

Spawning sites of depik, *Rasbora tawarensis* (Teleostei, Cyprinidae) in Lake Laut Tawar, Indonesia

Zainal A. Muchlisin

Department of Aquaculture, Faculty of Marine Sciences and Fishery, Syiah Kuala University, Banda Aceh, Indonesia. Corresponding author: muchlisinza@yahoo.com

Abstract. Depik, *Rasbora tawarensis* is an endemic species in Lake Laut Tawar, Indonesia, and this species has been listed as threatened species. Reproductive biology data is one of the important information to strategise conservation plan. This paper reported the spawning ground of the depik, hence this paper is contributing the additional importance information on the reproductive biology of *R.* in relation to provide comprehensive our understanding on the reproductive biology of this species. The study was conducted during July to November 2009 in Lake Laut Tawar. A total of 13 spawning grounds were detected in the study where the locations are distributed in five villages namely, five locations in Mendale, two locations in Kelitu, two locations in Gegarang, three locations in Bewang dan one location in Pedemon. However, only four sites remained active in the dry season i.e. two sites in Kelitu and two sites in Gegarang villages.

Key words: Threatened, endemic, reproductive biology and conservation

Introduction

Rasbora tawarensis or locally known as depik is one of endemic species to Lake Laut Tawar, Aceh Province, Indonesia. It has been recorded as threatened and is listed in the IUCN Red List (IUCN, 1990). A more recent evaluation revealed that this species is in the critical endangered category (CBSG, 2003). To date there have been some study done on *R. tawarensis* despite its enormous fishery and ecological importance in the region. Studies on reproductive behaviour of fish are one of the important and a basic requirement for improvement and effective fishery resources management and conservation (Ezenwaji et al., 1998; Brewer et al., 2008; Grandcourt et al., 2009).

Several studies describing various aspects of reproductive biology have been conducted for some freshwater Indonesian cyprinids for example the rainbow selebensis, *Telmatherina celebensis* (Nasution, 2005), serandang, *Channa pleurophthalmus* (Said, 2007), bonti-bonti, *Paratherina striata*, an endemic fish from Lake Towuti, Sulawesi (Nasution et al., 2007), nilem, *Osteochilus hasseltii* (Sharifuddin, 2010), wader pari, *Rasbora lateristriata* (Sentosa, 2010), neon rainbow fish, *Melanotaenia praecox* (Said and Mayasari, 2010) and slender betta, *Betta bellica* (Kusrini et al., 2010). While, some reproductive biology aspects of depik have been reported by Muchlisin et al. (2010a, 2010b, 2011a, 2011b). However, the spawning ground of this fish was not reported.

Hence, the objective of the present study was to identify the spawning location of the depik *R. tawarensis* in Lake Laut Tawar, Indonesia. This study is significant to strategise a conservation policy especially for determining the sanctuary for this species.

Materials and Methods

Study location and Identification of spawning sites

The study was conducted in Lake Laut Tawar, Aceh Province, Indonesia (04°36'43"N 096°55'25"E) during July to November 2009. This lake is situated in Aceh Tengah district and a detailed description of the Lake Laut Tawar was reported by Muchlisin et al., (Muchlisin et al 2010b).

The spawning sites were identified by the presence of *dedeseun* traps around the shore line of Lake Laut Tawar. The survey was conducted by using experimental boat and eye binoculars to identify the locations. Then, the survey team would visit the location to record the GPS coordinate and only active *dedeseuns* were recorded. To collect more information about the *dedeseun*, intensive interview was conducted with the head of fishermen organization of Lake Laut Tawar (LANTAK) and the *dedeseun* owners.

Results and Discussion

A total of 13 spawning grounds of Depik, *R. tawarensis* were detected in Lake Laut Tawar, distributed in four villages i.e. Mendale, Bewang, Gegarang, Kelitu and Pademon villages (Table 1). However, according to local fishermen only four locations remain active in the dry season (location no. 6-9), all of the active sites are located at Kelitu and Gegarang villages in the northern region of the lake (Figure 1).

Table 1. GPS positions of spawning sites according to village.

No.	Latitude	Longitude	Village name
1.	04° 64.073	096° 86.291	Mendale
2.	04° 64.232	096° 86.888	Mendale
3.	04° 64.198	096° 86.982	Mendale
4.	04° 64.019	096° 87.158	Mendale
5.	04° 63.880	096° 88.819	Mendale
6.	04° 62.878	096° 94.836	Kelitu
7.	04° 62.463	096° 95.775	Kelitu
8.	04° 62.352	096° 96.175	Gegarang
9.	04° 62.325	096° 96.354	Gegarang
10.	04° 57.927	096° 98.464	Bewang
11.	04° 58.021	096° 98.498	Bewang
12.	04° 57.734	096° 98.007	Bewang
13.	04° 60.453	096° 86.751	Pedemun

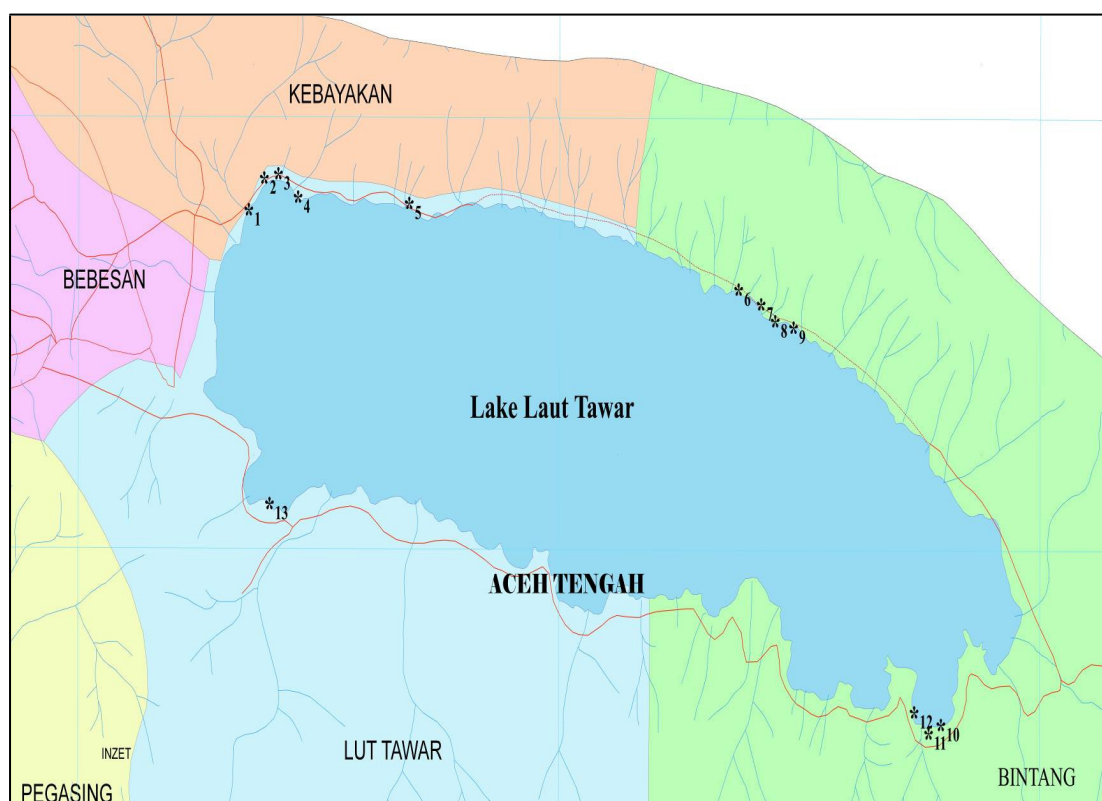


Figure 1. Spawning sites position of *Rasbora tawarensis* in Lake Lau Tawar (*).

Data on temporal and spatial distribution of spawning ground is crucial, in particular for stocks that suffer from prolonged over-exploitation and whose reproductive potency may have become seriously hindered (Vitale et al., 2008). The survey showed that 13 spawning grounds were detected in the lake and most of the locations are situated in Mendale and Bewang villages; however only four sites remain active in the dry season i.e. two sites in Kelitu and two sites in Gegarang villages.

The Depik migrates to small tributaries in the northern region of the lake to spawn in specialised spawning area locally called the *dedeseun*. The *dedeseun* refers to the water spring resources emerging from the rocky mountain around the lake. This spawning site covers a small area, for example an active *dedeseun* (Gegarang village) may be around 30 m in length and 1 m in width, with a maximum water level of 2 m in the rainy season and a minimum of 0.45 m in the dry season. The *dedeseun* bottom is gravel and the water is clean and clear (Plate 1). A similar type of spawning ground was reported in *R. lateristriata*, where the fish spawned in the shallow river with sandy and gravel bottom, and higher dissolved oxygen (Sentosa, 2010).

Random sampling of migrating Depik showed that their gonadosomatic index (GSI) was high (above 20.0) and most individuals were matured. According to the *dedeseun* trap owners, depik migration occurs during rainstorm throughout the year. However, the peak season was in the rainy season from the end of July to the end of December. This information was in agreement with the finding of the previous study where the mean GSIs were higher in September and December (Muchlisin et al., 2010a).

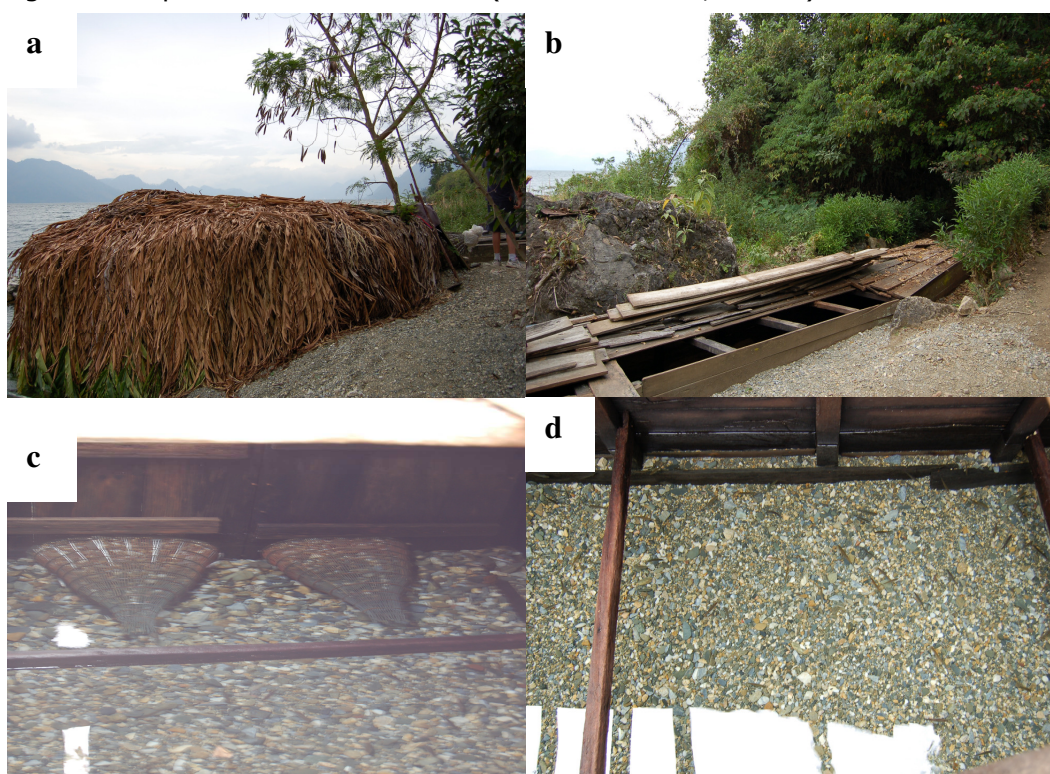


Plate 1. The image of *dedeseun*. The mouth of *dedeseun* (a), *dedeseun* canal (b), *dedeseun* trap (c), and *dedeseun* bottom (d).

The number and body size of migrating Depik have decreased over the years (personal communication with *dedeseun* trap owners). During the 1980s, migration rate was at least 15 to 20 times per month in the peak season, with a maximum harvest of 600 kg on every single migration day. However, in 2008 the rate decreased to a maximum of 5 to 10 times in the peak season with a maximum production of 60 kg per migration.

In 1970s, there were more than one hundred *dedeseun* around the lake and most of them were located in the northern and western regions of the lake (personal communication with the head of the local fishermen organization, LANTAK). The numbers decreased to 48 *dedeseuns* in 2006 and 13 *dedeseuns* in 2008, and only four *dedeseun* traps have remained active in the dry season of 2009, located in the Gegarang and Kelitu villages.

Declining water level is probably the main reason for the decreased number of *dedeseun* in Lake Laut Tawar. Many *dedeseuns* or tributaries have dried up while others had sluggish water flow (Plate 2). It is believed that water level had declined by 1.5 to 2 m during the last 20 years i.e. an average of 10 cm per year. This decline of water level is

probably caused by deforestation during the last two decades coupled with forest fires and land clearance schemes which have resulted in forest and ecological destruction.



Plate 2. The image of the dried *dedeseun* in Bewang village.

Conclusions

A total of 13 spawning grounds were detected in the study where the locations are distributed in five villages namely, five locations in Mendale, two locations in Kelitu, two locations in Gegarang, three locations in Bewang dan one location in Pedemon. However, only four sites remained active in the dry season i.e. two sites in Kelitu and two sites in Gegarang villages.

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