# Freshwater Fish
# Field Study Report

**Site: Tsak Yue Wu and**
**Pak Tam Chung**

**St. Catharine's School For Girls, KT**

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# Introduction

We want to learn more about freshwater fishes, the many different species, how they are adapted to the freshwater environment and how abiotic factors affect their lives, etc. The project aims to arouse students' interests in biology. Through this scheme, we have the chance to come close to the nature and enjoy studying biology. Also, the field study provides us with a valuable opportunity to apply the skills and knowledge in real research. We can gain experience of exploring the field of biology.

On 13May 2006, we studied the ecology of fresh water fishes in two sites ----Tsak Yue Wu as the upper stream and Pak tam Chung as the lower stream. We measured the physical factors and collected some specimen respectively. We carried out discussion after the field trip. We studied the specimen, learnt about their adaptations, and investigated the relationship between the abiotic factors and the life of freshwater fishes.

# Study Method

We used a variety of methods to collect data.

## *Abiotic factors*

### Three in one detector

This detector is used to measure the oxygen level, salinity and the temperature of the water accurately.

## *Specimen collection*

### 1. Hand netting:

There are different sizes of hand nets which suit for different sizes of fishes. We can catch fish with the hand nets. It is simple and easy to handle.



### 2. Bank side counting:

We use inspection method to observe the characteristics of the fish and their physical parameters. We often use binoculars on the bridge to look down into the river and observe the body of the fish.

### 3. Pot trap

Traps are simple, passive fishing gear that allows fish to enter and then make it hard for them to escape. This is often achieved by putting chambers in the trap or pot that can be closed once the fish enters. The fish species that can be caught by this way depend on the type and eating habits of the fishes and the characteristics of the pot or trap or baits being used.

# Findings

## I. Abiotic factors

The physical factors of the two sites, Tsak Yue Wu and Pak Tam Chung, were recorded below:

| | Upper stream (Tsak Yue Wu) | Low stream (Pak Tam Chung) |
|---|---|---|
| Temperature | 26.88°C | 34.33°C |
| Salinity | 0.02% | 14.94% |
| pH | 7.4 | 8.1 |
| D.O(mg/l) | 9.38 | 7.1 |
| Depth(cm/m) | 25-30 | 7.5 |
| Width(m) | 4 | 3 |
| Flow | Slow | Slow |
| Water colour | Clear | Yellow |
| Odour | Odourless | Unpleasant |
| Turbidity | Clear | Slightly silted |
| Catchment landform | Lowerland stream | Estuary |
| Microhabitats | Shoals , open water , riparian vegetation | Pools |
| Water course bed : | | |
| Bare rock | / | 5% |
| Boulder | 5% | 5% |
| Rubble | 63% | / |
| Gravel | 10% | 17% |
| Sand | 9% | 20% |
| Silt/clay | 10% | 50% |
| Detritus | 3% | 3% |
| Concrete | / | / |
| Surroundings | | |
| Urbanized | Roads, countryside | Parks |
| Rural | Abandoned | Abandoned |
| Natural | Scrublands | Graveled |



Pak Tam Chung


Task Yue Wu

## II. Freshwater Fish Species

Different species of freshwater fishes were found in the two sites of study. They were recorded below with detailed descriptions.

### In upper stream (Task Yue Wu)

Seven different species of freshwater fishes were found in the upper stream.

1). *Parazacco spilurus* 異鱲

| | |
|---|---|
| **Family:** | Cyprinidae (Minnows or carps) |
| **Order:** | Cypriniformes (carps) |
| **Class:** | Actinopterygii (ray-finned fishes) |
| **Fish Base name:** | Predaceous chub |
| **Max. size:** | 11.0 cm SL |
| **Environment:** | benthopelagic; freshwater; brackish |
| **Climate:** | Subtropical |
| **Resilience:** | High, minimum population doubling time less than 15 months (Preliminary K or Fecundity.) |
| **Distribution:** | Asia. |
| **Morphology:** | Pale brown on back of the body; white on belly; tinged with red brown and irregular zones on sides of body; red on belly of the head and a dark round spot in base of caudal fin. A row of pelvic scutes from the base of pelvic fin to the anus; snout pointed sharply. Lateral line curves downward on trunk and upward back the central axis after expanding the caudal peduncle; dorsal fin short, without hard spine and its origin opposite behind the origin of the pelvic fin; anal fin well developed. |

*Parazacco spilurus(upper)*

2). *Nicholsicypris normalis* 擬細鯽

| | |
|---|---|
| **Family:** | Cyprinidae (Minnows or carps) |
| **Order:** | Cypriniformes (carps) |
| **Class:** | Actinopterygii (ray-finned fishes) |
| **Max. size:** | 10.0 cm TL |
| **Environment:** | Benthopelagic; freshwater; brackish |
| **Climate:** | Subtropical |
| **Resilience:** | High, minimum population doubling time less than 15 months (Preliminary K or Fecundity.) |
| **Distribution:** | Asia: China. |

*Nicholsicypris normalis*

3). *Liniparhomaloptera disparis* 擬平鰍

| | |
|---|---|
| Family: | Balitoridae (River loaches), subfamily: Balitorinae |
| Order: | Cypriniformes (carps) |
| Class: | Actinopterygii (ray-finned fishes) |
| Fish Base name: | Broken-band Hillstream Loach 平鰭鰍 |
| Max. size: | 8.0 cm TL |
| Environment: | Demersal; freshwater; brackish |
| Climate: | Tropical; 22 – 24°C |
| Resilience: | High, minimum population doubling time less than 15 months (Preliminary K or Fecundity.) |
| Distribution: | Asia. China. |
| Biology: | Occurs in babbling bottom of mountain streams. Length type refers to body length. |

*Liniparhomaloptera disparis*

4). *Schistura fasciolata* 橫紋南鰍

| | |
|---|---|
| Family: | Balitoridae (River loaches), subfamily: Nemacheilinae |
| Order: | Cypriniformes (carps) |
| Class: | Actinopterygii (ray-finned fishes) |
| Fish Base name: | Sucker- belly Loach 吸盤鰍 |
| Max. size: | 12.0 cm TL |
| Environment: | Benthopelagic; freshwater; brackish |
| Climate: | Subtropical |
| Resilience: | High, minimum population doubling time less than 15 months(Preliminary K or Fecundity.) |
| Distribution: | Asia: China. |
| Biology: | Occurs in rapid current of mountain streams. Length type refers to body length which is assumed to be in TL. |

5). *Rhinogohius giurinus* 子陵吻鰕虎魚

| | |
|---|---|
| Family: | Gobiidae (Gobies), subfamily: Gobionellinae |
| Order: | Perciformes (perch-likes) |
| Class: | Actinopterygii (ray-finned fishes) |
| Fish Base name: | Barcheek Goby |
| Max. size: | 8.0 cm TL |
| Environment: | Demersal; amphidromous ; freshwater; brackish; marine |
| Climate: | subtropical; 45°N - 22°N |
| Importance: | fisheries: subsistence fisheries |
| Resilience: | High, minimum population doubling time less than 15 months (Preliminary K or Fecundity.) |
| Distribution: | Asia: China, Korean Peninsula, Taiwan, and Japan and Viet Nam. |
| Morphology: | Dorsal spines (total): 7 - 7; Dorsal soft rays (total): 8 - 8; Anal spines: 1; Anal soft rays: 8 |
| Biology: | Found both upstream and in estuaries. Carnivorous. Spawning season from July to October. Eggs are laid under stones in river shoals. Larvae travel in both river and the sea, and return to rivers from September to November. Caught by small trap nets in rivers, but not in abundance. |

Picture (Rhgiu_u1.jpg) by Kim, I.-S.

*Rhinogobius giurinus*

6). *Puntius semifasciolatus* 五線無鬚鮅


Picture (Puscm_u2.jpg) by Teigler, F.

| | |
|---|---|
| Family: | Cyprinidae (Minnows or carps) |
| Order: | Cypriniformes (carps) |
| Class: | Actinopterygii (ray-finned fishes) |
| Fish Base name: | Chinese barb |
| Max. size: | 7.0 cm TL |
| Environment: | Benthopelagic; freshwater; pH range: 6 – 8; pH range: 5 - 19; depth range 0 – 5 m |
| Climate: | Subtropical; 18 – 24°C; 24°N - 20°N, 102°E - 108°E |
| Importance: | Aquarium: commercial |
| Resilience: | High, minimum population doubling time less than 15 months(tm<1; multiple spawning per year; Fec=300) |
| Distribution: | Asia: Red River basin, southwestern China, including Hainan. Widely transported around the world. |
| Morphology: | Body with 4-7 narrow bars, more or less complete or dissociated into series of spots; complete lateral line; last simple dorsal ray serrated posteriorly; yellowish in color. |
| Biology: | Feeds on worms, crustaceans, insects, plant matter and detritus. Aquarium keeping: in groups of 5 or more individuals; minimum aquarium size 60 cm |

7). *Rasbora steineri* 斯氏波魚

| | |
|---|---|
| Family: | Cyprinidae (Minnows or carps) |
| Order: | Cypriniformes (carps) |
| Class: | Actinopterygii (ray-finned fishes) |
| Fish Base name: | Chinese rasbora<br>頭條波魚 |
| Max. size: | 10.0 cm TL |
| Environment: | Benthopelagic; freshwater; pH range: 6 – 6.5; dH range: 10 - 15 |
| Climate: | Tropical; 22 – 24°C |
| Importance: | Aquarium: commercial |
| Resilience: | High, minimum population doubling time less than 15 months (Preliminary K or Fecundity.) |
| Distribution: | Asia: Laos, Viet Nam and southeastern China. |
| Morphology: | Having a narrow (width less than 1 scale row) dark lateral stripe from opercle to end of median caudal rays; dorsal fin without blotch; 4 1/2 scales between lateral line and origin of dorsal fin. |

## In lower stream (Pak Tam Chung)

Only two species of freshwater fishes were found in the lower stream.

### 1.) *Bathygobius fuscus* 深鰕虎魚

| | |
|---|---|
| **Family:** | Gobiidae (Gobies), subfamily: Gobiinae |
| **Order:** | Perciformes (perch-likes) |
| **Class:** | Actinopterygii (ray-finned fishes) |
| **Fish Base name:** | Brown Frillfin Goby |
| **Max. size:** | 12.0 cm TL |
| **Environment:** | Reef-associated; amphidromous; freshwater; brackish; marine |
| **Climate:** | Tropical; 30°N - 30°S |
| **Importance:** | Fisheries: minor commercial |
| **Resilience:** | High, minimum population doubling time less than 15 months (Preliminary K or Fecundity.) |
| **Distribution:** | Indo-Pacific: Red Sea south to Bazaruto, Mozambique and east to the Line and Tuamoto islands, north to South Korea and southern Japan, south to the southern Great Barrier Reef. Does not occur in the Hawaiian Islands. |
| **Morphology:** | Dorsal spines (total): 7 - 7; Dorsal soft rays (total): 9 - 91; Anal spines: 1; Anal soft rays: 8. Dorsal fin plain and often with wide stripe. |
| **Biology:** | Inhabits shallow rocky areas, often in pools of the intertidal zone (Ref. 2798). Occurs mostly in coastal areas. Also found in estuaries, tidal zones and often ascending into freshwater streams. Sometimes seen as fresh catches at markets |

Picture (Bafus_u1.jpg) by Randall, J.E.

AquaMaps |

2). *Periophthalmus modestus*彈塗魚

| | |
|---|---|
| Family: | Gobiidae (Gobies), subfamily: Oxudercinae |
| Order: | Perciformes (perch-likes) |
| Class: | Actinopterygii (ray-finned fishes) |
| Fish Base name: | Shuttles hoppfish |
| Max. size: | 10.0 cm TL |
| Environment: | Demersal; freshwater; brackish; marine |
| Climate: | Subtropical |
| Importance: | Fisheries: of no interest; aquarium: commercial |
| Resilience: | High, minimum population doubling time less than 15 months (Preliminary K or Fecundity.) |
| Distribution: | Northwest Pacific: Hong Kong, northward to Korea and southern Japan. |
| Biology: | Intertidal, actively shuttling back and forth between rock pools and air. Breathes air when out of water. Can stay out of the water for up to 22-60 hours if kept moist. Found in estuaries, swamps, marshy areas and tidal mud flats. Moves around briskly on land preying on small animals. Used in Chinese medicine |

## III. Adaptation Of freshwater fish

Freshwater fishes were well adapted to their living habitat, freshwater stream. They have the following adaptations:

**1).Head**

Particular palpuses can be found near the mouth of several species of freshwater fish. These palpuses help sensing when the fish are swimming or looking for food. Carp is one of the species having palpuses near their mouths. Examples: Schistura fasciolata.

Different types of fish have different kinds of mouth. Fish live near the bottom of the river have ventral mouth, which is good for eating things on the surface of the river bottom. Most of the time they like to stick to the bottom of the river, or even hide under the boulders. Fish live in the middle level of the river have dorsal mouth. They swim quite a lot in the river. Some fish have terminal mouth, too.

**2).Body**

Almost all of the fish's bodies are covered with scales. Scales not only protect the bodies of the fish, but also provide camouflage to the fish. There are some pigment-containing cells on the scales. The colours of fish vary with the concentration of pigments inside the cells.

Besides, there are lots of sensory cells forming a 'side line' on the fish's body, which helps sensing chemicals, water currents and vibrations, in order to protect the fish from being harmed.

Freshwater fish have stream-lined bodies, which reduces the friction between their body surface and the water, to save energy when swimming.

**3).Fins**

i. Single fins

Single fins of fish include dorsal fin, anal fin and caudal fin. Fish move their caudal fin when swimming, and at the same time maintain balance using their dorsal fin and anal fin.

One thing to note, that is, the anal fin of some species has adapted for reproduction use. For instance, the anal fin of male Parazacco spilurus is extraordinarily large, which is used to dig the river bottom after copulation for the female fish to hide its eggs.

ii. Double fins

Double fins of fish include pectoral fins and pelvic fins. These fins help maintain balance in the water. The pectoral fins allow the fish to stop or do backward motions. For some particular species, the pelvic fins are fused together, forming a sucking disc, which help the fish to stay at the river bottom even when the water current is rapid. Rhinogobius giurinus is one of the species having the characteristics stated above. Examples: Liniparhomaloptera disparis, Rhinogobius giurinus, Schistura faciolata, Periophthlmus modestus.

# Discussion

It is found that there are greater number and variety of fishes collected in the upper stream than in the lower stream. It may due to the following reasons.

1. Temperature

   It is found that lower stream had a much higher temperature than lower stream. And there were much more species of freshwater fishes we could find in upper stream than lower stream. We ponder if temperature affects fishes' level of activities and thus their distribution.

2. Salinity

   Upper stream had a lower salinity than upper stream. Different levels of water salinity exert a varying degree of osmotic pressure on fishes. If the osmotic pressure exceeds a tolerable level, the fishes will die. The high salinity of lower stream may not be suitable for freshwater fishes to live in, so less fishes can be found there.

3. PH

   Upper stream had a pH of 7.4. The PH is near neutral and it is suitable for freshwater to live in. Freshwater fishes can't live in extreme PH. because the extreme PH may damage the gill membrane and affect them to breathe.
   On the other hand, lower stream had a pH of 8.1. The PH is slightly alkaline.

4. Dissolved oxygen

   Upper stream had a higher concentration of O2 in water. Since oxygen is essential to aquatic lives, more fishes can be found here.
   On the other hand, lower stream had lower concentration of O2 in water. There are less fishes found in the upper stream.

5. Depth

   Upper stream is deeper than lower stream and a better habitat for fishes.

6. Odour

   Upper stream was odourless. It shows that the upper stream is clean while lower stream had unpleasant smell. The bad smell may be produced by the anaerobic activities of bacteria in the stream.

7. Turbidity

   Upper stream is clear while lower stream was turbid. Since there are more plants grow near the river and the roots of the plants hold the soil and make the water clear. On the other hand, since there are fewer plants holding the soil in the lower stream. This makes the water become yellow and we can't see the river bed clearly. Fishes seem to prefer clear water to live in.

8. Weather

   A typhoon was approaching when we did the field study. This may also be one of the reasons why there were so few fishes found in the lower stream as the lower stream was near to the sea and was thus greatly affected by the changing weather.

## Our photos and feelings

I am glad that I can take part in this trip. I had a lot of fun during the activity.
In fact, I can learn a lot about the fish in Hong Kong and I love this trip very much. This is a valuable experience to me.

BY Carkey

I can learn more about freshwater fish from this trip and the introduction about freshwater fish is very nice. But this trip is a little bit short. If it is longer, we can learn more.

BY BONNIE

This field trip makes us increase the knowledge of fresh water fishes and allows us to have a leisure time in that afternoon. However, I think the time for us to learn and digest the knowledge is not enough. I think if the number of time for us to learn about these fishes increase, the consequence will be better.

By Tsang Yee Ting

This trip was really unforgettable. I had lots of fun. I have never caught fish in the river before. I wonder that the water there is so clear. In this trip, I have learnt how to distinguish different kinds of fish, and what is their suitable living environment. The most important thing is I have experienced the beauty of nature. We must love and protect this beautiful nature!!

BY SZEKI

The trip was really funny. There were many fishes and they were big. I had caught a lot of fishes :) But the trip will be better if we can eat the fishes. :P

BY RACHEL

It was very interesting to catch the fish in the stream. the fish is really cute and very different from each other. it makes me hard to remember their name and identify them. But this is still a good trip. I've leant a lot from it.

By Tam Wing Sze

It was so happy that i could join this biology trip. I had a lot of fun and I have learnt different kinds of fish .Also I have learnt a new method to catch the fish--pot trap. It was so interesting!

By Fanny

It is a precious experience for us that we shall do survey in a clear water river and catch fishes by hands! You can never image that there is a great variety of fish living in the river in HK.

By Ca

I think the trip is very useful. I can know many new species of the fish. Also, I have learnt many new methods and skills to catch the fish. The explanation of the tutor is very clear and detail, that make me easily to understand. However, I think there is not enough time for the trip, I hope it will be longer next time.

By Sze Mei

I think that we can learn a lot about the habitat in the fresh water stream.The fishes are quite cute but I can't identify some of them immediately at all. If we have longer time in the lower course of the river, it will be much better.

By Ng Ka Yan

This trip, we go to observe the lives of some special species of fishes in Hong Kong, I can learn a lot of things about our environment. For example: the relationship between the fishes and the location of the river (upper stream or lower stream) and other abiotic factors. The most interesting thing is that we can try to use those high-tech equipments that we haven't seen before to measure the pH value of the river, etc.

BY KELLY

Source: http://filaman.ifm-geomar.de/search.php