ANALYSIS OF MEKONG GIANT CATFISH BEHAVIOR USING A DATA LOGGER

Yasushi MITSUNAGA[1], Yukiko YAMAGISHI[1], Nobuaki ARAI[2] & Wataru SAKAMOTO[3]

[1] Faculty of Agriculture, Kinki University, Nara 631-8505, Japan.
E-mail: mittsu@nara.kindai.ac.jp
[2] Graduate School of Informatics, Kyoto University, Kyoto 606-8501, Japan.
[3] Graduate School of Agriculture, Kyoto University, Kyoto 606-8502, Japan.

ABSTRACT

Temperature and depth data logger was attached to Mekong giant catfish to observe their swimming behavior in a rearing pond. Four artificial seed reared in the Karasin Freshwater Research Station, Thailand were used to obtain the body temperature and fish position on water depth. The fish were anesthetized and implanted with a data logger (DST milli, Star-oddi Co., Iceland) into the body cave on 2 May 2002. One data logger was retrieved and body temperature and depth data were obtained for about one month. The fish moved to relatively deeper layer after sunrise and stayed there in the morning. In the afternoon the fish became active gradually and began to move vertically. After sunset the fish got more active and moved vertically from the surface to the bottom of the pond until the next sunrise. At sunrise the fish stopped the vertical movement. It seems that Mekong giant catfish have a nocturnal characteristic and get most active at twilight.

Keywords: Mekong giant catfish, data logger, activity rhythm, nocturnal characteristic

INTRODUCTION

Mekong giant catfish *Pangasianodon gigas* is one of the largest freshwater fish in the world and grow up to 3 m in length and 300 kg in weight. Recently, natural stocks of Mekong giant catfish have been endangered (Hogan, 1998). Therefore understanding its behavior has been requested to manage its stocks and to develop farming. Data logger is a powerful tool that provides continuous and simultaneous monitoring of fish in their natural environment. For example, ambient water temperature and fish position on water depth have been measured by data loggers to reveal some aspects of a circadian rhythm of vertical movement by many authors. Kasai et al. (1998) observed that yellowtail showed an apparent diurnal vertical migration pattern. Mitsunaga et al. (in press) observed that distances of vertical movement of red sea bream during daytime were longer than nighttime in winter. In this study, temperature and depth data logger was attached to Mekong giant catfish to observe their swimming behavior in a rearing pond.

MATERIAL AND METHOD

Four artificial seed reared in the Karasin Freshwater Research Station, Thailand (KFRS) were used to obtain the body temperature and the position on water depth. Details of each fish are given in Table 1. The fish were anesthetized and implanted with a data logger into the body cave on 2 May 2002. Details of implanting method were the same as Mitamura at al. (2002). The logger (DST milli, Star-oddi Co., Iceland) weighed 9.2 / 5g in air / water, was 12.5 mm in diameter, 38.4 mm length. The logger was available with two sensors, temperature and depth (pressure). Data were stored into a non-volatile

(EEPROM) memory. Memory capacity was 21,738 measurements per sensor. Sampling interval was variable and ranged from 1 second to 90 hours according to the purpose of the experiment. In this experiment we set the interval for 2 minutes. The tagged fish were released into the pond of the KFRS on 3 May 2002. To monitor the water temperature of the pond, another data logger was attached on the bamboo stake and set at the depth of about 0.5m.

RESULTS AND DISCUSSION

The loggers were retrieved on 25 June 2002. Fluctuations of water temperatures recorded by the logger attached on the stake were shown in Fig.1. Water temperatures fluctuated between 28.5 and 35.0°C through this experiment. Three of four loggers were disappeared from the fish body. It seems that the loggers had dropped before the scars were recovered completely. One data logger was retrieved and body temperature and depth data were obtained for about one month. Time series data including body temperature and the depth were also shown in Fig.1. To understand the activity rhythm, the depth changes from 14 May to 16 May were shown in Fig.2 by way of example. The fish stayed in relatively deeper layer in the morning. In the afternoon the fish became more active gradually. After sunset the fish got more active and moved vertically ranging from the surface to the bottom of the pond until sunrise. At sunrise the fish stopped the vertical movement suddenly. Mean distance of vertical movement and coefficient of variation of depth were calculated every one hour as activity indexes (Fig.3). At night mean distances of vertical movement were higher and about 4 m. At 6:00, just after sunrise, the distance fell down to about 1 m. Then the distances increased again gradually to 4 m from 10:00 to 18:00. coefficient of variation of depth had twin peaks up to 0.15 m at sunrise and sunset. In conclusion,

Mekong giant catfish had a nocturnal characteristic and got most active at twilight. Takai et al. (1997) observed that Lake Biwa catfish had nocturnal characteristics and showed an apparent changes in movement distance at both sunrise and sunset. In the case of Mekong giant catfish, the activity indexes showed an

Table 1 Details of Mekong giant catfish tagged with a data logger.

Tag No.	*FL (cm)*	*BW (kg)*	*Note*
1328	*61.0*	*3.2*	*Lost*
1329	*60.0*	*2.4*	*Lost*
1330	*89.0*	*9.4*	*Retrieve*
1331	*88.0*	*10.0*	*Lost*

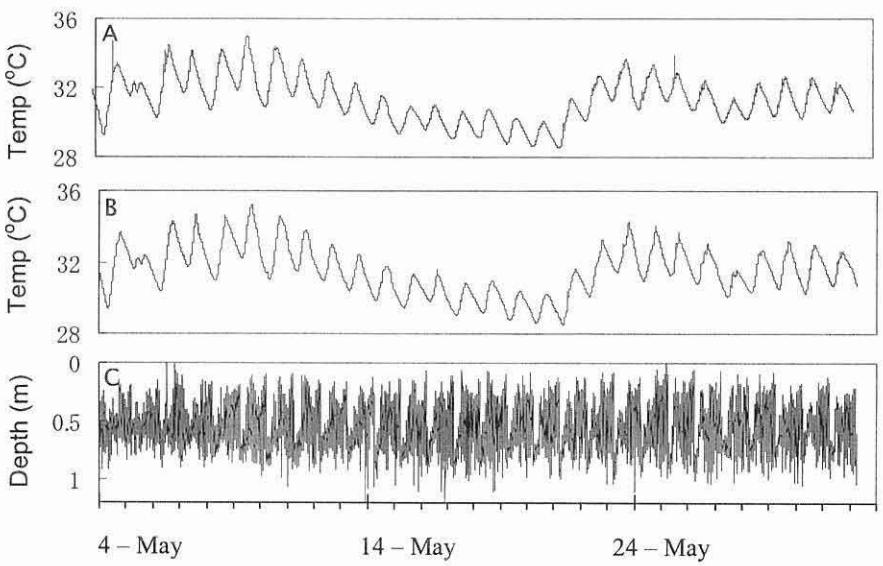

Fig. 1 Time sequences of A) water temperature at ca. 0.5m deep, B) body temperature and C) depth from the release to recover.

apparent change just after sunrise, but the indexes did not change apparently at sunset. One possibility is that the catfish was foraging in the afternoon. The fish were fed sinking pellets daily at 10:00 except holiday, which agrees with the time when the activity indexes started to increase. By measuring the movement of the fish at shorter intervals or by an acceleration data logger, the feeding behavior could be monitored. Another possibility is a lack of the dissolved oxygen. The water temperature increased after sunrise and it could make the dissolved oxygen low simultaneously. The fish may have avoided the low concentration of oxygen by moving toward the surface. Monitoring of the dissolved oxygen will make this possibility clear. According to the fisherman in the region, Mekong giant catfish is resting on the bottom of Mekong River during daytime. They set a gill net around the fish at daytime. The fish starts to move at night and be caught by the net. In the natural environment without punctual feeding and a lack of the dissolved oxygen, Mekong giant catfish would show an apparent change in behavior also at sunset.

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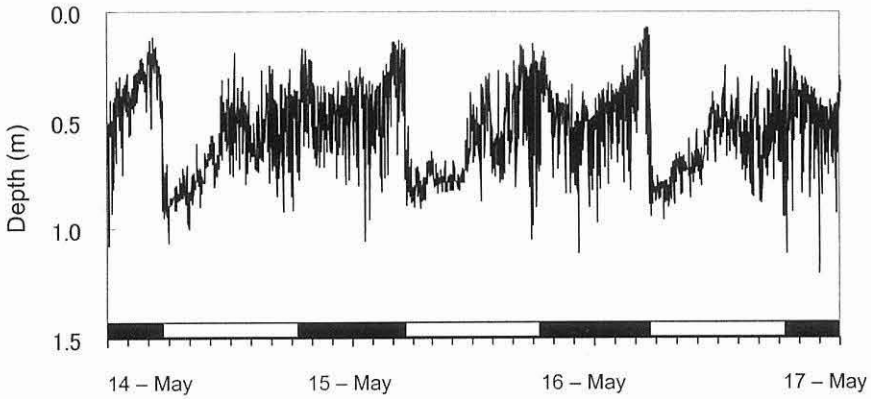

Fig. 2 Example of time sequences of depth experienced by the Mekong giant catfish from 14 May to 16 May. Dark and white bars on the bottom axis indicate night and day.

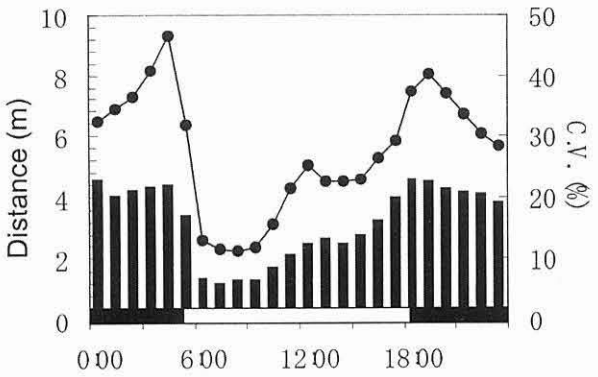

Fig. 3 Mean distance of vertical movement (solid bar) and coefficient of variation of depth (solid circle) every one hour. Dark and white bars on the bottom axis indicate night and day. Sunrise and sunset in Karasin during this experiment were at about 5:30 and 18:20.

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