

## Water current around traditional fishing gears in riparian swamps

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**Abstract:** Seasonal fluctuation in the water level and the current is an important issue to understand the relationship between the environmental conditions of the river and the fisheries activities of local inhabitants living along the riparian areas of the Mekong basin. We demonstrated in this study physical conditions of waters, such as water current and structure of water mass, influenced to fisheries resources in the branches of the Mekong river basin. Water direction and velocity in the peak of rainy season are measured by means of electromagnetic flow meter. Although the water level was extremely high, the water current was slow because the river flooded extensively throughout the floodplain. Most of current speeds were smaller than 5 cm/s. Water current in the surface layer were not uniform from the upper to the lower stream but flow to various directions due to the wind-drift. The downstream of the center of the river were relatively large below 1 m to near the bottom layer. Since water stagnant within the floodplain, only a little current could be detected near the bottom layers in the both sides of the river stream. It is speculated that migrated fishes don't need to swim against the main stream of the river and can move freely throughout riparian forests, and therefore traditional fishing gears "luan loub" and "pon paan" might be reasonable ones from the physical point of view.

**Key words:** riparian floodplain, swamp, water current, water level, Mekong River.

### Introduction

Wetland such as mangrove swamps and riparian freshwater swamps are important fields for nursing fisheries resources. In the Mekong basin, extensive riparian swamps are found around the branches of the middle and the lower river. The water level of the branches change largely from rainy season to dry season, and the river floods occasionally during rainy season. During rainy season, a lot of fishes migrate from the trunk of the Mekong river to the floodplain of the branches for feeding, breeding and nursing (Paulson *et al.*, 2002). Therefore, seasonal fluctuation in the water level and the current is an important issue to understand the relationship between the environmental conditions of the river and the fisheries activities of local inhabitants living along the riparian areas of the Mekong basin.

We demonstrated in this study physical conditions of waters, such as water current and structure of water mass, influenced to fisheries resources in the branches of the Mekong river basin. As the first step of this study, we measured the current speed of river stream around the traditional fishing gears of floodplain in rainy season.

### Materials and Methods

Fig. 1 shows our survey site. Our study site was established along the riparian swamp forests of Lam Se Bai (15°35'24"N, 104°27'43"E) in Na Kae village, Kham Khuam Kaeo district, Yasoton province, northeastern Thailand. Water level of this study site in Lam Se Bai is controlled by two irrigation dams, which is the Lam Se Bai dam ("Fai Khong Kan Lam Se Bai") in the upper side and the Pa Ao dam ("Fai Pa Ao") in the lower side. The study site is located between these two dams.

Water direction and velocity in the peak of rainy season are measured by means of electromagnetic flow meter on 11th September, 2010 (Fig. 2). The device consists of two parts; the right side is the electromagnetic flow meter to measure water direction and velocity (compact-em, JFE Advantech Co., Ltd), and the left side is the depth recorder (compact-TD, JFE Advantech Co., Ltd.). These devices record data synchronously because they were fixed on the edge of polyvinyl chloride (PVC) pipe by connected tools

made of stainless steel. Each PVC pipe is 4cm in diameter and 2m in length.

Samplings of current speed were carried out at 58 points along the river and the adjacent floodplain. The flow meter was submerged vertically from the surface to near the bottom and measured on the surface layer and every 1 meter depth (Fig. 3). Sampling interval was 1 second and sampling time was 15 seconds.



Fig. 1. Map of northeastern Thailand. Study site in Lam Se Bai

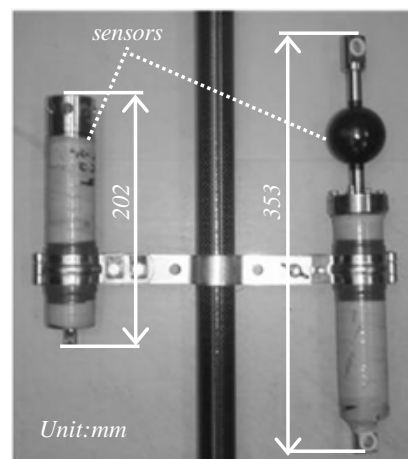


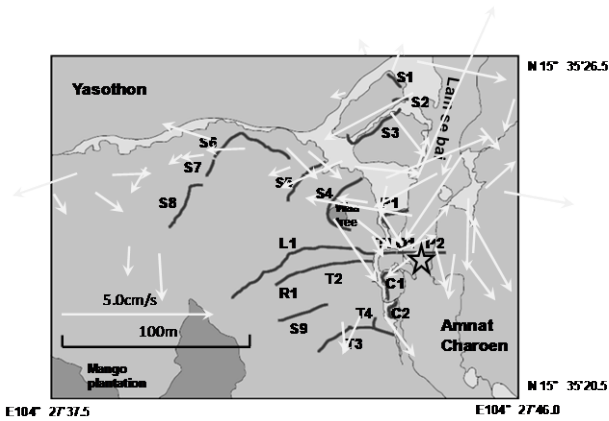
Fig. 2. Electromagnetic flow meter. right: direction and velocity meter, left: depth meter



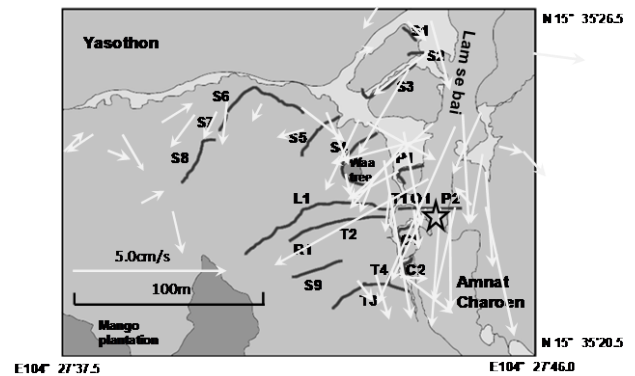
**Fig. 3.** Investigation scenery. The devices fixed to the edge of the pipe were submerged vertically from the surface to near the bottom and measured every 1 meter depth.

## Results and Discussion

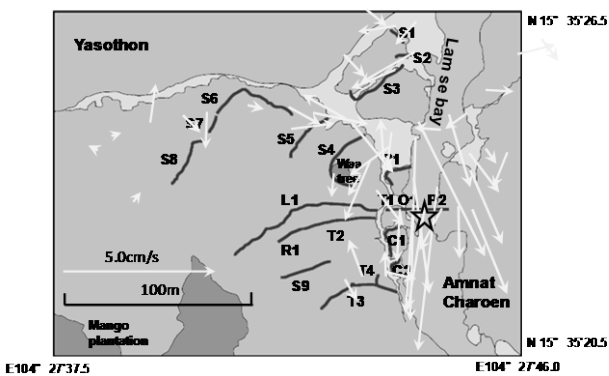
These are a lot of fishing gears are observed in Lam Se Bai, in which “luan loub” and “pon paan” are traditional and characteristic ones in study site (Fujioka *et al.*, 2010). The stake trap “luan loub” is a kind of tree fence which made by branch align according to the terrain vertically to the stream. The net trap “pon paan” is set between main gates in the center of the river stream. We measured water current around these fishing gears and the current speed vectors of surface layer (0 m), 1 m are shown sequentially in the Fig. (4a-e). In these figures, light blue color shows the main stream in Lam Se Bai, green shows riparian swamp forests and yellow shows pathway with sandy



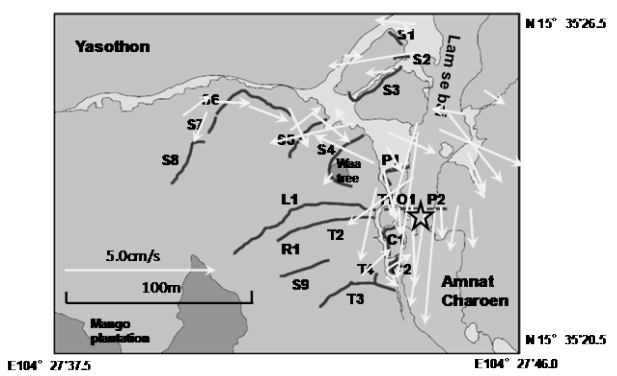
**Fig. 4 (a)** Current speed vectors of water depth 0m



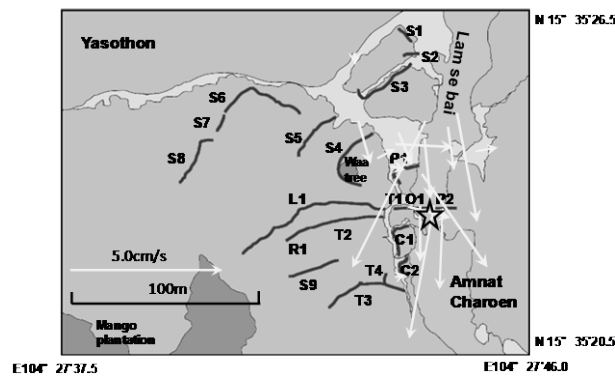
**Fig. 4 (b)** Current speed vectors of water depth 1m



**Fig. 4 (c)** Current speed vectors of water depth 3m



**Fig. 4 (d)** Current speed vectors of water depth 5m



**Fig. 4 (e)** Current speed vectors of water depth 7m

substratum. Thick black lines and star symbol indicate the actual positions of “luan loub” and “pon paan”, respectively (Fujioka *et al.*, 2010).

During our survey in the peak of the rainy season, the water level was extremely high with the maximum depth more than 10 m. However water current was comparatively slow because the river flooded extensively throughout the floodplain. Most of current speeds were smaller than 5 cm/s. Water current in the surface layer (0 m) were not uniform from the upper to the lower stream but flow to various directions due to the wind-drift (Fig. 4a). The downstream of the center of the river were relatively large below 1m to near the bottom layer. Since water stagnant within the floodplain, only a little current could be detected near the bottom layers in the both sides of the river stream (Fig. 4b). Counter currents against the river main stream were sometimes detected around the fishing traps "luan loub", though the velocity was small. It is thought that current speeds in the flood plain decreased by the resistance of riparian forests and the bottom friction. The characteristics of current speeds of 3m, 5m and 7m in depth were the same tendency as 1m (Fig.4c-e).

It is speculated that migrated fishes don't need to swim against the main stream of the river and can move freely throughout riparian forests. Thereby, traditional fishing gears "luan loub" and "pon paan" are reasonable ones from the physical point of view.

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### References

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