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Status of the Fisheries in Two Reservoirs of the Walawe River Basin, Sri Lanka: A Case of Participation of Fishers in Management

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Abstract

The status of the fisheries of Udawalawe and Chandrikawewa, two reservoirs in the Walawe river basin of Sri Lanka was investigated along with an assessment of the potential role of fisheries societies in fisheries management. Higher annual fish yield was reported in Udawalawe (137.6 kg ha^{-1}) than in Chandrikawewa (69.9 kg ha^{-1}). In both reservoirs, catches of cyprinids (*Labeo dussumieri* and exotic carps such as *Labeo rohita* and *Catla catla*) showed a positive correlation with rainfall. The high fish yield in Udawalawe was mainly due to high seasonal catches of these cyprinids during rainy season. In Chandrikawewa, a major proportion of the landings was formed by *Oreochromis mossambicus* and *O. niloticus*. Being situated within a wildlife sanctuary, some regulatory measures are in force in Udawalawe such as limiting the fishing time, banning the use of harmful fishing methods and need for obtaining fishing licenses, which help control fishing pressure. However, fish vendors were influential in making management decisions in this reservoir. In Chandrikawewa on the other hand, it is possible to establish mechanisms for better involvement of resource users in decision-making. For effective management of the fisheries of the two reservoirs, a strong fisheries extension mechanism is needed through which reservoir fishing communities could be motivated to establish institutions and mechanisms for achieving consensus among fishers which can be treated as platforms for resource use negotiation.

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Introduction

Although inland fisheries have played a significant role in animal protein supply for rural communities since the earliest recorded history (Siriweera 1994; Ulluwishewa 1995), no tradition of an organized freshwater fishery existed until the recent development of the reservoir fishery after introduction of the exotic cichlid, *Oreochromis mossambicus* into the country in 1952 (Fernando and Indrasena 1969; De Silva 1988; Amarasinghe 1998). An abrupt politically inspired withdrawal of state patronage for the development of the inland fisheries sector from 1989 to 1994 caused a major setback in the centralized management of reservoir fisheries due to a near cessation of the functioning of the management mechanism (De Silva 1991; Amarasinghe 1998). As a result, the capture fisheries in major reservoirs became unregulated open-access fisheries, which experienced a rapid increase in the number of full-time entrants and an intensification of fishing methods such as the use of small-mesh (<7.5 cm stretched mesh) gillnets and beach seines.

Capture fisheries management in reservoirs of Sri Lanka is either absent or very inadequate as is the case of most other Asian countries (De Silva 1996). There are statutory restrictions on types of gear and crafts in the Sri Lankan reservoir fishery. These include, complete banning of the use of monofilament gillnets, trammel nets, beach seines, mechanized crafts and gillnets of mesh sizes smaller than 8.5 cm. However, enforcement of these regulations is as poor as its monitoring capacity. On the other hand, the variable fisheries yields in individual crafts of reservoirs have direct impact on the economic status of the fisher families as well as fish traders due to the reason that the reservoir fishery forms the major or sole source of income for these social groups.

There has been a strong debate about Hardin’s (1968) “Tragedy of the commons” which suggests that overexploitation of collectively used resources takes place as a result of the users’ desire and action to maximize their own utility. In common-pool resources where various resource users have free access to exploit the resource, balancing their multiple interests is a key issue for resource management (Feeny et al. 1990). It has been well recognized that the local management institutions such as fisheries societies play a major role in the management of small-scale fisheries through collective action (Lobe and Berkes 2004; Berkes 2006). In the reservoir fisheries of Sri Lanka, active participation of fishing communities has shown that introduction of co-management is possible (Amarasinghe 1988; Amarasinghe and De Silva 1999; Nathanael and Edirisinghe 2002). In the present paper, an attempt is made to investigate the status of the fisheries of two reservoirs in the Walawe river basin of Sri Lanka and to investigate the potential role of fisheries societies in fisheries management. Towards this goal, attempts were also made to investigate the strengths and weaknesses of the societies in participatory management of the resources.

Materials and methods

This study was carried out in two reservoirs, Chandikawewa reservoir (6° 19' N; 80° 51' E) and Udawalawe reservoir (6° 27' N; 80° 50' E), situated in the Walawe river basin of Sri Lanka. The locations of the reservoirs and their morphological and physico-chemical characteristics are given in Athukorala and Amarasinghe (2010). The fisheries of the two reservoirs were investigated from January 1995 to December 1997. A reconnaissance survey was carried out to identify sizes and structures of the fisheries of two reservoirs. Also a good rapport was developed with the fishers which significantly facilitated data collection as well as adoption of participatory approaches for fisheries management.

In both reservoirs, the type of craft operated is non-mechanized dug-out canoes manned by two fishers. There were only 12 registered boats in Chandrikawewa as opposed to 58 in Udawalawe. Gillnet was the major gear in both reservoirs. In Chandrikawewa, gillnets of stretched mesh sizes ranging from 7.0 cm to 25.4 cm were used and in Udawalawe the range was 7.0 cm to 35.6 cm. In each boat, a cumulative panel length of about 600 m gillnets was used. Fishers set gillnets during dusk that are hauled at dawn on the following day. In Udawalawe reservoir, seine nets of stretched mesh sizes 7.0 cm and 7.6 cm were used sporadically, but their contribution to the total landings was negligible. Due to the uniformity of craft and gear and mode of operation, boat-days per month was considered as the measure of fishing effort.

Catch and effort data were collected once a month at the fish landing sites. Due to unavoidable circumstances, however, sampling could not be carried out in October 1995 in Udawalawe reservoir and in seven months in Chandrikawewa (October 1995, December 1996, January-February 1997, May-June 1997 and October 1997). Accordingly, analysis of catch and effort data in the present study was based on 29 sampling dates in Chandrikawewa and 35 sampling dates in Udawalawe. During the field visits, species-wise data on catches were collected from randomly selected boats. Total number of boats operated during each sampling date was recorded and information on the average number of fishing days per month for each boat was obtained from the fishers. In Udawalawe reservoir, fish landed are not weighed at the sites. Instead, fish vendors use an arbitrary measure known as “hand-full”, which is mutually agreed by fishers and vendors to value the catch. For cichlids and *Labeo dussumieri*, this measure is approximately 1.2 kg whereas for exotic major carps, it is about 1.5 kg. Accordingly, cichlids and *L. dussumieri* which had greater consumer preference than exotic carps fetched higher prices than carps. Using these conversion factors, total weights (by species), landed by sampled boats were determined. In addition to monthly sampling, daily data on fish species landed by each boat were obtained from the log-books maintained by three fish vendors at Udawalawe reservoir. The data based on study sampling were used to cross-check the accuracy of data recorded in the log-books of fish vendors. Number of boats operated and observed during the sampling dates in each year in both reservoirs and the data on boat-wise catches obtained from log-book records of fish vendors in Udawalawe reservoir are given in Table 1. In Udawalawe, of the 1179 boats operated during 35 sampling dates, 285 boats were observed. In addition, a total catch data of 2023 boats operated during 273 fishing days in 1996-1997 were obtained from log-book data of vendors. In Chandrikawewa, during 29 sampling dates, 116 out of 258 boats operated were observed to collect catch data.

Table 1. Number of boats operated and observed during the sampling dates in each year in both reservoirs and the log-book records of fish vendors on boat-wise catches in Udawalawe reservoir.

Reservoir/year (No. of sampling dates)	No. operated during sampling	No. observed during sampling	Log-book records obtained (Boat-days) and period covered
Udawalawe			
1995 (11)	373	89	-
1996 (12)	378	88	1227 (156 days from May to Dec)
1997 (12)	428	108	796 (117 days from Jan to May)
Total	1179	285	2023 (273 days in 1996-1997)
Chandrikawewa			
1995 (11)	87	46	-
1996 (11)	105	44	-
1997 (7)	66	26	-
Total	258	116	-

During the reconnaissance stage of the study, it was noted that in both reservoirs fishers experienced seasonal peak catches of some species associated with rainfall and water level. Peak catches of cyprinids (*L. dussumieri* and Indian carps) during rainy season were reported. Also according to fishers, macrophytes feeders such as *Tilapia rendalli* were caught in high proportions during the seasons of elevated water level due to their aggregation in peripheral areas with inundated terrestrial macrophytes. As seasonal variation of catches influence livelihoods of fishers, effects of water level and rainfall on the catch efficiencies were investigated. Although there are several factors which might influence seasonality of catch efficiencies, fishers notice apparent effects of water level and rainfall on catches of different species. As such, these two factors were thought to be of importance within the context of participatory management of the two fisheries. Data on monthly mean water levels of the two reservoirs and monthly rainfall were obtained from the Irrigation Department and Meteorological Department, respectively.

Monthly fish production (in kg) was estimated from the sampled boats in each reservoir using the data on catch per boat for each species, number of boats operated and the number of fishing days per month. In Udawalawe reservoir, conversion factors were used to estimate catch by weight as mentioned above.

Species composition in the monthly landings was determined and the mean annual fish yield (kg ha^{-1}) was estimated for each reservoir. As there were large monthly variations in catch per unit effort (CPUE) expressed as kg per boat-day, influence of water level and rainfall on CPUE was investigated using Pearson’s product moment correlation analysis (Zar 1999). As log-CPUE is known to be normally distributed (Gulland 1983), ln (CPUE+1) transformation was used for this analysis.

The fisheries co-operative societies of the two reservoirs were ill-functioning due to an almost cessation of the centralized management mechanism at the government fisheries authorities during the period 1989-1994. During this period, monitoring procedure by the fisheries extension staff was weak; hence, fishers did not comply with the regulations. As part of the exercise to investigate the possibility of managing the fisheries of the two reservoirs through community participation, these co-operative societies were activated and monthly meetings were organized from January to September 1996. In this exercise, our role was to serve as the mediator for facilitating identification of issues and strategies pertaining to management of the fisheries, based on two participatory methodology approaches, i.e., participatory rural appraisal and rapid rural appraisal (Townsley 1993). Fishers identified their livelihood problems. These issues were grouped into common categories and written down on a flip chart. The possible remedial measures for each of these problems were then identified by the fishers, and recorded. Finally, through a consensus approach fishers determined the strategies and mechanisms of implementation that were needed to be adopted in the fisheries. This methodology helped in convincing fishers that they themselves identified their livelihood problems, possible remedial measures and implementation mechanisms and consequently gave ownership to the problem solving process.

The effectiveness of implementation of fisheries management through user participation was monitored using two approaches. First, percentage of under-sized fish in the landings was recorded monthly to investigate the effectiveness of management decisions of the co-operative societies on mesh regulations. Here, under-sized fishes were determined as < 18 cm for cichlids in both reservoirs and < 26 cm for *L. dussumieri* in Udawalawe reservoir. Secondly, fishers who were selected randomly from the membership of the co-operative societies in the two reservoirs were interviewed regularly from April 1996 to May 1997 using a structured questionnaire to ascertain whether each of the management decisions implemented by co-operative societies were sustained and to identify reasons for any weakening of participatory management mechanisms.

Results

The list of fish species observed in the landings of the two reservoirs is given in Table 2. Although there were 13 and 16 species landed in Chandrikawewa and Udawalawe, respectively during the study period, major portions of the landings were formed by a few species such as *Oreochromis mossambicus*, *O. niloticus*, *Tilapia rendalli*, *Labeo dussumieri*, *L. rohita* and *Catla catla*.

Table 2. List of fish species observed in the landings of Udawalawe and Chandrikawewa reservoirs. Symbols used: Present (+); Absent (-); Exotic species (*).

Family / Species	Udawalawe	Chandrikawewa
Anabantidae		
Osphronemus goramy Lacépède*	+	+
Anguillidae		
Anguilla bicolor bicolor McClelland	-	+
Bagridae		
Macrones keletius (Val.)	+	-
Cichlidae		
Etroplus suratensis (Bloch)	+	+
Oreochromis mossambicus (Peters)*	+	+
O. niloticus (L.)*	+	+
Tilapia rendalli (Boulenger)*	+	+
Cyprinidae		
Aristichthys nobilis (Richardson)*	+	+
Catla catla (Ham.-Buch.)*	+	+
Cirrhinus mrigala Hamilton*	+	+
Cyprinus carpio L.*	+	+
Labeo dussumieri (Val.)	+	-
L. rohita (Hamilton)*	+	+
Puntius sarana (Ham.– Buch.)	+	+
Gobiidae		
Glossogobius giuris (Ham.- Buch.)	+	+
Ophiocephalidae		
Ophicephalus striatus Bloch	+	-
Siluridae		
Ompok bimaculatus (Bloch)	+	-

Monthly variations in species composition of the landings and monthly mean water levels in Udawalawe reservoir and monthly total rainfall in the area are shown in Figure 1. Figure 2 shows monthly variations in species composition of the landings and monthly mean water levels in Chandrikawewa reservoir, and monthly total rainfall in the area. Generally, dry months in both areas were from February to March and from June to October in each year. The peak rainy months were April-May and November-January. Figures 1 and 2 indicate that exotic carps had a higher contribution to the total landings during peak rainy seasons in both reservoirs. In Udawalawe reservoir, *L. dussumieri* also contributed significantly during the rainy seasons. The reservoir water levels appear to be positively influenced by rainfall and as such, the effect of water level on the species composition of the landings is essentially due to the influence of rainfall. However, *T. rendalli* registered high proportions during the months of receding water level in both reservoirs. Positive significant correlations with rainfall were evident for *L. dussumieri* and exotic carps in Udawalawe, and *O. niloticus* and exotic carps in Chandrikawewa (Table 3). In Chandrikawewa, *O. niloticus* and exotic carps also showed positive correlation with water level (Table 3).

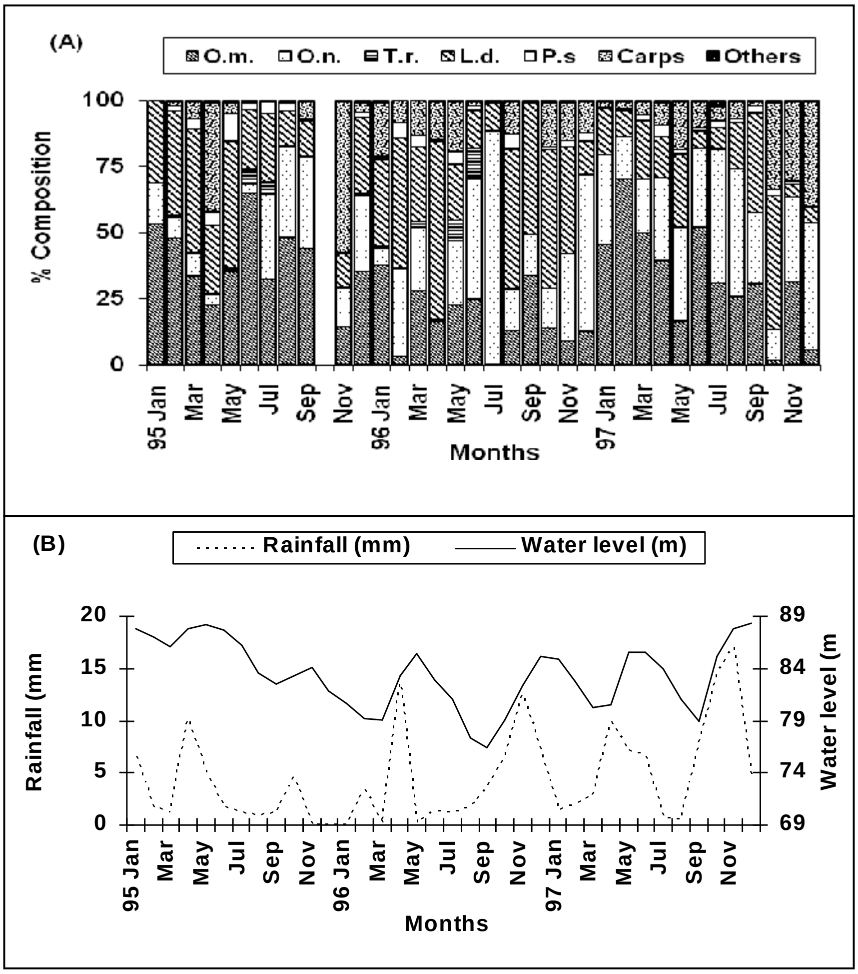

Fig. 1. Monthly variations in species composition of the landings and monthly mean water levels in Udawalawe reservoir, and monthly total rainfall in the area. O.m. – *O. mossambicus*; O.n. - *O. niloticus*; T.r. – *T. rendalli*; L.d. – *L. dussumieri*; P.s. – *P. sarana*.

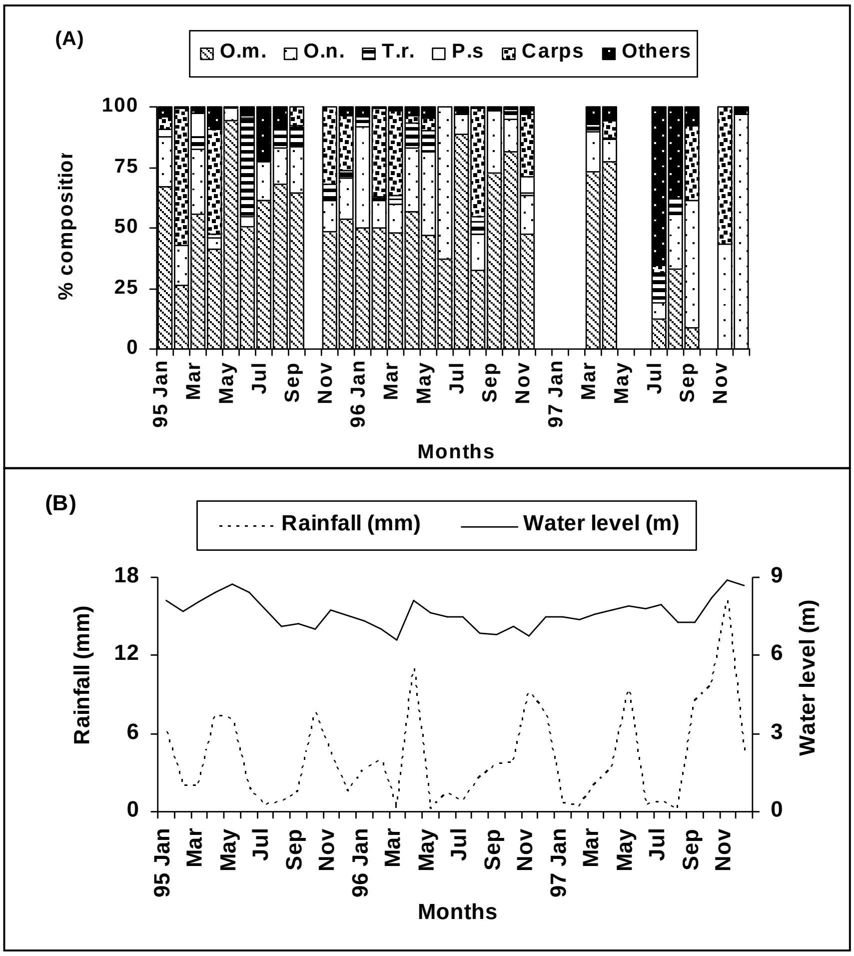

Fig. 2. Monthly variations in species composition of the landings and monthly mean water levels in Chandrikawewa reservoir, and monthly total rainfall in the area. O.m. – *O. mossambicus*; O.n. - *O. niloticus*; T.r. – *T. rendalli*; P.s. – *P. sarana*.

The estimated fish yields and overall percentage species composition in the two reservoirs during the study period are given in Table 4. The higher fish yield in Udawalawe than in Chandrikawewa was essentially due to peak seasonal catches of exotic carps during rainy seasons.

At the meetings of the fisheries cooperative societies in the two reservoirs during March – June 1996, the decision to curtail the use of small mesh (< 8.5 cm stretched mesh) gillnets and to inspect mesh sizes of gillnets used by fishers were made. In Udawalawe, following these management decisions, percentages of under-sized *O. mossambicus*, *O. niloticus* and *L. dussumieri* decreased until about January 1997 (Fig. 3). In Chandrikawewa on the other hand, percentages of under-sized *O. mossambicus* and *O. niloticus* remained at low levels after implementation of management decisions (Fig. 4). It must be noted that when the seasonal peak catches of Indian major carps (such as *C. catla*) occur especially during rainy seasons, fishers use large mesh (> 12.7 cm stretch mesh size) gillnets. Due to this seasonal shift of target species in the fishery, most fishers do not operate small mesh (<8.5 cm stretched mesh size) gillnets so that percentages of under-sized cichlids and *L. dussumieri* are low. The low percentages of under-sized fish even before the implementation of management decisions (Figs. 3 and 4) were essentially due to changes of gillnet mesh sizes to target large sized Indian major carps.

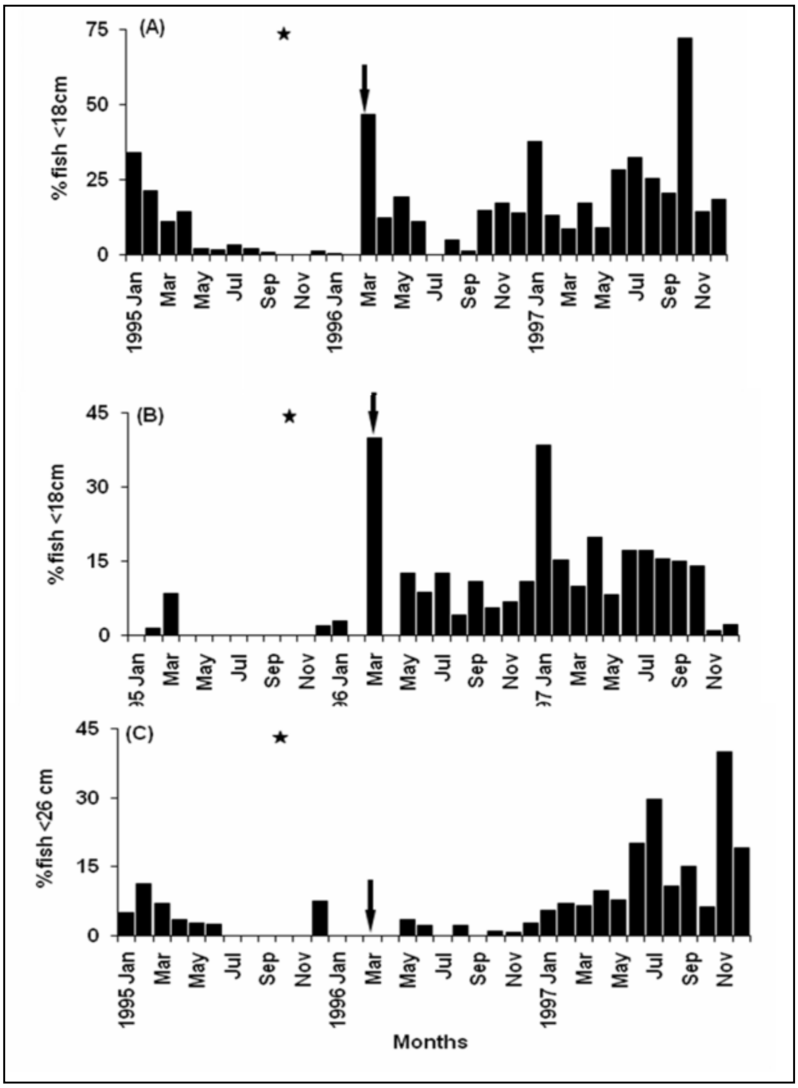

Fig. 3. Percentages of under-sized (A) *O. mossambicus*, (B) *O. niloticus* and (C) *L. dussumieri* in the landings of Udawalawe reservoir. The vertical arrow indicates the months of making decision at the fisheries cooperative society to stop the use of small mesh (< 8.5 cm stretched mesh) gillnets. During the months marked with asterisks, sampling was not done.

The management decisions implemented by fisheries cooperative societies in the two reservoirs are summarized in Table 5. These indicate that the participatory management mechanisms lasted for about 5 months in Udawalawe while in Chandrikawewa, it lasted for about 10 months. In both reservoirs, fishers expressed the view that due to the absence of active mediation of a fisheries extension officer, implementation of participatory management decisions was not easy, especially due to the reason that it has become customary among fishing communities to rely heavily on centralized management mechanisms. According to the fishers interviewed in the two reservoirs, involvement of fisheries extension officers in implementing fisheries management strategies is insufficient indicating that fishers are not yet fully equipped to be involved in independent decision making for resource management. The summary of the opinions of fishers in the two reservoirs with regard to participatory management mechanisms given in Table 6 indicates that the fishers in Chandrikawewa possess a more positive attitude towards participatory management of the fishery compared to those in Udawalawe.

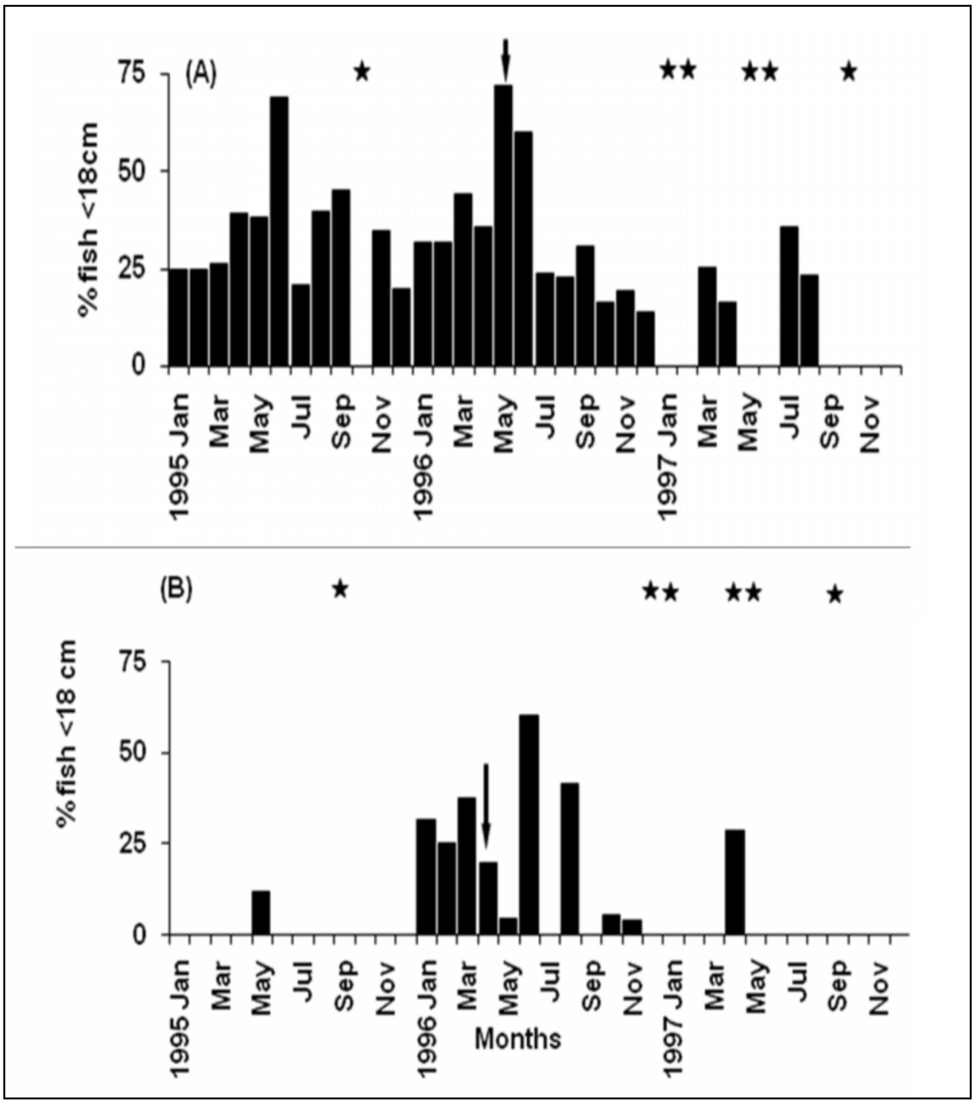

Fig. 4. Percentages of under-sized (A) *O. mossambicus* and (B) *O. niloticus* in the landings of Chandrikawewa reservoir. The vertical arrows indicate the months of making decision at the fisheries cooperative society to stop the use of small mesh (< 8.5 cm stretched mesh) gillnets. During the months marked with asterisks, sampling was not done.

Table 3. Correlation of ln (CPUE+1) with water level and rainfall in Udawalwe and Chandrikawewa. r = Pearson's product moment correlation coefficient; ** - Significant at 1% level; * - Significant at 5% level; ns - Not significant at 5% level.

Reservoir/Variable/Species	r	Significance level
Udawalawe		
Rainfall (n = 35)		
O. mossambicus	-0.0155	P > 0.05 (ns)
O. niloticus	0.0299	P > 0.05 (ns)
T. rendalli	-0.2641	P > 0.05 (ns)
L. dussumieri	0.3637	P < 0.05*
P. sarana	0.2813	P > 0.05 (ns)
Carps	0.4996	P < 0.01**
Other fish	0.3263	P > 0.05 (ns)
Water Level (n = 35)		
O. mossambicus	0.1977	P > 0.05 (ns)
O. niloticus	-0.0782	P > 0.05 (ns)
T. rendalli	0.1742	P > 0.05 (ns)
L. dussumieri	-0.1339	P > 0.05 (ns)
P. sarana	0.1850	P > 0.05 (ns)
Carps	0.2172	P > 0.05 (ns)
Other fish	-0.1977	P > 0.05 (ns)
Chandrikawewa		
Rainfall (n = 29)		
O. mossambicus	-0.0505	P > 0.05 (ns)
O. niloticus	0.4659	P < 0.05*
T. rendalli	-0.1398	P > 0.05 (ns)
P. sarana	0.1678	P > 0.05 (ns)
Carps	0.4283	P < 0.05*
Other fish	-0.1788	P > 0.05 (ns)
Water Level (n = 29)		
O. mossambicus	-0.1091	P > 0.05 (ns)
O. niloticus	0.3008	P < 0.05*
T. rendalli	-0.0290	P > 0.05 (ns)
P. sarana	-0.0958	P > 0.05 (ns)
Carps	0.0127	P < 0.05*
Other fish	0.1039	P > 0.05 (ns)

Table 4. The estimated fish yields and species composition in Chandrikawewa and Udawalawe during 1995-1997.

	Chandrikawewa	Udawalawe
Fish yield (kg ha^{-1} yr^{-1})	69.9	137.6
Species composition (%)		
O. mossambicus	54.9	28.0
O. niloticus	19.5	25.8
T. rendalli	3.8	0.7
L. dussumieri	-	28.0
P. sarana	0.9	2.5
Exotic carps	16.0	14.5
Others	4.9	0.5

Table 5. The management decisions implemented by co-operative societies in the two reservoirs.

Reservoir/Participatory management decision	Period of effective implementation
Udawalawe	
Banning of using small mesh (<8.5 cm) gillnets	May-September 1996
Prevention of using illegal fishing methods	May-September 1996
Restricting access of non-members to the fishery	March-September 1996
Streamlining society activities such as loan scheme, fund raising	May-September 1996
Monitoring of the fishing activities	March-September 1996
Chandrikawewa	
Banning of using small mesh (<8.5 cm) gillnets	May 1996 to February 1997
Agreements with fish vendors not to buy under-sized fish	July-September 1996
Prevention of using illegal fishing methods	September 1996 to March 1997
Introducing membership cards to fishers by fisheries authorities upon request by fisheries society.	October 1996 onwards
Streamlining society activities such as loan scheme, fund raising.	July 1996 to March 1997
Monitoring of the fishing activities	September 1996 to March 1997

Table 6. Summary of the opinions of fishers about ineffectiveness of participatory management strategies.

Udawalawe

(a) Due to ill-functioning of the co-operative society, the fishers were unable to take collective decisions regarding resource management and as a result, rich fish vendors were dominating in making management decisions.

(b) Due to high catch per fisher in Udawalawe reservoir which enables fishers repayment of loans, most fishers are not reluctant to borrow money from fish vendors as and when necessary. However, through money lending fish vendors can control the decision making process of fishing community in a way that is favourable to fish vendors.

Chandrikawewa

(a) As fish production is poor and catch per fisher is much lower than in Udawalawe reservoir, fish vendors are also concerned about rational utilization of the fishery resource in order to assure their daily income.

(b) Being a small group, fishers in Chandrika Wewa are better organized than in Udawalawe reservoir and as a result they arrive at collective agreement for equity sharing of the fishery resource.

Discussion

The annual fish yield in Udawalawe reservoir is observed to be considerably higher than in Chandrikawewa (Table 4). The low fish yield in Chandrikawewa may be due to the differences in biological productivity and species composition of the landings in the two reservoirs.

The high fish yield in Udawalawe is obviously influenced by the seasonal dominance of *L. dussumieri* and exotic carps (i.e., *Cyprinus carpio*, *Labeo rohita*, *Catla catla*, *Cirrhinus mrigala*) in the landings (Fig. 1) especially during the rainy season. The positive correlation between the landing of these cyprinids and rainfall is evident in the present study (Table 3). De Silva (1983) has also shown that two indigenous cyprinid species, *L. dussumieri* and *Puntius sarana* were abundant during rainy season in Parakrama Samudra, another reservoir in the dry zone of Sri Lanka. The biological traits of fish species such as differences in reproductive performance of cyprinids in the two reservoirs may be a governing factor of fish yields. The macrophyte feeder, *T. rendalli* was also caught during the months of receding water level in both reservoirs, although its yield was not significantly correlated with water level (Fig. 1). This species is known to be caught in high efficiencies during the seasons of elevated water levels in reservoirs as they occur in recently inundated littoral areas with terrestrial macrophytes such as grasses (Chandrasoma 1986; Amarasinghe and Samarakoon 1988).

In the lowland reservoirs of Sri Lanka, water level fluctuations are not essentially related to local rainfall but precipitation in the upper catchment areas (Schiemer 1983). Hence, influences of these two factors on the catch efficiencies of fish are not necessarily of similar magnitudes.

The seasonal variation in species composition resulting to peak cyprinid catches during rainy season and low catches dominated by cichlids during dry season in Udawalawe, compel fishers to change gillnet mesh sizes depending on the seasonal abundance of fish species. As such, mesh regulations imposed by the fisheries cooperative society could not be implemented effectively because fish vendors were prepared to buy cichlids caught by small mesh (<8.5 cm stretched mesh sizes) gillnets during dry season when the landings of cyprinids (Indian major carps) were low. On the other hand, in Chandrikawewa, where *O. mossambicus* (54.9%) and *O. niloticus* (19.5%) formed the major portion of the landings while reasonably high proportions of exotic carps (16%) occurred in the landings only during the rainy seasons, fishers continued to use larger (>8.5 cm) mesh gillnets, as decided by the fisheries cooperative society. As such in comparative terms, implementation of mesh regulations imposed by the fisheries cooperative society was more effective in Chandrikawewa than in Udawalawe reservoir.

However, since Udawalawe reservoir is situated within a wildlife sanctuary, fishers have to comply with regulations on limiting of fishing time, banning the use of harmful fishing methods and the need to obtain fishing licenses, which help existing control efforts. On the other hand, fish vendors were heavily influential for making management decisions in this reservoir. As fish vendors regularly lend money to fishers with the agreement that vendors would receive their landings, fishers refrain from making any accusation against fish vendors. The arbitrary measure of “hand-full” in Udawalawe reservoir, introduced by fish vendors is financially disadvantageous to fishers. Nevertheless, fishers are incapable of changing this system for their own benefit. As fish vendors are usually concerned with profit making, rather than rational utilization of the resource, their management decisions are not always helpful for sustainable exploitation of the fishery resource.

It has been shown that fishers develop strategies as an adaptive response to changes in resource abundance, environmental conditions and market or regulatory constraints (Salas and Gaertner 2004). For effective participatory fisheries management, some key elements required are: an understanding of leadership in fishing communities, role of local institutions and capabilities for resource management and social stability which are essentially elements of co-management. However, effective local level management is impossible without the existence of institutions and mechanisms suitable for achieving consensus among fishers participating in the fishery (Berkes, 1986). It has been highlighted that when the stakeholders perceive the same resource management problems in common pool resources, the establishment of “platforms for resource use negotiation” is an effective way of dealing with complex natural resource management problems (Röling 1994; Steins and Edwards 1999). As the resource users realize their interdependence in solving management problems, there is a potential for them to come together for collective action for the purpose (Röling 1994).

Meinzen-Dick and Bakker (1999) have shown that in irrigation systems in Kirindi Oya basin of southern Sri Lanka, which are recognized as common pool resources supplying water for multiple users, opportunities exist to develop user platforms for resource use negotiation for improving the overall productivity, as well as equity, of water uses. The present study also indicates that in the fisheries of Udawalawe and Chandrikawewa reservoirs, through a strong fisheries extension mechanism that could motivate fishing communities to establish institutions and mechanism for achieving consensus among fishers and fish vendors, effective co-management strategies can be implemented. Such strategies are needed to be implemented aiming at greater participation by resource users in the decision making process, empowering of local-level institutions (i.e., fisheries cooperative societies) and a decentralization of power from institutions to the fishing communities.

According to the classification of co-management arrangements presented by Sen and Raakjaer-Nielsen (1996), the potential co-management procedures for the management of fisheries of Udawalawe and Chandrikawewa appear to be those termed as “Instructive” and “Consultative” respectively. In the “Instructive” level of co-management, government involvement for decision-making is necessary because of heavy dependence of resource users on the external forces for making decisions. This is the case in Udawalawe reservoir, where the exchange of information is minimal between government and users. In Chandrikawewa on the other hand, it is possible to establish mechanisms for better involvement of resource users to decision making. However, further empowerment of resource users is necessary to make them active partners in decision making. During the present study it was evident that in Chandrikawewa, some mechanisms existed for government to consult with fishers but all management decisions were undertaken by the government institutions. This situation is reflected by the issue of membership cards by fisheries authorities after a request made by fishers in order to control access to the fishery.

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