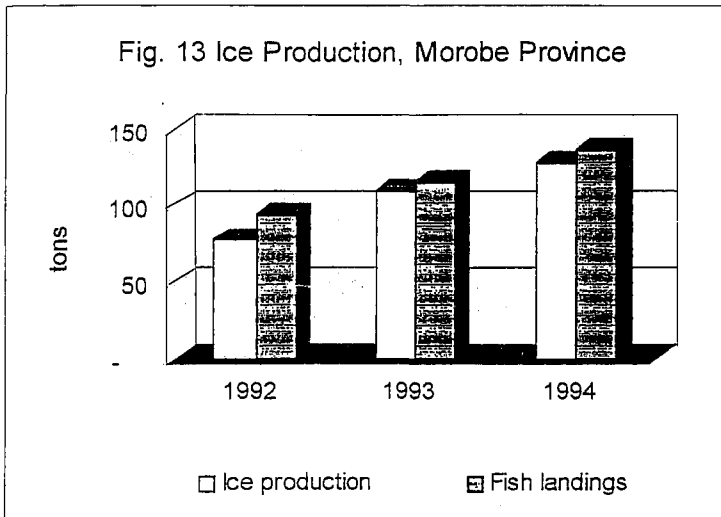


Fish landings are monitored according to broad ecological (and economic) categories. Increases of reef fish landings (category IV) are considered less sustainable and require closer monitoring of fishing grounds and further fisheries management measures. Increases should preferably consist of fish of categories I (large and medium size pelagics), category II (small pelagics) and category III (demersal slope fish). This is promoted by MCFDP through market development for categories I and II and the introduction of deep reel fishing for category III.

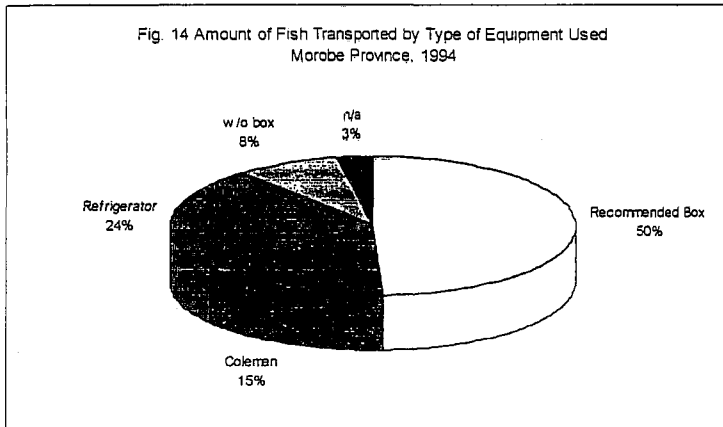
In 1994 the dominant taxa were Timor snapper *Lutjanus timorensis* and pink jobfish *Pristipomoides spp.* (mainly *P. typus*), with 19.9 % and 17.6 % of the total, respectively. These were followed by island mackerel *Rastrelliger faughni* (6.6%), skipjack tuna *Katsuwonus pelamis* (5.0 %), various other lutjanid snappers (4.5%) and rockcod *Epinephelus spp.* (4.5%). Other important taxa included emperor *Lethrinus spp.*, trevally *Caranx spp.*, mackerel tuna *Euthynnus affinis* and yellowfin tuna *Thunnus albacares*. More than 70 taxa amounted each to less than 2 % of total landings.

Almost 90 % of all fish landed is caught by hook and line; the remainder is produced using fishing nets (beach seine and gill nets). Approximately 52 % of landings consisted of demersal and deep slope fish (jobfish and snappers) mainly of the lutjanid family (Cat. III and Cat. V, in part). Coral reef fish (Cat. IV) amounted to 16 % and medium-sized pelagic fish (mainly small tuna and jacks) to 19 % (Cat. I and Cat. V, in part). Small pelagic and inshore bottom fish (Cat. II) only contributed 12 % of total landings.

Seasonality in occurrences was only noted in pelagic fish species. Peak tuna season are the months from May (skipjack tuna) to July (mackerel tuna) and August (both species). Tuna are least important in February. Both February and November are the months with highest landings of small pelagic fish (island mackerel and various scads).



Availability of ice is a prerequisite for fish marketing. No specific production figures are set for ice production but a target ratio of 1:1 ice to fish landings (Morobe Province only). Fish transported over larger distances require a higher ratio, but the substantial tuna and mackerel catches from adjacent villages can be landed un-iced in good quality.



Use of ice and suitable insulated containers (boxes) are necessary to maintain good quality of fish. MCFDP monitors the use of transport equipment of those fishing groups with landings of more than one ton and promotes (makes available) tested boxes.

Em tasol.