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Plankton community in Lam Se Bai in dry season

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Abstract: Qualitative aspect of the plankton in Lam Se Bai Canel was studied during dry season in April 2009. Plankton samples were collected by towing plankton nets of mesh size 21 µm, from 8 stations at the middle depth of canal. A total of 109 species in 3 division of phytoplankton recorded comprised of 15 species of Cyanophyta, 70 species of Chlorophyta, 24 species of Chromophyta and a total of 63 species in 3 phylum of zooplankton recorded comprised of 14 species of Protozoa, 42 species of Rotifera, 7 species of Arthropoda. The genera of phytoplankton as *Chroococcus*, *Oscillatoria*, *Lepocinclis*, *Phacus*, *Strombomonas* and *Trachelomonas* and the genera of zooplankton as *Polyarthra* and *Diffugia* were frequently found in large number.
Key words: Plankton, Lam Se Bai, dry season.

Introduction

Plankton is the crucial part of aquaitic food chain. As the primary producer, phytoplankton converts inorganic matters into organic compounds though photosynthesis, enabling transfers of energy and nutrients to zooplankton and other aquatic animals in the food chain. Each species of plankton inhabits in different evironments. Some live in areas with high concentration of organic matters, others are found in reservoirs with moderate concentration of organic matter while a number of species thrive in environment with little organic matter. Some phytoplankton species can thus be used as water quality index. Most plankton has short life cycle and can quickly respond to changing environment. (Hanpongkittikul and Wongrat. 2005); (Pradissan. 2000); (Reynolds. 1984)

Lum Se Bai is a small branch of the Mun river which is one of the Mekong river, The total length of Lum Se Bai is 233 km , Water level of Lam Se Bai is controlled by two small irrigation dams, that is, Lam Se Bai weir in the upper area and Amnat Charoen weir in the lower area. They were constructed to supply water for irrigation. Along Lam Se Bai have many riparian freshwater swamp forests, where are nursing fisheries resources with supplying potential source of food and breeding sites or shelter even though they have different frequency and period of flooding. Fisheries products are the important natural resources and fisheries activities of fishermen from every village that located along Lam Se Bai.

The purposes of this study are to investigate the species composition of plankton in Lam Se Bai, and whether there are temporal and spatial variation of phytoplankton and zooplankton community in the study area. Results of this study can be used as baseline for furture diversity and ecological studies. And also qualitative of the plankton from this studies are used for indicator of primary productivity in Lam Se Bai.

Materials and Methods

Study sites: Lam Se Bai is a small branch of the Mun river, origin from border of Mukdaharn province and pass though Yasotorn, Amnat Jaroen and joint with Mon river at Ubol Rattanee province. Lam Se Bai have two small irrigation dams, that is Lam Se Bai weir in the upper area and Amnat Charoen weir in the lower area. Eight sampling stations were used in the study to ensure proper coverage from upstream area to downstream area (Fig. 1). These stations selection is based on 4 reasons; near main survey site (Na Kae village), near dam or reservoirs, easily sampling (mainly on bridge) and moderate distance each other.

Sampling methods: Samples were collected during 2009, April before raining season when water from upper stream flood over the riparian freshwater swamp forests along Lam Se Bai. Plankton net with mesh size 21 µm were used in collecting samples with oblique tow technique. Plankton samples were preserved with 4% formaldehyde solution. Olympus CX31 microscopes and Sedgwick-Rafter slides were used in studying species indentification. Species classsification of the samples was mainly based on Wongrat (1999a and 1999b).

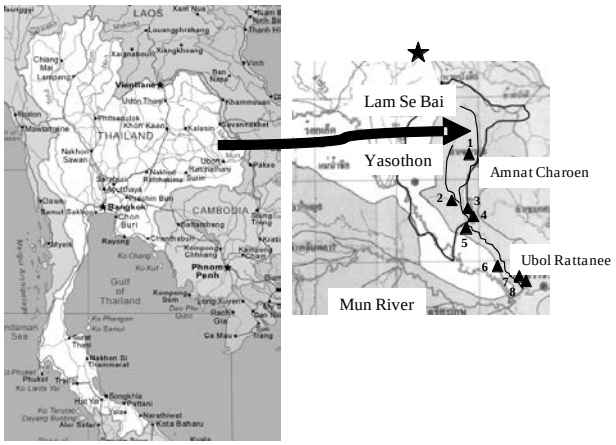

Fig. 1. Study site in Lam Se Bai

Results and Discussion

The study of plankton community in Lam Se Bai, we found 3 division phytoplankton, 54 genera, 109 species (Table 1). Most of species found belonged to Class Chlorophyceae (green algae) which had the highest number of species with 23 genera 51 species (47%), followed by Class Euglenophyceae (euglenoids) with 5 genera 19 species (17%), Class Bacillariophyceae (diatom) with 12 genera 16 species (15%), Class Cyanophyceae (blue green algae) with 8 genera 15 species (14%), Class Dinophyceae (dinoflagellates) with 3 genera 4 species (4%) and Class Chrysophyceae with 3 genera 4 species (4%), respectively (Fig. 2A).

Table 1. List of phytoplankton found in Lam Se Bai in dry season

Division Cyanophyta
Class Cyanophyceae
Order Chroococcales
Family Chroococcaceae
Chroococcus minutus (Kutzing) Naegeli
Chroococcus turgidus (Kutzing) Naegeli
Chroococcus sp
Gleocapsa granosa Kutzing (Berk)
Merismopedia punctata Meyen
Order Nostocales
Family Oscillatoriaceae
Lyngbya limnetica Lemmermann
Oscillatoria sp.8344
Spirulina sp. 8715
Family Nostocaceae
Anabaena sp.
Anabaena affinis Lemmermann
Anabaena occillarioides Bory
Anabaenopsis elenkinii V. Miller
Anabaenopsis raciborski Woloszynskt
Division Chlorophyta
Class Chlorophyceae
Order Volvocales
Family Volvocaceae
Eudorina cylindrica
Eudorina elegans Ehrenberg
Pandorina morum (Műller) Bory
Order Tetrasporales
Sphaerocystis shroeteri Chodat
Order Chlorococcales
Family Chlorococcaceae
Acanthospeara sp.
Ankistrodesmus sp.
Family Hydrodictyaceae
Pediastrum boryanum (Turpin) Meneghini
Pediastrum duplex Meyer
Pediastrum duplex var. *clathratum* (A. Braun)
Pediastrum duplex var. *gracilimum* West & West
Pediastrum simplex var. *duodenarium* (Bailey)
Family Coelastraceae
Coelastrum microporum Naegeli
Coelastrum scabrum Reinsch
Coelastrum sphaericum Naegeli
Family Botryococcaceae
Botryococcus braunii Kuetzing
Family Oocystaceae
Crucigenia apiculata (Lemmermann)
Crucigenia rectangularis (A. Braun) Gay
Crucigenia truncate G.M. Smith
Micractinium sp.
Oocystis elliptica W. West
Oocystis parva West&West
Oocystis sp.
Nephrocytium limneticum (G.M. Smith)
Tetraedron gracile (Reinsch) Hansgirg
Tetraedron trigonum (Naegeli) Hansgirg
Scenedesmus acuminatus (Lagerheim)
Scenedesmus denticulatus Lagerheim
Scenedesmus dimorplus (Turpin) Kutzing
Scenedesmus dispar
Scenedesmus obliquus (Turpin) Kutzing
Scenedesmus quadricauda (Turpin)
Selenastrum sp.
Order Ulotrichales
Ulothrix sp.
Order Zygnematales
Family Zygnemataceae
Spirogyra daedaleoides Czurda
Spirogyra gratina Transcan
Spirogyra weberi Kutzing
Class Euglenophyceae
Order Euglenales
Euglena acus Ehrenberg
Euglena ehrenbergii Klebs
Euglena spirogyra Ehrenberg
Lepocinclis ovum (Ehrenberg) Lemmermann
Lepocinclis sp.
Phacus helikoides Pochmann
Phacus longicauda (Ehrenberg) Dujardin
Phacus pleuronectes (O.F.M.) Dujardin
Phacus ranula Pochmann
Strombomonas australica Deflandre
Strombomonas girardidna Deflandre
Strombomonas fluviatilis Deflandre
Trachelomonas crebea Kellicatt
Trachelomonas dangeardiana Deflandre
Trachelomonas hispida (Perty) Stein
Trachelomonas mirabilis Swirenko
Trachelomonas oblonga Lemmermann
Trachelomonas similis Stokes
Trachelomonas superba Swirenko
Division Chromophyta
Class Bacillariophyceae
Order Pennales
Suborder Araphidinia
Family Diatomaceae
Synedra rumpens Kutzing
Synedra ulna (Nitzsch) Ehrenberg
Suborder Raphioidinia
Family Eunotiaceae
Eunotia sp.
Suborder Biraphidinia
Family Naviculaceae
Diploneis sp.1 8690
Entomoneis sp.
Frustulia javanica Hustedt
Gyrosigma sp.
Gomphonema parvulum (Kutzing) Grunow
Navicula sp.1
Navicula sp.2
Navicula bacillum Ehrenberg
Pinnularia gibba Ehrenberg
Diatom sp.8637
Family Nitzschiaceae
Bacillaria paradoxa Gmelin
Nitzschia sp.
Family Surirellaceae
Surirella robusta Ehrenberg
Class Chrysophyceae
Order Mischococcales
Family Sciadaceae
Centritractus belanophorus Lemmermann
Order Ochromodales
Mallomonas splendens (G.S. West) Playfair
Mallomonas sp.
Family Dinobryaceae
Dinobryon sp.
Class Dinophyceae
Order Peridiniales
Family Peridiniaceae
Peridinium sp.
Family Glenodiniaceae
Glenodinium sp.
Order Gonyaulacales
Family Ceratiaceae
Ceratium hircus Schroder

Table 2. List of zooplankton found in Lam Se Bai in dry season

Phylum Protozoa
Subphylum Sarcodina
Superclass Rhizopoda
Class Lobosa
Order Arcellinida
Family Arcellidae
Arcella discoides Ehrenberg
Arcella vulgaris Ehrenberg
Family Centropyxidae
Centropyxis sp.
Family Difflugiidae
Difflugia acuminate Ehrenberg
Difflugia urceolata Carter
Diffugia sp.
Class Filosia
Order Aconchulinida
Family Euglyphidae
Euglypha sp
Subphylum Mycetozoa
Superclass Acanthophractida
Class Heliozoa
Order Actinophryida
Family Actinosphaeridae Ehr.
Actinosphaerium eichhorni Ehrenberg
Subphylum Ciliophora
Class Ciliata
Subclass Holotricha
Order Gymnostomatida
Family Colepidae
Coleps sp.
Subclass Spirotricha
Order Tintinnida
Family Codonellidae
Codonella sp.
Family Codonellopsidae
Codonellopsis sp.
Class Oligohymenophorea
Subclass Peritrichia
Order Sessilida
Family Epistylidae
Epistylis sp.
Family Vaginicolidae
Pyxicola sp.
Family Vorticellidae
Vorticella sp.
Phylum Rotifera
Class Eurotatoria
Subclass Monogononta
Order Ploima
Family Brachionidae
Anuraeopsis coelata (Beauchamp)
Anuraeopsis navicula (Rousselet)
Brachionus angularis Gosse
Brachionus donneri Brehm
Brachionus caudatus Barrois and Daday
Brachionus falcatus Zacharias
Brachionus forficula Wierzejski
Colurella sp.
Keratella cochlearis Gosse
Keratella lenzi (Berzins)
Keratella tropica (Apstein)
Keratella valga Carlin
Macrochaetus sp.
Family Lecannidae
Lecane hastata (Murray)
Lecane leontina (Turner)
Lecane obtuse (Murray)
Lecane papuana (Murray)
Lecane signifera (Jennings)
Lecane thienemanni (Hauer)
Lecane sp. □□□□□□□
Lecane sp.
Family Notommatidae
Monommata sp.
Family Trichocercidae
Trichoceca capucina (Wierzn. And Zach.)
Trichoceca cylindrical (Imhof)
Trichoceca similes (Wierzejski)
Trichoceca sp.
Family Gastropodidae
Ascomopha sp
Family Asplanchnidae
Asplanchna brightwelli (Gosse)
Asplanchna sp.
Family Synchaetidae
Polyarthra vulgaris Carlin
Synchaeta pachypoda Jaschnow
Synchaeta sp.
Ploesoma hudsoni Imhof
Order Floscullariacea
Family Testudinellidae
Testudinella patina (Hermann)
Filinia camasecla Myers
Filinia longiseta (Ehrenberg)
Filinia opoliensis (Zacharias)
Filinia terminalis (Plate)
Family Hexarthridae
Hexathra sp.
Order Collothecacea
Family Collothecidae
Collotheca sp.
Phylum Arthropoda
Class Crustacea
Subclass Branchiopoda
Order Diplostraca
Suborder Cladocera
Family Sididae
Diaphanosoma sp.
Family Bosminidae
Bosminopsis deitersi Richard
Family Chidoridae
Subfamily Chydorinae
Alonella sp.
Unidentified Cladocerans
Subclass Copepoda (copepods)
Order Calanoida
Unidentified Calanoid copepods
Order Cyclopoida
Unidentified Cyclopoid copepod
Unidentified Copepod nauplius

The most diverse genus was *Trachelomonas* which was frequently occurred throughout the study with 7 species followed by *Scenedesmus* 6 species, *Pediastrum* and *Anabaena* 5 species. For zooplankton, we found 3 phylum, 34 genera, 63 species (Table 2). Most of species found belonged to Class Eurotatoria which had the highest number of species with 17 genera 42 species (67%), followed by Class Crustacea with 6 genera 7 species (11%), Class Lobosa with 3 genera 6 species (9%), Class Ciliata with 3 genera 3 species (5%), Class Oligohymenophorea with 3 genera 3 species (5%), Class Filosia with 1 genera 1 species (1%) and Class Heliozoa with 1 genera 1 species (1%), respectively (Fig. 2B). The most diverse genus was *Lecane* which was frequently occurred throughout the study with 7 species followed by *Brachionus* 5 species, *Trichocera* and

Keratella 4 species The genera of phytoplankton as *Chroococcus*, *Oscillatoria*, *Lepocinclis*, *Phacus*, *Strombomonas* and *Trachelomonas* were the most common species being found in all stations. As the genera of zooplankton as *Polyarthra* and *Diffugia* were the most common species being found in all stations (Fig. 3A and 3B). The varietion of plankton in the investigate site is not strong, unless station 7 (Upper of water gate of Amnat Cha roen weir) and station 8 (Lower of water gate of Amnat Cha roen weir), both investigates sites were separated by the water gates, found phytoplankton varietion of station 7 higer than station 8, because by the precipitate of sediment at upper site, effect on the high nutreint in water especially total ammonia. (Boyd. and Tucker. 1998).

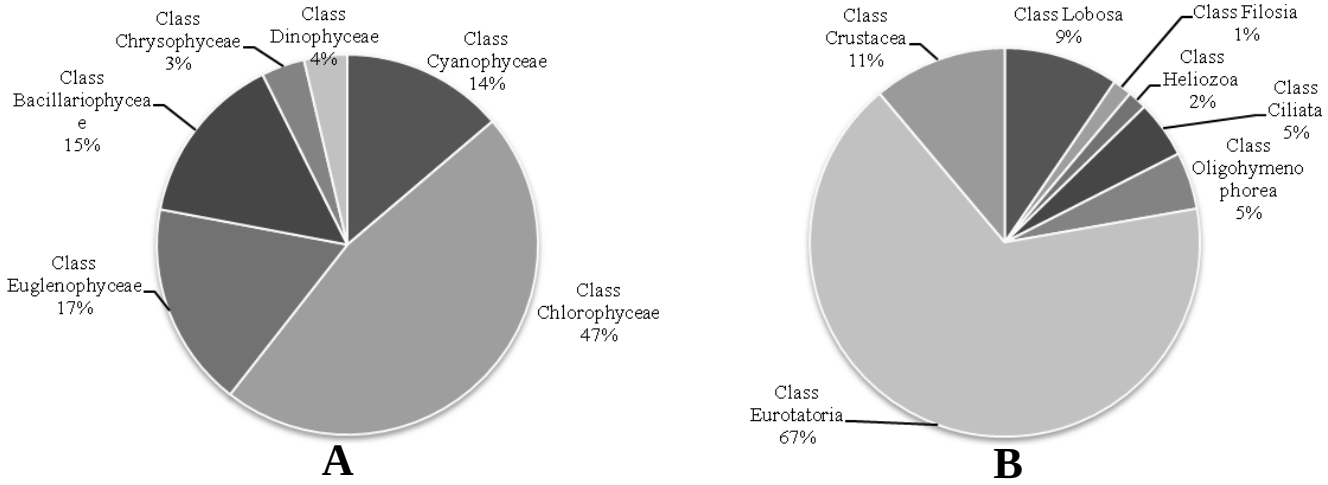

Fig. 2. (**A**) Taxonomic structure of the phytoplankton in Lam Se Bai, (**B**) Taxonomic structure of the zooplankton in Lam Se Bai.

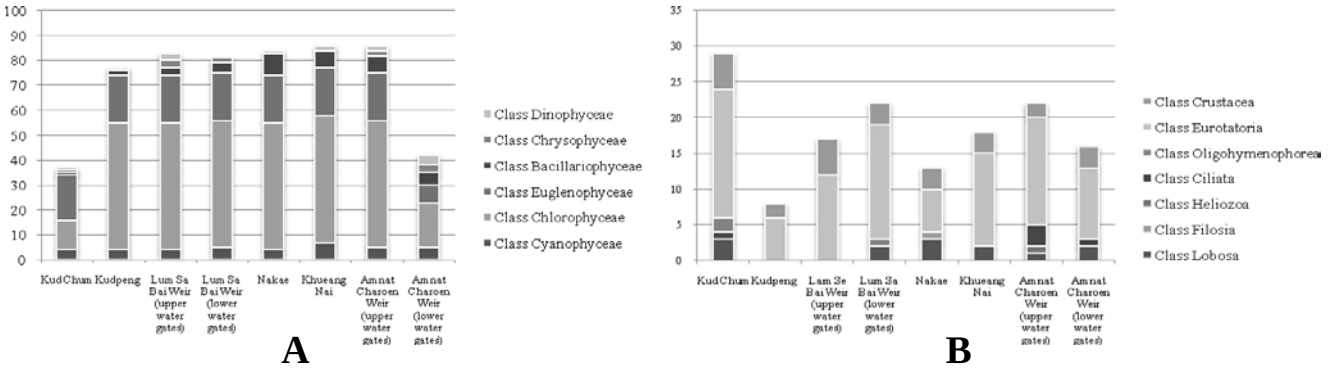

Fig. 3. (**A**) Spatial variations in species number of phytoplankton, (**B**) Spatial variations in species number of zooplankton.

Table 3. Comparison of water quality found in this study site

Station	BOD (mg/L)	Nitrite (mg/L)	Nitrate (mg/L)	Total Ammonia (mg/L)	Ortro Phosphate (mg/L)	Total Phosphate (mg/L)
Kud Chum	3.5	0.0054	0.0367	0.1337	0.0201	0.1355
Kudpeng	1.5	0.0098	0.0140	0.1891	0.0387	0.1093
Lam Se Bai Weir (upper water gates)	2.3	0.0042	0.0127	0.8158	0.0131	0.1051
Lum Sa Bai Weir (lower water gates)	2.0	0.0090	0.0509	0.1436	0.0221	0.1439
Nakae	1.2	0.0054	0.0147	0.1342	0.0304	0.1148
Khueang Nai	1.6	0.0062	0.0154	0.1254	0.0166	0.1093
Amnat Charoen Weir (upper water gates)	1.4	0.0057	0.0087	0.2648	0.0187	0.1065
Amnat Charoen Weir (lower water gates)	1.4	0.0056	0.0102	0.1186	0.0207	0.1037

Normally the water stream along Lam Se Bai is stopped in dry season, causes by no rainfall occured around the study site for long time, result on the suspended particles settle to bottom, effect on water qaulity especially the turbidity is very low and some investigates site found the transparentcy value could not detected (water depth is very shallow). The varietion of water quality that concerning about nutrient of plankton such as ammonia, nitrate and orthophosphate is slight. Water qaulity data that shown in

Table 3 is small value, because of the nutreint is absorbed by macrophytic algae that appeared along Lam Se Bai.

The taxon number of 109 species in phytoplankton, with the follow percentage: 47% Chlorophyceae, 17% Euglenophyceae, 15% Bacillariophyceae, 14% Cyanophyceae and 4% Dinophyceae and Chrysophyceae. And 63 species in zooplankton, with the follow percentage: 67% Eurotatoria, 11% Crustacea, 9% Lobosa, 5% Ciliata and Oligohymenophorea, and 1% Filosia and Heliozoa. The dominant species of phytoplankton were *Chroococcus*, *Oscillatoria*, *Lepocinclis* and *Phacus* was regularly observed all sampling station. As the dominant species of zooplankton were *Polyarthra*, *Difflugia* and copepod was regularly observed all sampling station.

The results provide useful knowledge on plankton community for further study (Rainning season) in Lam Se Bai, The studying on fluctuation of abandance of plankton all round year in Lam Se Bai lead to provide useful knowledge for primary productivity of this swanp area.

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