

Fisheries and Aquaculture

Impact of morning and evening fishing on herring (*Amblygaster sirm*): A case study in Chilaw, Sri Lanka

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Abstract

Coastal fisheries are considerably important to Sri Lanka's economy. Since many coastal fish species are heavily exploited at present, it is necessary to carry out research aiming to manage coastal fisheries. The present study was undertaken in Chilaw, Sri Lanka from April 2008 to March 2009 with the aim of investigating the impact of morning and evening fishing conduct by small mesh gillnets. The key target species in small mesh gillnet fishery in the West Coast of Sri Lanka is herring (*Amblygaster sirm*). Morning and evening fish landings made by Fibre Reinforced Plastic Boats (FRP boats) operated with small mesh gillnets were monitored at the key fish landing sites in Chilaw. This includes collecting information pertaining to the particular fishing operation and recording the total catch of the boat and catch by species. A biological study was also carried out to understand the reproductive biology of *A. sirm*. Accordingly, fish samples collected during the morning and evening were separately analysed at the NARA laboratory. The sex was determined and monthly averages of Gonadosomatic Index (GSI) were estimated for males and females separately. The results indicated that a longer duration of fishing time is normally taken at the sea for evening fishing. Morning fishing is normally carried out at deeper waters than evening fishing. Two spawning seasons were identified; from April to August and from November to March. Catching of herring before maturity was common in both morning and evening fishing but higher portion was found in the morning catches. From August to January, the morning catch almost comprises of immature fish. However, spawning fish were mostly caught by evening fishing. Since both morning and evening fishing are negatively impacted on the sustainability of small pelagic fish, new regulations are needed to be introduced (eg. mesh size restrictions) for small mesh gillnet fishery in Sri Lanka.

Keywords: *Amblygaster sirm*, gonadosomatic index, small meshed gillnet

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Introduction

The marine capture fishery is still the backbone of the commercial fishing industry in Sri Lanka. More than 90 % of the marine fishing fleet is operated within the coastal waters (MFARD, 2016). The coastal fisheries resources are threatened due to over exploitation and present fishing practices are not carried out in a sustainable manner especially regarding small pelagic fish. The key small pelagic fish such as herrings and sardines are among the most highly exploited coastal resources at present (Haputhanthi, 2008).

Materials and Methods

Morning and evening fish landings made by Fibre Reinforced Plastic Boats (FRP boats) operated with small meshed gillnets were monitored once a week at the key fish landing centres in Chilaw during the period from April 2008 to March, 2009. On each sampling day, morning and evening fish landings were monitored. Accordingly, total fish catch and species

composition was recorded from randomly selected fishing boats. Other information related to fishing operations such as total fishing time, fishing depth in Fathoms (1 Fathom = 1.83 m), number of gillnet pieces used with eye sizes were also recorded. Random samples of herrings taken from both morning and evening landings were analysed to examine the reproductive biology of *A. sirm.* at the NARA laboratory, total length (to the nearest 0.1cm) and total weight of each individual (to the nearest 0.01g) were measured. Fish were dissected to determine the sex and maturity stages of the gonads. Weight of the gonads of each individual were measured to the nearest 0.01 g to calculate Gonadosomatic Index GSI (gonad weight/body weight * 100) to identify spawning seasons. Monthly percentages of immature *A. Sirm* in the collected samples were also estimated.

Results

Fishing crafts, gear and operations:The fishing vessels operated in small meshed gillnet fishery in Chilaw Fisheries District are mainly FRP boats. FRP boats are 5 to 7.4 m in length and fitted with outboard engines 9.9 – 30 horse power. Both morning and evening fishing operations were conducted using small meshed gillnets. The estimated mean true fishing time was 1.21 h (SD = 0.45) and 1.27 h (SD = 0.47) for morning and evening fishing operations respectively. In addition, morning fishing activities are conducted in relatively shallow waters (average depth =10.7 F) when compared with night fishing activities (average depth =13.6 F).

Reproductive biology of *A. Sirm*:Total length of the fish examined at the laboratory for reproductive biology ranged from 8.20 cm to 21.0 cm. There were two spawning peaks with higher GSI values (April to August and November to March) suggesting two distinct spawning periods. Moreover, higher GSI values were observed in evening samples than morning samples showing that more matured fish are caught by evening fishing (Fig. 1). Catching immature fish was common in both fishing activities, but more immature fish were recorded for morning fishing. From August to January, almost all morning fish were immature (Fig.2). Very similar results were obtained in the months of September and October for evening catch. On the other hand, more spawning fishes were always recorded in evening catches than morning catches (Fig .2).

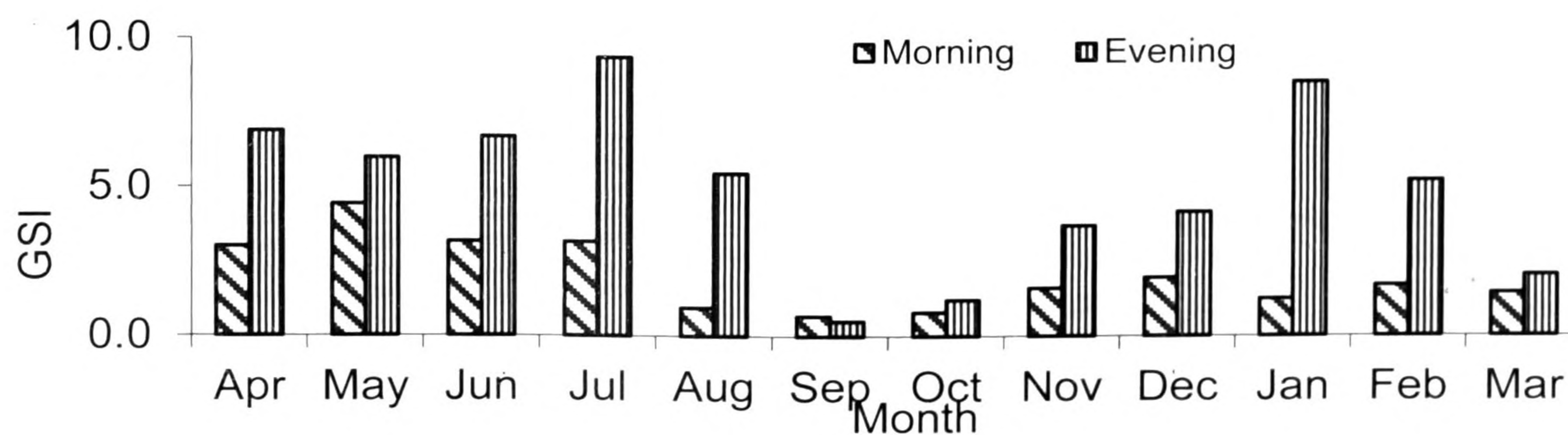


Fig. 1: Monthly variations of Gonadosomatic Index (GSI) for *A. sirm*

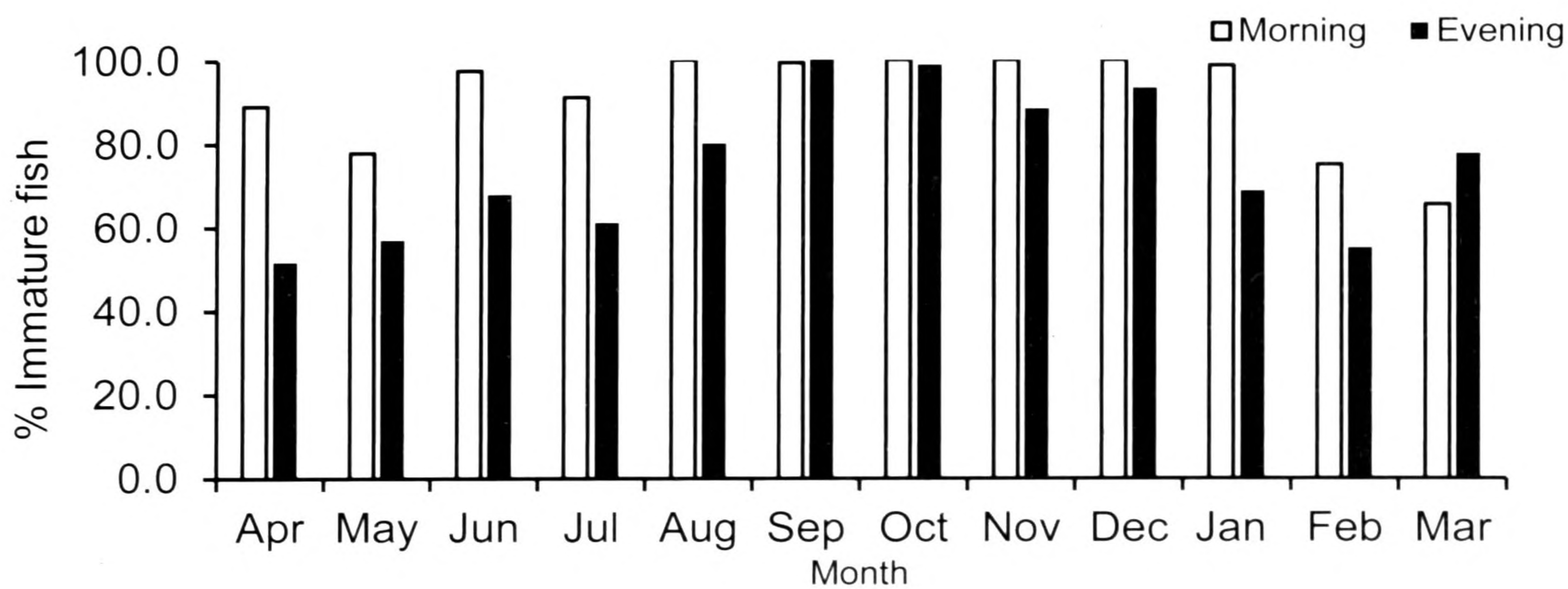


Fig.2: Monthly variations of immature *A. sirm* in morning and evening catches

Discussion

The spawning stock of herring is exploited by night fishing operations than morning operations. On the other hand, higher percentages of immature fish are mostly caught to morning fishing than evening fishing. This is not a good sign in terms of the sustainability of the herring fishery. Therefore, it might be a useful management measure of banning the evening fishing during the peak spawning months of the year. However, several resource friendly features were observed at the evening fishing operations. Since relatively larger mesh sizes are employed for evening fishing, such fishing operations target relatively larger size herrings. The diversified species composition in the evening catch also supports to ease the fishing pressure on key small pelagic. The fishing pressure on the major small pelagic stocks can further be eased though promoting evening fishing during the non-spawning months.

Conclusion

Introduction of new management guidelines is necessary for the management of small mesh gillnet fishery in the west coast of Sri Lanka. Closed seasons and minimum mesh size regulations could probably be the best management options. Conducting a comprehensive research study aiming to small pelagic fishery management is however, advisable for proposing the effective management measures.

References

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