COMMUNITY BASED FISHERIES MANAGEMENT IN EGODAUYANA (PANADURA)

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ABSTRACT

The inshore waters around the village of Egodauyana, near Panadura on Sri Lanka's west coast, have plentiflul fish resources because of the rocky environment. The live bait fishery and other fisheries depending on it —the pole and hne tuna fishery and the hand line demersal fishery – are the main traditional fisheries in the area. The live bait fishery supplies the others with red bait, caughtin inshore coastal waters, and prawn, caught in fish traps in the Panadura river. The community has developed its own informal self-management system, mainly to protect the red bait resource. Unwritten norms prohibit the capture of immature fish. If these are caught, the fishery may be closed for a fixed period. The use of certain types of gear is banned and sanctions are imposed on those breaking the rules. Measures are also taken to protect the prawn. However, the local management system cannot cope with certain problems, such as pollution and the use by non-local fishermen of gear that is banned by the local community. Thus the responsibility for fisheries management in Egodauyana should be shared between the local community and the Government.

1. INTRODUCTION

Locally organised infonnal fisheries management systems exist in different traditional fisheries in Sri Lanka. Under these management regimes the local fishennen share tacit agreements on the running of the fishery within waters which they consider 'theirs' and which they protect from 'intruders'. Most of these systems have broken down, mainly because of the introduction of new technology but in some areas these regimes still remain as an effective system of management for certain fisheries. This paper describes such an informal management system adopted by the fishing community in the village named Egodauyana (Panadura), mainly for the protection of fish resources which are used as live bait. About *65%* of fish production in this area comes from fishing with live bait.

Egodauyana is a fishing village about 27 km from Colombo, close to Panadura town along the west coast of Sri Lanka. It is bound by the sea in the west and the Panadura river in the north and south (Fig. 1). The inshore waters around this village are rich in demersal fish associated with the rocky environment.

2. FISHERIES IN EGODAUYANA (PANADURA)

There are about 262 fishing households in the village and about 283 active fishermen supporting a total population of about 960. The majority of them depend on sea fishing while the rest fish in the Panadura river and Bolgoda lake. The fishing community here is predominately Sinhalese. Only four families are Muslim. Ninety percent of Sinhalese fishermen are Buddhists while the rest are Catholic. The average size of a fishing family is four. The average number of persons engaged in fishing per household is one.

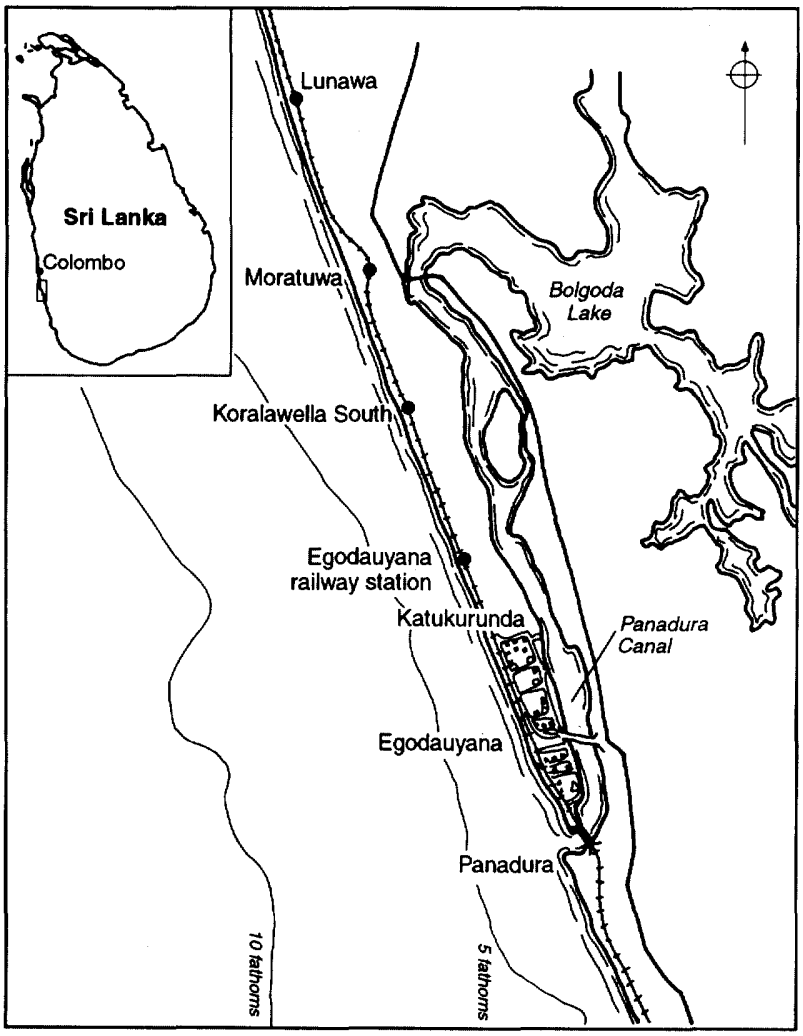

Fig. 1. The Location of Egodauyana (Panadura).

Some women in the village are employed in the fishery, repairing and mending nets and about 30 women are involved in selling fish from house to house in baskets.

The composition of the village fishing fleet in relation to type of gear and area of fishing is shown in Table 1 which shows that 30% of the total fishing fleet is mechanised. In the fishing fleet engaged in sea fishing, 48% is mechanised. The main types of fishery are described below.

2.1 Live bait fishery

This has been the main traditional fishery practised for generations. It exists as a separate

Table 1.
The fishing fleet of Egodauyana (Panadura)

Type of craft	Number	Area of fishing	Gear used
Mechanised:			
3.5 t boats fitted with inboard engines, 8.5 m length	24	sea	Drift gillnets, pole & line, hand line with live bait (bait cone fishing), bottom long line
5.5 m FRP boats fitted with outboard motors	11	sea	Small meshed gillnets, hand line with live bait (bait cone fishing), bottom long line
Non-mechanised:			
Outrigger canoes of 7.3 m length	22	sea	Lift net for live bait, hand line with live bait (bait cone fishing)
Outrigger canoes (below 6 m length)	15	sea	Hand line, lobster fishing
Small canoes (below 4.5 m length)	35	river	Line fishing
Fishing without craft - Jakotu (fish kraals)	6	river	Fish traps for prawns and fish.

Source: Department of Fisheries and Aquatic Resources

fishery for the supply of live bait for pole and line fishing and hand line fishing (cone-bait fishing) in this area. Live bait used here is red bait and prawns. The red bait locally known as 'Hingura' *(Dipterygynotus leucogrammicus)* is caught in the inshore coastal waters while the prawns are caught in fish traps usually known as 'Jakotu', constructed in the Panadura river.

Red bait is known to concentrate in large numbers over the rocks at a depth of 20 – 33m in coastal waters of the Egodauyana area and occasionally to concentrate into balls at the surface. They are caught with a special kind of lift net known locally as 'Hinguran dela'. This fishery has been in existence for more than a century and operates from November to May.

The lift net is square; each side is about 12 – 15m long and hung on a 10 – 12 mm diameter coir rope along the perimeter. Loops are provided at the four extreme points and two others, one at the centre of each of the opposite sides to facilitate the easy lifting of the net. The net is made of webbings of 3 —4mm mesh and 6—12 ply of im square at the bottom, 10 mm mesh of 15 ply webbing of 3m square in the middle and a webbing of 50 mm mesh and 18 ply 14m square at the top. The complete net is handmade out of Kuralon twine and is treated with an extract of mangrove bark to reduce rotting and to stain it dark brown to camouflage it in the rocky environment.

Bait fishermen go to the fishing grounds early in the morning in two outriggers 7.3 m long, locally known as 'Hadi Oru', with a 3.5 ton boat. The fishermen locate the rocky patch above which the red bait usually gather in shoals. After setting the net on the rocky patch it is allowed to settle for about 15 —20 minutes until the frightened fish shoal together again, this time over the net. In order to keep the net at the desired point and against the bottom, two stones each of about 2 kg are attached on either side of the net. The net is then lifted up quickly and continuously by

the ropes. Both canoes come close in and collect the live fish, putting them into wooden containers, and transferring them to the wooden container attached to the 3.5 ton boat. The 3.5 ton boat leaves for pole and line fishing while the outriggers return to the shore with the lift net. Red bait is also used as live bait in cone bait fishing for trevally and rock fish.

The 'Jakotu' fish kraals are traps constructed in the estuary of the Panadura River to provide live prawns. They are made of reed and split bamboo and consist of two main parts, the trap and the fence. There are about 70 Jakotu distributed over Bolgoda lake and in the Panadura River there are 12 Jakotus, of which six belong to the Egodauyana fishermen. The catch consists of prawns and fish species such as trevally, glassy perchlet, pony fish, giant perch and silver whiting.

2.2 Pole and line fishery

This method of fishing has been practised for over 100 years in this village and, among the traditional fisheries is still important in the village. Fishing is highly seasonal and lasts from October to April. It is directed mainly towards schools of skipjack tuna migrating seasonally into the coastal waters. The live red bait is a prerequisite for the pole and line fishery.

In the past fishing for red bait as well as pole and line fishing for tuna were carried out by the same large outrigger canoes locally known as 'Hadi Oru'. The pole and line outriggers worked in pairs in the fishery since two of them are required to operate the lift net to catch the red bait and each outrigger is manned by a crew of five or six. The outriggers left in pairs early in the morning for the bait fishery. If fishing for bait was successful, the same outrigger set out for pole and line fishing for tuna. With the introduction of 3.5 ton boats in 1972 these sail driven outriggers were gradually replaced and their use became limited mainly to the bait fishery (Amarasiri, 1991). Sometimes, they are used in the hand line fishery with live bait for rock fish and paraw. At present, a pole and line fishing unit consists of two outriggers and a *3.5* ton boat. The income from this fishery is shared between the *3.5* ton boats and two outriggers equally.

2.3 Hand line fishery with live bait (bait cone fishing)

This is a long established traditional fishery for demersal fish, in this village. Usually the fishing is carried out from October to May by 3.5 ton boats, 18. Sm FRP boats and outrigger canoes. The fishery requires the use of live bait – red bait and prawns. The bait is taken to the fishing ground in wooden containers perforated at the bottom and oval in shape. This is tied to the side of the craft and partly submerged. The live bait is released at the required depth by using a bait cage. It resembles a cone with a diameter of 70 —90 mm at the bottom and a height of 200 —250 mm. A lead ring weighing 0.75 – 1 kg is attached to the circular bottom as a sinker and to keep it upright. Bait cones used here are made of cane.

Fishermen reach the fishing grounds around six in the morning. They carry live prawns or Hingura depending on their availability. The bait cone is released regularly every 20 —30 minutes. Once the bait is released, three or four fishermen start doing hand lining for the demersal fish coming out of the sheltered areas to feed on the bait or other pelagic fish which gather around the baited water column. The targeted species are high value demersal fish such as bream, snappers, groupers and trevally, as well as horse mackerel, reef and rock fishes.

2.4 Gillnet fishery

(a) With large mesh

The large mesh gillnet fishery targeted at large pelagic species such as skipjack, frigate, mackerel and yellow fin tuna is characterised by 3.5 ton boats using nylon drift nets with a mesh of 100 – 150 mm. There are 24 such boats. This kind of boat was first introduced to this village in 1972 through the Moratuwa Fisheries Co-operative Society under the Govermnent subsidy programme. At present this fishery contributes about 50% of the fish production in the area.

(b) With small mesh

The small mesh gillnet fishery, targeted at small pelagic species such as 'Hurulla', where *5.5m* boats fitted with outboard motors are used, is a recent introduction to this village. In 1994, eight such boats were issued to the members of the Egodauyana South Fisheries Co-operative Society under the Government subsidy and bank credit programme.

2.5. Bottom **long line fishery**

This fishery uses 3.5 ton boats, 5.5m FRP boats and outriggers and targets the bottom fish – rock fish and trevally. It generally starts in October and extends to March. The main bait used is 'Hurulla'.

3. COMMUNITY-BASED MANAGEMENT OF THE TRADITIONAL FISHERIES

The live-bait fishery and the other fisheries depending on it viz, the pole and line tuna fishery and the hand line demersal fishery (bait cone fishing) have been the major traditional fisheries in Egodauyana. Before 1968, these fisheries contributed over 90% of the fish production in the village including all tuna fish production. With the introduction of *3.5* ton boats and drift gillnets, the pole and line contribution has diminished, but still remains high compared to other areas.

These two fisheries are associated with the well established live bait fishery in the area. The red bait (Hingura) is used as the live bait mainly for the pole and line fishery. It is also used to some extent in bait cone fishing for demersal fish. Prawns are mainly used for demersal fish. The red bait is known to concentrate over large rocks at 11 to 18 fathoms depth. Over 10,000 such rocks are known to exist in the inshore waters around Egodauyana. Some of them have been given names by the local community such as 'Laxapana', 'Pettagala', 'Wadugala', 'Dabaraya', 'Ketagala', 'Menumgala', 'Harasgataya', 'Bimpalugama', 'Diyabagala', 'Idiwaragala'. The local fishing community has exercised its rights over the section of inshore water around the village where the red bait concentrate. In 1908 there was a dispute over the right to catch red bait in the waters between the fishermen in Egodauyana and the fishermen in Pinwatta, a neighbouring village. The dispute was settled by dividing the inshore waters between the two villages by a line drawn from the Nuga tree located between the two villages.

3.1 Current management practices

There has been a well established community-based management system mainly to protect the red bait resource. In this self management system run by the community, there are "rules" and unwritten norms governing the fishery and sanctions are imposed. These informal customary

Table 2
Fishermen's cooperative organisations in Egodauyana

Name of the Society	Membership		Total
	Male	Female	
Egodauyana South Fishermens Co-op. Society	86	21	107
Egodauyana Central Fishermens Co-op. Society	45	22	67
Egodauyana North Fishermens Co-op. Society	60	23	83
Total	191	66	257

Source: Department of Fisheries and Aquatic Resources.

regulations prohibit the capture of immature red bait and close the fishery until the fish matures. When young red bait are caught in the lift net, the local fishermen gather at the beach to stop red bait fishing for a period decided by the community itself. Usually the fishery is closed for about 15 days. The community has had to take such decisions a number times during the fishing season for the pole and line fishery.

Bottom set gillnets or any other fishing gear which damages the rocky habitat and drives away the red bait are not allowed under the traditional management regime. The breaking and removal of rocks where the red bait concentrate is also not allowed. The sanctions imposed on persons committing a breach of the 'rules' of the traditional management system are: (a) suspension of right to keep the sail, lift net and outrigger ropes in the hut (locally known as the 'Aduwadiya Baraganna maduwa') collectively owned by the community for safe keeping of accessories of the outriggers going to the bait fishery; (b) cutting threads fixing the arms of the outrigger to the dugout to make it inoperative; and (c) suspension from fishing for a week. If anyone is caught using bottom set gillnets, he will be punished by the community by not allowing him to conduct fishing operations from the village.

In the Jakotu fishery too measures are adopted by the Jakotu fishermen to protect the prawn. Under this regime the fishermen remove the reed panel and other structures during the period of larval growth to prevent larvae getting caught in the traps. Delaying the bringing of reeds for the construction of panels and other ways of impeding their construction are the sanctions imposed by the community on persons who do not obey the rules.

3.2 Regulations

Apart from the traditional informal fisheries management system described above, there are no regulations made by the Government to manage the fisheries in this area, except the regulations made by the Moratuwa Urban District Council, under local government ordinance No, 11 of 1920, in 1931 to regulate the Jakotu fishery in the Panadura river. Under these regulations, fishing by kraal is permitted only under licence issued by the chairman of the Moratuwa Urban District Council for a fee of Rs.25. Every kraal should leave a central gap 27.5 m wide for the passage of craft and a gap inshore at each end 9 m wide. No kraal shall be permitted within 45 m of any other kraal. Fishing by kraals is prohibited during the months of April, May and June. These regulations were enforced by the Moratuwa Town Council, which is now defunct.

3.3 Fish aggregating devices (FADS)

Twelve different types of surface FAD were tested on the continental shelf off the Egodauyana area from 1982 to 1986 under the pilot project run by the BOBP/FAO and NARA. Fishing was carried out around the FAD during the day and used to supplement the catch of mechanised craft during the lean season. The traditional non-mechanised craft benefited since their time and distance of travel was reduced. In general the fishing was done around the FAD on the way to the fishing ground for primary fishing or on returning home. However, if the aggregation of fish around the FAD was good, that became the primary fishing ground. The main species caught are dolphins and rainbow runners.

Although the fishermen accepted the concept of FAD and the potential benefits, the construction and deployment of FADs was not taken up by the fishermen in the village after the termination of the BOBP/NARA programme. The probable reason is the open and free access to fishing around the FAD. The fishermen from Egodauyana as well as adjacent villages fished around the FAD. Another reason is that the fishermen are unable to exercise property rights even if they are given the FAD as they are deployed about 16 km away from the coast.

3.4 Fishermen's groups and organisations in fisheries management

In the existing informal management system, the community itself, particularly the group of bait fishermen, participated in the decision-making process in designing the 'regulations' and 'sanctions' and in implementation and enforcement of the regulations. At present there are three Fishermen's Co-operative Organizations in this village formed in 1989 under the reorganisation programme launched by the Government. The membership of these organisations, shOwn in Table 2 represents only 67% of the active fishermen in the village. These organisations mainly function as providers of fishing inputs such as boats, engines and gear to their members under the Government subsidy programme.

In the traditional informal management system these organisations have not played a significant role except in the case of conflicts arising between 'outsiders' and the local community. In these instances, these organisations took a leading role, making representations to Govermnent agencies such as the Fisheries Department and the Police. Conflicts with the fishermen from distant fishing villages like Negombo and Ja-ela arose for the first time in 1987 and subsequently in 1992 and 1993. There were protests against the 'outsiders' because they used bottom-set gillnets, trammel nets and small-meshed gillnets. The Egodauyana fishermen believe that such gear drive away the red bait fish shoals and destroy the rocky habitat that sustains the resource. Another important reason for the protest was the fall in the fish price due to heavy landings by the non-local fishermen. In 1993, 116 of the 5.5 m FRP boats were bought by non-local fishermen.

4. THE EFFECTS OF THE MANAGEMENT MEASURES IMPLEMENTED

The fish production of the 3.5 ton boats of this village consists of more than 50% bottom fish and less than 50% tuna. The main fishing method for the bottom fish is bait cone fishing with live bait. About 30% of tuna production comes from the pole and line fishery and the rest from gill netting. Thus 65% of fish production of 3.5 tonners in this village comes from line fishing with

live bait. Compared with other fishing methods, pole and line and bait cone fishing brings in better quality fish which can command a better price. The high percentage contribution from line fishing with live bait is due to the well established live bait fishery in this village. The success of this fishery can be attributed to the management approaches adopted by the community itself to protect the bait fish and prawns.

Although pole and line fishing has declined drastically on account of the non-availability of red bait and rapid expansion of gillnet fishing (its present contribution to the total tuna production of Sri Lanka is less than 4%), the percentage contribution of the pole and line fishery to tuna production in this village is high. This is mainly due to the availability of red bait in this area.

The protests made by the community against the outsiders resulted in them being driven away. This helped to keep the fish price high and the fish resource in rocky areas in good condition.

5. FUTURE MANAGEMENT ISSUES

The problems to be faced by the fishermen in this village can be summarised as follows.

- Use of diversified fishing gear such as bottom set gill nets, trammel nets, small meshed gill nets, use of purse seines and dynamite in and around rocks where the red bait aggregate, particularly by non-local fishermen.
- Discharge of pollutants from the factories into the Bolgoda lake and destruction of mangroves by reclamation of land for house building, thereby threatening the fishery.
- Fall of fish prices due to the heavy landings by non-local fishermen.

6. CONCLUSION

Pole and line fishing and bait cone fishing are the major fisheries in Egodauyana. They contribute about *65% (50%* from bait cone fishery and 15% from pole and line fishing) of the fish production, particularly of *3.5* ton fishing boats. The main reason for this is the existence of a well established live bait fishery in this area. A community based management system has existed in this village for the protection of fish resources used as live bait, ie red bait (Hingura) and prawn.

The community takes the responsibility for all the management functions including making of rules for the running of the fishery, implementing the regulations and imposing sanctions. But these management regimes have been subject to threats during recent times. The outsiders from distant fishing villages have, on several occasions, used fishing gear not allowed under the community based management system. Moreover the Panadura River has been subject to pollution by effluent discharged from industries and the prawn (Jakotu) fishery has been threatened.

Since the local management systems alone cannot cope with these problems, Government intervention is necessary to deal with them. Sharing the responsibility of management between the community and the Government is one possibility (Jentoft, 1989). This can be done by declaring the area of the sea which the fishermen in Egodauyana consider 'theirs' as a 'local

fisheries management area' under section 30 of the Fisheries Act. In making regulations on the conduct of fishing operations and the use of different gear in this area, due consideration should be given to the regulations which are already being enforced in an informal manner by the community itself. The 'outsiders' should be controlled through the introduction of a system licences to fish in this area.

The conditions under which fishing should operate in the area can be laid down in consultation with the community through the Fishermen's Co-operative Societies. The number of permits to be issued and to whom they should be issued could also be decided in consultation with the community. As far as the Jakotu fishery is concerned, the regulations made in 1931 under the local government ordinance have become obsolete. Hence new regulations based on the measures adopted by the community should be made under the Fisheries Act. A permit fee should be increased. The pollution problem needs to be considered and acted on by the environmental authorities.

Since the construction and deployment of FAD cannot be expected to be undertaken by individuals or a co-operative society, government assistance is needed. Assistance can be given in the form of a subsidy as high as *75%* of the cost of construction and deployment of FAD and training and extension. The fishermen can contribute labour and raw materials available in the village. They can also provide boats for deployment. Fishermen's participation can be organised through the Fisheries Co-operative Society. Raising a fund for the construction and deployment of FAD by collecting a fee from the fishermen who fish around the FAD through the fishermen's co-operative society is also suggested.

In short, the responsibility for fisheries management in Egodauyana needs to be shared between the community and the Government, based on the concept of Fisheries Co-management.

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