Chapter 8

Summary and Recommendations
8.1. Summary

In most parts of the world, marine capture fisheries are reaching the limits of sustainability. This global phenomenon implies crossing the frontiers of production that natural stocks can sustain. Many fish stocks and fishing areas are fully exploited or overfished. Kerala also is no exception. Fishing effort in the state has exceeded both in quantitative and qualitative terms in such a way that even the artisanal fisheries sector has adopted smaller versions of non-selective and energy intensive fishing gears. Adoption of selective and low energy fishing methods seems to be an important alternative in meeting this crisis.

This study on gill nets of Kerala, the fishing method depended upon by maximum fishermen of the state focuses on the importance of this selective and low energy fishing method in the marine fishing sector of the state. The results of the study are detailed in eight chapters.

The study opens with the conceptual framework by briefly reviewing the crisis in the marine fisheries sector. Maximum
fishermen depend upon gill net, which is, an important selective and low energy fishing gear. A review of relevant literature on aspects such as material, selectivity and techno-economic efficiency together with scope and main objectives of the study form the major part of the compass of the introductory chapter.

The methodology of the study is detailed in the second chapter. Based on available secondary data, a baseline survey along the Kerala coast was conducted focusing on areas of intense gill net operation. This survey provided the inputs for selection of centres. The chapter presents the basis for selection of sample centres, sample units and methodology for field and experimental study.

Divided into two sections, the next chapter deals with the design and technical characteristics of the gill nets of Kerala coast. In the first section, the types of gill nets operated along the coast are identified; based on mesh size, method of operation and species targeted they are further classified into appropriate groups. Typical design of each net is given and the regional variations corresponding to the important technical specifications are discussed. Mention is also made on the changes that have taken place during the past four decades.
In the latter part of the chapter, design details of each type of net is scrutinised and evaluated. Such an exercise has been done with specific reference to twine size- mesh size ratio, buoyancy-weight relationship and hanging ratio. The analysis of the prevailing floatation-ballast relationship showed that, eventhough floatation and ballast are given arbitrarily by the fishermen based on experience, the theoretical ratios established by Fridman (1986) and Sainsbury (1996) are followed.

The subject matter of the fourth chapter is a basic study on gear materials. The weathering resistance, which is an important criterion to assess the material performance, was studied for polyamide monofilament in comparison to polyamide multifilament and polyethylene twisted monofilament. The property assessed by rate of loss in breaking strength and extension of materials exposed to sunlight is compared. The underlying degradation in the polymer leading to loss in strength assessed by infrared spectroscopy is also discussed. The study provides supporting evidence of oxidation and characteristic C-O stretching in polyethylene and cyclic lactam formation and presence of OH in polyamide.

The material for gill nets for large pelagics in Kerala continues to be polyamide multifilament while in many other states cheaper
polyethylene has been substituted. Chapter five summarises the results of the study conducted for substitution of polyamide of 210dx6x3 (Rtex 455) by polyethylene twisted monofilament of 1.25 mm diameter (Rtex 620) in seer gill nets. Polyethylene showed equal catching efficiency to polyamide while it costs only 52 % of the polyamide net.

The selectivity aspects of gill nets are covered in the sixth chapter under two sections. The former section covers the results relating to optimum selection length, selection factor and optimum mesh size for *Sardinella longiceps*, *Otolithes argenteus* and *Penaeus indicus*. The observed and estimated selection lengths are compared to assess the effect of the currently used mesh sizes on these species.

The small mesh gill net sector operating in the inshore waters of Kerala use gill nets consisting of a multitude of meshes. Results of the catch analysis of these nets for two successive years are given in the latter part of this chapter. The catch composition, size composition and proportion of juveniles caught in each mesh size are discussed. The study indicates that small mesh gill netting can be encouraged as a selective fishing method in the inshore waters with restrained use of 30 and 32 mm mesh sizes.
The next chapter discusses the technical and economic efficiency of gill net operations. Based on the level of technology and species targeted, four sub-sectors were identified within the gill net sector viz. non-motorised small mesh, motorised small mesh, motorised large mesh and mechanised large mesh sectors. The technical efficiency of these sub-sectors was compared with reference to fishing effort and productivity. Effort in terms of depth of fishing, days fished, fishing time and volume of net used show a direct relationship with the level of technology. Productivity in terms of physical (catch) and value (revenue) terms however, does not show such direct relationship. The economic efficiency was assessed using standard indices such as rate of return, internal rate of return, pay back period, fishery income, energy efficiency and factor productivity. The effect of size and cost of capital and cost of production on the economics of operation is also discussed in this chapter. It was observed that level of technology did not have direct effect on economic performance.

8.2. Recommendations

Suggesting methods to manage the multispecies and multigear fisheries is not easy. For the marine fisheries of Kerala, which has a
long history of uncontrolled development, management is more difficult.

The present study on gill nets of the Kerala coast brings to light certain valid points which would make gill netting a more ecofriendly fishing method suitable for tropical fisheries. The following suggestions are given for further development and effective management of the gill net fishery.

1) The use of resource specific gill nets may be encouraged to suit specific resources available over space and time so that exploitation of juveniles can be minimised.

2) Polyethylene twisted monofilament can be used effectively to substitute polyamide multifilament in seer gill nets of Kerala. The study indicates that PE of 1.25 mm diameter is a good substitute for PA multifilament of 210dx6x3 currently used. The PE net has equal efficiency but costs only 52% of the standard PA net.

3) The selectivity study categorically shows that the optimum mesh size for the exploitation is:

   a) 34 mm for *Sardinella longiceps*;
   b) 38 mm for *Otolithes argenteus*; and
   c) 40 mm. for *Penaeus indicus*. 
Mesh sizes stipulated above are found to exploit the resources in a safe way without affecting juveniles. Hence mesh sizes below these should be avoided to protect the resources.

4) The catch analysis of the small mesh gill nets shows that mesh size of 30 and 32 mm has to be used with utmost caution considering the multispecies nature of the inshore fishery.

5) As the spawning period of most of the fishes is during May to July gill netting using mesh sizes 30-38 mm during this period may be regulated.

6) Productivity of capital in a fishing unit depends on the effective utilization of it. Hence maximum utilization of capital by way of more fishing trips and more fishing time may be encouraged.

7) The importance of low energy nature of gill net fishing is to be highlighted in the light of its better fuel efficiency compared to other fishing methods.

8) The better performance of the mechanised large mesh sector engaged in multiday operations compared to single day operations of motorised large mesh sector give scope for motorised sector
also to engage in two day operations. The non-productive use of fuel in daily commuting can be reduced in multiday operations.

9) Finally, the fishermen should be made aware of the advantages and disadvantages of using different fishing gears. Through the involvement of actual fishermen only implementation of any regulation can be made successful. Hence they may be made aware of the need for sustainability of fish stocks and may be involved in the decision making.