Fishery Technology 53 (2016) : 177 - 182

Exploited Fishery Resources of Muvattupuzha River, Kerala, India

C. R. Renjithkumar[1]*, K. Roshni[1] and B. Madhusoodana Kurup[2]
[1] *School of Industrial Fisheries, Cochin University of Science and Technology, Cochin - 682 016, India*
[2] *Kerala University of Fisheries and Ocean studies, Panangad, Cochin - 682 506, India*

Abstract

The exploited fishery resources of Muvattupuzha river have been estimated as 45.01 t during 2009-10. Twenty three fish species belonging to 6 orders and 20 genera contributed to the fishery of this river. Highest landings was recorded during post-monsoon season (21.87 t) followed by pre-monsoon season (15.77 t) and lowest in monsoon (7.38 t). Family Cyprinidae ranked first among fish groups with a numerical strength of 6 species. The landings were represented by two endangered (*Hypselobarbus curmuca* and *Tor khudree*) and one vulnerable (*Horabagrus brachysoma*) fish species. *Gibelion catla* was the only non-native species represented in the landings and *Clarias gariepinus* were the non-native species represented in the landings. *Wallago attu* (7.62 t), *Labeo dussumieri* (7.21 t*), H. curmuca* (4.90 t), *Channa striatus* (4.6 t) and *H. brachysoma* (3.67 t) were the dominant fishes in the landings. Among the landing centres, Mulakulam accounted for 32% to the total fish landings, followed by Kalampoor (27%). Gillnets (88%) contributed the major bulk of the fish landings followed by seine nets (11%). Catch per unit effort recorded in gillnet for major species were *W. attu* (0.11 kg h^{-1}), *Channa striata* (0.08 kg h^{-1}), *T. khudree* (0.08 kg h^{-1}), *G. catla* (0.08 kg h^{-1}) and *C. marulius* (0.07 kg h^{-1}). In seines, highest catch per unit effort was recorded for *C. striata* (0.28 kg h^{-1}) followed by *C. marulius* (0.20 kg h^{-1}) and *H. brachysoma* (0.08 kg h^{-1}).

Keywords: Muvattupuzha river, exploited fishery resources, gears, fishing seasons

Received 25 January 2016; Revised 07 July 2016; Accepted 15 July 2016

* *E-mail: renjith.kumar347@gmail.com*

Introduction

Inland capture fisheries is significant to the livelihoods of fishers (Bartley et al., 2015). Lack of information on catch data on small-scale fisheries often result in insufficient management strategies (Prasad et al., 2012). Information on fish production from any water body is important for its judicious exploitation and management. A number of fishing gears are employed in inland fisheries which vary greatly by season. The major threats faced by inland fishery sector include irresponsible fishing practices, habitat degradation, water abstraction, dam construction and pollution which may result in substantial declines in the inland fishery resources.

Muvattupuzha river originates from Southern Western Ghats of Kerala, drains mainly through Idukki, Kottayam and Ernakulam districts with a total length of 121 km. At Vettikadumuku the river bifurcates into Murinjapuzha and Ithipuzha and discharges into the Vembanad Lake. Ichthyofaunal diversity of Muvattupuzha river system had been carried out by Thomas (2004), Radhakrishnan (2006) and Thomas & George (2010). The literature on the exploited fish and fisheries on rivers of Kerala is scanty. Renjithkumar et al. (2011) quantified the exploited fishery resources of Pampa river in Southern Kerala. There is no information available on the status of fisheries of Muvattupuzha river. In this context, the present study has been made to quantify the exploited fishery resources of Muvattupuzha river.

Materials and Methods

Systematic surveys and sampling were conducted during pre-monsoon (February-May), monsoon (June-September) and post-monsoon (October-January) seasons during 2009-2010 at major fish landing centres of the river namely Vellor, Mulakulam, Kalampoor, Kaduthuruthi, Kadumpidi and Kaliyar

(Fig. 1). Details regarding type of gear, mesh sizes, species composition and weight, size groups represented in the catch, actual fishing hours and man power engaged were collected. Selection of fishing units for detailed observation was done following Alagarja (1984) and Kurup et al. (1992) and 30% of the total gears were sampled. Fish samples collected were preserved in 8% formalin and brought to the laboratory for species level identification following Day (1878), Talwar & Jhingaran (1991) and Jayaram (1999; 2009). All the fish species collected from the landing centres within the limits of freshwater area of the river were brought under study. Catch per unit effort (CPUE) was computed following Scaria et al. (1999). Daily landings from each type of gears and fishing methods were computed following Kurup et al. (1992) and monthly catch was then estimated by multiplying daily catch with total number of fishing days in a month. Season wise landings was computed by multiplying monthly catch by number of months in the season. The annual catch quantity was calculated by summarising the landings of the three seasons.

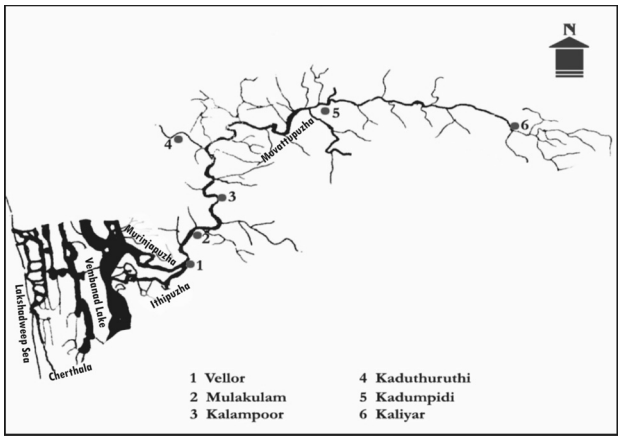

Fig. 1. Sampling locations in Muvattupuzha river basin

Results and Discussion

Fishery resources of Muvattupuzha river comprised of 23 finfish species belonging to 6 orders and 20 genera based on season wise sampling during 2009-10 period, which is on a lower side compared to 26 species reported in Pampa (Renjithkumar et al., 2011). Radhakrishnan (2006) reported a fish diversity of 28 species from this river which includes 3 threatened and 25 non-threatened species. Family Cyprinidae ranked first among different fish groups with a numerical strength of 6 species (26%) in river Muvattupuzha. The preponderance of Cyprinids in most Southeast Asian rivers, as well as in the Indian subcontinent are well documented (Bhat, 2003). Numerical strength of fish families contributed to the exploited fishery in river Muvattupuzha is depicted in Fig. 2. It was evaluated that two endangered, one vulnerable and two near threatened categories of fishes were represented in the river as per IUCN categorization. The only alien fish encountered in the catch was *Gibelion catla* (5.6%) while in Pampa river there were by *G. catla* and *Clarias gariepinus.* Sreenivasan (1995) reported that introduction of non-native Indian major carps as the major factor leading to the population decline of endemic Peninsular carps such as *Cirrhinus cirrhosa*, *Labeo kontius*, *Puntius carnaticus, P. dubius* and *P. pulchellus* in South Indian reservoirs. The ranching of *G. catla* may pose potential threats to indigenous species in future. The cultured stock which genetically differs from its wild relatives, may sometimes escape from ponds or cages into natural waters, creating an opportunity for interbreeding between non-native cultured stocks and native wild stocks (Silas, 2010).

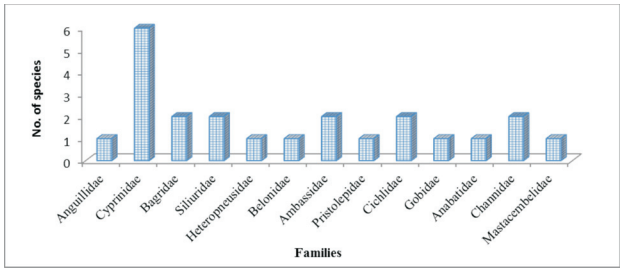

Fig. 2. Numerical strength of various fish families in the exploited fishery in Muvattupuzha river

Riverine fisheries are highly dispersed and unorganized, making collection of data on fishing and fish yield difficult (Sinha, 1999). Due to the lack of historical data from the study area, the comparison of present catch with previous trends is difficult. The annual exploited production of Muvattupuzha river was estimated as 45.01 t. Renjithkumar et al. (2011) quantified the exploited fishery in Pampa river, which covers a small portion of Kuttanad wetland ecosystem, as 394.22 t. This difference in the landings of Pampa and Muvattupuzha rivers may be attributed to a comparatively lower fishing activity in Muvattupuzha river. Renjithkumar et al.

(2011) reported the highest production during the pre-monsoon period (49%) followed by post-monsoon period (41%) in Pampa river whereas in the present study, the landings were 35% and 49% respectively for pre and post-monsoon. Low fish landings was reported in monsoon period in both Pampa (9%) and Muvattupuzha (16%) rivers. Among the six landing centres, Mulakulam accounted for 32% to the total fish landings, followed by Kalampoor (27%), Vellor (19%) and Kaduthuruthi (11%).

Renjithkumar et al. (2011) recorded that gillnet accounted for 77% of the catch in Pampa river, operating all along the river stretch, followed by seines (19%), cast nets (3%) and hooks and lines (1%). In the present study, gillnet (88%) and seine nets (11%) contributed bulk of the fish landings (Fig. 3). Baiju & Hridayanathan (2003) reported three major types of fishing gear, *viz.*, gillnets, cast nets and hook and lines from Muvattupuzha river system. About 80% of the inland fishermen in Kerala use gillnets as the main gear (Remesan & Ramachandran, 2005). Kurup et al. (1993) identified 28 types of gillnets in the inland waters of Kerala. Gillnet size varied from 50 to 150 m with the mesh size ranging from 22 to 150 mm in different designs. The landings from the gill nets comprised of *W. attu* (19.22%), *L. dussumieri* (18.18%), *H. curmuca* (12.06%) and *H. brachysoma* (8.90%). Highest cpue was recorded in gillnets for *W. attu* (0.11 kg h^{-1}), *C. striata* (0.08 kg h^{-1}), *T. khudree* (0.08 kg h^{-1}), *G. catla* (0.08 kg h^{-1}) and *C. marulius* (0.07 kg h^{-1}) (Fig. 4). The main catches in the seine nets consisted of *C. striata* (39.95%), *C. marulius* (30.68%), *Heteropneusteus fossilis* (11.62%) and *Anabas testudineus* (7.94%). Kurup & Samuel (1985), Kurup et al. (1993) and Remesan & Ramachandran (2007) reported the presence of

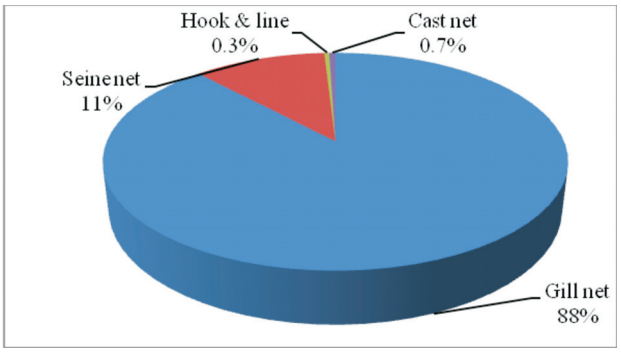

Fig. 3. Percentage contribution of gears in the exploited fishery of Muvattupuzha river

seines in rivers and Vembanad lake in Kerala. In seines, highest catch per unit effort was recorded for *C. striata* (0.28 kg h^{-1}), *C. marulius* (0.20 kg h^{-1}) and *H. brachysoma* (0.08 kg h^{-1}) (Fig. 5). The main catches in the cast net consisted of *H. curmuca* (51%) and *Dawkinsia filamentosa* (25.51%) with a catch per unit effort of 0.5 kg h^{-1} and 0.25 kg h^{-1}, respectively (Fig. 6). *Mastacembelus armatus* and *Anguilla bengalensis* were mainly obtained in the hook and line fishery.

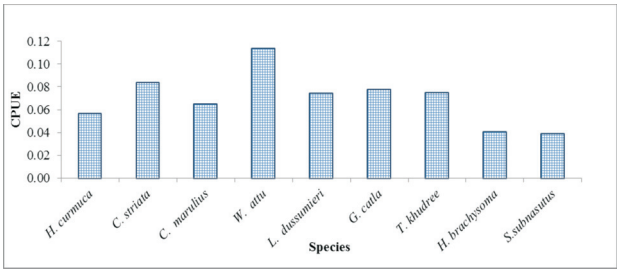

Fig. 4. CPUE of major fish species exploited by gillnets in the Muvattupuzha river

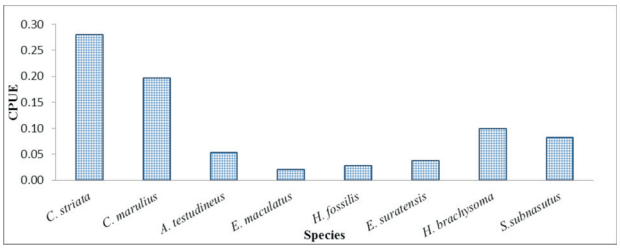

Fig. 5. CPUE of major fish species exploited by seine nets in the Muvattupuzha river

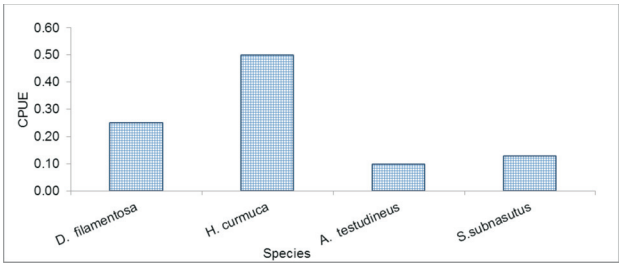

Fig. 6. CPUE of major fish species exploited by cast nets in the Muvattupuzha river

The commercially important species, their common names and size ranges are presented in Table 1.

W. attu, one of the most important catfish in flood plain fisheries in India showed highest landings (16.93%) from this river. In Pampa river this species

Table 1. Species composition in the exploited fishery from major landing centres in Muvattupuzha river

Sl. No.	Order	Family	Scientific name	Common name	Landing (t)	Size range (mm)
1	Anguilliformes	Anguilidae	*Anguilla bengalensis*	Indian longfin eel	0.12	299-512
2	Cypriniformes	Cyprinidae	*Hypselobarbus curmuca*	Curmuca barb	4.90	122-256
3			*Labeo dussumieri*	Malabar labeo	7.21	110-287
4			*Tor khudree*	Deccan mahseer	0.65	155-366
5			*Gibelion catla*	Catla	2.56	311-543
6			*Dawkinsia filamentosa*	Filament barb	2.51	77-166
7			*Systomus subnasutus*	Swamp barb	4.45	99-216
8	Siluriformes	Bagridae	*Horabagrus branchysoma*	Yellow catfish	3.67	88-200
9			*Mystus cavasius*	Gangetic mystus	0.26	66-100
10		Siluridae	*Ompok bimaculatus*	Indian butter catfish	0.02	166-213
11			*Wallago attu*	Freshwater shark	7.62	277-710
12		Heteropneustidae	*Heteropneustes fossilis*	Stinging catfish	1.27	144-200
13	Perciformes	Ambassidae	*Parambassis dayi*	Day's glassy fish	0.19	58-100
14			*Parambassis thomassi*	Glassy perchlet	0.02	54-97
15		Pristolepidae	*Pristolepis marginata*	Common catopra	0.09	110-150
16		Cichlidae	*Etroplus maculatus*	Orange chromide	0.75	42-76
17			*Etroplus suratensis*	Pearl spot	0.71	112-236
18		Gobiidae	*Glossogobius giuris*	Tank goby	0.11	132-178
19		Anabantidae	*Anabas testudineus*	Climbing perch	0.78	133-168
20		Channidae	*Channa striata*	Striped snakehead	4.60	144-344
21			*Channa marulius*	Giant snakehead	2.24	170-312
22	Synbranchiformes	Mastacembelidae	*Mastacembelus armatus*	Zig-zag eel	0.14	190-322
23	Beloniformes	Belonidae	*Xenentodon cancila*	Needle fish	0.14	177-220

contributed 9.55% of the total catch and the size range was 300-990 mm (Renjithkumar et al., 2011). This species supported a lucrative fishery round the year and sustained as the major source of livelihood to the fishermen in Pampa river (Renjithkumar et al., 2011). John (1936) reported that *W. attu* was found abundantly in Kuttanad during February, March and April when the streams and rivers are partially dry. The average annual yield of 353.9 kg was reported for *W. attu* from river Ganga (Montana et al., 2011). Rao et al. (1991) reported that *W. attu* constituted a fishery to the tune of 7.4 to 8.2% in the Narmada River. Due to the population declines, this species is assessed as near threatened (NT) as per IUCN. The landings of *H. brachysoma* in Muvattupuzha river was high (8.1%) when compared to that of Pampa river (4.3%) (Renjithkumar et al., 2011). Sreeraj et al. (2007) and Renjithkumar et al. (2011) reported a size range of 160-330 mm and 90-230 mm for this species from Vembanad Lake and Pampa river, respectively. The size range of *H. brachysoma* in the fishery of Muvattupuzha river was 88-200mm. *H. brachysoma* once abundant in riverine area of Vembanad lake declined to only 1.52% of the total fishery (Padmakumar et al., 2002). Overexploitation, habitat alteration and pollution contributed to the decline of *H. brachysoma* and the fish is listed as Vulnerable in the IUCN Red list.

L. dussumieri contributed 16% of the landings in Muvattupuzha river. A similar trend in landings was noticed for this species in Pampa river (19%) (Renjithkumar et al., 2011). The species supported annual landings of 5.14 to 7.08 t in Pampa river during 1987-1990 (Kurup, 1993). John (1936) reported that *L. dussumieri* is one of the most common species of the rivers of Travancore where it was frequently encountered in gillnets. Chalakudy

and Periyar rivers, also sustained the fishery of this species earlier and, since a decade, the fishery of this species has declined and disappeared from these two rivers (Kurup & Kuriakose, 1991). The results of the present study show that the fish fauna of the Muvattupuzha river is highly diverse consisting of twenty three species. The study indicated a decrease in the fish landing from pre-monsoon to monsoon. It is observed that threatened category of fishes contributed to nearly one fourth of the total annual landing in the river. Proper management is vital for the sustainable utilization of the fish stocks of Muvattupuzha river which can include the mesh size regulation, declaration of closed season, ranching of fry and fingerlings of threatened species and setting up of a local body for the management of fishery wealth.

References

Alagaraja, K. (1984) Simple methods for estimation of parameter for assessing exploited fish stocks. Indian J. Fish. 31(2): 177-195

Baiju, M and Hridayanathan, C. (2003) Fishing gears in Muvattupuzha river system of Kerala. In: Riverine and Reservoir Fisheries, Challenges and Strategies (Boopendranath, M.R., Meenakumari, B., Joseph, J., Sankar, T.V., Pravin, P. and Edwin, L., Eds), pp 256-263, Society of Fisheries Technologists (India), Cochin

Bartley, D. M., De Graff, G. J., Jorgensen, J. V. and Marmulla, G. (2015) Inland capture fisheries: status and data issues. Fish. Manag. Ecol. 22: 71-77

Bhat, A. (2003) Diversity and composition of freshwater fishes in streams of Central Western Ghats, India. Environ. Biol. Fishes. 68:25-38

Day, F. (1878) The fishes of India being a natural history of the fishes known to inhabit the seas and fresh waters of India, Burma and Ceylon. Wm. Dawson & Sons Ltd., London. xx+ 778 p

Jayaram, K. C. (1999) The freshwater fishes of the Indian region, 551p, Narendra publishing house, New Delhi, India

Jayaram, K.C. (2009) The freshwater fishes of the Indian region, 614p, 2nd edn., Narendra Publishing House, India

John, C. C. (1936) Freshwater fish and fisheries of Travancore. J. Bombay Nat. Hist. Soc. 38: 702-733

Kurup, B. M., Sebastain, M. J., Sankaran, T. M. and Rabindranath, P. (1992) Fishery and biology of *Macrobranchium spp*. of the Vembanad Lake. In: Freshwater Prawns (Silas, E. G., Ed), pp 78-89, KAU, Trichur

Kurup, B.M., Sebastian, M.J., Sankar, T.M. and Ravindranath, P. (1993) An account of Inland fishing gears and fishing methods of Kerala. In: Low Energy Fishing (George, V. C., Vijayan, V., Varghese, M. D., Radhalakshmi, K., Thomas, S. N. and Jose, J., Eds), pp 145-151, Society of Fisheries Technologists (India), Cochin

Kurup, B. M. and Samuel, C. T. (1985) Fishing gear fishing methods of Vembanad Lake. In: Harvest and Post-harvest Technology of Fish (Balachandran, K. K., Iyer, T.S.G., Madhavan, P., Joseph, J., Perigreen, P.A., Ragunath, M.R. and Varghese, M.D., Eds). pp 232-237, Society of Fisheries Technologists (India), Cochin

Kurup, B. M. and Kuriakose, B. (1991) *Labeo dussumieri* (Val) an indigenous endangered carp species of Kerala. Fish. Chimes, 14: 39-42

Kurup, B. M. (1993) Preliminary observation on river ranching of *Labeo dussumieri* (Val.) in Pampa, Kerala. Paper presented in the Fifth Kerala Science Congress, January 1993

Montana, C.G., Choudhary, Dey, S. and Winemiller, K. O. (2011) Composition trends of fisheries in the River Ganges, India. Fish. Manag. Ecol. 18: 282-296

Padmakumar, K. G., Krishnan, A., Radhika, R., Manu, P. S. and Shiny, C. K. (2002) Open water fishery interventions in Kuttanad, Kerala, with reference to fishery decline and ecosystem changes. In: Riverine and Reservoir Fisheries, Challenges and Strategies (Boopendranath, M.R., Meenakumari, B., Joseph, J., Sankar, T.V., Pravin, P. and Edwin, L., Eds), pp 15-24, Society of Fisheries Technologists (India), Cochin

Prasad, G., Ali, A., Harikrishnan, M. and Raghavan, R. (2012) Population dynamics of an endemic and threatened Yellow Catfish, *Horabagrus brachysoma* (Günther) from Periyar River, southern Western Ghats, India. J. Threat. Taxa. 4(2): 2333-2342

Radhakrishnan, K.V. (2006) Systematics, germplasm evaluation and pattern of distribution and abundance of freshwater fishes of Kerala. 518 p, PhD Thesis, Cochin University of Science and Technology, India

Rao, K. S., Chatterji, S. N. and Anil, K. S. (1991) Studies on the pre-impoundment fishery potential of Narmada basin (Western region) in the Context of Indira Sagar, Maheshwar Omkareshwar and Sardar Sarovar Reservoir. J. Inland Fish. Soc. India. 23(1): 34-41

Remesan, M. P. and Ramachandran, A. (2005) Gillnets for inland fishing in North Kerala. Fish. Technol. 42(2): 125-134

Remesan, M.P. and Ramachandran, A. (2007) Seine nets for riverine fishing in selected districts of Kerala. Fish. Technol. 44(1): 17-24

Renjithkumar, C.R., Harikrishnan, M. and Kurup, B.M. (2011). Exploited fisheries resources of the Pampa River, Kerala, India. Indian J. Fish. 58(3): 13-22

Scaria, K.S., Devaraj, M., Joseph, A., Synudhin, M.B., Vijayalakshmi, K.V., Ammini, P.L., Beena, M.B. and Sindhu K. A. (1999) Production pattern in the marine fisheries of Kerala. CMFRI special publication

Sinha, M., Mukhopadhyay, M. K. and Hajra, A. (1999) Inland fisheries development: achievements and destinations for twenty first century. In: Souvenir: The National Seminar on Eco-friendly Management of Resources for Doubling of Fish Production-Strategies for 21st Century. (Sinha, M., Mukhopadhyay, M. K. and Hajra, A., Eds), pp 25-35, Inland Fisheries Society of India, Barrackpore, India

Sreeraj, N., Raghavan, R. and Prasad, G. (2007) Some aspects of the fishery of the threatened yellow catfish *Horabagrus brachysoma* from Vembanad Lake with a note on their landings at Vaikom, Kerala, India. Zoos Print J. 22(4): 2665-2666

Sreenivasan, A. (1995) Where have all these fish species gone? Fish. Chimes. 15(2): 245-257

Silas, E.G. (2010) Phylogeography and evolutionary aspects of Indian fishes: challenges for the future. Indian J. Animal Sci. 80(4): 8-15

Thomas, K. (2004) Habitat and distribution of hill-stream fishes of southern Kerala (South of Palghat Gap), 186p, Ph.D. Thesis. Mahatma Gandhi University, Kerala, India

Thomas, R. K. and George, M. J (2010) Primary hill stream fishes of Muvattupuzha and Meenachil rivers, Central Kerala, India. Millennium Zoology. 11(1): 17-19

Talwar, P. K. and Jhingran, V.G. (1991) Inland fishes of India and adjacent countries. Vol. I and II, 536p, Oxford & IBH Publishing Company Pvt Ltd., New Delhi, India