

# wetlands

vol.  
151

sungei buloh wetland reserve







COVER PICTURE:  
Hairy Foot Mangrove Spider  
*Idioctis littoralis*  
Mendis Tan, SOO, SBWR.

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Mendis Tan shares about his spider outing with three volunteers at Sungei Buloh Wetland Reserve.

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Kwok Chen Ko shows us the link between water quality and the rich bio-diversity of Sungei Buloh Wetland Reserve's flora and fauna

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Dadsforlife and Sungei Buloh Wetland Reserve started their first collaborative activity to foster better communication between father and child. Read about the activity here.

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This issue's volunteer feature is Ms Cai Hong Xia and Mr Wu Zhi Yuan; two of our passionate volunteers at Sungei Buloh Wetland Reserve!

## upcoming events

### 1. Public Exhibition of Sungei Buloh Masterplan Concept Design

19 June 2010 to 1 August 2010

The concept design of Sungei Buloh's master plan, which was first announced at SBWR's 15th Anniversary in December 2008, will be unveiled at this exhibition. Join us for a day of celebration, and take a first hand look at the plans for Sungei Buloh in the near future.

### 2. Free Guided Tour every Saturday

9.30am and 3pm

Limited to a maximum of 20pax per time slot

Call 6794 1401 or visit [www.sbwr.org.sg](http://www.sbwr.org.sg) for more details.

## A Day out Spider Hunting

Mendis Tan

Senior Outreach Officer,  
SBWR

Photos by Mendis Tan

Three volunteers and I were greeted by a bright breezy morning at Sungei Buloh Wetland Reserve, where the spider survey has been ongoing. It was time for a spider photo shoot at SBWR. The three volunteers, Robert Heigermose, Antonios Mak and Iris Li, helped to search for and photograph spiders as we walked along route one of SBWR.

The more we conduct research into spiders, the more we discover how important they are in maintaining a balance in the natural environment around us. Being highly adaptable, these predatory creatures can thrive in both urban and natural areas. This means that you can find spiders almost in all habitats as well as built up urban areas. At SBWR alone, there could be as many as 300 species. Here are some of the species we discovered while on this outing.

Mangrove Heavy Jumping Spider  
*Hyllus dardi* (Juvenile)



White & black Crab spider  
*Thomisus spectabilis*





# Water Quality in Sungei Buloh Wetland Reserve

Experimental work by Tan Yan Ting, Koh Hui Yan and Wang Zheng

You see quality assurance and quality control in television sets, mobile phones and cars. Why not water? After all, this precious resource covers about 70% of the earth. In this study, you get to explore the quality of water in Sungei Buloh Wetland Reserve (SBWR). Is the water as pristine as you hope or is it truly as polluted as you fear? Read on.

One key factor affecting the health of the ecosystem is water quality, especially since most of the reserve is periodically covered by brackish water. Up till now, little has been documented about this vital parameter. This study has the ambition of initiating a scientific approach to monitor SBWR's water quality on a regular and long term basis. No longer will you need to speculate what causes a sudden algal bloom because it can be pinpointed to the presence of nutrients showing up in the water quality.

Since we are working from the perspective of nature conservation, we shall focus our definition of water quality on that for the survival of the ecosystem. These water quality parameters were monitored - water temperature, pH, dissolved oxygen (DO), turbidity, phosphorus, nitrate, ammonia, chemical oxygen demand (COD) and *Escherichia coli*. Four sampling stations were selected to provide a reasonable coverage of SBWR and to monitor the 2 main streams – Sungei Buloh Besar and Sungei Bilabong Buloh (see figure 1). Monitoring was performed once a month from June to November 2008.

The water temperature measurements (25 – 31°C) were consistent with the ambient temperature range in Singapore.

Most literature cites a pH between 6 and 9 for optimum growth and health of aquatic organisms. (There are exceptions as aquatic life can adapt to an extreme environment over time.) The pH in SBWR was slightly alkaline, ranging from 7.2 to 8.4 because seawater exerts a significant influence.

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Two-Striped *Telamonia*  
*Telamonia elegans*

Malayan *Phaeacius*  
*Phaeacius malayansis*

Mangrove Big-jawed spider  
*Tetragnatha josephi*

Yellow-Lined *Epeus*  
*Epeus flavorbilineatus*



Figure 1





In general, a DO level of above 5mg/L is desirable for aquatic life. A DO of 1-5mg/L allows various fishes to survive but their metabolism and growth may be affected. Below 1.0mg/L, only small creatures such as worms and mosquito larvae can survive. From figure 2, several incidences of low DO (below 5mg/L) were recorded, with the lowest being 2.5mg/L. This calls for concern and further monitoring.

Turbidity measures the loss in transparency in water due to the presence of suspended particles such as phytoplankton and silt. Fishes start to experience stress when exposed to a turbidity of 10-100NTU (nephelometric turbidity units) for several hours. From figure 3, turbidity ranged from 3-36NTU, with an average of 12NTU.

Phosphorus has the potential to trigger an overgrowth of phytoplankton or nuisance macrophytes. Total phosphorus in surface waters seldom exceeds 0.5mg/L. However, a level of 0.005-0.5mg/L is already enough to cause phytoplankton blooms. From figure 4, phosphorus levels ranged from 0.05-0.42mg/L, with an average of 0.14mg/L. This warrants concern as the data suggest the possibility of unwanted blooms.

Like phosphorus, nitrogen can cause a phytoplankton bloom. Concentrations of 0.1-0.75mg/L nitrate + ammoniacal nitrogen in fresh waters or even less in saline waters have been enough for a bloom. From figure 5, nitrate + ammoniacal levels ranged from undetected to 1.73mg/L, with an average of 0.84mg/L. This makes blooms probable.

Ammoniacal nitrogen is normally less than 0.25mg/L in unpolluted waters. Higher concentrations may be due to sewage, industrial waste or fertiliser run-off. The un-ionised form of ammonia is toxic to fish and other aquatic animals. High pH, high temperature and low salinity increase the proportion of un-ionised ammonia. Un-ionised ammonia should not have any lethal or sub-lethal effects below 0.005-0.01mg/L (as nitrogen) for warm water fish species. From figure 6, it ranged from 0.002-0.021mg/L (as nitrogen), with an average of 0.010, implying a possibility of ammonia toxicity.

COD is a measure of organic pollution in water. Biodegradable organic pollutants require DO for aerobic decomposition, possibly lowering the DO to dangerous levels. COD ranges from 20mg/L or less in unpolluted waters to greater than 200mg/L in contaminated waters. From figure 7, the COD levels in SBWR ranged from 5-126mg/L, with an average of 41mg/L. The water could be considered weakly polluted.

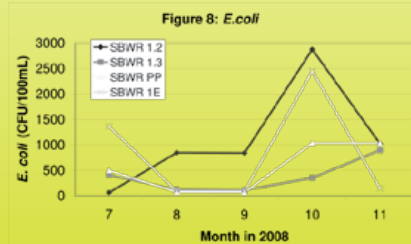
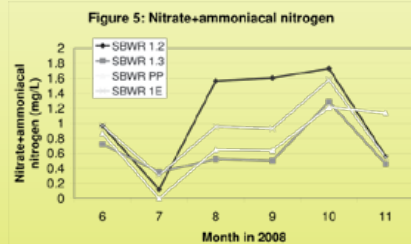
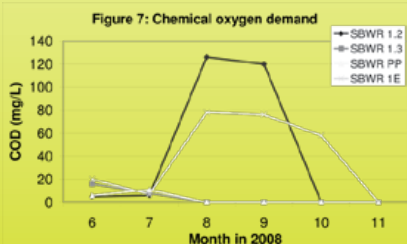
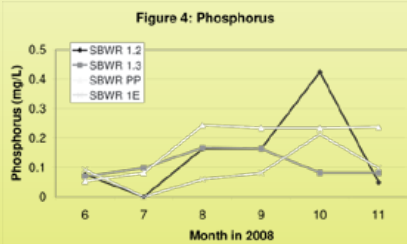
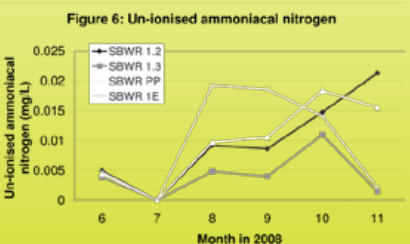
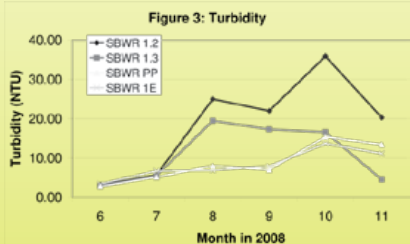
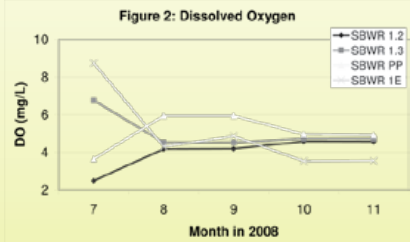
E. coli is commonly used as an indicator microorganism for faecal contamination. United States Environmental Protection Agency (USEPA) standards mandate a maximum of 1000 CFU (colony forming units) per 100mL sample for primary contact activities e.g. swimming, and a maximum of 5000 CFU/100mL for secondary contact activities e.g. boating. From figure 8, E. coli count ranged from 60-3000 CFU/100mL, rendering the water undesirable for swimming if you are game to try.

Overall, the water quality in SBWR was either relatively unpolluted or weakly polluted. Some concerns are raised regarding the levels of DO, phosphorus, nitrogen (ammonia and nitrate) and E. coli. Further monitoring of these parameters is recommended to decide if remedial action is necessary.

#### About the author:

Kwok Chen Ko is lecturing on environmental science in Singapore Polytechnic. He is always exploring new ways to bring nature into the classroom. Short courses on water quality monitoring for teachers and students are conducted by the author. You may email him at kwokck@sp.edu.sg or check out his water quality monitoring activities at [waterqualityinsingapore.blogspot.com](http://waterqualityinsingapore.blogspot.com).

As of this writing, Tan Yan Ting, Koh Hui Yan and Wang Zheng are final year students studying in the Diploma of Chemical Process Technology, Singapore Polytechnic.



Start of the morning



Fathers learning how to save a mangrove sapling



The children walk on mud. Most of them were doing this for the first time.



Father & child doing it together

Working at it as a team

# Dads for life!

Mendis Tan

Senior Outreach Officer, SBWR

Photos by Mendis Tan



A job well done! 67 saplings!

Dadsforlife and Sungei Buloh Wetland Reserve organised their first collaborative activity on 10 April 2010 at 8.30am. St. Hilda's Primary School pupils and their fathers, members of Dadsforlife, came to Sungei Buloh Wetland Reserve to complete a Mangrove Salvaging activity. Dadsforlife is a national fathers' movement that seeks to inspire, mobilise and involve fathers to become good influencers in their children's lives.

One of the main objectives of the activity was to foster father and child communication. The fathers were first taught how to salvage mangrove saplings from the mudflats of Sungei Buloh Wetland Reserve, by digging them up carefully from the mud, putting the saplings into planting bags and moving them to a nursery. They then taught their children to do the same and completed the activity together. In total, the group salvaged 67 mangrove saplings.

After the mangrove salvaging activity, the fathers and children took a leisurely walk back to the visitor centre, with a checklist of flora and fauna found in SBWR.

It was certainly a fruitful morning for SBWR as well as the participants! A picture tells a thousand words, so take a look at the photographs taken during this event.

A picture tells a thousand words, so have a look at the photographs taken during this event.



# Volunteer FEATURE

Name: Cai Hong Xia and Wu Zhi Yuan  
Volunteers as: Guided Tours in Mandarin,  
Origami workshops



Hong xia



Zhi Yuan

Thank you very much  
Hong Xia and Zhi Yuan!



Both of them in  
action during origami  
workshops



## Contributions:

Hong Xia and Zhi Yuan designed SBWR's first guided tour conducted in Mandarin. They are innovative and committed in providing quality service to visitors of SBWR. They both help to run the origami workshops monthly on Sundays.

Hong xia and Zhi yuan have been conducting origami sessions monthly at SBWR since October 2009. Origami is the Japanese art of paper folding. Both of them use this creative and interesting activity to teach participants about the behavior and some interesting facts about the creatures they are folding. Further, both of them pioneered the mandarin guided tours at SBWR. They volunteered to design and conduct the mandarin guided tours. Now, it is a popular guided tour amongst our visitors.

Text by Mendis Tan,  
Senior Outreach Officer, SBWR