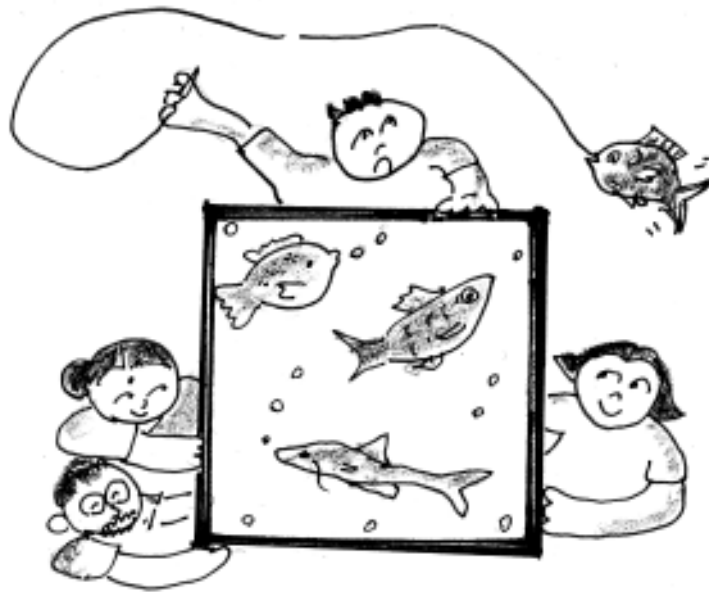


Creative Lesson Plan on

# Fish



for teachers, educators and community workers

ENRE

(Ecology and Natural Resource Education Programme)  
Development Research Communication & Services Centre

### **'Creative lesson plan on Fish' (Selections from 'Basbhumi' : booklet - 10)**

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Drawing of fish ▶ is from 'Freshwater Fishies of Peninsular India' (R.J. Ranjit Daniels / University Press, 2002)

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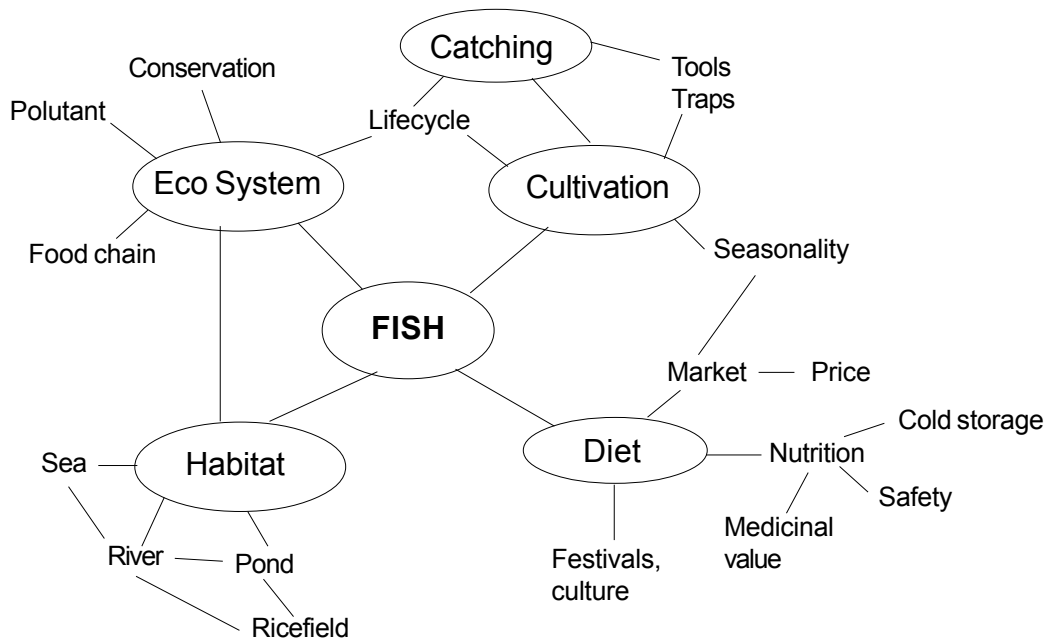
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# Dear Teachers, educators, community workers, and parents —

It is said that India has about 2,500 species of fish which are 11.7% of fish species in the world. Among India, as Bengal is called 'the land of *Maach* (fish) & *Bhaat* (rice)', fish is very popular diet in West Bengal. Diversities of water bodies existing in the landscape of West Bengal offers wider variety of fishes too.

In this booklet, we are going to focus on the relationship between fish and its environment along with observation and survey of locally available fish. Through step-wise lesson plan activities, children will be able to understand that fishes have important roles in each habitats, ponds, rivers, and rice fields etc. To study about fish is to learn about those ecosystems and its conservation.

The following topic map is showing some idea how teachers/facilitators can expand lesson plan on fish.



## How a Lesson Plan can be 'Creative' —

A good lesson plan should provide the opportunity of discovering and searching out facts by the children themselves. Children can choose their own learning process and context. The teachers need to facilitate it only, rather than imposing an uniform style for all. The reason we call this 'creative' is, this kind of lesson plan can not only enhance the children's knowledge but also widen their 'perception'. Perception means How children look around their world ... this is an important goal for children as learners and future citizens.

### **Creative Lesson Plans should have the following aspects**

- ✓ **Starting from what children already know and what children have experienced / felt.**  
These help to create and enhance children's interest about the topic.
- ✓ **Having the overall goal related to 'Social / Environmental Issue' and 'Scientific attitude'.**  
Setting up these goals help to be aware that they can also do something to improve their environment and solve some of the social problems.
- ✓ **Children should have fun and enjoy the moments of discovery in their learning process.**
- ✓ **Activity should link the classroom and community.**  
This is essential for Environmental Education, as we need more and more people's initiatives for better environment.
- ✓ **Using active and group based learning methods** by encouraging children's involvement in group.
- ✓ **Using local materials and examples for activities.** You can also make the activities low cost and eco-friendly by using waste materials.



*asking good questions  
is much more important  
than seeking answers*



*'Link the classroom  
and community'*

# Fish

## ■ Overall goal

Through a series of activities children will be able to identify fish they eat and observe in their locality. They are encouraged to understand fish has close connection with environment and often work as an indicator to point degradation of ecosystem. Some initiatives and actions among children to protect water bodies from pollutants such as wastes or agricultural chemicals are most welcome to conserve fishes as natural resources and valuable food.

## ■ Activity Steps








### Step 1 Preparatory work

to build children's interest and to know what children already know. Children collect information / data through own observation and inquiry to family members & local community members.





#### Activity (A)

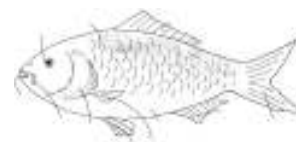
'About Fish Which Children Like Most to Eat'

-  for both rural & urban schools
-  class 5 to 7
-  keeping record, listing, searching information, ranking, categorizing, making profile
-  Math (average calculation), Art (drawing)
-  2-3 periods (1½ hours / period) & home work

#### Activity (B)

'My Experience with Fish'

-  for both for rural & urban schools
-  class 5 to 7
-  brain storming, keeping record, listing, searching information, categorising, making Profile, language (describing), art (drawing)
-  2-3 periods (1½ hours / period)



### Step 2 Review & Make Sure

to make a platform for further activities, organise a discussion with children to summarize & review preparatory work. Discuss about missing information and make sure that Children have →

### ■ Changes Expected

- Increasing variety of fish in children's diet
- Giving importance to locally available fish
- Re-valuing disappearing / decreasing fish variety in each locality
- Awareness & action towards water body conservation



### Step 3 Investigation/Project Work

to create child-oriented activity. Children can apply their collected information into designing studies which are meaningful for the community.

#### Activity (A)

##### 'Ask Fisherman'

- ☑ mainly for rural schools, but its possible for urban schools where there are ponds nearby

🕒 class 7 to 9

- 🔗 information collection, interviewing, mapping, group work, making chart

#### Activity (B)

##### 'Making a Pond in a School Yard'

- ☑ for both urban & rural schools

- 🔗 observation, designing, drawing, group work, gardening

➔ learnt necessary points for the next step. Encourage childrens to raise further question and to take initiative towards finding solutions.

### Key Concepts which you can develop through the activities

Keywords	Step 1		Step 2	Step 3		Resource Page
	(A)	(B)	(Make Sure)	(A)	(B)	
Fish species / variety	✓	✓		✓		✓
Habitats of fish	✓	✓	✓			✓
Fish anatomy	✓		✓			
Fish in diet / nutrition			✓			
Fish and ecosystem			✓	✓	✓	✓
Fish and Conservation				✓	✓	✓
Fish Cultivation				✓	✓	✓

## We got feedback from different Groups —

All the lesson plans included in this booklet were developed by ENRE team and tried out (and sometimes modified) by the teachers and children's groups of ENRE network. The teachers had tried out each activity with their students (targeted class 4-9) in their class or as extra curricular. You can see the survey results and children's work examples after each lesson plan. We hope these feedbacks help to create your motivation to conduct each activities and reflect them in your way.

We got feedback from different groups affiliating ENRE partner organisations. Some survey results were also shared by other projects of DRCSC. Most trials were carried during 2001-2004.

### MPEC (Multi Purpose Education Centre) project / DRCSC

There are 4 centres working for pre-primary school children, adolescent, and mothers groups for aiming to improving community livelihood and economical situation. Youth group of MPEC - Shimulberia in Bankura district report their experience of fish cultivation in village ponds.



### Kajla Group, East Medinipur District

The area is located in the coastal area and regularly hit by cyclones. Agriculture, small scale industries and fisheries are the main sources of livelihood of this area.



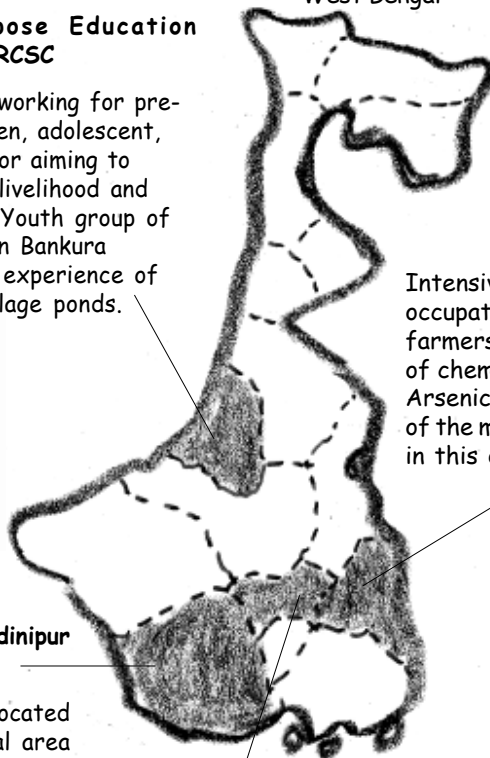
### Chandannagore group

Hooghly district (home-based activity)

Chandannagore is a small town and located on the bank of Ganga river. Many trees and ponds are seen like in other towns in this district. Many commuters go to Calcutta everyday by train from here.



West Bengal



### Swanirvar group

North 24 Parganas district

Intensive agriculture is the main occupation of this area and the farmers used to apply large amounts of chemical fertiliser & pesticide. Arsenic in the ground water is one of the major environmental problem in this district.





Step - 1  
Preparatory Work



for growing children's interest

 **Lesson Plans**

 **Feedbacks**



# Fish

## Step 1 — Preparatory Work — Activity (A)

### 'About Fish Which Children Like Most to Eat'

What kind of fish do children eat at home ? Do they like fish ? Encourage children to know about fish they eat.

[ 🏠 for both rural & urban schools 😊 class 5 to 7 ✍️ keeping record, listing, searching information, ranking, categorizing, making profile, 📖 Math (average calculation), Art (drawing) ⌚ 2-3 periods (1.5 hours per period) & home work ]



### Objectives

- To create children's interest on fish through their daily food habit.
- To know about the present situation of children's diet in relation with fish.
- To be able to recognise fish which children eat commonly by name and type such as sea fish, river fish, and pond fish.



### Success Indication for Proceeding to the Next Step

- Children are interested to know more about each fish (on its life cycle, habitat, seasonality, way of cultivation and the trading process – how fishes are to be brought in the market / shop etc).
- Children realized various cooking methods of fish and various part of fish can be cooked and eaten. (This can be a motivation to learn about body structure of fish.)



## Activity



### Creating Interest and Motivation

- Ask the children how often they eat fish at home. [everyday, 2-3 days / week, once in a week, Once in 10-14 days, None (as vegetarian).]
- Ask the children whether they like to eat fish or not ? If they don't like fish, ask the reason, too.

like very much		so so		don't like
like		not so much		
[why ?]		[why ?]		[why ?]

- Ask the children which parts of fish do they like or don't like to eat.



### Collecting Information (through children's experience)





- Ask children to list up fish they eat commonly, and rank them according to their favourite order.
- Ask children to keep record for one week what fish they ate. Children are asked to write down,
  - name of fish
  - from where it comes (purchased from market? caught from nearby pond / river?)
  - how it was cooked ?
  - whether they liked it or not ?



## Summarizing Information

- Compare the data in general & record for one week. Discuss with children how 'Fish Ranking List' can be made.

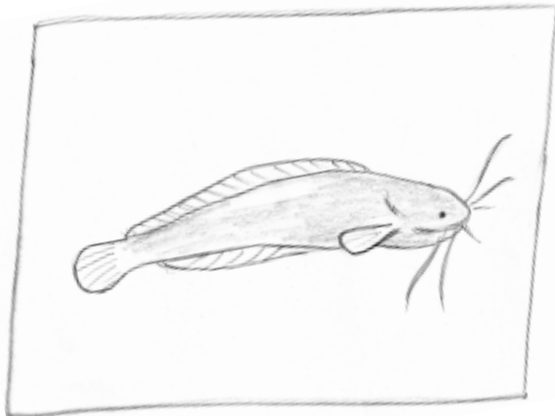
example : [Data for 20 children class VI]

Name of fish	Favourite ranking	Popular for eating	Cooking method
A 	1 (18)	2 (32)	fry, curry
B 	2 (15)	1 (21)	soup
C 	3 (10)	3 (18)	.....
D 	4 (8)	4 (15)	

number of students

number of times they consumed during a week

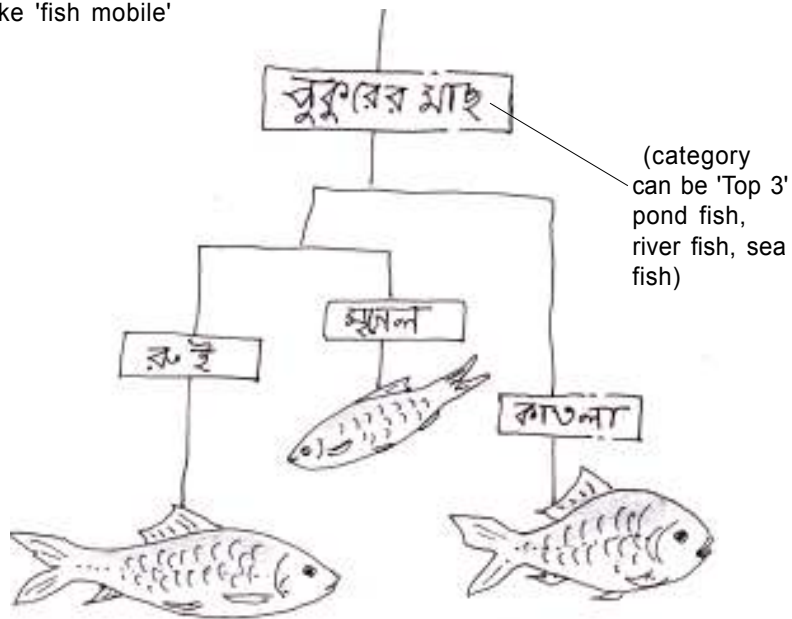
- Divide children into group for further studying on each fish. They can collect information from books, text book, internet etc. 'Fish profile can be made for each fish appeared on the list.



On the back of the card the following information can be written

- name of fish
- category according to its habitat : pond / river / sea fish
- what they eat
- popular season for eat
- price in local market Rs. / kg
- our favourite ranking

- Make 'fish mobile'



## Initial Conclusion and Further Question

- Based on the result of information collected by children, discuss with children why we eat fish. Pick up children's opinion and encourage them to think about nutritional value of fish and the reason why Bengali people love fish so much. [see step 2 & Expert's view note]
- Beside the listed fish through this activity, encourage children to list up more according to each different habitat such as pond / river / sea / rice field.
- Children are requested to write down what they have learnt and discovered through this activity. Also they can write down what they want to find out more about fish.

## Feedback

### Step 1 – Activity (A)



This 'Top 10' choice is common activity to introduce the topic to the children. Through this activity, children must increase their attention toward fish which they eat. Also this activity helps to identify common fish in own area.

To identify fish appeared in the following feedback, please refer the 'Fish List' (Page 73) in Resource section.



### Feedback Summary

ENRE Partner organization (District)	Swanirvar (North 24 Parganas)	Swanirvar	Kajla Janakalyan Samity (East Mednipur)
<b>Village</b>	Kalsur, Andharmanik	Chandaalati	Hinchi
<b>School/ Group</b>	G.D.S	KKB	Hinchi Bidhyasagar, KKB
<b>Students</b>	Total 29 (12 girls & 17 boys)	Total 34 (28 girls, 6 boys) into 2 groups	Total 20 (7 girls & 13 boys)
<b>Class</b>	Class 4-9	Class 5-9	Class 5-7
<b>Teacher's name</b>	Subhankar Bhabak	Fazlur Rahuman	Shek Jabak Ali
<b>Activity duration (Class periods)</b>	August 2003	Strating 4th June, 2003 Class - 6 periods (2hrs / period)	



## Results

### Fish which Children Eat

- 5 records are shown as examples from GDS, Swanirvar. We can see that children eat 3-4 kind of fish in average 4 days per week. The name of fish in their records are; **Punti, Pona, (Kata Pona), Tilapia, Bata, Mrigel, Grass Carp, Chyang, Gutel, Lyata**

☺ Rani Mondal (10-16th August, 2003) : 4 kinds of fish, 5 days / week

Date	Name of fish	From where	Cooking
10.08.03	<b>Punti &amp; Pona</b>	Pond + Cannel + Padma	<i>Punti</i> - Fry <i>Pona</i> - Curry
11.08.2003	-	-	-
12.08.03	<i>Kata Pona</i> (Common carp)		Kalia
13.08.03	<i>Kata Pona</i> (Common carp)		Curry
14.08.03	-	-	-
15.08.03	<b>Tilapia</b>	Pond	Curry with brinjal
16.08.03	<b>Tilapia</b>	Pond	Curry

☺ Rakesh Parui (11-17th August, 2003) : 3 kinds of fish, 4 days / week

Date	Name of fish	From where	Cooking
11.08.03	-	-	-
12.08.03	<b>Bata</b>	Pond	Fry & Curry
13.08.03	<b>Bata</b>	Pond	Curry
14.08.03	<b>Punti</b>	Cannel	Fry & Curry
15.08.03	-	-	-
16.08.03	-	-	-
17.08.03	<b>Mrigel</b>	Pond	Curry

☺ Subhajit Bhabak (10-16th August, 2003) : 3 kinds of fish, 4 days / week

Date	Name of fish	From where	Cooking
10.08.03	<b>Grass Carp</b>	Pond	Curry
11.08.2003	<b>Grass Carp</b>	Pond	Curry
12.08.03	-	-	-
13.08.03	<b>Bata</b>	Pond	Fry & Curry
14.08.03	<b>Tilapia</b>	From Market	Curry
15.08.03	-	-	-
16.08.03	-	-	-

☺ Tuphan Mukta (20-26th August, 2003) : 3 kinds of fish, 4 days / week

Date	Name of fish	From where	Cooking
20.08.03	<b>Mrigel</b>	Pond	Curry
21.08.2003	Various small fish	Padma	Fry
22.08.03	-	-	-
23.08.03	-	-	-
24.08.03	<b>Chyang</b>	Padma	Curry
25.08.03	<b>Chyang</b>	Padma	Curry
26.08.03	-	-	-

☺ Tuphan Mukta (20-26th August, 2003) : 3 kinds of fish, 3 days / week

Date	Name of fish	From where	Cooking
20.08.03	-	-	-
21.08.2003	<b>Gutel</b>	Padma	Fry
22.08.03	<b>Lyata</b>	Padma	Curry
23.08.03	-	-	-
24.08.03	-	-	-
25.08.03	<b>Punti</b>	Padma	Fry
26.08.03	-	-	-

- 20 children from KKB, Swanirvar gave information what they ate during one week and they summarised it as below.

Day	Fish (number of students)
Sunday	<b>Tilapia</b> (5) <b>Rui</b> (1) <b>Silver carp</b> (4)
Monday	<b>Silver carp</b> (9)
Tuesday	<b>American carp</b> (3)
Wednesday	<b>Tilapia</b> (15) <b>Rui</b> (4) <b>Prawn</b> (1)
Thursday	<b>Kata pona*</b> (7), <b>Bata</b> (3)
Friday	<b>Kata pona*</b> (2), <b>Tilapia</b> (3)
Saturday	<b>Tilapia</b> (13), <b>Bata</b> (2), <b>Rui</b> (3)

\* *Kata* means pieces of fish, *Pona* means any three kinds of fish (*Rui*, *Katla*, *Mrigel*) which are very common in West Bengal.



▶ *Rui*



▶ *Mrigel*

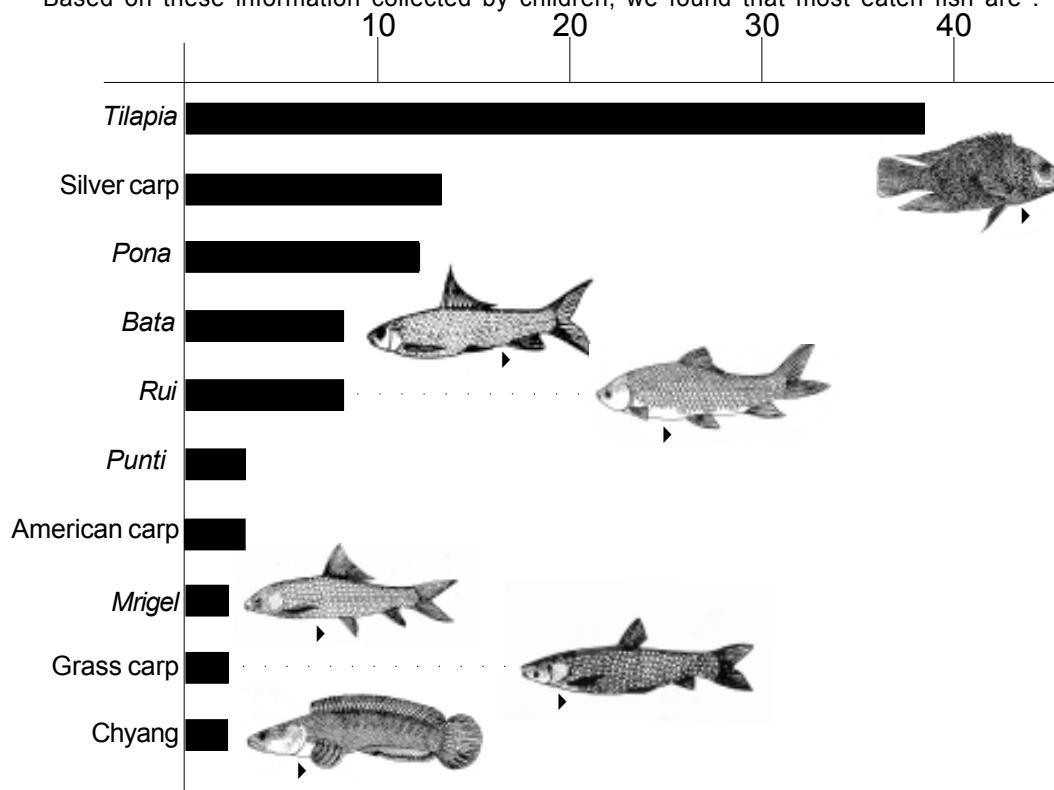


▶ *Katla*



## ENRE :

Based on these information collected by children, we found that most eaten fish are :



## Children's Favourite Fish

- Several students described 'My favourite fish' with some drawings.

### ☺ **Manaka Parvin (girl student, KKB, Swarnirvar)**

My favorite fish is **Tilapia**. The body colour of **Tilapia** is blackish ash, it has 7 fins and eats small water plants (plankton), cow dung, insect, chicken dung, cooked rice etc. It has scale. It belongs to fresh (mishiti) water fish, and no seasonality of cultivation or propagation.

**Tilapia** are moving together with babies. Eggs stay around its gill, then if other fish attacks babies then it hides them inside the gill. There are two types, one is **Tilapia** which is tasty and the other is **Nailontika** which is not so tasty, but become bigger in size. The merit of **Tilapia** is they eat egg of mosquito and insects, they are edible and people can earn money by cultivating them. The demerit of **Tilapia** is that Male **Tilapia** eats baby fish.

### ☺ **Ashadus (class 6, KKB, Swarnirvar)**

Fish I know: **Tyangra, Bata, Khalshe, Mural, Tilapia, Nailontika, Khoira, Techokha, Shating, Kekle, Mrigel**

The fish I ate last two weeks: Sunday - **Rui** (curry with vegetable), Monday - **Lyata**, Wednesday - **Tilapia** (curry with vegetable), Tuesday (17th) - **Ilish** (curry with vegetable), Saturday (28th) - **Tilapia** (curry)

My favorite fish are **Rui, Tilapia, and Shingi**.

- ☺ **Arina Sultana (Class – 9, Pally Unnayan Kendra, Chandal Ati, Swarnirvar)**  
My favorite fish is **Tilapia**. Mainly because it has good taste and grows faster. Cost of this fish is also lower than other fish. This fish also helps to clean our environment by eating mosquito egg. We do not get any sea fish here so we mainly eat pond fish (sweet water fish).

- ☺ **Bakibilla Gaji (Class – 6, Hinch KKB, Kajla)**  
My favorite fish is **Magur** (Catfish), because
- This is a pond fish and has good taste & also grows faster.
  - It can be grown in shallow water with muddy condition.
  - Less scale body & slippery.
  - This fish has accessory air breathing organs. It can crawl out of ponds to look for food, because they can live in even shallow ponds. The pectoral fins are armed with spines, dorsal & anal fins that run over more than half the length of the body; the tail fin rounded.

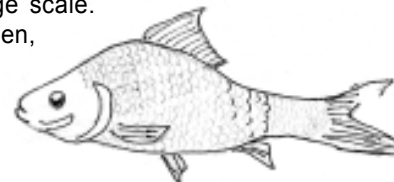


- ☺ **Anisur Rahaman (Class – 4)**  
My favorite fish is **Koi** (Climbing perch)  
This is a small to medium sized fish, generally resembling the Tilapia in shape. The fins, however rounded & short; both the dorsal and fins are armed with strong spines. Spines are also present on the rear end of the gill cover, at the base of the pectoral fins.



☺ **Meherunnessa (Class – 6)**

- My favorite fish is **Katla** ( Catla, Thick lips as 'Trade name' )  
Body of this fish is covered by bluish glittering large scale.  
Body can be divided in three parts – Head, abdomen, tail. This is large, silvery fish with a massive head, thick lips & tail is not divided in equally.



- ☺ **Sarowar Sarder (Class – 9)**  
My favorite fish is **Rui** (Common carp)  
This fish mainly inhabits rivers (sweet water) of low elevation. It is also culture in ponds. It eats very small plants of water, rotten garbage etc & it can also take mud in the time of lack of food.



- Students of Hinchī Bdhyasagar KKB, Kajla Janakalyan Samity, listed up their favorite pond fish and sea fish repeatedly. The result and the reasons are reported as below.

**List of favorite 10 fish of river (Sweet water)**

Sl. No.	Name of fish	The reasons why these fishes are favorite
1	<i>Shingi</i>	i. Good taste
2	<i>Magur</i>	ii. Do not take so many time in boiling
3	<i>Rui</i>	iii. These fish are used as patients food
4	<i>Koi</i>	iv. Available
5	<i>Bhetki</i>	v. Contains more protein
6	<i>Hybrid Magur</i>	vi. Comes from pond
7	<i>Syprinus</i>	vii. Fibrous part is more than spine
8	<i>Chital</i>	viii. We get some egg also.
9	<i>Katla</i>	
10	<i>Grass carp</i>	

**List of favorite 10 fish of Sea (Salty water)**

Sl. No.	Name of fish	The reasons why these fishes are favorite
1	<i>Hilsa (Ilish)</i>	i. Quantity of Phosphorus is so high than an other fish, which is good for our eye.
2	<i>Jabda</i>	
3	<i>Tapshe</i>	ii. Available
4	<i>Phirka</i>	iii. Good taste
5	<i>Bhola</i>	iv. These fishes are used in the time of medicine preparation
6	<i>(Bagda chingri)*</i>	v. Spines are soft
7	<i>Daichak</i>	vi. Scalp less
8	<i>Gura</i>	vii. Fibrous part is more than spine
9	<i>Sea Mular</i>	viii. We get some egg also.
10	<i>Babla</i>	

\*( ) a kind of small prawn



## Fish

### Step 1 — Preparatory Work — Activity (B)

#### 'My Experience with Fish'

Some children like fishing, some children may keep fish as pet. Do they have any interesting encounters with fish? What observations do the children have on fish? Through children's various experiences, encourage them to know more about fish and its surrounding environment.

[ 🏠 for both for rural & urban schools 😊 class 5 to 7 🧠 brain storming, keeping record, Listing, Searching information, Categorising, Making Profile, Language (describing), Art (drawing) ⌚ 2-3 periods (1½ hours per peiod)]



#### Objectives

- To create children's interest on Fish which are commonly observed.
- To know what children already know about fish.
- To grow children's skill of observation & keeping record.



#### Success Indication for Proceeding to the Next Step

- Children want to know more about fish — its name, habitat, life cycle, marketing etc.
- Children realise that there are some fish which we do not eat but they bring us another benefit such as controlling mosquito etc.



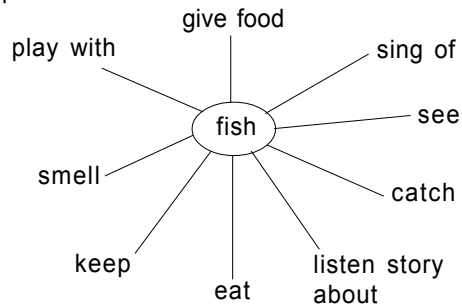
## Activity



### Creating Interest and Motivation

- Ask children to describe the word in place of   
'I  fish'

Teacher writes down those words mentioned by children at random without any comment or question.



- After all words come out, if teacher & children have question they can do. Also some similar word can be categorised. (eg keep + give food)
- Now children can realise by themselves there are many contact points with fish.



### Collecting Information (from children's observation & experience)

- Ask children to write down own experience with fish. A4 size format can be useful.
- Even small experiences are welcome. Some children might need 5-6 sheets in order to write down their experience.

Fish name \_\_\_\_\_

experience category based on 'children's brain storming' e.g. 'see', 'observe', 'eat', 'keep', 'listen'

drawing of experience

• State of experience \_\_\_\_\_

• My opinion & impression \_\_\_\_\_

• Further question \_\_\_\_\_

Student's name, class, school, teacher's name



## Summarizing information

- Divide children into groups and each group is asked to make a summary chart. Later summarise them by class-wise.

eg. group A : 5 children Total 22 'experience sheets'

Experience Category	Summary Statement	Fish name	Further Q ? & idea
see (7)	1. fish jump & gather on the surface of the pond when there are moonlight 2. fish sellers always beat surface by the buckets. 3. 4. . . 7.	? (pond fish) ?	fish eat insects ?
eat (6)	1. like fish fry than fish curry 2. like the part which has less bone 3. . . 6.	<i>Rui</i>	same fish is different taste by different cooking
catch (4)	1. . . 4.		
keep (3)	1. I keep small fish because they are pretty and eat mosquito larvae . 3.	Guppy	Other fish eat mosquito ?
listen (2)	1. many people say Bengali is intelligent because we eat more fish 2. People avoid taking bath in pond because big magur fish enter the pond in the rainy season.	Magur	Do fish have special nutrient for our brain ?

number of experience



## Initial Conclusion and Further Question

- Discuss with children about further question & ideas came out from their experience.  
Guide children to find out some questions & answers from their text books as well as from other books also.  
e.g. - how fish breath (review school text book)  
- the fish which eat mosquito larvae
- List up what children want to find out further ?

## Feedback

### Step 1 – Activity (B)



This activity is aiming to learn what experience children have with fish.

Encounter with fish takes the children to new discovery and interests to know more about the fish which they encounter. This activity can be a good entry point to learn any kind of natural resources. However, we could not get enough feedback from network members.



### Feedback Summary

ENRE Partner organization (District)	Swanirvar (North 24 Parganas)	Swanirvar	ENRE Teachers' Workshop
<b>Village</b>	Chandaal Ati	Chandaal Ati	Kolkata
<b>School/ Group</b>	KKB	Pally Unnayan Kendra	10-12 teachers from 3-4 organisations
<b>Students</b>	Total 34 (28 girls & 6 boys) into 2 groups	Total 32 (27 girls, 5 boys) into 2 groups	
<b>Class</b>	Class 5-9	Class 6-9	
<b>Teacher's name</b>	Fazlur Rahuman	Fazlur Rahuman	
<b>Activity duration (Class periods)</b>	Strating 4th June, 2003 Class - 6 periods (2hrs / period)	From 2nd July to 2nd August, 4 periods (2hrs / period)	August, 2001



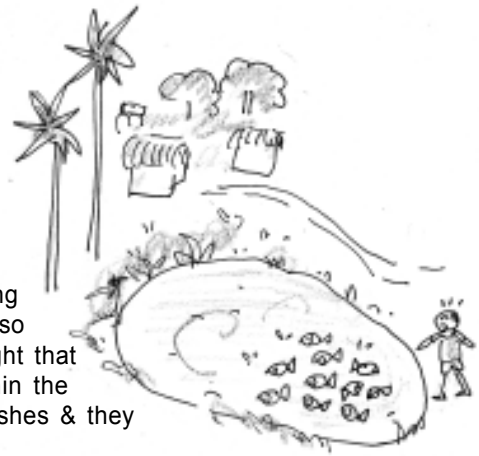
## Results

### ■ Children's encounter with fish

☺ **Ruksana Parvin (Class 8, Pally Unnyan Kendra / Swarnirvar)**

Encounter:

I went to my elder sister's house in summer holiday. While going there, I saw a pond. I wandered around the pond because surrounding of the pond was very nice. On that time I saw so many fishes were playing in one place. I thought that Friendship relation like persons also exist within the fishes. I threw a small piece of stone to that fishes & they have gone under the water.



Dialogue prepared for play:

Rahim : Mother, I saw fish in the market. That fish was so good.

Mother : Why you didn't bring that fish ?

Rahim : Actually, I know that you also like fish but father doesn't like fish so ....

Mother : Your father has become older that is why he can't eat fish. He can't remove fish born nicely.

Rahim : If father getting older now, then who will give me money to buy fish from market ?

Mother: I will give you.

Rahim : Father used to give me enough money for buying good fish. But now you do not give me such amount of money, how can I bring good quality fish from the market.

Mother : Ok, I will give you more money.

Rahim : Always you say so, but you won't do so.

- At last mother gave more money to Rahim. Rahim could bring good quality fish.



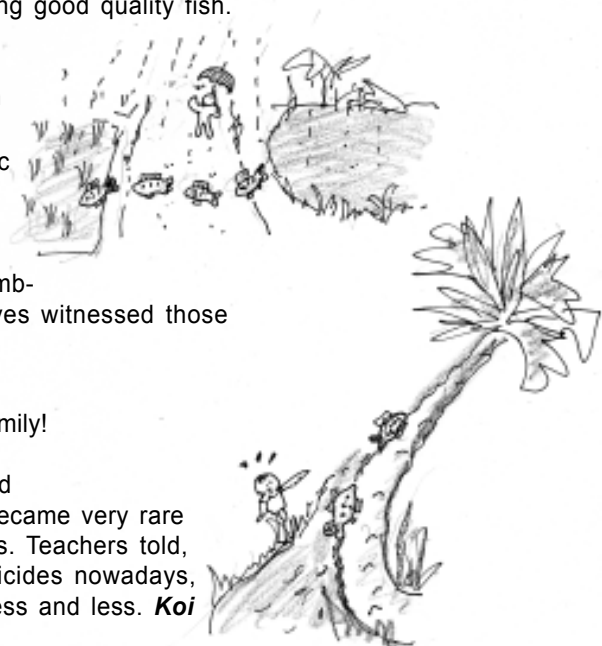
### ■ In the session

on feedback lesson plans with ENRE teachers, one of the most popular topic was 'Fish'. A few teachers from Kajla group in East Midnapore district reported that the children observed interesting behavior of **Koi maach** (Climbing Perch) and also teachers themselves witnessed those points.

#### **Koi maach**

- walks on the road even with whole family!
- climbs Palmyra tree
- lives in ponds but lays egg in rice field

They told that children found out **Koi** became very rare fish in market compared to earlier days. Teachers told, farmers are using more chemical pesticides nowadays, therefore the number of **Koi** became less and less. **Koi**





is very nutritious fish and strong enough to survive under mud when even less water in pond. Koi has two extra organ for breathing, therefore they can get oxygen from both water & air and move some distance even without water.

- Bengali proverb says '*koi macher jan meye manusher pran*' (girl's life power is strong as Koi maach's)



- **My experience with fish** - How I buy fresh fish in the market  
(by Surjakanta Das-ENRE/DRCS, Translation by Subhadyuti Mitra)

Are you going to the market for buying fish? I do marketing for my household and when I buy fish I try to identify the fresh one for the best rewards for the price I pay. Here I share some tips I follow.

How to check	Fact / Reason
<p>1. Check the color and smell of the <b>gills</b> If the gills look reddish, then the fish must be fresh. But remember - this might not be the same always as the gills are sometimes artificially colored. So look out for the smell from the gills, too. If it smells badly, then the fish is not fresh, in spite of the gills being dark red.</p>	<p>Gills function like our lungs, while alive, they get lots of blood supply so look red until bloods in the gill get decomposed long after death.</p>
<p>2. Check out the solidness of fish <b>body</b> Press the fish body with your finger tip and if the finger impression remains on the body, then you judge fish is NOT fresh. If you buy sea fish like <i>Hilsa</i> or <i>Bhekti</i>, keep it on the palm of your hand and then see whether it bends or not. If the fish bends down, then the fish is NOT fresh.</p>	<p>Decomposing muscles become loose so cannot hold the live shape.</p>



Photo : Satoko



Photo : Satoko

How to check	Fact / Reason
<p>3. Check the <b>scales</b> While buying a big scaly fish, try to take out the scales. If the scales come out easily, then the fish is NOT fresh.</p>	<p>Decomposing tissues into which scales are embedded loosen the grip.</p>
<p>4. Check the <b>eyes</b> Look carefully at the fish eyes. If they look pale, then the fish is NOT fresh.</p>	<p>Decomposing makes the eye lenses looking dull.</p>
<p>5. Check the slimy cover on the body; in a very freshly caught fish it is present.</p>	<p>Upon death fish body stops secreting slimes.</p>

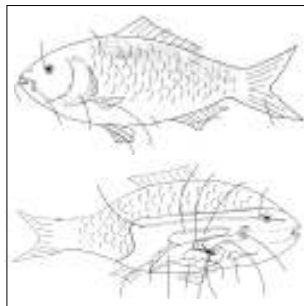
(Note of 'Fact/Reason' was put by Shilanjan Bhattacharya)

But the problems nowadays are there are a lot of iced (preserved in ice) fish and in some case the fishes are colored artificially to make them look fresh. Though those who sell fish can understand whether the fish has been coloured or not, how long has it been kept out of ice and how long it can remain well before it starts rot, I guess that it is becoming tougher for consumers to identify real fresh fish.



Photo : Surja

**Step - 2**  
**Review & Make Sure**



for platform towards the next step

## Review & Make Sure

### What is a Fish ?

The word of 'Fish' (*'Maachh'* in Bengali) sometimes is used wide meaning for describing all kind of water-dwelling creatures. For example people in West Bengal call prawns as '*Chingri maachh*' in Bengali language.

It is better idea that teacher conducts a basic Biology class for defining Fish after preparatory activity, so that children can make sure to understand what is a fish and its basic body structure and function. These knowledge will help the children to conduct further investigative activity in next step.

#### General character of fishes

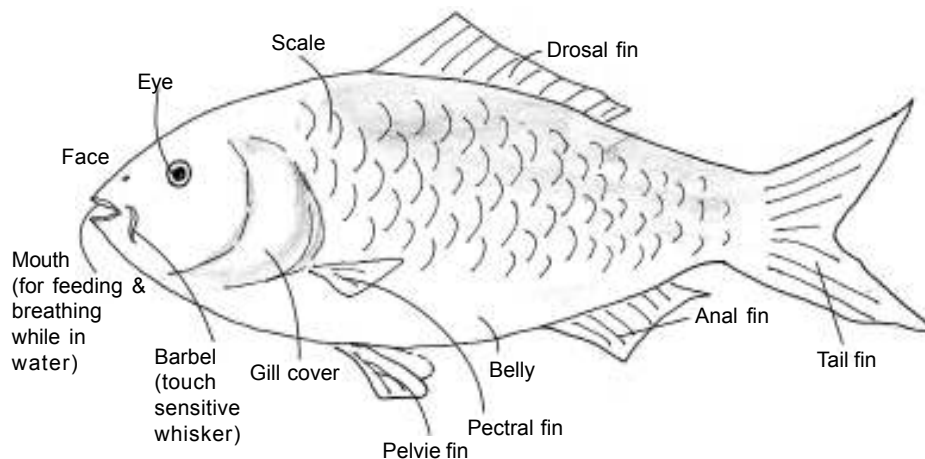
It is said there are about 24,000 species of fish in the world. Each species are different in shapes, colours, sizes and habitats etc. But we can make a few generalizations.

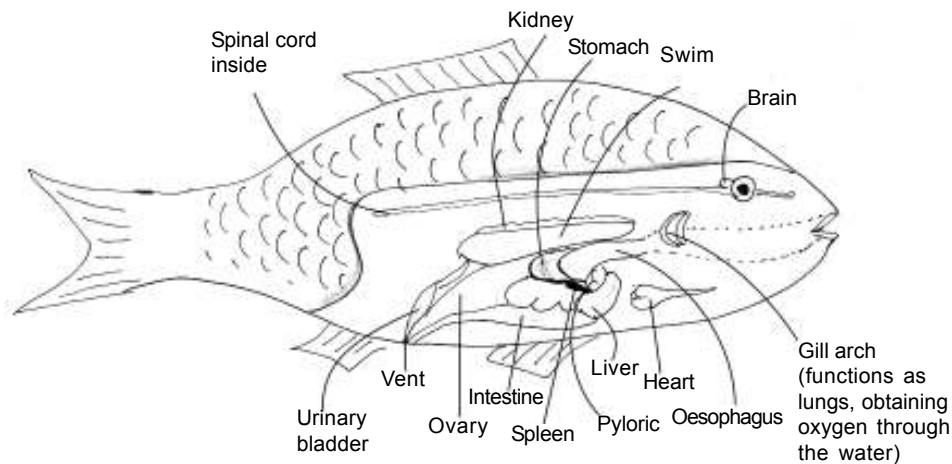
Most fishes • live **in water**, • breathe through **gills**, • possess a **scaly body**,  
• swim and manoeuvre themselves using their **fins** and • all fishes are **vertebrate** (they have a backbone)

< They are not 'Fishes' >

Various animals are thought of as 'fishes' simply because they live in water, but they are not true fishes.

Dolphin, Whale (mammals) / Seals (mammals) / Prawn, Crab (insects, anthropods) / Tortoise (reptiles) / Water snake (reptiles) / Frogs (amphibians) / Shells (molluses)





## Category of Fishes

### Biological evolution aspect

All living fishes are broadly grouped under two categories based on biological aspects: **Cartilaginous fishes** which have soft bone such as Shark and Rays, and **Bony fishes** which have typical hard bone and most of fishes are in this category.

### Habitats aspect

According to habitats, Fishes are divided into two groups; **Freshwater Fish** and **Saltwater Fish**.

In West Bengal, people eat mainly Freshwater Fish called as 'Sweet' water fish as Pond fish or River fish. Most fishes appeared in records made by children of ENRE network are Freshwater fishes. But people in coastal area of Bengal bay, such as East Midnapore, people eat a lot of Saltwater Fish called as Sea fish. [see more detail in 'Expert's view point in Resource section Pg 68-72]

### Freshwater Fish

It is defined that fishes that spend most or all of their lives in non-saline waters are considered as Freshwater fishes. These fishes inhabit hill streams, rivers, lakes, tanks, ponds, reservoirs and other kind of permanent or temporary water bodies such as Rice fields.

It is said that 'pure' Freshwater fishes are about 500 species in India, but this number goes up around 900 species if fishes which lives in large river where get sea water influence or marine fishes that move inland into freshwater habitats are included. Present research work in India treats about 750 species as Freshwater fishes.

Freshwater fishes are of two broad kinds;

**Primary** freshwater fishes – those originated in freshwater habitats  
(*cypriniform, siluriform etc.*)

**Secondary** freshwater fishes – those originated in marine environment and then adapted to living in freshwater habitats (*perches, gobies etc.*)

### Neither freshwater nor saltwater

Some fishes spend a part of their lives in both freshwater and saltwater (marine) environments by migrating between them. Those fish are called **diadromous**. About 200 species worldwide are classified into this group.

The purpose of migration is mainly for breeding. For example eels breed in the sea and live as adult in freshwater habitats. These are called **catadromous** fishes.

On the other hand salmon or hilsa (*Hilsa ilisha*) live in the sea as adults and ascend the rivers to breed. These are **anadromous** fishes.

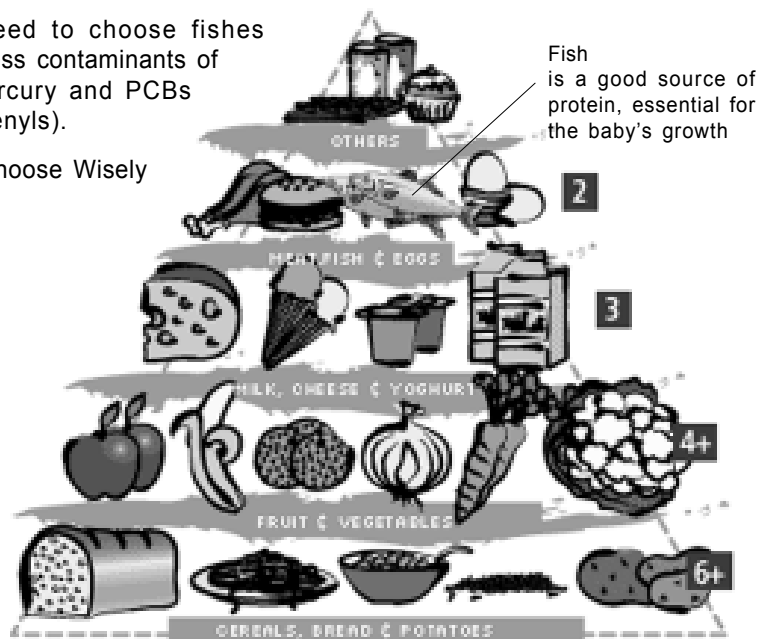
## Fish and Nutrition

Generally it is said that Bengali people are smart because Bengali people eat a lot of Fish ! If we look at nutrition aspect of fish, we can say this might be actually correct.

Nutrition facts call Fish is 'brain and heart food'. It is highly recommended eating fish twice a week. Because fish are a great source of protein, vitamins, and nutrients. Fish are loaded with omega-3 fatty acids, which provide protection from heart disease and are great brain food for both adult and children. Also if we eat small whole fishes, we can get more calcium.

But nowadays we need to choose fishes carefully which have less contaminants of pollutant such as mercury and PCBs (Polychlorinated Biphenyls).

Eat Fish, Be Smart, Choose Wisely



(Source : Website BIM Corporate - For Students - school of Fish - Fish and Nutrition)

## Basic Observation of Fish

### Data cards

In ENRE activities, children are encouraged to observe Fishes and keep records. This is basic way to know and learn about fishes as local natural resources.

'Data cards' prepared by ENRE, as supportive materials, can help activating children's observation skill.

Children can describe on fish <Sample card - front>

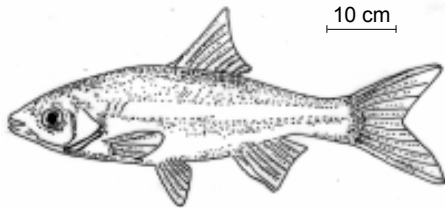
<Sample cards-behind>

Cut and paste the drawing of the fish from ENRE Data Cards - sheet, or children can draw the fish by themselves

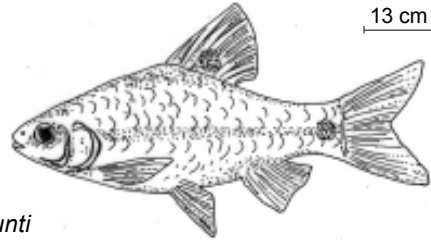
## Local Variety of Fish

ENRE gives more importance on locally available fishes rather than commercial fishes. Because local fishes are not only food but they are connected with the surrounding environment, so that if children are encouraged to value their local fishes, it helps for them to take care of their environment and water body ecosystem as whole. ENRE selected 12 fishes as such in the area of West Bengal where most children of ENRE network are living.

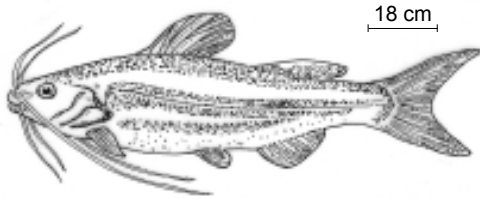
### <Fishes introduced in ENRE Data Crad - Sheet>



Local Name : *Mourola*  
Common name : Indian Carplet / Mola Carplet  
Scientific Name : *Amblypharyngodon mola*



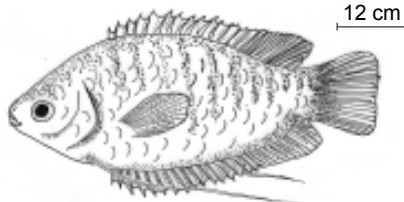
*Punti*  
Spotfin Swamp barb  
*Puntius sophore*



*Tangra*  
Tengara Mystus  
*Mystus tengara*



*Magur*  
Magur  
*Clarias batrachus*



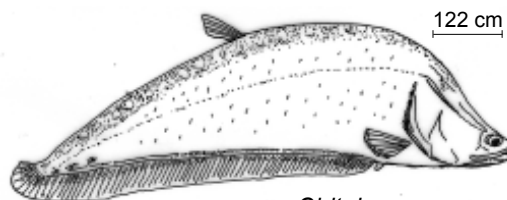
*Khalse*  
Stripled gourami / Giant Gourami  
*Colisa fasciatus*



*Bele*  
Tank Goby  
*Glossogobius giuris*

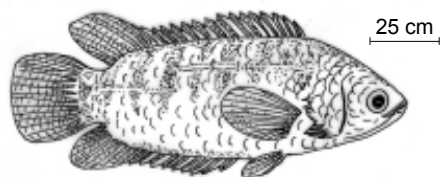


*Bhangan Bata*  
Boga Labeo  
*Labeo boga*



*Chital*  
Humped Featherback  
*Notopterus chitala*





*Koi*  
Climbing Perch  
*Anabas testudineus*



*Shoel*  
Striped or Branded Snakehead  
*Channa striatus*



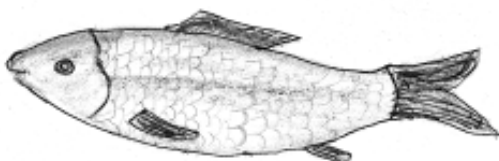
*Kajli / Kajri*  
Gangetic Ailia  
*Ailia coila*



*Kash Khoira*  
Indian Hatchetfish / Indian glass-barb  
*Chela laubuca*

### Examples of 'Data Cards on Fish' recorded by children

*Hilsa*



1. eats algae and bacterial insects
2. lives in the upper layer of brackish water
3. lays eggs in the rivers during the monsoon
4. preferably eaten as curry, fry etc.

*Singi*



1. eats insects and other fish
2. lives in the lower level of canals
3. lays eggs in the canals during the monsoon
4. preferably eaten as curry

*Katla*



1. eats other fish
2. lives in the depth of 1-2 ft. of sweet water
3. lays eggs during the monsoon
4. preferably eaten as curry, fry etc.

*Kalbose*



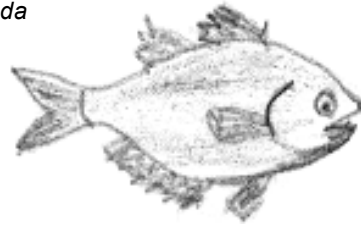
1. the blind male fish eats algae
2. lives in the deeper level of ponds
3. lays eggs in the ponds during the monsoon
4. preferably eaten as curry, chatni, fry etc.

*Grass carp*



1. eats grass and algae
2. lives in the deeper level of ponds
- 3.
4. preferably eaten as spicy curry

*Chanda*



1. eats algae
2. lives in the upper layer of ponds & water logged fields
3. lays eggs in the ponds & water logged fields during the monsoon
4. preferably eaten as curry etc.

*Tilapia*



1. eats small fish
2. lives in the deep layer of sweet water
3. lays eggs during May-June
4. preferably eaten as fry, curry etc

*Danrika*



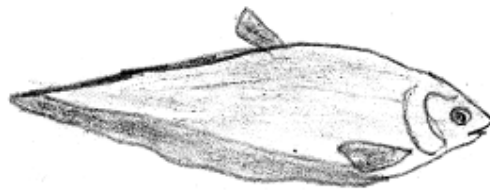
1. eats algae
2. Lives in the upper level of ponds, canals
3. lays eggs in the canals during monsoon
4. preferably eaten as chatni etc.

*Parshe*



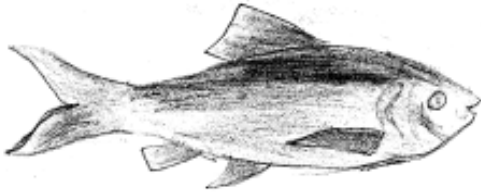
1. eats algae
2. lives in the deep layer of brackish water and ponds
3. preferably eaten as curry, chatni etc

*Phalui*



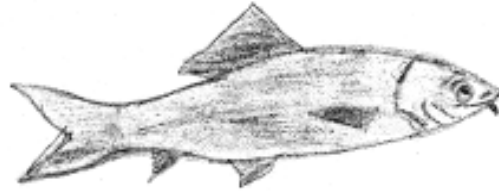
1. eats small fish and insects
- 2.
3. lays eggs in the ponds during monsoon
4. preferably eaten as fry

*Rui*



1. eats algae
2. lives at a depth of 3-4 ft of the sweet water
3. lays eggs during monsoon
3. preferably eaten as curry, chatni, fry etc

*Mrigel*



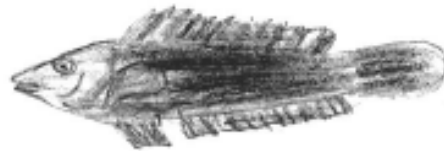
1. eats algae
2. lives at a depth of 1-2 ft of the sweet water
3. lays eggs during monsoon
4. preferably eaten as curry, chatni etc

*Bhetki*



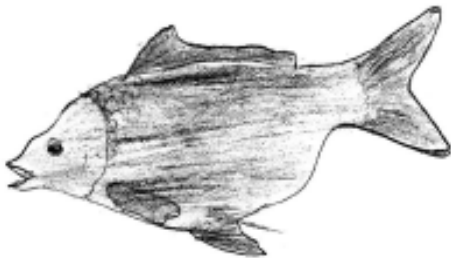
1. eats small fish
2. lives in salty and sweet water at a depth of 5-6 ft
3. lays eggs during March-April
4. preferably eaten as fry, curry, chatni etc

*Lyata*



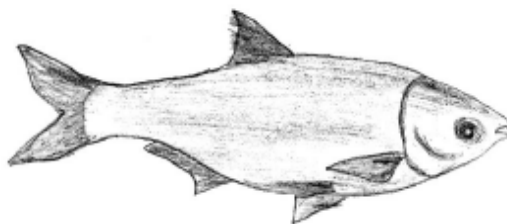
1. eats other small fish & insects
2. lives in sweet water at a depth of 4 ft.
3. lays eggs in ponds, canals, fallow canals during monsoons
4. available during monsoons, eaten as curry after deep frying

*Saiprinum*



1. eats everything
2. lives in the deep layer of ponds
3. lays eggs during monsoon and winter
3. preferably eaten as curry, fried etc

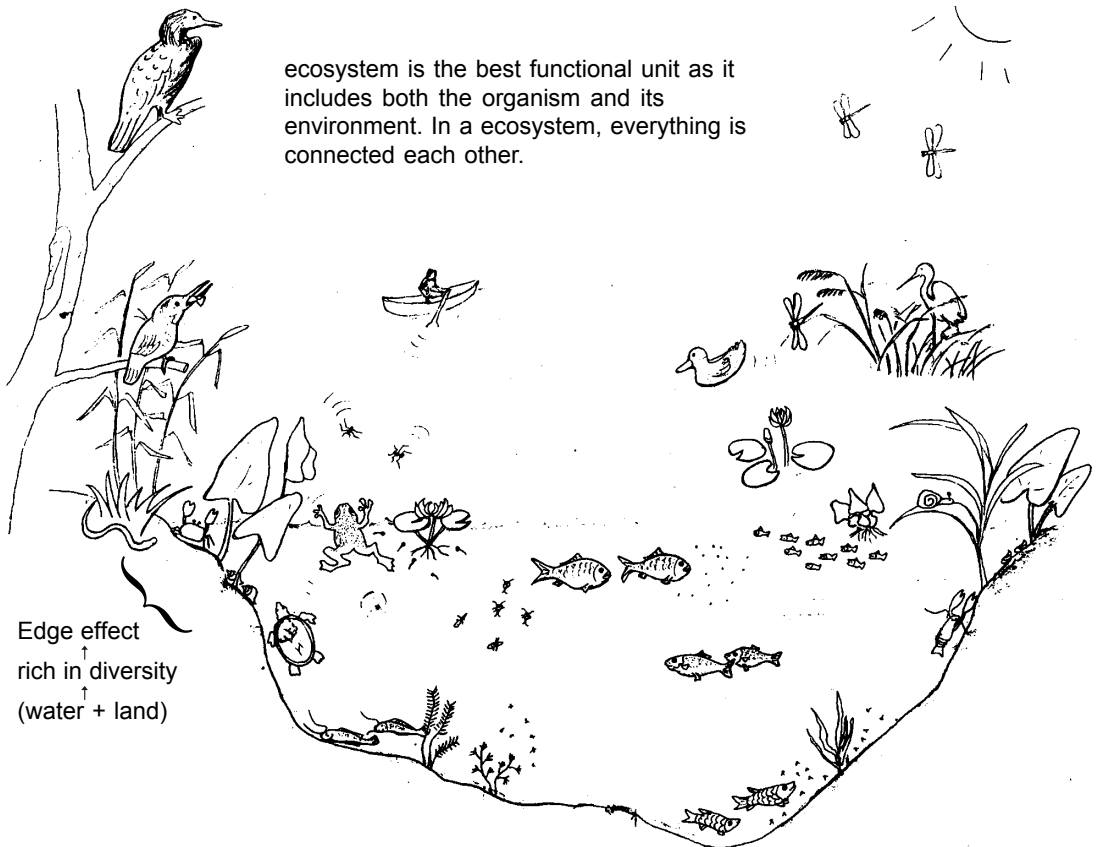
*Silver carp*



1. eats algae
2. lives in the upper layer of the ponds
- 3.
4. preferably eaten as fry and curry

## A Pond Ecosystem

As most freshwater fishes live in ponds in West Bengal, it is important for children to learn about Pond ecosystem as habitat for fishes. (This is connected to activity step 3.)

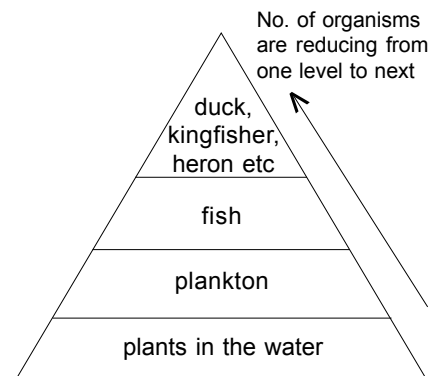


ecosystem is the best functional unit as it includes both the organism and its environment. In a ecosystem, everything is connected each other.

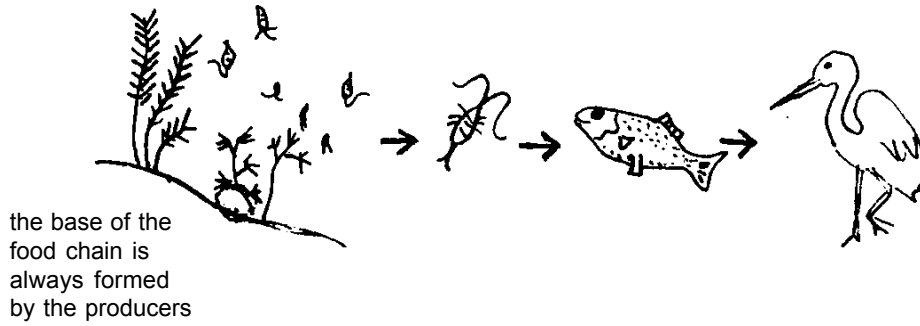
Edge effect  
rich in diversity  
(water + land)

### Components in a Pond Ecosystem

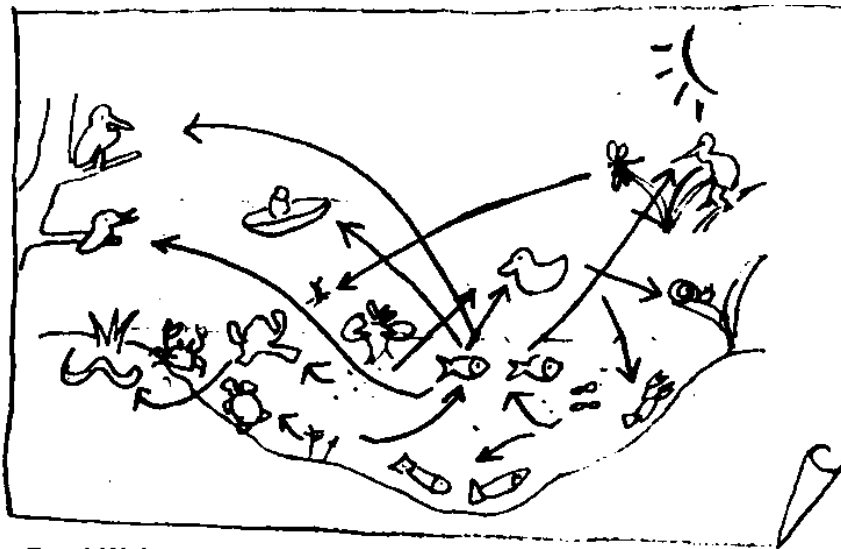
1. <b>Abiotic (non-living) Materials</b>	water, the nutrients found in water, sediments & organic matter in the water, wind, water current, temperature, sunlight
2. <b>Producers</b>	plankton & plants in the water
3. <b>Consumers</b>	small / large fish, frog, snail, snake, crab, duck, turtle, kingfisher, heron, indian shag, pond snail, dragon fly etc.
4. <b>Decomposers</b>	Bacteria & fungi in water & sediments



### Food Chain and web in a Pond Community



Several food chains form a food web in an ecosystem. Along with this food web, energy & nutrient are flowing and cycling in an ecosystem, original source from the sun.



<Food Web>



## MEMO PAGE



## Step - 3

# Investigation / Project Work



for creating child oriented activity

 Lesson Plans

 Feedbacks



## Fish

### Step 3 — Investigation / Project Work — Activity (A)

#### 'Ask Fishermen !'

Let's interview fishermen in the locality. They are specialist of fish. Most of the questions which children have raised though their preparatory work can be solved with the help from local fishermen. Information collected from the fishermen alongwith own observation, help children to investigate 'pond ecosystem' in relation with fish culture.

[ 🏠 mainly for rural schools, but its possible for urban schools where there are ponds nearby  
👤 class 7 to 9 🗺️ information collection, interviewing, mapping, group work, making chart ]



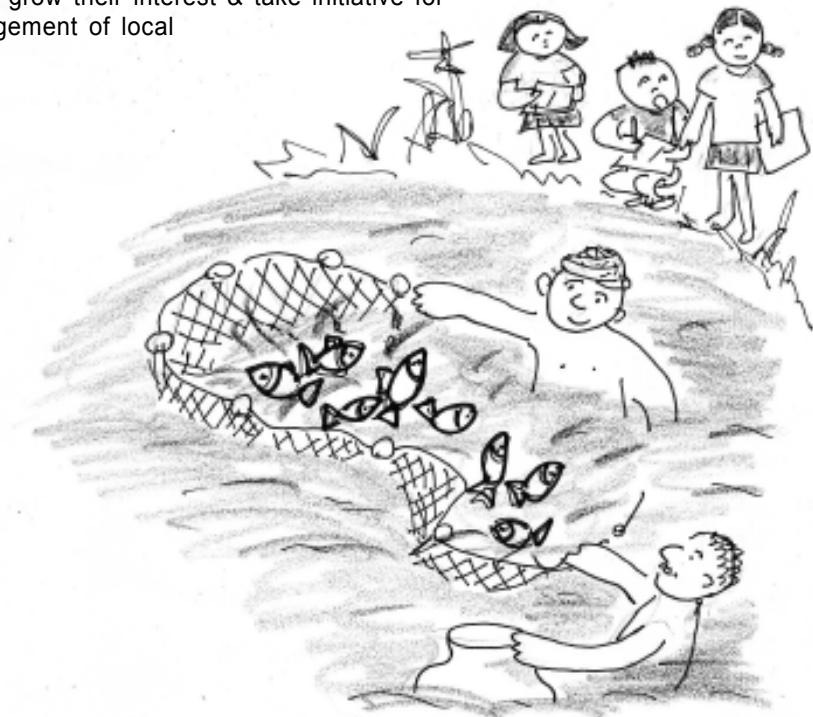
#### Objectives

- To understand more about fishes and their environment of habitat.
- To know about fish culture in own locality.
- To learn about 'pond ecosystem' in relation with human activities.



#### Expected Products / Achievements through this Activity

- 'Seasonal calender of fish culture' in local ponds.
- Children figure out 'our pond & its ecosystem' into chart.
- Children can grow their interest & take initiative for better management of local ponds / river.





## Activity



### Review & Discussion

Teacher is suggested to conduct short review of the preparatory work. Look again the summary chart made by children during activities in Step 1. Discuss with children what they have found and how many fish varieties children could identify. Ask children to list up further questions & how they can solve those questions. For example, among pond fish <each variety of fish live at different depth>, how can you know that ? etc.

Suggest children, if they want to know more about fish in pond (river), we need to learn more about whole pond (river) system, in which different various living things and human activities are involved.



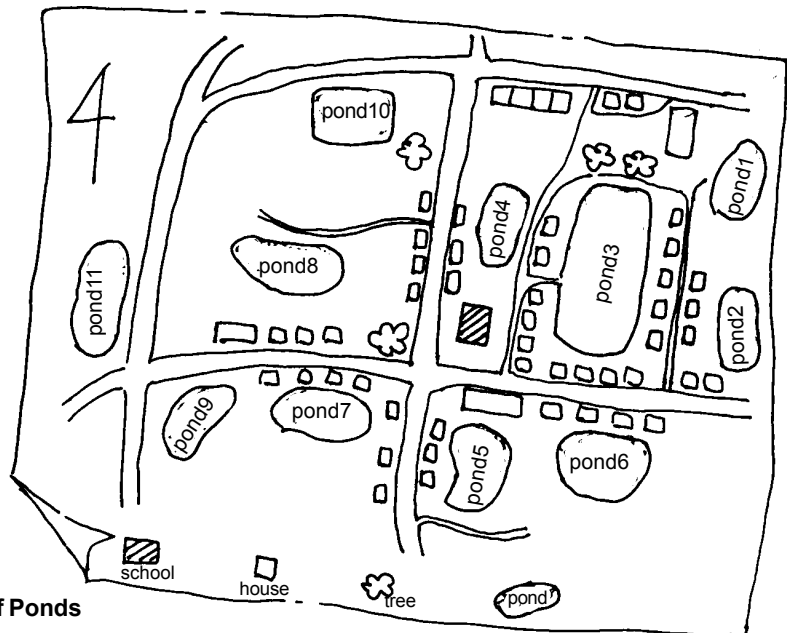
### Planning & Preparation

Children are requested to make a 'pond location map' in the locality. According to the children's capability it might be required for the teacher to prepare a rough area map (roads main landmark on it) and ask children to describe the locations of ponds.

If children are not sure about the location of each pond, it might be good idea that everybody walk together to the area at a time.

Together with children put general information on each pond. such as;

- serial number for identification
- pond name (how local people call the pond)
- whose pond ? (ownership)
- character of pond (by general observation; size, water colour, capacity - dry up summer ? or always water etc)
- fish cultivation ? (some fishermen work in the pond ?)



#### Location Map of Ponds

<Does your area have a lot of ponds ?>



## Investigative Work

- Divide children into groups. One group takes responsibility for one pond.
- Each group discuss what point they want to find out & from whom or how they can collect those information.
- Each group reports their enquiry points and make a common enquiry sheet as a class.

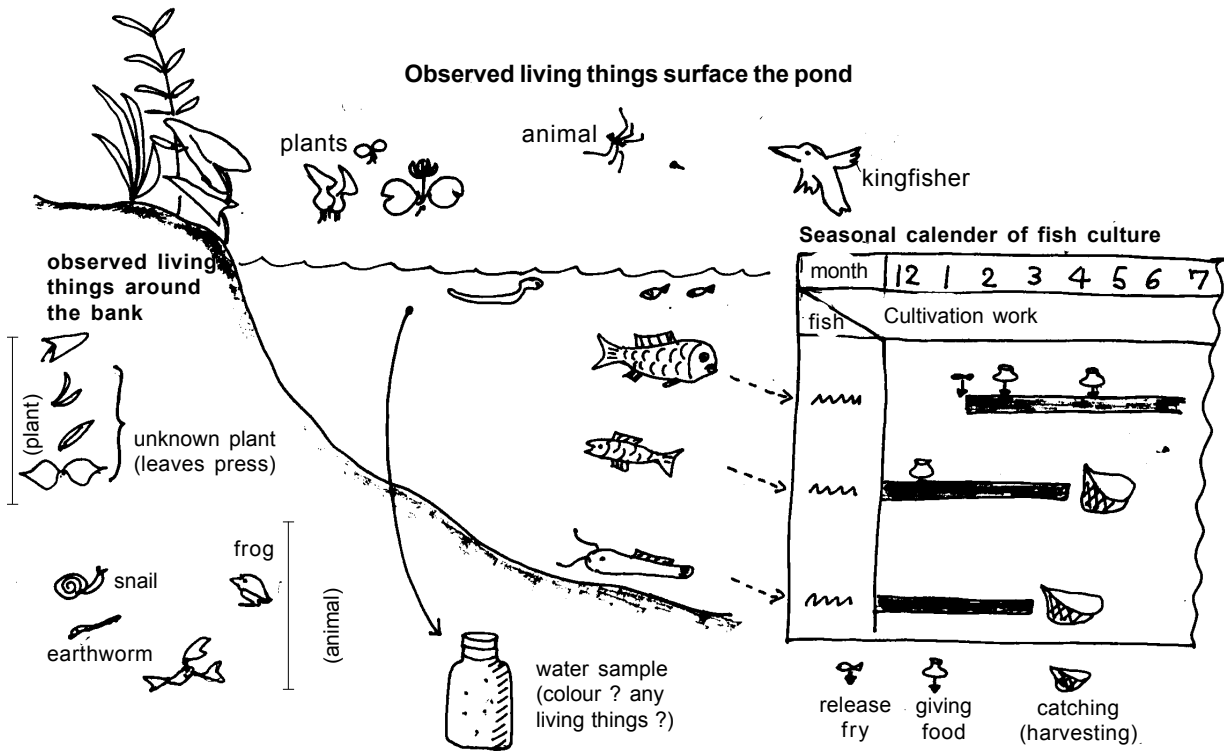
[Example] Enquiry sheet for 'pond profile'

<b>General</b>	<ul style="list-style-type: none"><li>• pond no. (on the map)</li><li>• location (village, <i>para</i>)</li><li>• owner (individual or community pond)</li><li>• size (shortest &amp; longest length by measure)</li><li>• depth (according to the fishermen or local people)</li></ul>
<b>Observation</b>	<ul style="list-style-type: none"><li>• water colour</li><li>• water surface (clean or covered by green algae)</li><li>• water quantity / level (water existing throughout the year or dry up in summer, flood in rainy season etc))</li><li>• plants growing around the surroundings</li><li>• how people use this pond (bath, wash clothes &amp; plates etc)</li><li>• fish cultivation (if 'yes'.....who is doing ? if 'no' ..... why ?)</li></ul>
<b>Interview to fishermen</b>	<ul style="list-style-type: none"><li>• name &amp; how many fishermen are involved</li><li>• what fishes are they cultivating ?<ul style="list-style-type: none"><li>- name of fish</li><li>- living water level (shallow, middle, bottom)</li><li>- the reason for choice</li><li>- feeding</li></ul></li><li>• how fish culture work are going on according to the season ?<ul style="list-style-type: none"><li>- fish nursery</li><li>- release small fish (fry)</li><li>- harvest etc</li></ul></li><li>• how to harvest fishes (tools &amp; methods)</li><li>• about production &amp; profit</li><li>• fishermen's opinion<ul style="list-style-type: none"><li>- any changes before &amp; now</li><li>- difficulties</li><li>- special key points for fishing</li></ul></li><li>• additional questions</li></ul>



## Reporting & Summarizing

- Each group is asked to summarise their collected information along with a drawing of the pond (cross section).
- Groups are asked to make seasonal calendar of fish culture based on fishermen's interview.

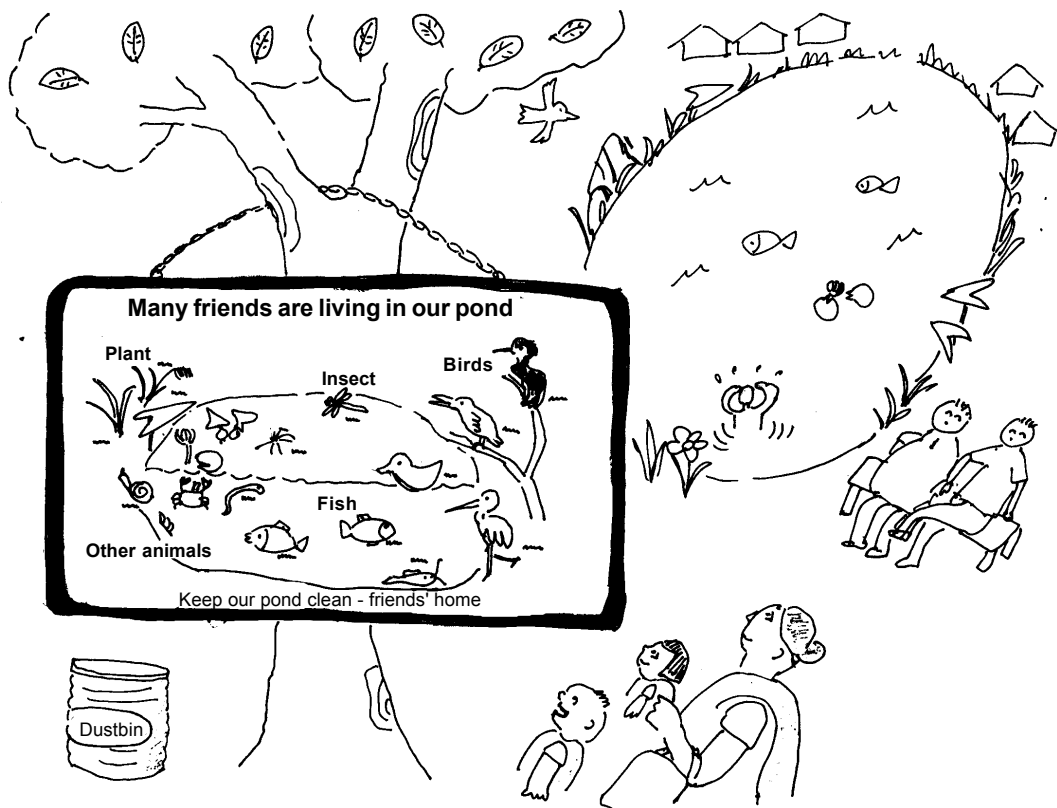


<Pond cross section & Seasonal calendar>



## Toward Local Activity

- Presentation/sharing the result what the children have learnt for community members.
- Make and set up the 'Pond Board'.  
The children can make community 'pond board' with illustration and name of living things in & surrounding the pond, alongwith children's message.  
(\* need to select proper materials for board & paint to protect from rain & sunlight)
- Clean up the space around the pond regularly as eco-group based activity.
- Organise community based eco-tour to local river & pond.



<'Our community pond sanctuary'>

## Case Study

### Disappearing fish varieties in Tiorkhali village

(Report by Surjyakant Das - ENRE/DRCS, Translation by Subhadyuti Mitra)

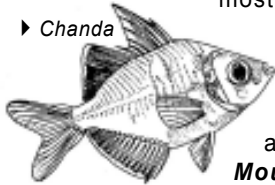
Village Tiorkhali is located at Bhagwanpore Block No.2 within Garbari Gram Panchayat in the East Midnapore district. The total number of households is around 484 families with its population 2649.

A big canal flows towards the eastern side of the village as the border of next Block. Apart from several small usable ponds in the area, there are around 13 bigger ponds are existing. These were actually the sources of many rare kinds of fishes, but the ENRE eco-group in this village found through their survey that the situation has been changing over last 5-6 years.

In general we know that the rural Bengal is mostly filled with different water bodies in various shapes and some valuable natural resources occupy these water bodies, which used to fulfill the area's demand for free nutrition. Since such resources grew naturally and in abandon, they did not need any human interference before.

In the year 2007-08 the Eco group in Tiorkhali village, affiliated with Kajla group, conducted a survey of unconventional food items and prepared a valuable document on it. The document has come up with a list of fishes from Tiorkhali as well as the rest of the villages nearby. Here mostly those fishes have been documented which have become

▶ *Chanda*



endangered or extinct. Through interview of villagers and local fishermen, the children have identified around 18-20 fishes which are no more to be found in their locality such as – **Shaal, Bai tyangra, (Jalsa), Chanda and Shingi**. The endangered fishes appeared in their survey are – **Lyata, Mourola, Kholse, and (Mirjhali)** etc.

According to villagers whom the children did interview told that these fishes could be seen in abandon in and around the fields and ponds just 4-5 years before during monsoon but now they are no more to be found.



▶ *Lyata*

These fields or ponds were used to be the main source of these fishes and people never had to depend on fishery to fulfill their dietary needs. The survey mentions that the main cause of the extinction of these fishes could be effects of chemical fertilizers and pesticides used in the agricultural fields in their locality. So now people in Tiorkhali village have lost the opportunity of having such protein food items from their regular diet. Even if one wants to pay more for a patient in his/her family, it is almost impossible to find fishes with immense medicinal values such as **Koi, Magur, and Shingi** anymore.



▶ *Shingi*

Now the villagers have to purchase cold storage fish (iced over several days) from far distance in the local market. The sudden shooting up of the price of fish often brings difficult situation for villages as consumer. The villagers claim that the iced fish sometimes cause diseases among them. Having lost local fish variety also affected the people who involved in knitting a fish net during monsoon as they on the verge of losing their income source.

Therefore the members of the ENRE eco-group in Tiorkhali village are trying their best to at least save the limited resources they have at present. They are promoting conservation activity of local ponds along with raising awareness among villagers.

## Teacher's Note

### – Cultivating Rice and Fish Together –

Traditionally villagers and farmers used to catch wild fish as their food from Rice field time to time especially in rainy season in the rural area of West Bengal.. Not only 'catching' but actually it is said that 'cultivating' rice and fish together has been a 2,000-year old tradition in some parts of Southeast Asia. However, this beneficial cultivation system was gradually abandoned as wild fish stock declined and our agriculture became heavily dependent on chemical pesticides and fertilizers. This is unfortunately confirmed through several surveys which ENRE eco group children had done in their locality. We can see many wild and indigenous fish species are disappearing and declining rapidly.

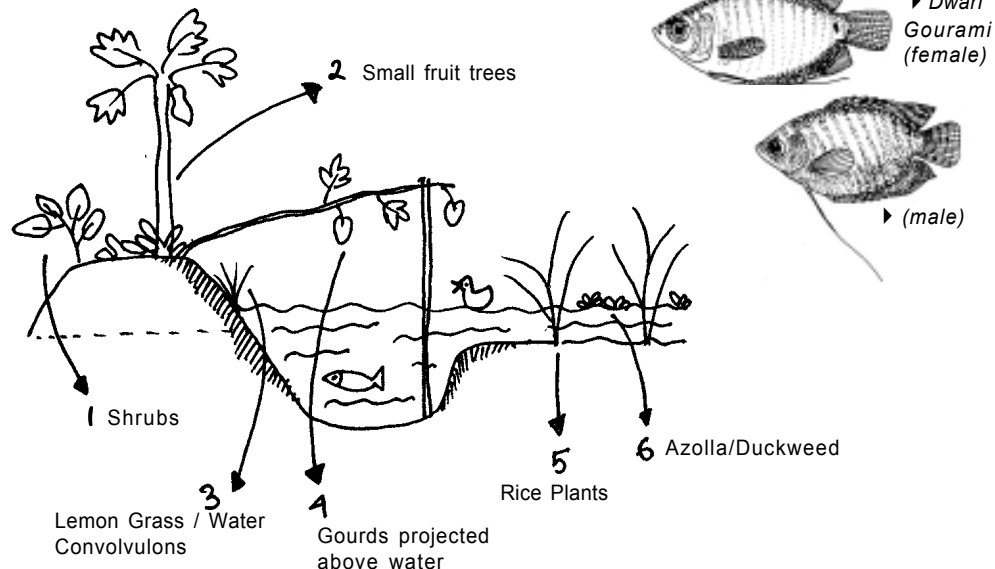
During the 1980s and early 1990s, rice-fish culture experienced a revival in some area including West Bengal. This is a low cost method of producing rice and at the same time the stocked fish provides an environmentally friendly way of controlling pest and grass and it provides nutrients for farm needs.

Teachers are suggested to be aware of this practice and to encourage children to observe whether there is any practice of 'rice-fish culture' in their locality.

Fish culture in rice fields may includes several management techniques, however, the simplest form is the way which wild fishes enter the paddy field during flooding and are captured at the end of the rice-growing season, in stead of fish stocked are managed. Fishes that cultivated generally includes common carp, **Silver carp**, **Puntius**, **Tilapia**, **Snakehead**, **Gourami** in freshwater and **Shrimp** in brackish water.



Photo : DRCS



[Source : extracted text, photo, illustration from *Rice-Fish Farming; A Handbook* / Biofarm Publication series : Handbook 04 / DRCS]

## Feedback

### Step 3 – Activity (A)



This activity encourages children to observe local ponds and collect information from local fishermen. Since rural area of West Bengal have a great number of ponds, some feedback and survey results done by children are quite interesting and informative.



### Feedback Summary

ENRE Partner organization (District)	Swanirvar (North 24 Parganas)	Swanirvar	Swanirvar	Kajla Janakalyan Samity (East Mednipur)	Home based groups (Hooghly)
Village	Beliyakhali	Kalsur, Andhar Manik	Chandal Ati	Hinchi	Chandannagore
School/ Group		G.D.S	Pally Unnayan Kendra	Hinchi Bidyasagar KKB	Green Sprout
Students		Total 29 (12 girls & 17 boys)	Total 32 (27 girls & 5 boys) in 2 groups	Total 20 (7 girls & 13 boys)	2 children
Class		Class 4-9	Class 6-9	Class 5-7	Class 6-8
Teacher's name		Subhankar Bhabak	Fazlur Rahman	Shek Jabak Ali	Satoko Chatterjee (mother)
Activity duration (Class periods)		August 2003	August 2008	?	2004-2005



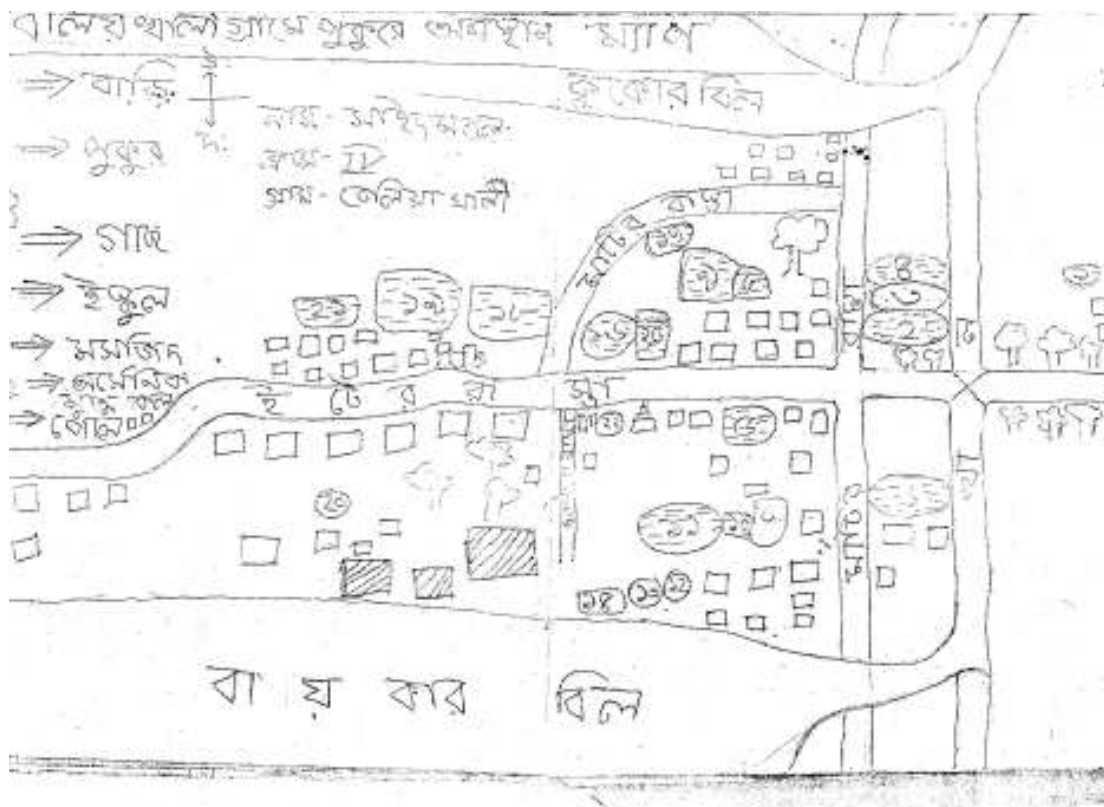
## Results

- Sayed Mondal, Class 4 student in Beliya Khali village, North 24 Parganase district (Swarnirvar group).  
In his village there are as many as 17 ponds and out of them 12 ponds are used for raising fish.

No.	Location	Ownership	Size & Depth	Water Level & condition	Uses	Fish Cultivation
1	Purba Para (East)	Personal	40' x 30' 7 feet	In summer the pond become dry, Upper level of pond in clear	Cleaning utensil etc.	Yes
2	Purba Para (East)		200' x 150' 10 feet	Water is available throughout the year, Sometimes algae are seen on the upper level of the water	Utensil Cleaning, bathing etc.	Yes, Lease
3	Purba Para (East)	Personal	200' x 100' 8 feet	Water is available throughout the year, Colour of water is green & algae is there	Utensil Cleaning, bathing etc.	Yes
4	Purba Para (East)	Personal	220' x 150' 12 feet	Water is available throughout the year, Upper level is clear & some water hyacinth is there	Bathing, villagers use this water for cooking	Yes
5	Purba Para (East)		160' x 120' 7 feet	In summer the pond become dry, Bamboo leaves & water hyacinth is floating, also water is not clear	No uses	Yes, but not so much
6	Parui Para		210' x 150' 8 feet	In summer the pond dries up		
7	Parui Para		250' x 200' 10 feet	Water is available throughout the year, surface is covered by water hyacinth	Cleaning utensils	No, Local fish is available
8	Purba Para (East)		100' x 60' 6 feet	In summer the pond dries up, the surface covered by weeds	Washing cows, habitat of ducks	No
9	Purba Para (East)		160' x 150' 8 feet	Water is available throughout the year, many trees are present surround the pond that is why water of this pond is dirty.	Washing clothes, cows & habitat of ducks	No
10	Majer Para (middle)		150' x 80' 6 feet	In summer season the pond becomes dry, Bamboo leaves are floating and the water is not clear	Washing cloth & cow	Yes
11	Majer Para (middle)		The largest pond of the village 7 feet	In summer season the pond becomes dry, colour of water is light green & surface is covered by bamboo leaves	20 family use for bathing & cleaning utensils	Yes



12	Pachim Para (West)		180'x90' 8 feet	Water is not clear due to presence of bamboo surround the pond.	Bathing & cleaning cow	Yes
13	Pachim Para (West)		150'x50' 5 feet	In summer season the pond become dry, surface is covered by weeds	Cleaning cow	Yes
14	Pachim Para (West)		140'x80' 10 feet	Water is available water is clear	Bathing & cleaning clothes	Yes
15	Pachim Para (West)		100'x60' 8 feet	In summer the pond become dry, surface is covered by weed	Cleaning cows	Yes, Irregular
16	Pachim Para (West)		150'x70' 9 feet	Water is available throughout the year, the surface covered by bamboo leaves	Cleaning clothes & cows	Yes, but not so good
17	Majer Para (middle)	Personal	80'x40' 8 feet	In summer the pond become dry, surface covered by weeds	No uses	No



- Children of Hinch /Kajla group went to the nearby pond and catch fish from there with a big bowl.

They reported the following fish they caught.

1. *Tilapia*
2. Nailontika ( Nile's tiger)
3. *Cyprinus carp*
4. *Mourola*
5. *Punti*



► *Nailontika*

- Manosi Chatterjee (Class 7, Green Sprout, Home based eco group in Hooghly district) did interview to fishermen who were netting of the pond in her locality. (This interview was done in 2005)

Q1: What kind of fish are raising in this pond?

A: ***Rui, Katla, Shol, Punti, (Bothi), Bata, American Rui, Nailontika***

Q2: Fish culture calendar of this pond (How many times 'Catch and Sell'?)

A: Every 2 years this refilling process is done. Then per month 1 time to catch fish.

Q3: How to make pond water 'rotten' in this 'refilling' process ?

A: 'Refilling' is to clean pond of fish. The process takes 5-6 days by catching fish depends on various size of pond.

'Poison' to kill remaining fish. Fish food being – 'khol' biscuit

Q4: What do fishermen in early morning ?

A: Since selling of fish happens at morning for fresh fish

Q5: How many fishermen are involved in?

A: 8-9 fishermen, 7 officials, 1 supervisor for this community pond fish cultivation.

Q6: Is there any price difference for selling to Para people and to general market ?

A: 5-10 Rs./kg difference. 7 officials get 1 kg fish free per netting of fish.

Q7: Fish culture of this pond is profitable?

A: Yes, very much. Huge profitable business, because fishes have high demand in market.



Photo : Satoko



Photo : Satoko

2-3 fishermen

net

4 fishermen

In early morning at 5 am, Fishermen collect net for harvesting fish

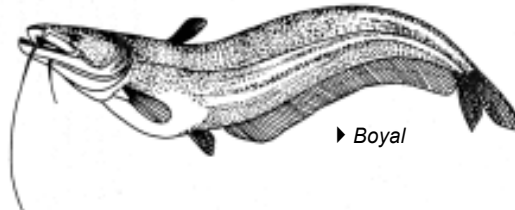
- Students of GDS, Kalsur (Swarnirvar group) collected information from 10 local fishermen about seasonality of fishes.

<b>Summer</b>	<b>Rainy</b>	<b>Autumn</b>	<b>Hemanta</b>	<b>Winter</b>	<b>Spring</b>
(Apr, May)	(Jun, Jul)	(Aug, Sep)	(Oct, Nov)	(Dec, Jan)	(Feb, Mar)
<i>Katla, Bata, Pona, Rui /American Rui, Japani Punt, Tilapia, Nailontika, Mrigel, Kaalbose</i>					
Mrinar carp					
<i>Bhola</i>					
<i>Punti , Magur, Bele,Shingi</i>					
<i>Hilsa, Shol, Chela</i>					
<i>Chyang</i>					
<i>Chanda, Pakal, Kekle, Kunche</i>					
<i>Bhola , Boyal</i>					
<i>Hybrid Magur</i>					
<i>Mourola, Jhaya</i>					
<i>Pholui, Chital, Lyata, Koi</i>					
<i>Pomphrate</i>					
<i>(Parshe), Gutel</i>					
<i>(Parul)</i>					
Information collected by other group, Magurkhali Jana Kalyan Samity					
<i>Mrigal, Rui, Katla</i>	<i>Hilsa, Bele, Amadi</i>	<i>Tilapia, Shol, Punt</i>	<i>Magur, Mrigel</i>	<i>Koi, Magur Amad</i>	<i>Rui, Katla,</i>

► *Kaalbose*



► *Boyal*

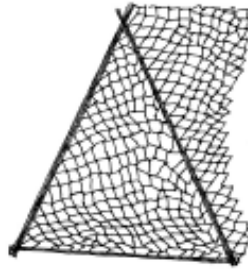


- To catch fish different kind of tools and traps are used. Students of GDS listed up such as Net, Fishing rod, *Ghurni*, *Barsha*, *Khara*, *Polo*, *Koch*, *Pata*, *Fansh* net.

Students of Pally Unnayan Kendra, Chandal Ati village, North 24 Parganas, affiliated with Swanirvar sent a detail survey record of fishing traps and tools used in their locality with each drawing. You can find so many tools as below.



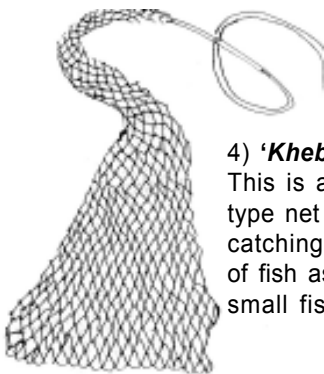
1) '**Polo**' : Bamboo-basket trap used to collect a small number of live fishes in shallow knee-deep water.



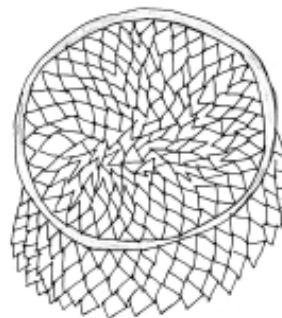
2) '**Shitki-jal**' : Triangular bamboo flamed net is used for straining fishes from water covered by water hyacinth or algae.



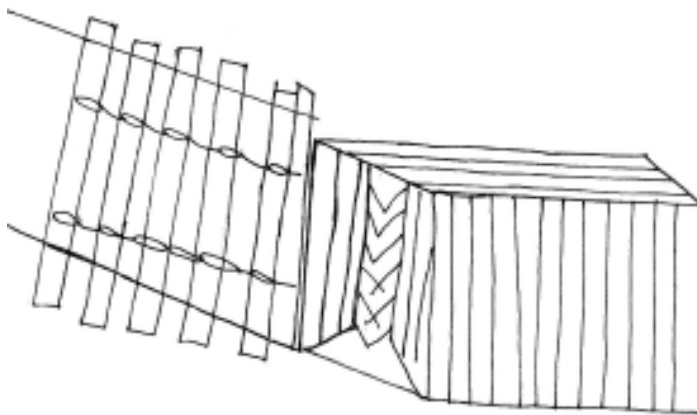
3) '**Bhata**' : This is made with bamboo and used as a trap by being placed under the water of side/corner of the water body.



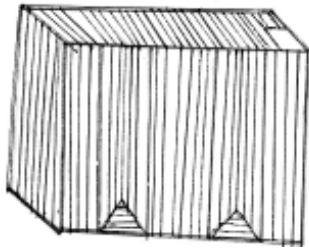
4) '**Khebla-jal**' : This is a casting type net and used for catching bigger size of fish as well as small fishes.



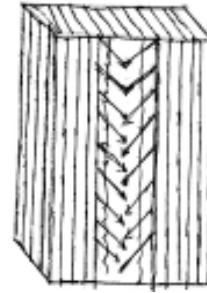
5) '**Chak-jal**' : Circle bamboo flamed net is used for straining fishes from water covered by water hyacinth or algae.



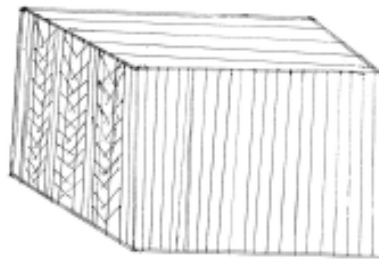
6-7) '**Pata & Anne**': They are made by bamboo and rope. *Pata* is used for blocking the flow of fishes. *Anne* is used as a trap for catching fishes as being placed in front of *Pata*.



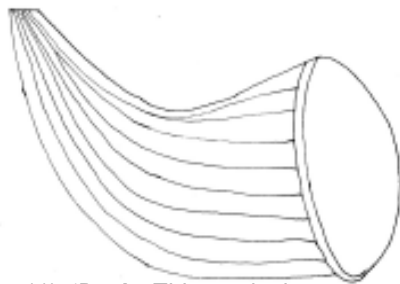
8) '**Ghuni**' : This is a trap for placing in shallow water to catch small fishes.



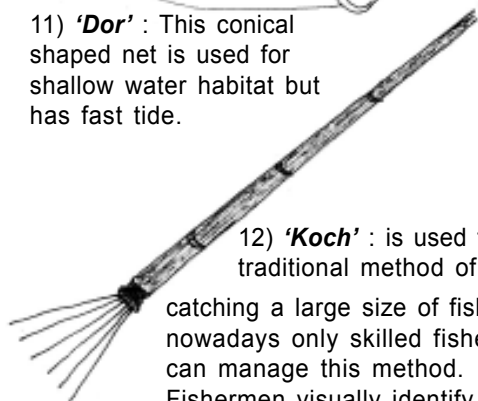
9) '**Chero**' : This is made by wire or wood cage and used as a trap. It is set under shallow water and sometimes earthworms are placed in the bottom for attracting fishes.



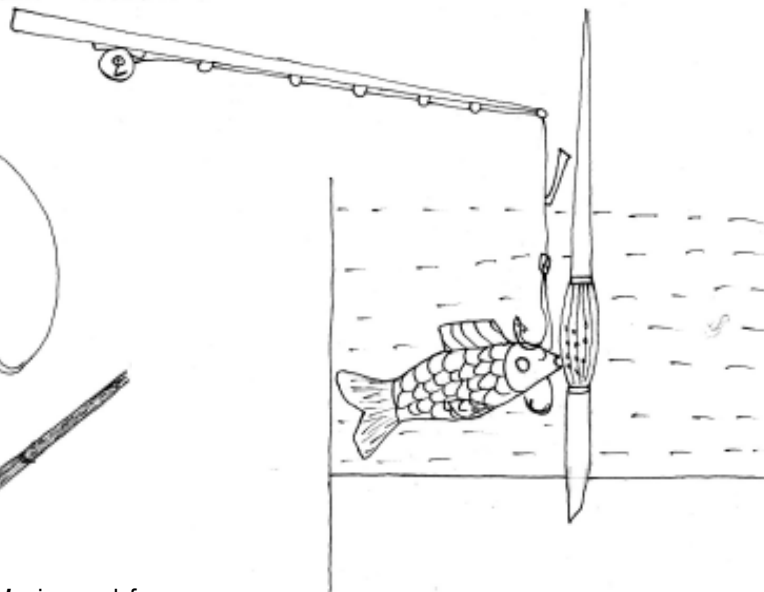
10) '**Ato**' : This is made by bamboo, a kind of climbing plant, and rope. This is placed in front of *Pata* functioning same as *Anne* (7).



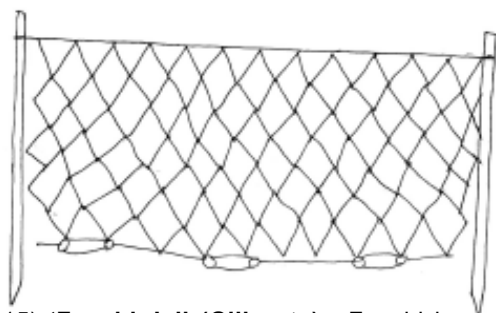
11) '**Dor**' : This conical shaped net is used for shallow water habitat but has fast tide.



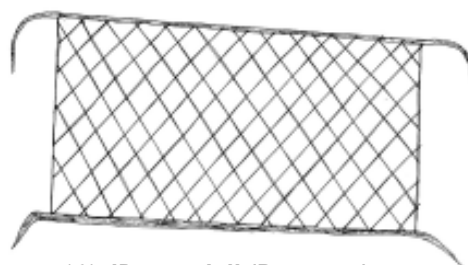
12) '**Koch**' : is used for traditional method of catching a large size of fish, nowadays only skilled fishermen can manage this method. Fishermen visually identify the species and size of the targeted fish before aiming to catch.



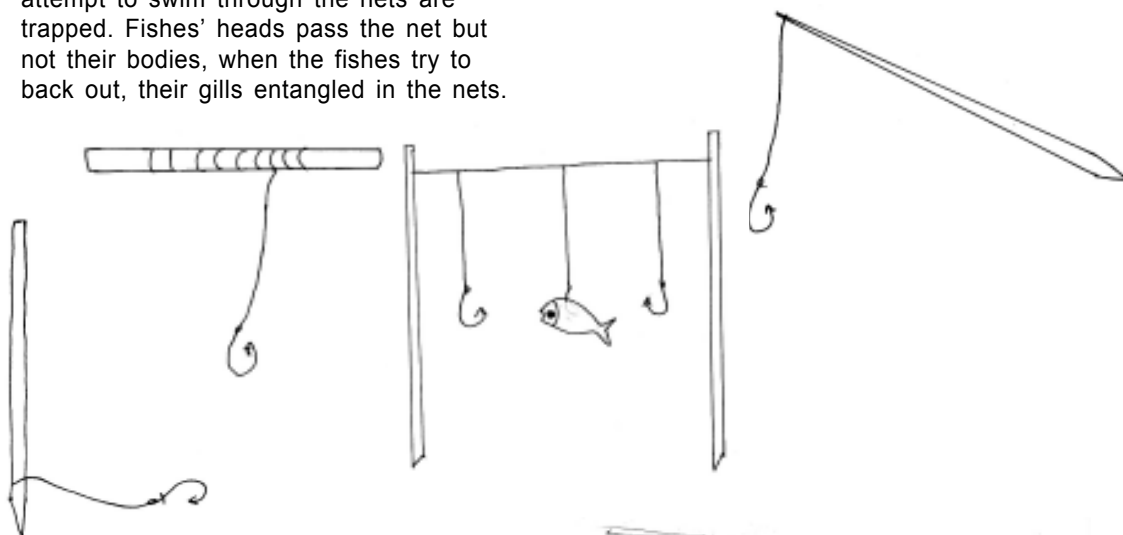
13 & 14) **Wheel & 'Ta'** : These are used as a set. *Ta* which contains rice or rice husk is poled into the pond to attract fishes, then *Wheel* is used as fishing rod. Bury on the rod indicates whether fishes are caught or not. Sometimes a few hooks are hanged on the line.



15) '**Fanshi Jal**' (Gill nets) : Fanshi in Bengali means 'Gill'. These Gill nets are allowed to drift across ponds or rivers for a period time. The top is kept close to the surface with floats and the bottom is held down with some weights. Fishes that attempt to swim through the nets are trapped. Fishes' heads pass the net but not their bodies, when the fishes try to back out, their gills entangled in the nets.



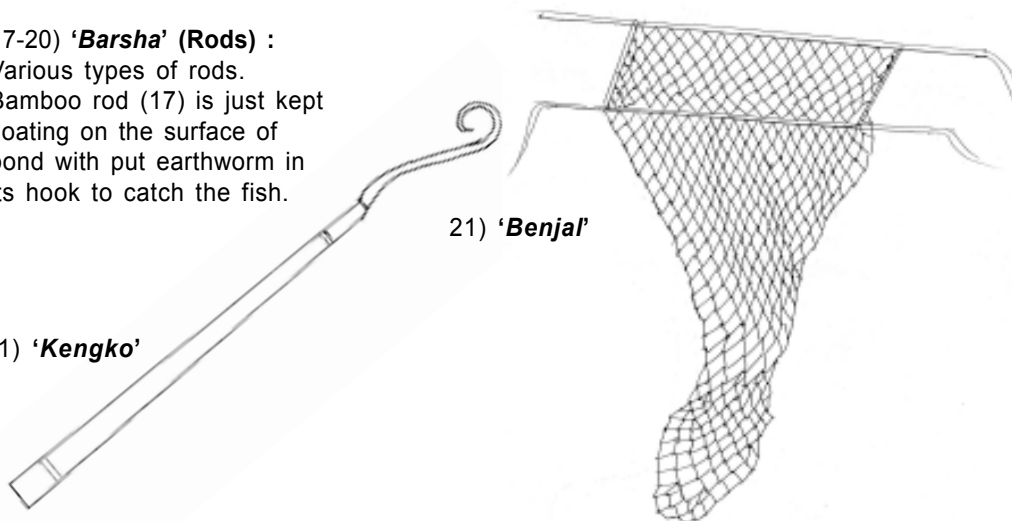
16) '**Deora Jal**' (Drag net) : This kind of Drag net works as wall for trapping fishes by dragging with 2-4/5 person, deepening on the size of net.



17-20) '**Barsha**' (Rods) : Various types of rods. Bamboo rod (17) is just kept floating on the surface of pond with put earthworm in its hook to catch the fish.

21) '**Benjal**'

21) '**Kengko**'





## Fish

### Step 3 — Investigation / Project Work — Activity (B)

#### 'Making a Pond in a School Yard'

Let's design and make a small pond for small fish. The pond is not only for keeping fish, although children can observe how a tiny pond can contribute to increase natural diversity of surroundings.

[ 🏠 for both urban & rural schools ✎ observation, designing, drawing, group work, gardening]



#### Objectives

- To know about fish & other aquatic plants & animals.
- To apply knowledge into practical work through creating pond.
- To learn pond ecosystem through practical work.



#### Expected Products / Achievements through this Activity

- A small pond created by children in school yard or home garden.
- School gardening activity at the surrounding of the pond ?
- The posters / charts created by children on their pond & its ecosystem.



## Activity



### Review and Discussion

Teacher can conduct a short review session with children, with the summary chart made by children during preparatory work in step 1. Now children know about various types of fish in their locality.

Discuss with the children, how they can keep / grow fish by themselves. If you have a pond in your school yard, you can conduct 'fish culture' with children under the guidance from local fisherman (refer activity 3-A).

Or discuss about the idea of making a 'small pond' by children themselves. Even if there is not enough garden space it is possible to make a 'container pond' !



### Planning & Preparation

For creating a small pond what you can do is to imitate a natural pond.

Ask children to observe local ponds and list up related components. Later, children can check books / websites for more details.

Observed components relating pond can be listed up like this : [example]

Aquatic animals	Where they live	Food chain	
		they eat	they are eaten by
Fish A B C Crab Frog Snail Dragonfly Pond scate Water spider Water shark Birds A B C Mosquito larvae	Middle layer Bottom of the pond   Surface	   Housefly Mosquito	     Fish B & C
<b>Aquatic plants</b>			
Water lily Duck weed Water hyacinth Pond weed Tape grass ..... ....	floating on the water " " under water " floating bank side		

(if children don't know the name of plants / birds etc, ask them to draw it)

This list can be rearranged according to each living place. For example, aquatic plants list can be summarised by floating plants, under water & bank side plant.



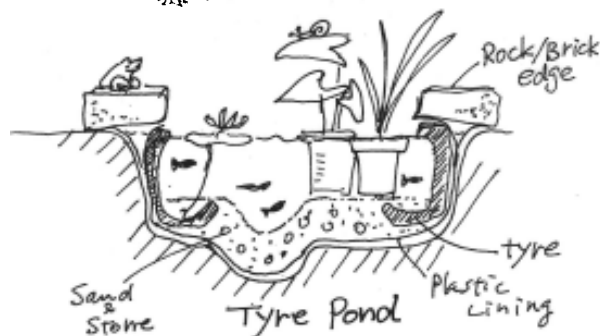
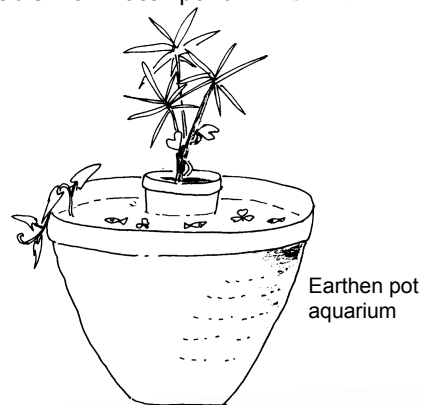
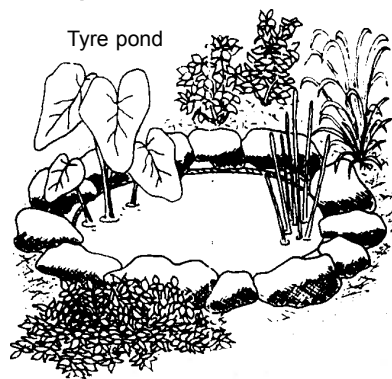
- After knowing each component, ask children to design the pond. Children are free to create interesting shapes for the ponds.
- Share each children's design & ideas. They decide the pond design for actual work. Several designs can be done by group activities.



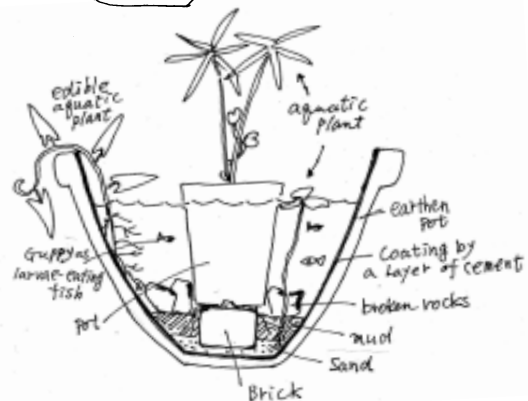
### Actual Work — Let's make a pond !

Each group of children start to create own pond. The site of the pond should be semi shaded spot. According to the pond size, you need to introduce proper number of local fish, aquatic plants which are available from local pond.

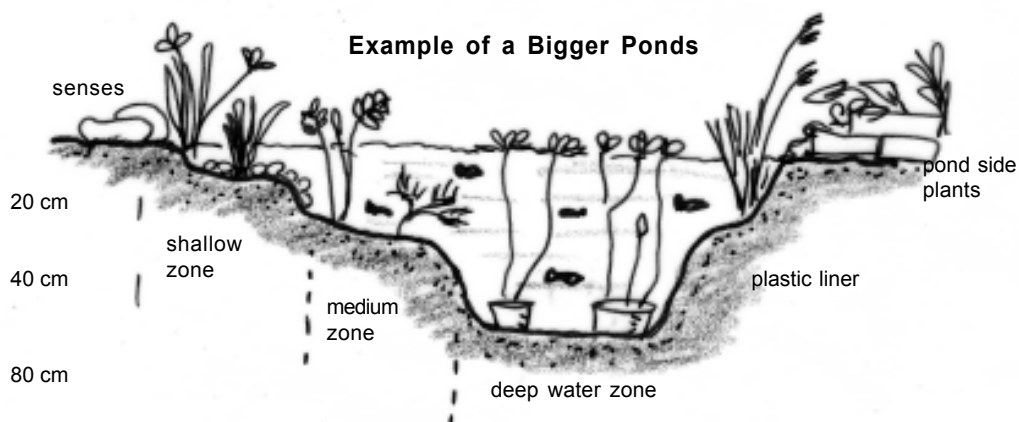
#### Examples of Small Ponds



Cross section of a Tyre Pond



Cross section of a Earthen pot aquarium





## Reporting / Summarising

Children are asked to keep observing & recording own pond. Children can write down their observation record once a week for 1-2 months. Do they realise any newcomers in the pond ? Any other new grass growing by the pond ? How is the situation of the pond water ? Children need to add fresh water time to time.

After sometimes, children might need to protect this pond from natural bird (sometimes bird eats fish).

In that case, ask children to observe how fishermen protect fish from bird in local pond. They can try out similarly.



## Towards Local Action

- Activity from making a pond to produce fish and aquas food in school garden.
- Growing edible aquatic plants in school gardens.
- Same way children can try out a small pond or container pond in their house.

**– Aquatic Communities : A Pond Community –**

**The pond**

A Pond is a freshwater community. It does not have a fixed shape but the centre is usually the deepest part of the pond.

Sunlight can pass through the water if it is not too muddy. It is important that the water plants get sufficient sunlight. Otherwise they can not make food, without photosynthesis, oxygen is not added to the water. If the plants and animals in the water will not have enough oxygen to breathe, they will die of suffocation after some time.

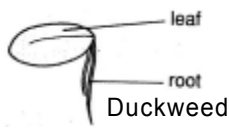
Many populations of plants and animals live in the water and in the surrounding area of the pond. The tiny plants which we can see only with a microscope are called algae. They are an important source of food for the many pond animals.

**Plants which grow at the edge of the pond**

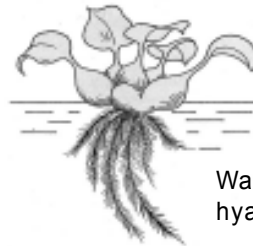
Grass and the water banana plant grow along the edge of the pond. Many pond animals hide among the leaves of these plants and lay their eggs on the leaves.



**Floating plants**



Water moss fern



Water hyacinth

**Submerged plants**



Hydrilla



Elodea



Cadomba

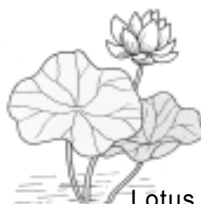


Tape Grass

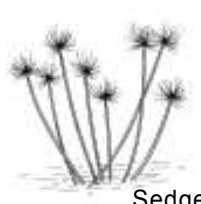
**Partially submerged plants**



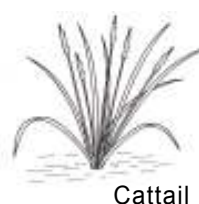
Water lily



Lotus



Sedge



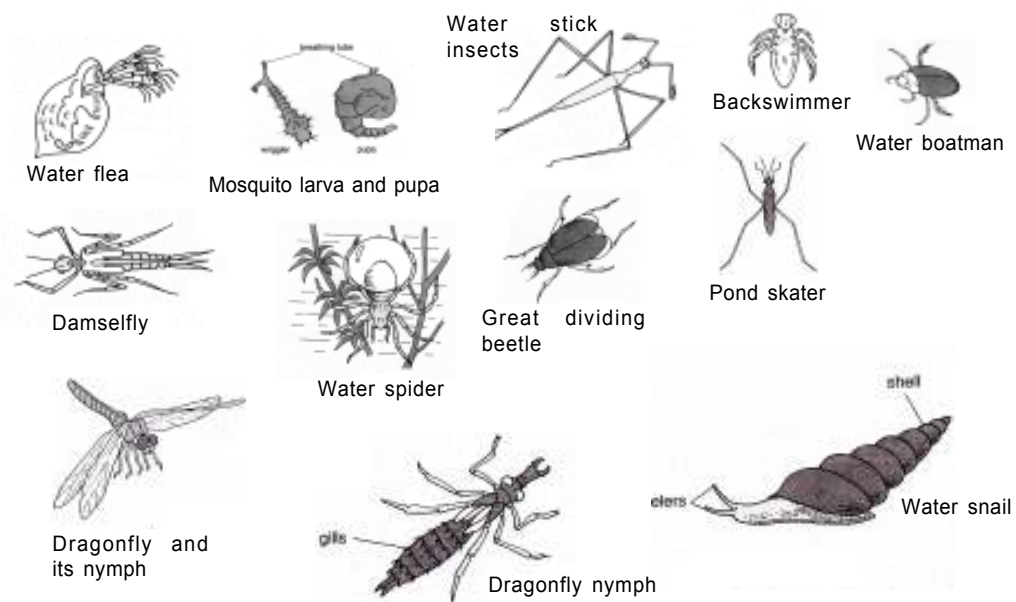
Cattail

**Why water plants are useful. Because they;**

- 1) keep the water in the pond or the aquarium fresh. They take up the dissolved carbon dioxide from the water and supply the water with oxygen. The water animals need oxygen to breathe.
- 2) provide food for the pond animals.
- 3) provide shelter for the small animals to hide from their enemies.
- 4) provide a place for animals to lay their eggs so that the eggs are not washed away and are hidden from those animals which eat them.
- 5) make the pond /aquarium beautiful.

**Pond animals**

Besides fishes and birds there are various small creatures such



(illustration / extracted and compiled from *Times Complete Home Tutor : Science* by S.H. Xie, Federal publication)

## Feedback

### Step 3 – Activity (B)



This activity encourages children to observe local ponds and collect information from local fishermen. Since rural area of West Bengal have a great number of ponds, some feedback and survey results done by children are quite interesting and informative.



### Feedback Summary

<b>ENRE Partner organization (District)</b>	<b>Home Based Group (Hooghly)</b>	<b>Shimulberia MPEC Centre (Bankura)</b> <b>(as case study)</b>
<b>Village</b>	Chandannagore	Shimulberia
<b>School/ Group</b>	Green Sprout	
<b>Students</b>	Shantonu & Manosi Chatterjee	Srikanta Murmu, Paresh Tudu, Sukanto Tudu, Kamal Murmu, Srikanta Tudu, Hemanta Murmu, Paramananda Tudu
<b>Class</b>	Class 4-7	Age 17 - 20
<b>Teacher's name</b>	Satoko Chatterjee (mother)	Durgadas Tudu
<b>Activity duration (Class periods)</b>	2000 - 2002	June - November 2008

## Results

- Home Based Group Green Sprout made earthen pot aquarium as their 'Guppy Pond'. They learnt about guppy, too.



Photo : Satoko



Guppies (*Poecilia reticulata*), known as larvae - eating fish. We can tolerate a wide range of water even grey water, but cannot survive at low temperature below 5°C. We live 3-5 years and mature in 90 days, when males are 1.8 cm long and females 2.5 cm long. Male guppies have more colourful tails than female guppies. The female produces 50-200 offspring a month, in broods of 5-7.



## Case Study

### – Fish cultivation by youth group in Shimulberia village –



(Report and Photos by Durgasankar Pardhan – MPEC project/DRCS, translation by Subhadyuti Mitra)

7 youth member (age 17 to 20) of Shimulberia village have tried out 'Group fish cultivation' in their village. Shimulberia is located in Saltora Brock in Bankura district where belongs to dry land region. Generally there is not much scope of fish cultivation in that area, because the number of ponds is less. So the cost of fish in the market is comparatively high all the year round. Therefore youth group came out the idea of fish cultivation in order to get a supplementary income support. After having got a 3 days training in August 2008, they started fish cultivation in three ponds in the village during rainy season and harvested fish in Nov.2008.



Photo : D S Pradhan

Pond	Pond A	Pond B	Pond C
Size (Length x Breadth Depth)	27m x 14m x 0.9m	14m x 5m x 1.2m	27m x 27m x 1.8m
Water level	No water in Summer. Dry up totally from Dec. till next rainy season.		There is water throughout a year but water level is low in summer.
Pond ownership	Individual, 1 Kg Magur fish as a rent for both ponds together		Forest department No share was given to them.
Applying lime* (end of July 2008)	15 Kg	5 Kg	20 Kg
Introducing fry** stage fish (beginning Aug.)	<b>Katla</b> - 100 <b>Rui</b> - 200	<b>Magur</b> - 200	<b>Rui</b> - 400 <b>Katla</b> - 300 <b>Mrigel</b> - 300 ****
Food giving (early Sep.to Oct.)	3 times each of 10 Kg mixture of Rice bran and Cow dung in ratio of 2:3 by weight.	2 times each of 10 Kg mixture of Rice bran and Cow dung. 1 time 10 Kg Poultry litter	1) 20Kg of mixture of Rice bran and cow dung 2) 30Kg of Termite and mound mushroom 3) 50 Kg Poultry litter 4) 50Kg <i>Haria</i> (coun try liquor made by rice) left over rice material
Maintenance	– Applying net for supply oxygen*** in every 7 days. – Cleaning waste in last July		

Harvesting fish	1) 20th Oct. <b>Rui</b> -3Kg <b>Katla</b> -2Kg 2) 8th Nov. <b>Rui</b> -3Kg	1) 20th Oct. <b>Katla</b> - 3Kg <b>Magur</b> -2Kg 2) 25th Oct. <b>Magur</b> -1.5Kg 3)1st Nov. <b>Magur</b> - 3Kg	1) 20th Oct. <b>Rui</b> -1.5Kg, <b>Katla</b> -2Kg <b>Mrigel</b> -1Kg 2) 25th Oct. <b>Rui</b> -1Kg, <b>Katla</b> -3Kg <b>Mrigel</b> -1.5Kg 3)1st Nov <b>Rui</b> -2.5Kg, <b>Katla</b> -2Kg <b>Mrigel</b> -1.5Kg 4) 7th Nov. <b>Rui</b> -0.5Kg, <b>Katla</b> -1Kg <b>Mrigel</b> -0.5Kg 5) 12thNov. <b>Rui</b> -1.5Kg, <b>Katla</b> -3Kg <b>Mrigel</b> -0.5Kg
	 Photo : D S Pradhan	 Photo : D S Pradhan	
Earning by selling fish	6Kg <b>Rui</b> / Rs.50 5Kg <b>Katla</b> / Rs.50 Total Rs.550	6.5Kg <b>Magur</b> / Rs.60 Total Rs.390	7Kg <b>Rui</b> /Rs.50 11Kg <b>Katla</b> /Rs.50 5Kg <b>Mrigel</b> /Rs.50 Total Rs.1150

Thought the Group fish cultivation, the youth members reported the following points

**Find outs:**

- Mushroom found in the termite mounds, which was earlier of no use, is now used for feeding the fish.
- The waste produced during the processing country liquor *Haria* is now used for feeding the fish as well as the cows.
- Cow dung, which was earlier used as manure for cultivation is now also used as fish food.
- Poultry litter is also used as fish food.

**Difficulties they faced:**

- x Since there was too much water in the ponds till the month of July, fish could not be raised properly there
- x Since the depth of the pond C was not much, and comparatively the number of fish was more, the fishes did not grow much.
- x Magur fish was stolen.
- x Since the group did not have their own fish net, they had to hire it and as a result, fish had to be given as a rent to the net-owner.



Photo : D S Pradhan

If we calculate the balance of this group fish culture in three ponds

<b>Operational cost</b>	<b>Amount</b>
1. Fry (fish babies) - total 1500	Rs. 800
2. Rental value of ponds – 1Kg <i>Magur</i>	Rs. 60
3. Lime –total 40Kg/Rs.4	Rs. 160
4. Rental value of Net -5-6 times-3Kg <i>Rui</i>	Rs. 150
5. Poltry litter as fish food	Rs. 50
<b>Total</b>	<b>Rs. 1220</b>



**Return**

1. <i>Rui</i> 13 Kg / Rs.50	Rs.	650
2. <i>Katla</i> 16Kg / Rs.50	Rs.	800
3. <i>Magur</i> 6.5Kg /Rs.60	Rs.	390
4. <i>Mrigel</i> 5Kg /Rs.50	Rs.	250
<b>Total</b>	<b>Rs.</b>	<b>2090</b>

**Balance** = Rs.870

(If we include expecting harvest, there are still too small fish to harvest.  
This is estimated 12.5Kg x Rs.50/Kg = Rs. 625 as additional Return)

**Note from ENRE:**

\* Lime, highly alkaline substance, needs to be applied into the pond after first rain of monsoon to avoid water becoming high acidity due to sudden activation of organisms. Lime also cleans water. Calculation basis of applying Lime is 2Kg lime per 65m<sup>2</sup> of pond area (1 *Kata* ) depth around 1.5m.

\*\* In terms of fish nursery, it is described as Spawn (3-4 days old, 7-8mm) and Fry stage (15days, 20-25 mm). Youth member in this report purchased fry from a seller from Bankura.

\*\*\* Another simple way to supply oxygen is to flapping water by hands.

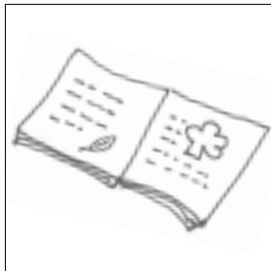
\*\*\*\* These three fish selection can be due to each fish has different depth habitat in a pond. Usually it is said that *Katla* in Shallow water layer, *Rui* in Middle, and *Mrigel* habits in bottom layer.



## MEMO PAGE



## Resources



to strenghten your guiding role

# Fishes of Bengal

by Silanjan Bhattacharya

*Bengalis are known for their love for fishes. Most of the Bengalis would consider his meal unfulfilling if at least one fish preparation is not there. Modern medical knowledge suggests that fishes are good animal proteins and having fishes in the diet regularly is a very good habit for health. Many varieties of freshwater and brackish water fishes and some sea fishes enrich Bengali dishes. Diversity and abundance of kinds of fishes in the habitats of Bengal have allowed Bengalis to develop this luxury of diet. Unfortunately, this age old good habit of Bengalis is now facing a crisis due to ecological, socio-economic and cultural changes...*

## Fishes and their habitats

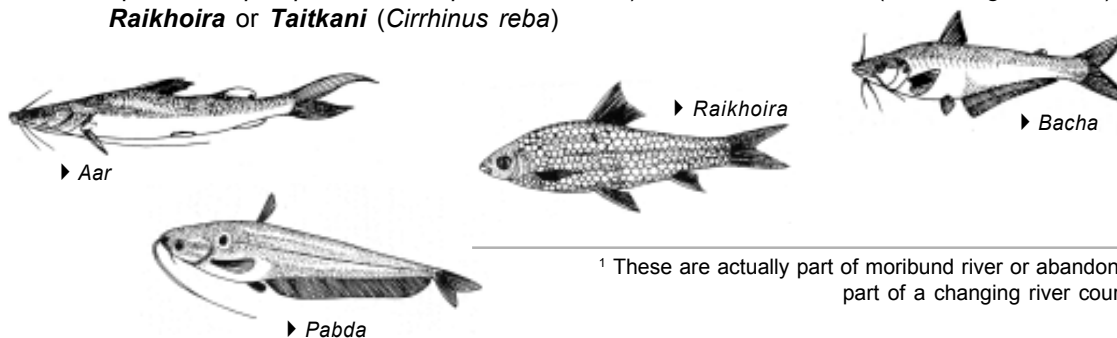
Along with coastal area, Bengal's landmass is entrapped in the fabrics of innumerable smaller rivers, rivulets, channels, creeks and other wetlands (for example, *beel*, *daho*<sup>1</sup> etc.) which owe their origins to the delta forming activities of two greatest river systems - the Ganga and the Brahmaputra. At the sea face, this delta has formed extensive estuary covered with mangroves, the famous Sunderbans. The water in this estuarine part is brackish, i.e. a mixture of salt water from the sea and freshwater brought by the rivers. To these natural water bodies, humans have added ponds, tanks, ditches, reservoirs by digging and creating embankments while building roads, houses etc. Waters are flowing in rivers, rivulets, channels and creeks; they are stagnant in ponds, tanks, ditches, *beels* and marshes. This enormous variety of habitats allows a rich diversity of fish species to breed, grow and live in them which Bengalis use as their fish resources.

Habitat wise the fishes of Bengal could be characterized as followings;

**Freshwater Fishes:** These fishes live, breed and grow in freshwater bodies. There are differences among them in their preference for types of freshwaters.

- Riverine freshwater fishes: live and breed in the flowing waters of rivers or bigger wetlands like *bils* which are directly and well connected to a flowing river. Rarely, they may enter other wetlands with monsoonal floods.

Examples - **Aar** (*Aeorichthys aor*), **Bacha** (*Eutropiichthys vacha*), **Pabda** (two bigger species-*Ompok pabo* and *Ompok bimaticulus*), **Khorshol** or **Tarui** (*Rhinomugil corsula*), **Raikhoira** or **Taitkani** (*Cirrhinus reba*)



<sup>1</sup> These are actually part of moribund river or abandoned part of a changing river course

- Riverine-pond freshwater fishes: breed in the flowing freshwaters only but, may live and grow in any clear but stagnant water bodies like ponds where they may enter naturally by monsoonal floods. Traditionally, fertilized eggs or fries of these fishes are collected and then released in the ponds where these fishes grow to considerably bigger sizes for harvest.

Examples - **Rui** or **Rohu** (*Labeo rohita*), **Katla**(*Catla catla*), **Mirgel** (*Cirrhinus cirrhinus*), **Kaalbose**(*Labeo calbasu*), **Bata** (*Labeo boga*)

- Stagnant freshwater fishes: live in stagnant freshwaters including ponds, tanks and ditches. Many of them go out with first monsoonal rains to breed and then grow in waterlogged paddy fields. A good percentage of newborns then manage to come back to ponds, ditches and other wetlands with flooding rains later.

Examples – **Punti** (*Puntius sophore*), **Tith punti** (*Puntius ticto*), **Sor or Saral Punti** (*Puntius sarana*), **Mourola** (*Amblypharyngodon mola* ), **Chanda** (*Chanda spp.*), **Kholse** (*Colisa spp.*), **Koi** (*Anabas testudineus*), **Lyata** (*Channa punctatus*), **Shol** (*Channa striatus*), **Shal or Gojal** (*Channa marulius*), **Pankal**(*Macrognathus aculeatus*), **Baan** (*Mastacembalus armatus*), **Kanklesh** or **Bogo** (*Xenentodon cancila*)



► Baan

**Estuarine or Brackish water fishes:** In the southern parts of the Bengal delta, freshwater get mixed up with the sea water that come with tides and create brackish water. Brackish water is not as salty as sea water, neither is it as sweet as upland freshwater. Moreover, during monsoon, rain water reduces salinity (i.e. the saltiness) of these water. Rivers, creeks, channels and other natural water bodies in the estuaries of Sunderbans contain such brackish waters. Many fishes are adapted to this kind of water. Some of them are actually sea-dwellers, coming to breed in this habitat for abundance of food and safety provided by the mangroves. **Ilish** or **Hilsa** (*Hilsa* or *Tenulosa ilisha*), the most popular of



► Hilsa / Ilish

fishes to Bengalis, come from the sea to breed and grow in estuaries and in rivers further up. Some species breed, grow and live in the brackish waters of the estuaries only. Many of the fishes Bengalis are fond of are estuarine or brackish water species. **Topse** (*Polynemus paradiseus*), **Parshe** (*Mugil spp.*), **Bhetki** (*Lates calcarifer*), **Deshi Pangash** (*Pangasius pangasius*) are to name a few.

**Sea Fishes:** **Pomphrets** (*Brama spp.*) and **Lotey** (Bombay Duck fish, *Harpadon nehereus*) which are very popular in the Bengali diet are typically marine, i.e. sea living ones. Typical sea fishes like Sardine, Tuna, and Mackerels which are popular globally are still rare in Bengali diet.



► Deshi Pangash

All the fishes mentioned above are bony fishes, i.e. the skeletons of these fishes are made up of bones. The skeletons of other types of fishes are made up of softer substances called cartilage. Sharks and Ray fishes are of these types, many of them are popular in diet elsewhere but Bengalis avoid them except the **Shankar Maach** which is a Ray fish.

### Magnitude of fish diversity

Experts have estimated about 24,000 species of fishes living in various aquatic habitats on earth. Within Indian territories, there seem to be of 2,415 species of bony fishes of which nearly 1,000 species are freshwater inhabiting. An authority from Zoological Survey of India has given account of 64 species of freshwater and brackish water fishes that are found in

West Bengal. These estimates vary as some scientists are giving different estimates. In a typical flood plain landscape of West Bengal like those found in the districts of Murshidabad, Nadia, Hooghly, Howrah, South and North 24 Parganas, one may easily note the presence of 40-50 species in the local freshwater habitats. A good fish market in any Bengali locality generally displays more than 50 species of fishes on sale, of which barring a few are all from fresh waters or estuaries.

**Use of fish diversity by people:** How much of this diversity in fish do we use? Most of the fishes are edible, but only a smaller percentage of them are eaten globally. People's preference for particular species of fishes differs from country to country, region to region, culture to culture. Also, people traditionally believe in special food values of specific species. **Jeol** (means air breathing) fishes like **Shingi** (*Heteropneustes fossilis*), **Magur** (*Clarius batrachas*), **Koi** (*Anabas testudineus*) are considered to have special nutritional properties to help patients recovering fast from illness. On the other hand, species like **Boyal** (*Wallago attu*) are avoided by many people during illness. **Hilsa** or **Ilish**, though very popular in Bengal as a tasty delight, are avoided during sickness for being considered to be difficult to digest.

**Wild fishes and cultured fishes:** Man has domesticated many animals by manipulating the wild populations of the species. The breeding, feeding and other necessities of them are taken care of by the people. A few fish species like **Rohu**, **Catla**, **Mirgel** are now artificially bred and cultured in ponds, they could be considered as domesticated fishes. But, most of the fish species Bengalis eat are wild in nature because they breed and grow by themselves in natural wetlands.

**Indigenous fishes and Exotic fishes:** Some of the fishes now found regularly in Bengali meals are not original inhabitants of this country. They have been brought from other countries to breed and grow in our wetlands, because of their fast rate of growth. **Tilapia** (*Oreochromis mossambica*), **Nilontika** (*Oreochromis nilotika*), **Silver carp** (*Hypophthalmichthys molitrix*), **Grass carp** (*Cteropharynodon idellus*), **Hybrid magur** (actually, not a hybrid but an African catfish, *Clarius garrripinus*) etc are such exotic species. While Tilapia and Nilontika can breed and grow independently, other exotic fishes like Silver carp, Grass carp have to breed artificially.

### Ecology and behaviors of fishes

Same as other natural resources, fishes also exist as component of local environment. The ecology and behavior of the fishes are extremely diverse. There are **herbivore fishes** who eat phytoplanktons (microscopic plants floating in the water) or other aquatic plants, others are **carnivores**, i.e. eat animals, many are omnivores-eat plants or animals both. There are also **detritivorous fishes** that collect food from the debris lying at the bottom of their aquatic habitats. Fishes are also very important food source for many animals and birds, including humans. As a result, fishes form important links with all others living in an ecosystem. If their diversity and populations are affected, the functioning of entire local ecosystem gets affected. Unfortunately, this is what happening in our localities.

Not much is known about the ecology and behaviors of most of the fishes. But, fishermen and people who regularly catch fishes often carry important knowledge that are yet to be verified and documented by scientists. There is little doubt about some scientific basis of most of such knowledge as people have been catching fishes for generations using them. Given below are some important observations on some of the popular fishes of Bengal plains.

- With the first heavy rains in monsoon many freshwater fishes become excited to go out of the ponds or any other water bodies they were living in so far. Flooding flow of waters excite fishes like **Koi, Lyata, Shol, Shingi, Magur, Puntis** to breed. Their new born fries disperse with water to new water bodies including rainwater logged paddy fields. There they grow to bigger sizes and some of them manage to come back to permanent water bodies towards the end of monsoon with late heavy rains flooding the lands. Rampant use of pesticides in the paddy fields and indiscriminate embankment of natural water flows are now heavily affecting the natural breeding and growth of these fishes.
- **Bangroosh, Bangosh or Sonabaam** (the Bengal eel, *Anguila bengalensis bengalensis*) looks like snake. It can grow up to 3-4 feet. It has the habit of coming out of water and wriggling quite far through the land in search of food. It leaves a slimy trail on the path of its movement and follows it while returning to water. If encountered it shows aggression by opening its sharp-toothed jaws and trying to bite. People scatter ash or saw dust on the slimy trails which trap the fish and make easier to catch. This fish used to be common in the riverine tracts of lower Bengal, now they are commonly found only in the estuarine areas.
- **Boyal** is a very aggressive predator. It stalks on and tries to engulf any creature little smaller than its body. Such preys may include fishes (even another *boal*), rats getting close or into water in search of food, small water birds etc. It is basically a nocturnal predator.

- **Shaal or Gojal** and **Chitol** are the two most aggressive species of Bengal's freshwater.



► Shaal / Gojal

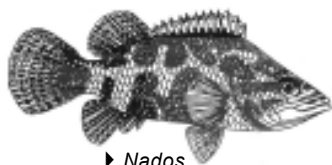
It is known to attack anyone including human beings if they comes close to their eggs or fries. A very big size (up to 3.5 feet long) *shaal* may inflict a serious injury even to an adult person or cattle.

- **Botkoi** or **Podkoi** (*Badis badis*), **Beley** (*Glossogobius giuris*), **Guntey** (*Lepidocephalus guntia*) can change its body color to camouflage with the environment.



► Guntey

- **Nados** or **Meni** or **Bhulsa** or **Bhyada** (*Nandus nandus*) (all



► Nados

these Bengali names stand for dull or lethargic character) stupidly do not move at all if they are attempted to be caught, justifying the meaning of its names.

- Many fishes, like **Deshi Tyangra, Puntis, Kholse** would not live in a wetland which do not have any natural aquatic vegetations. **Kanklesh** or **Bogo** live in freshwater wetlands whose water is very transparent.

**What students can research out:** Very little is known to scientists about the intricacies of ecology and behaviors of our **indigenous freshwater fishes**. Students being guided by their teachers and taking help from local knowledgeable persons can themselves observe,

document and study many important aspects of these fishes of Bengal. Some suggestions are following-

- What are the natural habitat requirements of a particular species? Where the species can breed and grow better and where they can not do that. How important the presence or absence of aquatic weeds like *kolmi* (water convolvulus, *Ipomoea aquatica*), *Jhanjhi* (*Hydrilla*) etc. in this regard are? Which species can tolerate or benefit from the presence of water hyacinths?
- What are the breeding seasons and particular details of breeding behaviors of a species?
- What are the different traditional trapping and catching techniques that were or still are in use in the locality? How these techniques are used in exploiting particular fish behaviors?
- How are the habits of eating fishes or particular species now changing with new generations? For examples, many kids, especially, urban ones do not like small fishes. This may change the market demand and market values for these species, in turn, influencing the farmers not to keep them in their ponds and other aquatic bodies.
- Many species of fishes which used to be commonly found in local water bodies might have become rare or are found in smaller sizes only. Which are these fishes? And why has it become so?

Many other important questions can be pursued this way which can contribute to the serious understanding of the behaviors and ecology of our fishes, as well as to their conservation for future generations.

**Silanjan Bhattacharyya**, a faculty member of the West Bengal State University, has been teaching ecology, behavior and evolution at UG and PG levels for last 13 years, where he involved his students to do field works intensively. He is also involved seriously with the biodiversity conservation movements and West Bengal Biodiversity Board as a board member. His research interests include biodiversity, traditional knowledge, and animal behavior and he writes frequently on these subjects in leading news papers and magazines. He obtained PhD from Indian Institute of Science, Bangalore, by working in the field of human ecology after having done Masters in Zoology from Calcutta University.



# List of Fish

## Alphabetical Order of Bengali Name

		Local name (Bengali)	Common name	Scientific name	Appeared in	Image (Page)
আ	আর বা আর ট্যাংরা	Aar / Aar tyangra	River Catfish	<i>Aeorichthys aor</i>	R	68
ই	ইলিশ	Ilish	Hilsa	Hilsa ilisha Temulosa ilisha	1A, R	33, 69
ক	কই	Koi	Climbing Perch	Anabas testudineus	1A, C1, R	18,25,33
	কুঁচে	Kunche		Monopterrus cuchia	2,3A	
		Kaalbose	Black Rahu	Labeo calbasu	3A, R	33,51
	কাজলি	Kajoli / Kajri	Gangetic Ailia	Ailia coila	EDC	33
	কাতলা	Katla	Catla	Catla catla	1A, 3A, R	16,18,33
	কানক্লেশ বা বোগো বা কেকলে	Kanklesh or Bogo or Kekle		Xenentodon cancila	1A, 2, 3A, R	
	কাশখইরা	Kash Khaira	Indian Glass Barb/ Indian Hatchet Fish	Chela laubuca	EDC	33
	কার্প	Karp	Carp			
	গ্রাস কার্প	Grass Karp	Grass Carp	Cteropharyngoden idellus	1A, R	17,34
	সাইপ্রিনাস কার্প	Cyprinus Karp	Common Carp / Cyprinus Carp	Cyprinus carpio	3A	
	সিলভার কার্প	Silver Karp	Silver Carp	Hypophthalmichthys molitrix	1A	
খ	খলসে	Kholse	Dwarf Gourami	Colisa lalia	1, C1, R,T	46
	খলিসা	Kholisa	Striped Gourami	Colisa fasciatus	EDC	32
	খরশোল বা তারুই	Khorshol or Tarui		Rhinomugil corsula	R	
গ	গুঁতেল বা গুঁতিয়া	Gutel / Guntey		Lepidocephalus guntia	1A, 3A, R	71
	গাপ্পি	Guppy	Guppy	Poecilia reticulate	3B	62

		Local name (Bengali)	Common name	Scientific name	Appeared in	Image (Page)
চ	চেঙ	Chyang	Asiatic / Dwarf Snakehead	Chanda ranga / Chanda nama	1A, 3A	17
	চিতল	Chitol	Humped Featherback	Notopterus chitala	1A,3A, R EDC	32
	চাঁদা	Chanda	Indian Glassy Fish/ Glass Fish	Pseudambassis ranga	2, 3A, C1, R	34,45
	চেলা	Chela	(see Khas Khaila)		3A, EDC	
ঝ	ঝায়া		Jhaya	Chelas sp.	3A	
ট	ট্যাংরা	Tyangra / Golse tangra	Gangetic Mystus	Mystus cavasius		
	(আর) ট্যাংরা	(Aar) Tyangra	Giant River Catfish	Aorichthys seenghala		32
	(দেশি) ট্যাংরা	(Deshi) Tyangra		Mystus vittatus		
	(বই) ট্যাংরা	(Bai) Tyangra				
ড	ডোমরিয়া	Domria / Danria		Esomus danricus		
ত	তেলাপিয়া	Tilapia	Tilapia, Egyptian Mouth Breeder	Tilapia mossambicuss	1A, 3, R	17,34
	তারুই বা খরশোল	Tarui / Khorshol		Rhinomugil corsula	R	
	তেচোখা	TechoKha		Polynemus paradiseus	1A, R	
	তপসে	Topse		Polynemus paradiseus	1A, R	
দ	দইচাক	Daichak			1	
	দেশি পাঙাশ	Deshi Pangash	(see Pangash)		R	69
ন	নাইলনটিকা	Nailontika		Oreochromis niloticus	1A, 3A, R	50
	ন্যাদস বা মেনি বা	Nados/ meni/Bhulsa	Leaf Fish / Mottled Nandus	Nandus nandus	R	71

		Local name (Bengali)	Common name	Scientific name	Appeared in	Image (Page)
	ভুলসা বা ভাইআদা	Bhulsa / Bhyada				
প	পাঙাশ	Pangash / (Deshi) Pangash	Pungas	Pangasius pangasius	2 R	
	পুঁটি	Punti	Spot-Fin Swamp Barb	Puntious sophore	1A, 3A, R, EDC	
	(তিত) পুঁটি	(Tith) Punti		Puntius ticto	R	
	(সর) পুঁটি বা (সরল) পুঁটি	(Sor / Saral) Punti		Puntius sarana	R	32
	(জাপানি) পুঁটি	(Japani) Punti			1A, 3A	
	পাকাল	Pakal / Pankal		Macrognaathus aculeutus	2, 3A, R	
	পাবদা	Pabda	Indian Butter Catfish	Ompok pabo / Ompok bimaticulus	R	68
	পমফ্রেট	Pamphret		Brama spp.	3A, R	
	পারসে	Parshe		Mugil spp.	R	34
	পদকই বা বটকই	Podkoi / botkoi		Badis badis	R	
ফ	ফলুই	Pholui		Notopterus notopterus	3A	34
	ফ্যাসা বা বাচা	Phyasha / Bacha		Eutropiichthys vacha	R	68
ব	বাটা	Bata	Reba Carp,	Labeo boga	1A, R, 3A, EDC	17,32
	বেলে	Beley / Bele	Goby, Tank Goby, Bar-eyed Goby	Glossogobius giurus	3A, R	32
	বাণ বা বাইম	Baan / Baim		Mastacembelus armatus	R	69
	বাঁশপাতা	Banshpata		Dani devario		

		Local name (Bengali)	Common name	Scientific name	Appeared in	Image (Page)
	বোয়াল	Boyal /Boaal		Wallago attu	2A, 3, R	51
ড	ভেটকি	Bhetki		Lates calcarifers	1A, 3A	35
ম	মৃগেল	Mrigel	Cauvery White Carp	Cirrhinus cirrhosus	1, R	16,17,35
	মাগুর	Magur,	Magur	Clarius batrachus,	1A, 2, C1, R, EDC	18,32
	(হাইব্রিড) মাগুর	(Hybrid) Magur	African catfish	Clarius garripinus		
	মুরাল, মৌরলা মুরলিয়া	Mural, Mourola, Murliya	Indian carplet	Amblypharyngodon mola	1, R, C1, 3A, EDC	32
র	রাইখইরা বা তাইতকানি	Raikhoira / Taitkani	Reba Carp	Lirrhinus reba	R	68
	রুই	Rui, American Rui	Rohu	Labeo rohita	1A, 3A, R	16, 17, 18, 35
ল	ল্যাটা	Lyata	Spotted Snakehead	Channa punctatus	1, R, C1, 3A	45
		Lotey	Bombay Duch Fish	Harpadon neheteus	R	
শ	শোল	Shaal / Shol / Gojal	Striped / Banded Snakehead	Channa marulius	R, C1, 3A, EDC	33,71
	শিঙি	Shingi	Stinging Catfish	Heteropneustes fossillis	1A, 2,C1, 3A, R	33,45

R='Expert's View Point', C = Case Study, EDC = ENRE Data Card,  
1A, 2, 3A, 3B = Activity Steps, T = Teacher's Note

- Local names impossible to identify আমাদি (Amadi), আমুলিয়া (Amliya), ম্নার কার্প (Mrinar Karp), গুড়া (Gura), চনা বা চাঁওয়া (Chyana, Chanya), জলসা (Jalsa), পারুল (Parul), ফিরকা (Phirka), বাবলা (Babla), বাড়ুরা (Baruya), বোথি (Bothi), ভোলা (Bhola), মিরঝালি (Mirjhali), রুলি (Ruli), লুটি (Luti), শাটিং (Shating)



## References

- Data cards and worksheets on FISH prepared by ENRE is available. You can use them as supportive materials for activity-based learning and data collection.
- To develop lesson plans on this issue we have looked through the following resources.

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- Towards Sustainable Aquaculture / Vandana Shiva, Research Foundation for Science, Technology & Environment, 1997
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- *Banglar Maachh* / Shilanjan Bhattacharyya / WB Biodiversity Board

### Children's Book

- Suresh and the Sea/ Ragavendra Rao, Tulika, 1998

### Lesson Plans from Website & Magazine (Lesson plan / Level / Source)

- Aquaculture/ Secondary /www.panasia.org.sg
- Underwater Critters / Primary / www.kidsdomain.com
- Kids world : Pond Ecosystem / Primary / www.indev.nic.in/wwf
- Fish Feeding / Secondary / www.thewildones.org.

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