

TRANSFORMATION OF WASTE WATER TREATMENT AREA INTO NATURE PARK

A Case-Study from Kolkata, India

Paper at the 3rd International Smallwat11, Congress

Seville, Spain, April 25-28, 2011

Organised by

Foundation Centre of New Water Technologies (CENTA)

Presenter:

Ms. Debarati Chakraborty

Convenor, Women for Water Waste & Wealth (WWWW)

& Research Fellow, Centre for Built Environment

69/1 M.C.Garden Road, Kolkata – 700030, India.

Email: ar.debarati@gmail.com

Introduction



One of the objectives of the sustainable development is to reduce the gap between resource input & output

With rapid urbanisation and economic growth there is more waste and disposal, has become a problem & also expensive.

Recycling helps in ecological balance.

In Kolkata (formerly Calcutta), India, utilisation of sewage fed wastewater for aquaculture and also agriculture is an age old practice. There are examples in the periphery of Kolkata

One of such area in South Kolkata has become a nature park on waste water treatment area, managed by the Fisherman's Co-operative Society.

It is perhaps the best example in all over Kolkata

History

1932/42....?



Migration of Fishermen to the waste land area when the River Damodar had dried

1956



A registered society was formed with the guidance of Department of Fisheries of the Government of West Bengal, and obtained the lease from Kolkata Port Trust

1985-upto date



Strengthening the financial capability, improving solidarity with local people Institution of wetland and laying stronger claims for preservation of the wetland area by providing additional recreation and open space facilities

1986-upto date



Extensive plantation started
Animal Husbandry has been formed and a recreation a park was also created

WATER LOGGED WASTE LAND HAS BEEN TRASFORMED INTO AN URBAN FISHERY AND WATERFRONT RECREATIONAL ECOSYSTEM

Location



Located in a densely populated area about 20 Kms South West of the heart of Kolkata and based on some wetlands Kolkata Port Trust on lease.

Location

PLAN SHOWING LANDUSE.



 **INDUSTRIAL AREA**

 **SLUM AREA**

Land Mass and Financial Aid

In 1961, a group of fishermen formed a Co-operative Society (Mudialy Fishermen's Co-operative Society – MFCS) took lease of 70 Ha of marshy land from Kolkata Port Trust. Later on 10 Ha. Was obtained from the State Govt. of West Bengal and the society later onward 2.5 Ha

Total 82.5 Ha. Of which

Effective water Area : 55 Ha

Nursery Pond : 3.5 Ha

Society Forestry : 13 Ha

Embankment: 11 Ha

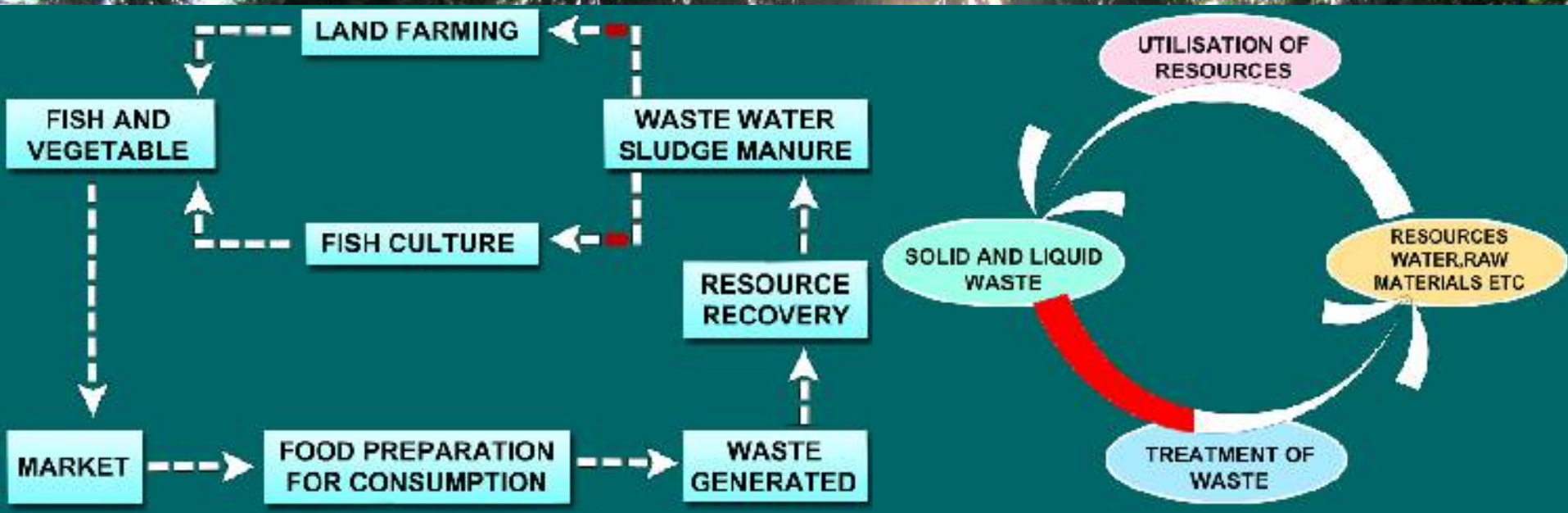


The waste water is 70% from the Industries and 30% for the Residential Use

The average daily loading is about 23 million litre

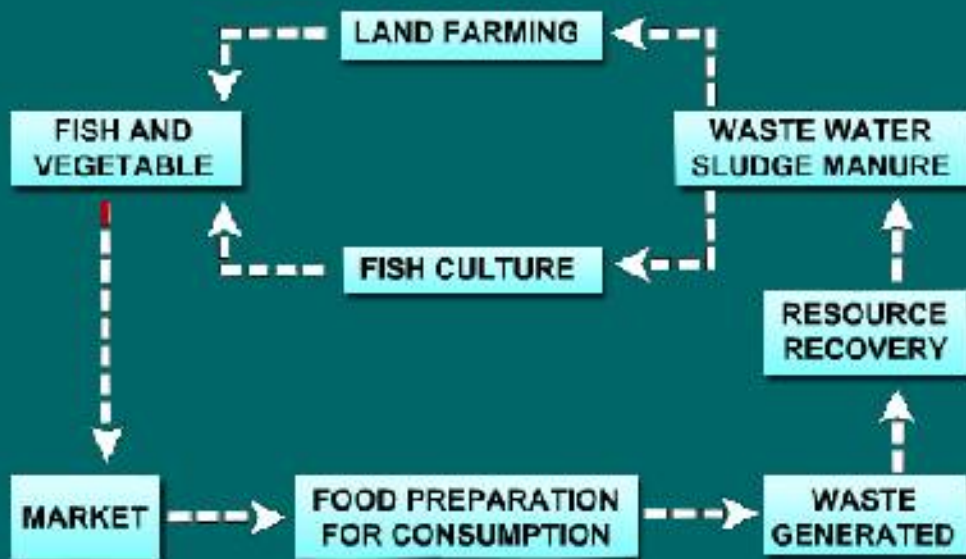


Methods



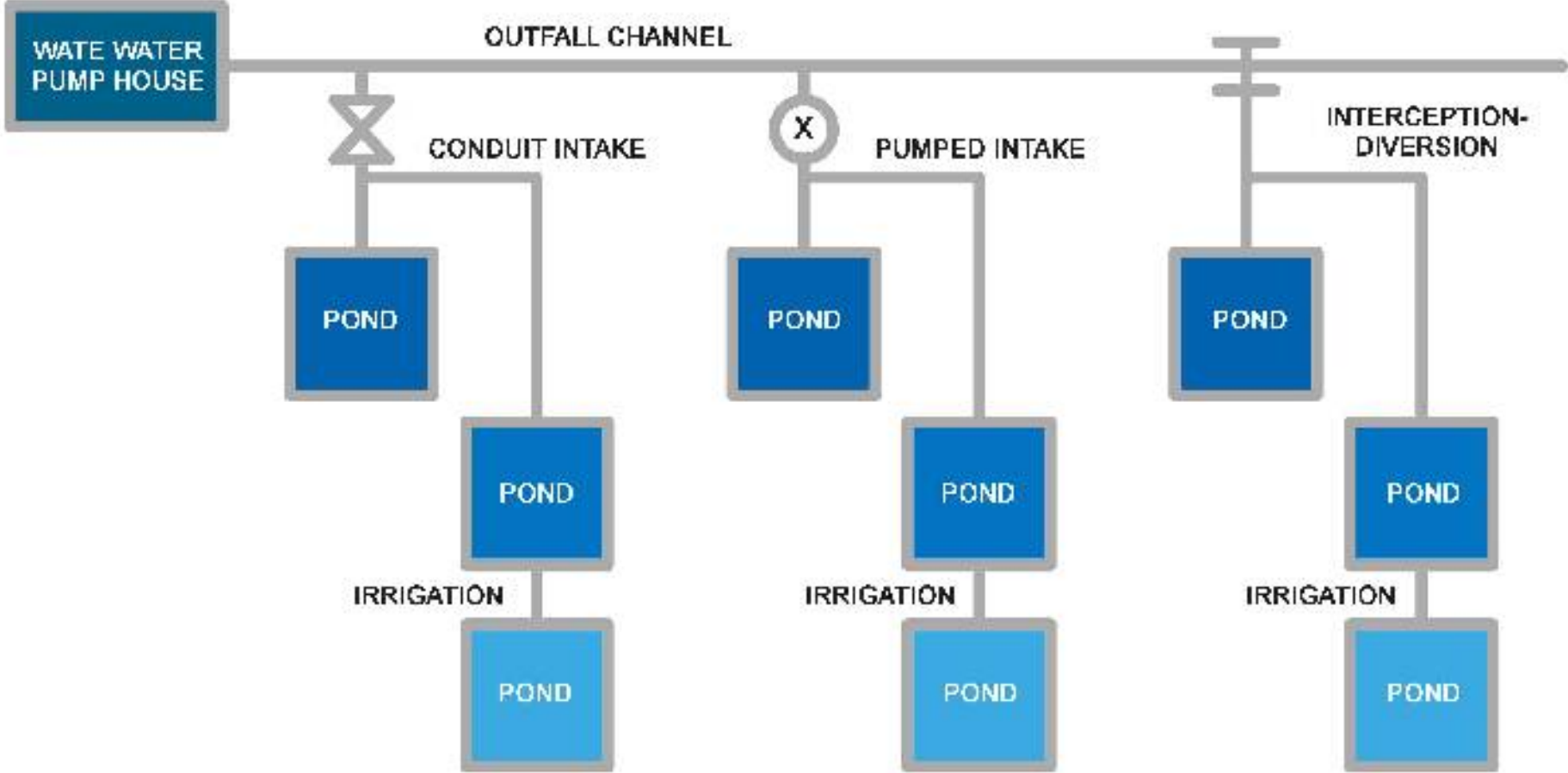
INTEGRATED RESOURCE RECOVERY SYSTEM

Methods



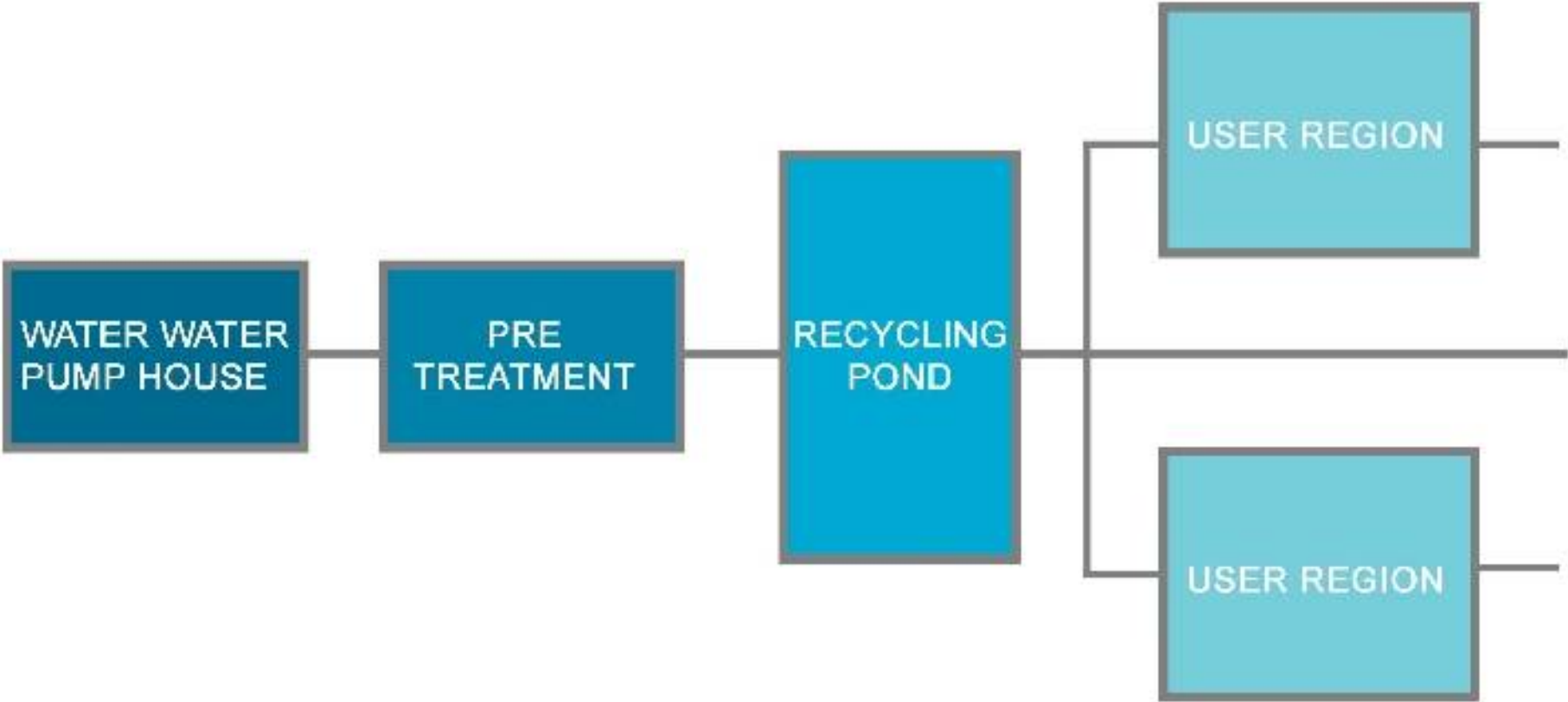
INTEGRATED RESOURCE RECOVERY SYSTEM

Methods



ABSTRACTED FLOW SYSTEM

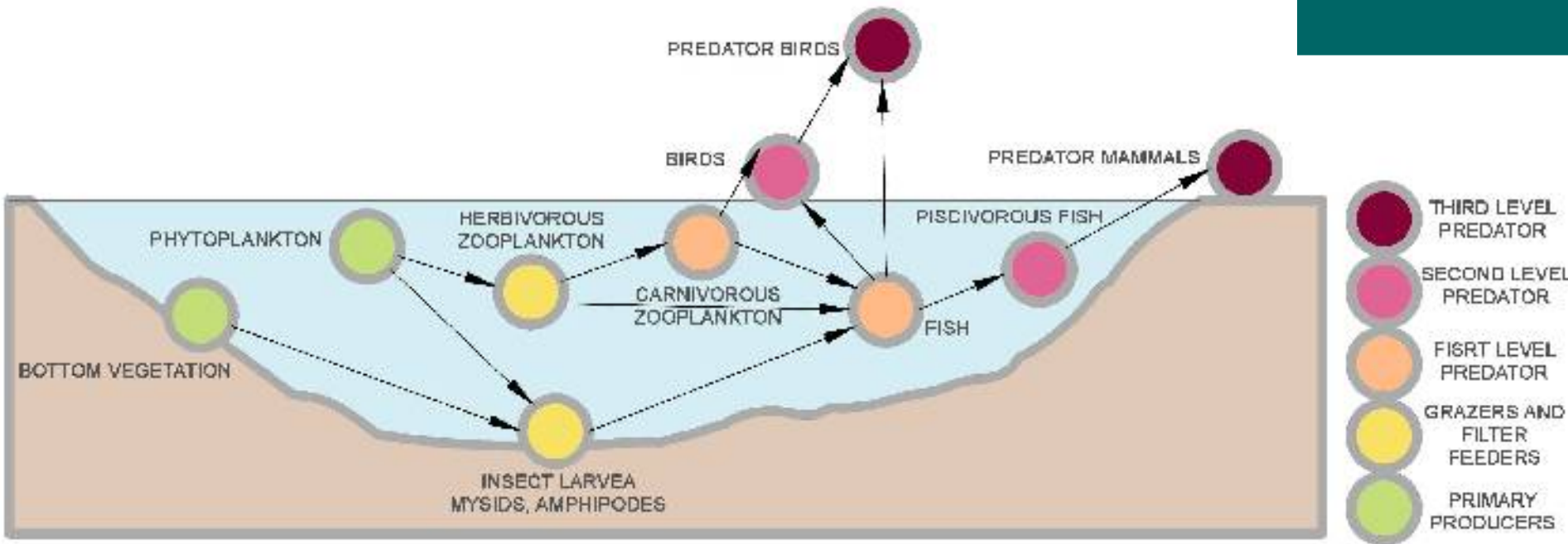
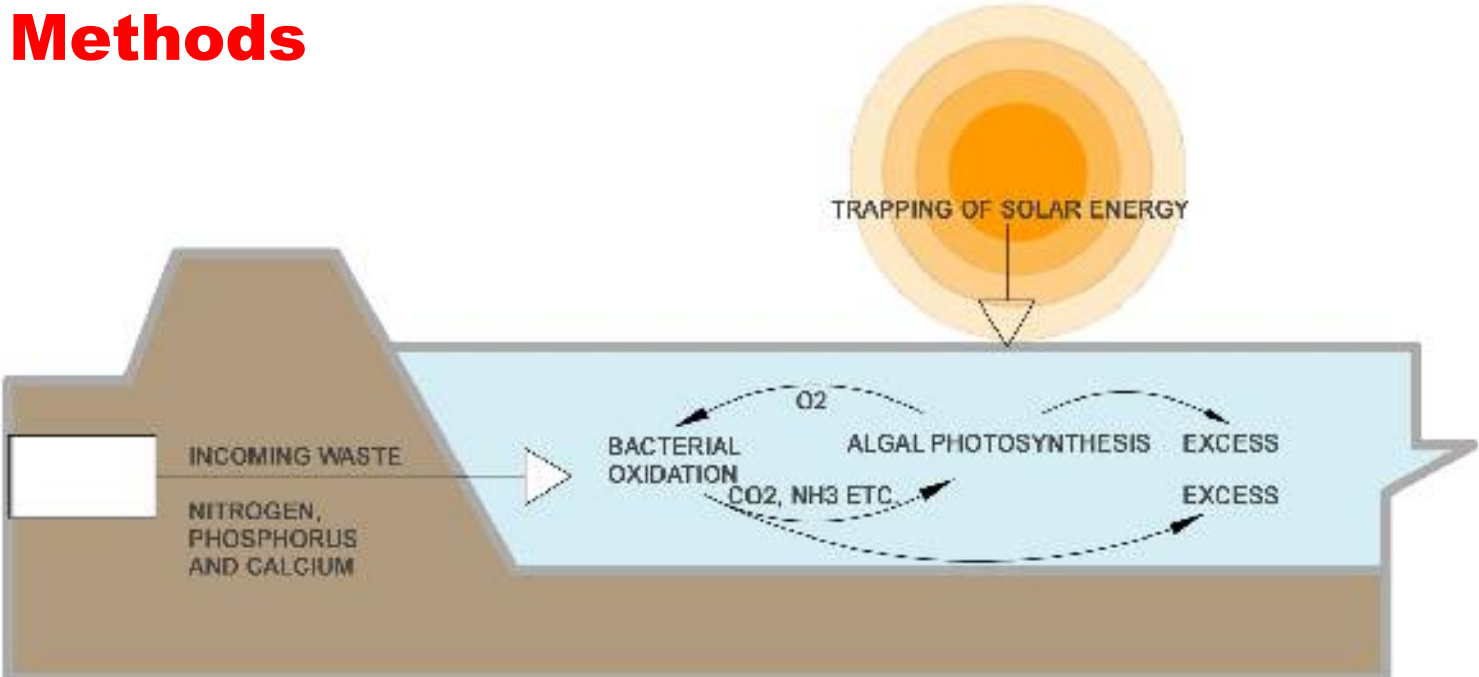
Methods



FLOW THROUGH SYSTEM

Methods

MICRO MACRO FLORA & FAUNA STRUCTURE AND THE BASIC FOOD CHAIN IN A POND



FOOD CHAIN IN THE FISH POND

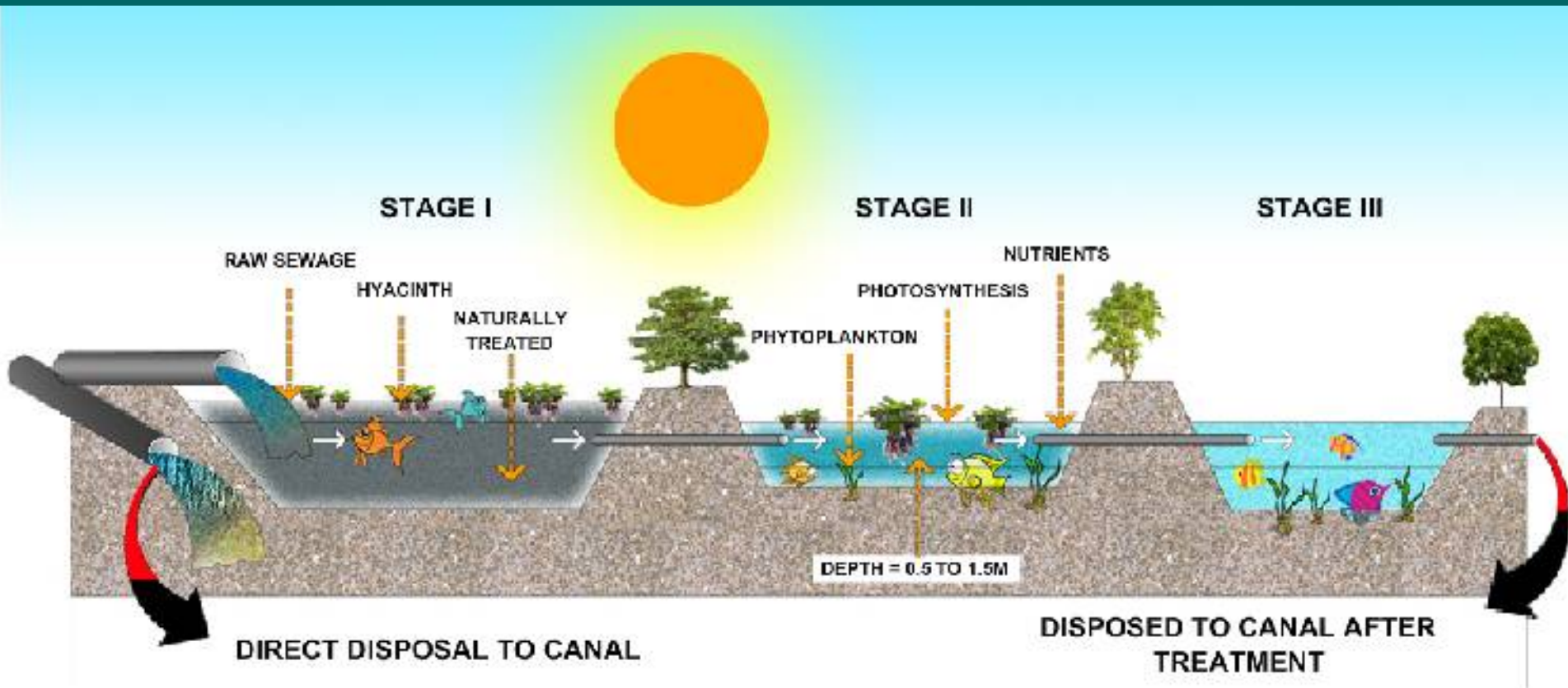
Methods

The method is indigenous. The ponds act as solar reactor. The shallow ponds receive sunlight for photosynthesis process. Phytoplankton algae is developed which provides fish food and emits oxygen

The rich nutrient is responsible for quick growth

The waste water and other sludge is used in nearby area to produce good quality vegetables

And natural compost out of solid waste is also used as manure (Ghosh 2001)



Methods

The method is indigenous. The ponds act as solar reactor. The shallow ponds receive sunlight for photosynthesis process. Phytoplankton alga is developed which provides fish food and emits oxygen

The rich nutrient is responsible for quick growth

The waste water and other sludge is used in nearby area to produce good quality vegetables

And natural compost out of solid waste is also used as manure(*Ghosh 2001*)

Process



Process



Process



Process



Fish stocking tanks



Process

FURTHER DEVELOPMENT

- 1. A laboratory has been developed by society, so when effluents released are found to be too deadly, the system has a provision to take the same water through entire circle again thus improving its quality.**
- 2. The climatic condition of the area facilitates the conversion of organic waste into protein rich micro algae for raising herbivores and fine catch of fish with much supplementary feeding**
- 3. More sensitive natured species of fishes have been found in some of the pond , mostly in the terminating pond indicating a positive mark in the level of improvement in the quality of the water.**

RESULTS

PARAMETERS	INFLUENT WATER	EFFLUENT WATER
Flow m^3, hr^{-1}	993.3	947.0
Temp ^o C. Amb/water	30/28	33/28
pH	7.95	7.50
Total Solids	1152.01	788.00
Suspended Solids	51.18	73.00
Dissolved Solids	1099.90	715.00
Total Volatile Solids	340.41	210.00
BOD	77.58	15.00
COD	470.42	65.00
Total Alkalinity as $CaCO_3$	285.44	192.00
Total Nitrogen as N	114.07	31.00
Phosphate as P	0.20	0.04
Mercury as Hg, $\mu g.l^{-1}$	4.52	Below Detectable Limit

All parameters except pH, Temperature, Mercury and Flow are expressed in $mg.l^{-1}$

RESULTS

Table No. 8

REMOVAL OF BOD AND COLIFORM IN THE MFCs POND SYSTEM

	INFLUENT WATER	EFFLUENT WATER	% OF REMOVAL
BOD (mg.l^{-1})	77.00	15.00	80.52
Fecal Coliforms (MPH/100ml $\times 10^3$)	46000.00	0.91	99.9980

NEERI, 1990. Water Quality Studies Of The Jeel In Calcutta Port Area. National Environmental Engineering Research Institute, Nagpur, India, p.35 & 75.

SOURCE : USAID REPORT JAN 1995 PN-ABU-593

Nature Park



The Mudially Fishermen Co-operative Society (MFCS) has developed the waste water treatment area into nature and ecological Park

This has become an example of biodiversity, recreation, and study of nature – fishes, birds, plants etc.

34 variety of fish are produced – which are sold in the city market

School children and others visit as part of their education

Nature Park



Boating for recreation also for aeration required for fishes

Nature Park



plantations

Extensive plantations have been made

30% fodder (leguminous varieties)

30% dust and chemical absorbing plants

30% shading and fruit trees to attract birds

10% for horticulture

Nature Park



Recreation, Joggers Park, and picnic spot

Nature Park



Poultry and piggery have been developed also. These are some micro-organisms



Nature Park



Birds

A survey by the zoological survey of India have found 120 species of birds including 27 migratory birds

Nature Park



So with all these greeneries, waterbody, a small zoo & park with Deer, Rabbits, Peacock, turkey it has become a Nature Park in true sense



Nature Park

REVENUE GENERATED



নেচার পার্কের বিভিন্ন প্রমোদ ক্ষেত্র (SPOT)
-এর সমিতি নির্ধারিত হার

প্রমোদক্ষেত্র (SPOT) -এর নাম	মূল্য বা টোল ৳/সদ. / সপ্ত
১) ক্ষেত্র নং ১/২/৩	২০০০-০০
২) ক্ষেত্র নং ৪	২০০০-০০
৩) ক্ষেত্র নং ৫ থেকে ক্ষেত্র নং ২৫	৩০০-০০
৪) ক্ষেত্র নং ২৯ থেকে ৪৫	১০০-০০
৫) তথ্য বিলিয়ার কেন্দ্র	৯০০০-০০
৬) শুভ বিবাহ ও বান্দ্য অনুষ্ঠানের জন্য	১০০০০-০০
৭) ভাটিং এর জন্য	৫০০০-০০

* নির্ধারিত হারের সঙ্গে জনপ্রতি ১০ (দশ) টাকা প্রবেশ মূল্য লাগবে।
বি.প্র. ক্লাবায় ও প্রকল্প তত্ত্বাবধিকার প্রদেশের সহ সেরা পর্যটক কার্যক্রম যোগাযোগ করতে অনুরোধ করা হচ্ছে।

ESTIMATED RATES OF DIFFERENT SPOTS AT NATURE PARK

NAME OF THE SPOT	DAILY RATES ৳.
1) SPOT NO 1/2/3	2000 00
2) SPOT NO 4	2000 00
3) SPOT NO 5 TO 25	300 00
4) SPOT NO 26 TO 45	500 00
5) INTERPRETATION CENTRE	3000 00
6) FOR MARRIAGE AND HASPIKHOOS FUNCTION	10000 00
7) FOR SHOOTING	5000 00

* ENTRY FEE Rs. 10 (TEN) PER HEAD

N.B. : SCHOOL & TRAVELING CONTINGENT ARE REQUESTED TO CONTACT BY THE NATURE PARK OFFICE WITH THEIR VALID DOCUMENT

Nature Park

REVENUE GENERATED

Table No. 9

Source : MFCS Records

MONTHLY EARNING FROM FISH SALE

(In Rs.)

YEAR	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APRIL	MAY	JUNE	TOTAL
1980-81	42346	49517	41312	52528	57509	61601	54146	47301	41537	51201	103621	195042	790451
1981-82	31013	70117	38309	76201	69212	86301	65151	93985	79546	87243	97241	106993	1021412
1982-83	99306	67576	59307	112503	107202	78507	76594	91322	87507	134509	137564	157028	1217525
1983-84	125220	68212	96155	94201	95907	72301	74506	90442	88336	107109	195211	202477	1330077
1984-85	66422	68501	123222	90451	42221	69340	86937	92301	75405	97485	132982	223206	1155033
1985-86	89420	67536	72728	122987	45887	85803	84423	79383	76235	101395	165704	324269	1304275
1986-87	372176	428828	266936	265506	205651	180070	184698	165021	193459	205589	352592	509855	3429326
1987-88	408341	425199	375536	280583	290095	148594	80960	131625	240970	260670	352067	537004	3521665
1988-89	253949	310524	284934	304986	223241	206067	705676	162765	165064	289872	469557	883882	2002625
1989-90	452627	518942	488851	530211	453672	375026	296190	365645	411293	292283	365235	450452	5021441

1:00 = Rs.19.00

SOURCE : USAID REPORT JAN 1995 PN-ABU-593

Nature Park

TABLE 1 : ACTIVITIES OF MUDIALY FISHERMEN'S COOPERATIVE SOCIETY

Main Business Activities:	Peripheral Business Activities:	Welfare Activities for Members:
1. Sale of fish through enlisted retailers	1. Plantations	1. Medical AID
2. Order Supply of Fish	2. Rearing of wild Animals	2. Educational AID
3. Sale of Fishery Inputs	3. Construction of Nature Park	3. Old Age Pension and Family pension
4. Sale of Consumer goods	4. Sale of Sheep & Goat	4. Consumption Loan
	5. Co-operative Fishery & Environmental Training	5. Marriage Grant
	6. Co-operative leadership training	6. Housing Loan
		7. Janta Insurance Policy
		8. Funeral Expenses
		9. Investment in drainage, Sanitation, & Drinking Water Facilities.



Nature Park

VISION PLAN OF THE MUDIALY FISHERMEN'S CO-OPERATIVE SOCIETY

1. To further develop the model with new scientific knowledge in order to promote itself as an exemplary demonstration centre.
2. To set up Aquariums of fresh water and marine fish for both educational and recreational purpose.
3. To start a Turtle Hatchery Farm
4. To further extend the existing forestry with medicinal plants.
5. To improve the current water testing laboratory and build up a library with computer & internet facility
6. To setup a bird observatory
7. To set up an adult education camp with TV & VCD facility.
8. To conduct regular interaction with Colleges & Universities
9. Many future works like (i) a big go-down, (ii) ten retail shops, (iii) buy two mini trucks, (iv) Ice plants cum cold storage
10. A children's area in the park

FUTURE PLAN FOR PROTECTION OF ENVIRONMENTAL POLLUTION

- 1. Regular de-silting of the wetland**
- 2. Increase of water retaining capacity of the existing ponds**
- 3. To bring more area under social forestry scheme**
- 4. To set up more beautifications by setting up flower gardens, decorative plants.**
- 5. Implementing scheme of lighting on the embankments by solar panels**
- 6. Bird Sanctuary**

Results and Discussions

Using Urban Refuge and polluted water of the city, a complete Indigenous bio-engineering system has been generated to perform three important functions:

1. **improving the waste water quality** before releasing it again to the river Ganges.
2. **Using the waste water to grow fish**
3. Developing an **ecologically balanced system** to accommodate a number of animals and plant species.

A journalist has aptly pointed it,

“While the whole world has been after World Bank Loans for restructuring and development, this small society is sustaining and ever growing without any financial support from any quarter.”

Nature Park

Results and Discussions

The area has been developed as nature park by the fishermen themselves in participatory process.

It provides **employment**:

The profit in income from sale is used for social benefit.

- *it provides oxygen and improves the environment*

- *The nature park is encouraging education and recreation*

The MFCS has built an interaction centre, a small laboratory and is building a guest house.



Methods

Results and Discussions

WASTE WATER CATCHMENT AREA

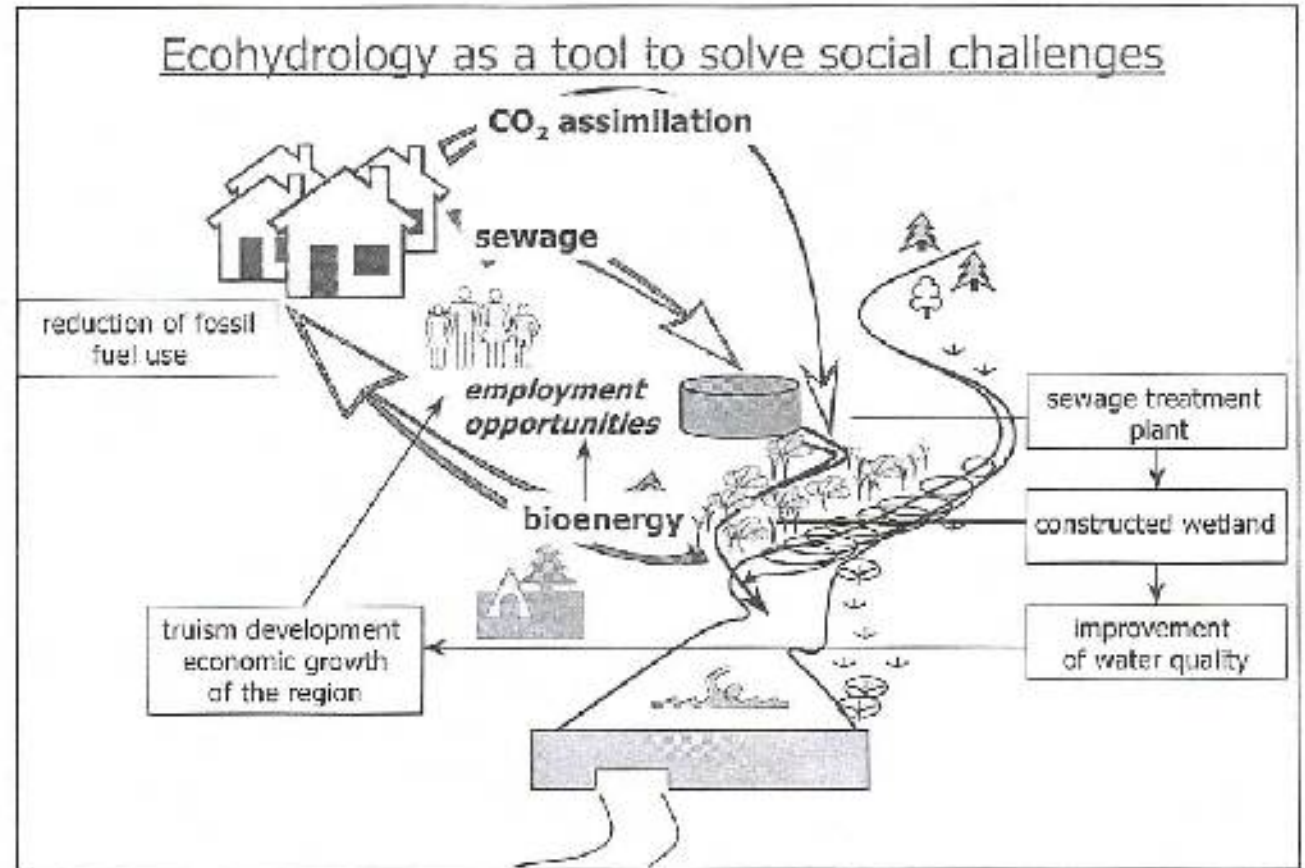
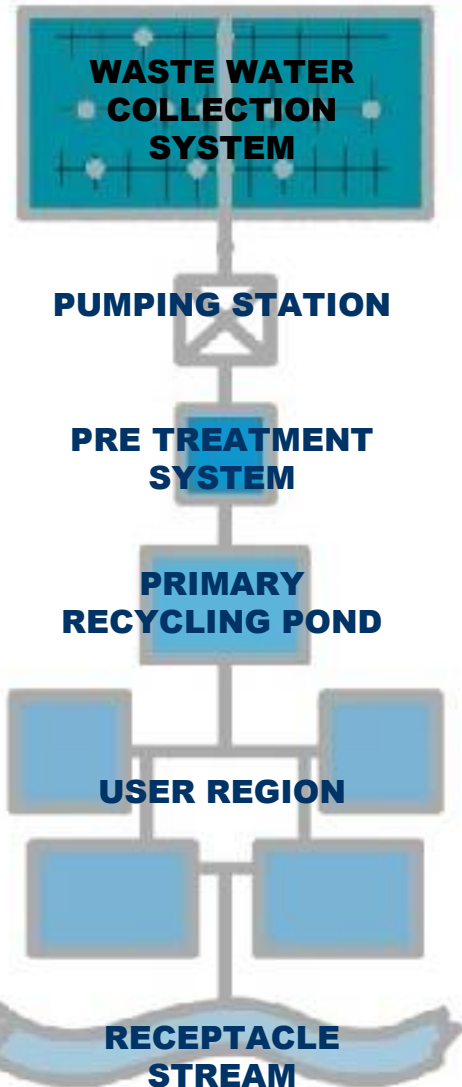


Fig.10.1. The application of Ecohydrology Concept for improvement of quality of environment water resources and creation of positive socio-economic feedback; ← socio-economic feedbacks, - - - ecological processes.

SOURCE : UNEP ISBN92-807-2059-7

Nature Park

Conclusions

These are about 100 members and 30 families depended on this. There are casual work forces including women.

Fish and other products are sold in the market. The profits are used for housing, health and other benefit of the members.

At one time these was proposed to fill up the ponds by the port authority but members of the society with help of various NGOs fought and was able to consummate this

Mudialy Nature park has received many awards and commendations and media coverage is printed on electronic media

More fruit trees and aquatic plants are needed.

Mosquito control is not very effective.

Control of visitors for some activities are required to protect the flora and fauna

However this can be used for similar project elsewhere

References

- Ghosh, Santosh (2001) Indigenous technology in Waste Water recycling, Calcutta Case Study, International Congress in Mitigation and Drainage. Seoul, September 2001, Proceeding.**
- MFCS (2005) Nature Park a report by Mudially Fishermen's Co-operative Society Ltd. Kolkata.**
- USAID (1995), Integrated wetland system for wastewater treatment and recycling. Basic Mannual, Arlington, Virginia, USA.**

Gratitude

MY SINCERE THANKS TO:

- Foundation CENTA
- Secretaria Smallwat Congress
- Dr. Isabel Martin
- Prof. Santosh Ghosh (Centre for Built Environment)