

Revisiting East Kolkata Wetlands: Globality of the Locals

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ABSTRACT

Background: The East Kolkata Wetlands system has become a research trove. Describing a little known wetland as a tutorial ecosystem for learning wetland wise use and thereafter getting it included in the Ramsar List of Wetlands was good. It took me about 20 years. But the subsequent lesson of how feeble is the strength of existing wetland conservation tools including the one of the Ramsar Bureau, has been much more absorbing and that needed to be revisited. Revisiting started with re-familiarisation. Familiarisation is the tool where perception is the task. No matter how deep the extent of perception research aimed at, the primary tool that the researcher must carry is 'familiarisation'. How do you start knowing a language? By knowing the alphabets. How do you start knowing about the ecosystem? Start familiarising yourself with the ecosystem. This is an unalterable roadmap to learn about ecosystems. And that is how we begin to learn Ecology.

Place of Study: East Kolkata Wetlands, West Bengal, India.

Discussion: The work that we have taken up now begins with the study of perception of the East Kolkata Wetlands ecosystem residents and how the real estate lobby looks at them, thinks about them and finally attempts to destroy them. We have got results which in many cases have been surprising if not stunning. We also know that the route to conserve a threatened wetland is much more complex, more non-linear and needs to be inclusive in content. I have initiated research

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focusing on wastewater as commons. This has not been done before. The reason for no available research in wastewater as commons is straightforward. Municipal wastewater is always seen as a pollutant and never understood as a resource as it is, without treatment. It has been the worldview of the enlightened fishermen and the fish producers in the East Kolkata Wetlands, who saw wastewater as resource and used it in their ponds to grow fish. This unique phenomenon has turned wastewater as commons. However, I will call it a localised commons, and not to be considered as global commons. We are not even in a position to list our lessons learnt because we continue to doubt ourselves. Or maybe this happens to be our first lesson: To look at the phenomenon of 'certainty' differently. In an ecosystem very few things can be said to be certain. Most things that happen are unpredictable and non-linear in the span of time.

Keywords: East Kolkata Wetlands; holistic conservation; wastewater as commons; familiarisation as cognitive tool.

1. BACKGROUND TO WETLAND CONSERVATION IN EAST KOLKATA

1.1 Research Questions

The East Kolkata Wetlands system (Fig. 1) has become a research trope¹. Describing a little known wetland as a tutorial ecosystem for learning wetland wise use and thereafter getting it included in the Ramsar List of Wetlands (Fig. 1) was good. It took me about 20 years. But the subsequent lesson of how feeble is the strength of existing wetland conservation tools including the one of the Ramsar Bureau, has been much more absorbing and that needed to be revisited. Maybe it will take a longer time for us to know how to conserve ecosystems.

Before I set the research questions for the present it will be proper to come up with a short summary of all we were able to know about the East Kolkata Wetlands. This will help us to context the present set of research questions.

1. These wetlands consist of shallow ponds which are fed by wastewater and profusely grow fish, and act as oxidation ponds (stabilisation ponds, Fig. 2). In a tropical climate, oxidation ponds are the most efficient option for wastewater treatment and the only option that lowers faecal bacteria count by at least 99%. In fact, conventional mechanical treatment plants hardly reduce coliform bacterial counts.
2. Fishes grow in these ponds, graze on blooms of algae grown out of algae-bacteria symbiosis (bacteria gives carbon-dioxide and algae gives oxygen for each other's growth). An adequate supply of sewage removes the need for supplementary feeding to grow fish up to a

production level of 10 tonnes per hectare (Fig. 3).

3. Wastewater retention in most of the fish ponds is not less than 21 days and can be 30 to 45 days depending largely on the availability of wastewater (no proper hydrological study is available in the public domain).
4. Ideally most fish ponds within the region designated as the East Kolkata Wetlands and Waste Recycling Region will not require pumping to access sewage from the adjacent drains carrying sewage. But this system needed heading up of the main drainage canal flow at the Bantala Lock Gate (Fig. 4) uniquely constructed for this purpose just before India's independence in 1947. Today the importance of this heading up of wastewater is no longer understood by the operating agencies. Instead, large numbers of 5 horse power pump-sets (Fig. 5) dot the landscape to access wastewater into the fishponds from the adjacent secondary drainage canals that have insufficient flow.
5. A remarkable network of drainage canals (Fig. 6) was constructed by the land-owners for which we have no recorded listing except a survey carried out in the beginning of the year 2000 by the Department of Environment from which we know that the total length of the canals was 61 km (record not in the public domain).
6. Before the beginning of large-scale perennial wastewater fishponds which were started in 1930 by the late Bibhuti Bhusan Ghosh, small-scale short-term (six months at a time) wastewater fisheries were started in Dhapa Jheels². This was

¹For additional background see references [1-11].

² Dhapa is the name of the place. It lies within the designated area and serves as the waste recycling region of the entire core Kolkata, receiving its solid waste, largely organic.

innovated and introduced by the late Bhabanath Sen who started his creative intervention in Dhapa Square Mile (see Fig. 1).

7. In addition to those Indian major carps (Rohu-Katla-Mrigel) which share among themselves three separate water layers (surface, bottom and mid-column), *Tilapia Nilotica* has been the most prolific product. This is the only fish that breeds spontaneously and needs no specific care or management.
8. Most workers in the wetlands fishery area have tried to utilise the residual time of the day, after completing their working hours in the fish ponds, for enhancing their income, working elsewhere. The type of work they do may vary from working in vegetable gardens, working as unskilled labour, assistant in a shop and the like. This tendency is more pronounced in recent times than in older times. Working in other places is sometimes mistaken as a willingness to shift from a fishing livelihood.
9. All the fish which is grown and sold are distributed to seven auction markets spread out around the waste-recycling region. There is a continuous demand for fish in Kolkata markets. None of these auction markets are registered with the city corporation as of now and they do not seem to pay tax. There has not been any exhaustive study of these auction markets. It looks like a fair market; at least the producers have not generally been able to assert influence on auctioned prices of fish.
10. In the beginning of the 1990's the Government of West Bengal took an initiative to impress upon the Ganga Project Directorate in New Delhi that the wastewater fish ponds in the East Kolkata Wetlands were acting as an efficient biological treatment system and this was time tested (Ganga is the most important river in India and the Ganga Cleaning Project started in 1985, being the biggest environmental conservation project in Asia at that time). Therefore no funding for the construction of conventional sewage treatment-plant should be allotted, the state government argued. The central authority carefully examined the proposition and no fund has ever been allocated for the construction of conventional sewage treatment plants for the sewage coming out of the core of Kolkata flowing through outfall canals,

along the centre of the wetland region. This was the crucial feature of these wetlands which led to its declaration as a Ramsar Site.

The issues which have hitherto remained unattended by researchers (as well as the present author) include the following:

- Impact of land reform and related issues on the tenurial status of the fish farmers of the large fisheries (more than 17 acres or 6.88 hectares) and their appropriate right to cultivate.
- Morphological shifts due to impact of the changing ownership pattern on the institutional management of the wastewater fisheries.
- Ground level assessment of wetland conversion relative to 1997 baseline data on the East Kolkata Wetlands prepared by the Department of Environment, Government of West Bengal.
- Understanding strategy and tactics of the real estate oligopoly in carrying out counterfeit conversion of wetlands within the designated region.
- Perception of the fish workers vis-à-vis the intractability and uncertainty in their life and livelihood in a 'protected' wetland.

Most certainly, there is an interwoven and inextricable connection between wastewater fisheries, the people working in them, and ecosystem management. What I discuss in this paper is about our first few steps in getting a hold on the perception of the workers of the East Kolkata Wetlands as a way to better understand how the wetlands can be conserved, managed, and continue to provide ecosystem services. How to understand understanding is the next basic question that marks the beginning of a tangible enquiry. There can definitely be multiple routes to understand understanding. In the present case, the central focus of research has been to enquire into the experiential knowledge (community level knowledge as well as individual excellence) of the fish workers, their perception, including its context, connectivity and non-linearity. We do not claim this to be the best route to look at the bigger picture or the deeper layers. However, bona fide of this method lies in the continuous attachment of the research team with the community where we have focused our mind and enquiry.

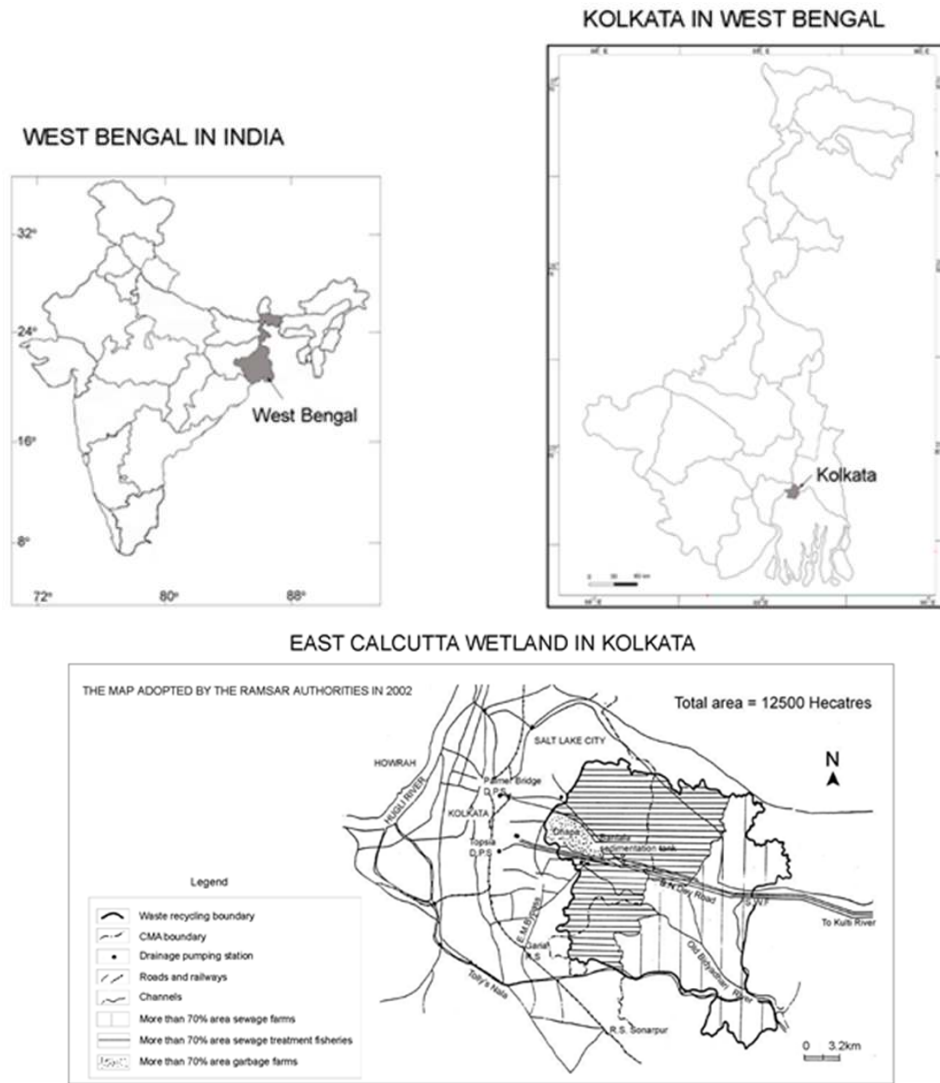


Fig. 1. East Kolkata Wetlands



Fig. 2. Oxidation ponds of East Kolkata Wetlands



Fig. 3. Community fishing in East Kolkata Wetlands



Fig. 4. Bantala Lock Gate, originally used to supply wastewater to stabilisation ponds without pumping



Fig. 5. More recent practice of pumping wastewater from secondary canals to stabilization ponds



Fig. 6. Secondary drainage canals constructed by landowners

2. PRINCIPLES OF DEVELOPING A HOLISTIC CONSERVATION APPROACH

2.1 Familiarisation as the Decisive Interface

Familiarisation is the tool where perception is the task. No matter how deep the extent of perception research aimed at, the primary tool that the researcher must carry is 'familiarisation'. How do you start knowing a language? By knowing the alphabets. How do you start knowing about the ecosystem? Start familiarising yourself with the ecosystem. This is an unalterable roadmap to learn about ecosystems. And that is how we begin to learn Ecology.

Familiarisation enables perception. Perception leads to realisation. Realisation in turn improves upon the ability to perceive and leads to newer realisation. This is an endless saga of learning ecology, its arts and science that keeps changing its referral points. Familiarisation is a tool, a method that is an antithesis of superficial knowledge. To familiarise is to make (oneself or another) well acquainted or conversant with something; or to make (something) well-known; bring into common knowledge or use.

We can get back to the basics. What is the task of whatever we do under the rubric of environment and ecology? It is conservation of ecosystem. There are ecosystems where conservation largely takes place naturally. Previously we had many of them. Increasingly we have fewer of them. Conservation of ecosystem at this point of time requires conscious effort of those who consider it

important. The world, as we now know, for most of its parts are divided into two confronting groups. One group is in favour of conserving it and the other against. To complicate matters, battle lines are not so sharply drawn. There is also a grey segment in between who pose as pro-conservationist and actually work against conservation. They are *pseudo-conservationist* and are the most complex and unpredictable enemy of conservation initiatives.

Why are the pseudo-environmentalists unpredictable? Because they skillfully use the same set of vocabulary as those of bona fide conservation scientists or activists and easily confuse the world with aplomb. We have learnt that pseudo-environmentalism is the soft underbelly of conservation initiatives today and the suffering people are both under prepared and ill-equipped to forestall this menace. Ecosystem knowledge does not include the story of pseudo-environmentalism enough. Ecologists, hitherto, have not only remained generally untouched by the activities of pseudo-environmentalists but have also not shown sensitivity towards the variations in conditions and context of learning the subject. I mark this as a major subjective deficiency.

Ecosystem management, as a subjective tool to save this threatened planet, has not as yet included within its fold the responsibility of reading pseudo-environmentalism. We are already late. A conservation scientist/activist/engineer/manager/historian/economist/researcher/lawyer/planner or for that matter anyone who intends to live creatively with nature [12] in the first place needs to know about the strength and weakness of the opposing sides of

the environmental conservation initiatives. He or she has to be wise and pro-active. He/she has to continuously learn about the situation and use this learning to change it positively. He/she cannot make many mistakes and the crucial method to avoid mistakes is to *familiarise*. The more one gets familiarised with the situation the less will be the chances of making mistakes in understanding an ecosystem.

Why do we make so many mistakes (both in theory and practice) in our efforts to conserve our environment? Reason is, we do not familiarise ourselves adequately with the position and strength of those who are in favour and those who are against conserving environment. Furthermore, the battle is far from easy. The forces against environmental conservation are indeed formidable and lack ethics. And yet, in the context of our preparedness to understand the importance of *counter-ecological* forces and positions we have not been able to appreciate the importance of such things in the fold of ecosystem studies.

We in our strides to conserve the East Kolkata Wetlands have learnt these by making serious mistakes in our efforts to conserve a wetland ecosystem. Nevertheless, we have learnt some generic lessons. Even then, we have at best been amateurish in taking the battle to our opponents' courtyard.

2.2 Perception Research and Cognitive Corridors

Perception research is the gateway to ecosystem understanding and one of the tools for familiarisation. It begins with the perception of the researcher/researchers about the ecosystem being observed. It then proceeds to read the perception of the ecosystem residents/stakeholders, interest groups and even of a business interest from afar (we live in a small world served by a globalised economy and examples of such distant interest are pervasive). Failing to understand this globality of the lived experience enhances the risk of mistakes in understanding the ecosystem. Much of the ecosystem research is not alert enough to grab the centroid of learning ecosystem management. Therefore we do not see much of a curricular compulsion in learning perception research within the fold of a conventional syllabus.

Perception research will usually begin with ecological interpretation of the researcher

regarding the observed ecosystem. We completed the task during the first few years of my encounter with this wetland ecosystem where no ecologist had stepped in earlier. For a city with one of the oldest displays of versatile academic interest, a conspicuous lack of attention towards such an interesting field of study less than 10 km away from its centre, is really surprising.

After about two decades of work I had generally completed the first round of perception research. It included the usual list of geographical, hydrological, microbiological issues followed by elementary questions of employment pattern, market function, aquaculture, bio-diversity (elementary level), existing policy and regulations, interventions and so on. Results of this stage of research finally led to the declaration of the Wetlands as a Ramsar Site. We thought we shall be able to help conserve the wetlands to the east of Kolkata adequately. We now know it did not at all happen like that. More than anything else it exposed our inadequacy in matters of learning how to conserve a threatened wetland. For me as a student of ecology, it was a crucial setback. I realised then that we have to channelise this setback into newer directions in ecological learning/ecosystem understanding.

The work that we have taken up now begins with the next stage of perception research: perception of the ecosystem residents and how the real estate lobby looks at them, thinks about them and finally attempts to destroy them.

We knew we had not realised the problem of ecosystem conservation adequately enough. We had a serious shortfall in realising how the ecosystem starts decaying. Perception research should enable our ability to realise the dynamics and the dialectics of ecosystem as it works. In turn realisation will cater and improve the realm of perception of the researcher. This is a continuous process of learning. We may call it *perception-realisation continuum*.

We are just into the second stage of perception research where the questions we ask are about the wetland community's world of recognising the wetlands, its threats, its wealth, its interconnectedness with the wetland community's life. It is about their ecology. We have identified four corridors (Fig. 7). We are experimenting with the methods of learning ecosystem management. In the present case Fig. 7 is self-explanatory with respect to the questions we have started asking. We are getting

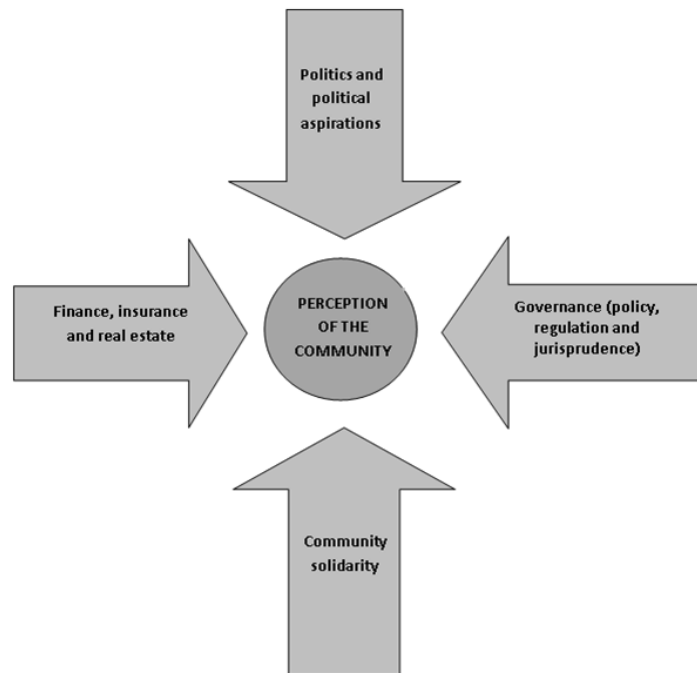


Fig. 7. The four cognitive corridors for ecosystem management

results which in many cases have been surprising if not stunning. We also know that the route to conserve a threatened wetland is much more complex, more non-linear and needs to be inclusive in content.

2.3 Patterns: The Building Blocks of Learning Ecology for the Non-learned

I now believe that there is more than one way of learning ecosystem management or ecology. Our conviction of multiple routes to learning ecology rests upon our familiarisation with the wetland community who display time tested competence in living creatively with nature. No conventional classes in Ecology deal with any questions about any one of the natural ecologists who impressed us with their ability to set meaningful relationships with nature.

How did they know what they know? This is a leading question for barefoot researchers like us. The immediate answer is that they learn it through experience. Good. But then how do they learn through experience was the next level question for us. This needed us to proceed deeper into their way of doing things. We are trying to assimilate their realisation.

At this stage of our knowing we found something fundamental. We were able to mark the ability of

the advanced farmers to discern patterns (some of the farmers are good at recognising patterns). The dynamic arrangement of constantly changing input and output yet retaining a form and style, (the way we have seen a vortex take shape) – this is called pattern. Most of the ecosystem decisions they take are based on their ability to recognise patterns. Examples are ubiquitous. Patterns form the building blocks for learning and understanding how an ecosystem works. It is surprising that patterns are not adequately, in fact most insufficiently, discussed in the text books of ecology and ecosystem management. The naiveté of the learned is much too conspicuous and deserves elaboration.

Forming patterns is a tendency of nature. Whatever we have learnt from history is that pattern is a vital indicator or signal at the disposal of ecosystem residents in recognising how the system works and when it ceases – pattern alone provides flawless clue to that. Threats are anticipated and the areas needing innovative improvements identified. Carefully observing the patterns in nature helps forecast climate, locate disorders in landscapes, agricultural fields, water regimes and also in social encounters, political interactions etc. Not only is this list seemingly endless but it is also without mistake. Patterns can be visualised almost everywhere in any ecosystem, in the living of the smallest species

up to the most intelligent ones we call human beings. It is unfortunate that mainstream ecological teaching and learning is not sure about the centrality of patterns. It is difficult to miss the significance of pattern in the study of ecology and ecosystem management. In this awe inspiring tendency of nature, human beings are also included with all the baggage of greed, selflessness, hypocrisies, solidarity and so many others.

Everywhere we can locate the presence of a typical pattern. Patterns connect. Patterns can be seen, can be heard and also can be sensed. My grandmother was blind but could recognise her grandchildren, more than ten in number, the moment they shook her hand. Grandmother could recognise a sensory pattern of the hands she shook individually for each of her grandchildren. Physically challenged persons are very sensitive to recognising patterns. One of the greatest musicians of the West, Beethoven who was born in 1770, became deaf before he was 30 years old. Yet, he was one of the greatest musicians of our time. The entire world of music displays patterns. In fact there are patterns of patterns or a meta-pattern. Even relatively untrained ears can effortlessly distinguish between folk music, classical music and contemporary music and fusion as well. This is about pattern of patterns. Each piece of music inevitably has its own pattern upon which it rests and flourishes. A listener recognises the pattern which is essentially a definite and unalterable arrangement of musical notes that leads to a distinguishable identity.

3. IMPLEMENTING PRINCIPLES OF A HOLISTIC CONSERVATION APPROACH

3.1 Experiential Components of Commons Research

From understanding patterns, we proceeded to familiarising ourselves to know the structure and function of the institutions which have come up in the course of the last few decades for managing the business of wastewater fisheries. We are also trying to look at the way they account for the expenses made and returns accrued thereupon.

Although commons research is well-known, we have not come across any work that has followed the working of institutions which rest upon using *wastewater as commons*. We started with well-known assessment criteria of Elinor Ostrom [13].

We went further ahead by improving upon the assessment schedule by contextualising with the way wastewater fish ponds exist and work.

Two specific observations were striking. The first of these was in the institutional management of the fish ponds. There was a gradual change in the structure and function, the morphology of the informal co-operatives which are the mainstay of the larger fish ponds. These in most cases do not have the owner in charge of the fishery because of the proclamation of the Land Ceiling Act (1955, Third Amendment in 1980) of the Government of West Bengal. This act debars the owner³ from owning any fishery land above 17 acres (6.88 hectares).

The second observation is the coming of age of the slipshod way of managing the business which is fairly large in size for the investment class to which it belongs⁴. Within the protected domain of the fishery owners everything was private and no published document or audited report of the business existed. It started changing since 1980. For the leaseholders, groups that took charge of the fisheries, it was obligatory to come up with some kind of income-expenditure statement to be shared with the lessee. Nothing understandably came in the public domain. The breakthrough was inevitable as the practice of income-expenditure statement had to be exhibited in the general meetings of the informal co-operatives run by the workers themselves. This has occurred since the last part of the 1990s. For the first time in the history of wastewater fisheries income-expenditure statement became an open book. This change in accounting procedure, its considerable openness and accuracy, we thought is a striking thing to happen in the history of managing wastewater as commons in the East Kolkata Wetlands.

Fishing communities are active in rivers and coasts and even in deep sea. All of them are exploiting commons. But the difference in the case of the East Kolkata Wetlands is three-fold.

- The availability of wastewater is limited.
- Wastewater is retained in impoundments.

³ Originally, when sewage fed fisheries started in the dried up bed of the Bidyadhari River landlords/owners gained control of this land which came wholly under private ownership and before India's independence there was no upper limit to the extent of land that they could own.

⁴ The owners of the fish-ponds, the landlords, often used to use the paper found in the inside of cigarette packets to do their calculations, and throw these away.

- Unique ecosystem knowledge of local fishermen is the mainstay of the practice of fishing.

We have been familiarising ourselves with this practice as well as the advanced farmers of this unique practice. I have been able to mark three areas where intelligent interventions become obligatory. These areas are:

- Distribution of water rationally.
- Regulating the flow of water within a fish pond.
- Optimising the fish stocked in the impoundments depending upon the features of the pond in the first place.

Most co-operative institutions have been reasonably democratic in their decision making and have been sensitive to the distresses of their workers. Women workers are not allotted night guard duties or particularly difficult duties although they are allowed to draw same payments as their male counterparts. We have not seen any child labour.

We were contexting our studies in use of wastewater as commons to understand the working of the fisheries better. One simple method to do this was to trace the value chain of this entire operational route map. We identified four concentration points where value addition takes place distinctly. Tracing the value chain simplified the complex interplay of financial interests which are active in this business regime.

The gap analysis that I present in Fig. 8 are my first few steps to realise the genesis.

The reason for no available research in wastewater as commons is straightforward. Municipal wastewater is always known as a pollutant and never understood as a resource as it is, without treatment. It has been the worldview of the enlightened fishermen and the fish producers, who saw wastewater as resource and used it in their ponds to grow fish. This unique phenomenon has turned wastewater as commons. However, we will call it a localised commons, and not to be considered as global commons. Interestingly, managing wastewater as a localised commons relates to local governance, very much with the same building blocks as that of global commons vis-a-vis global governance. These are sustainable economic growth, social inclusion and protection of the environment. Managing commons at the local level will have to be tied up with the local governance in the first place and thereafter with subsequent levels of governance.

3.2 Conservation versus Real Estate and Beyond

In the wetlands of Kolkata, Bengaluru, Guwahati and many other places in the world, the confronting lines are drawn sufficiently clearly: conservation versus real estate. We have to be able to see another pattern as the forces of environmental conservation are challenged by

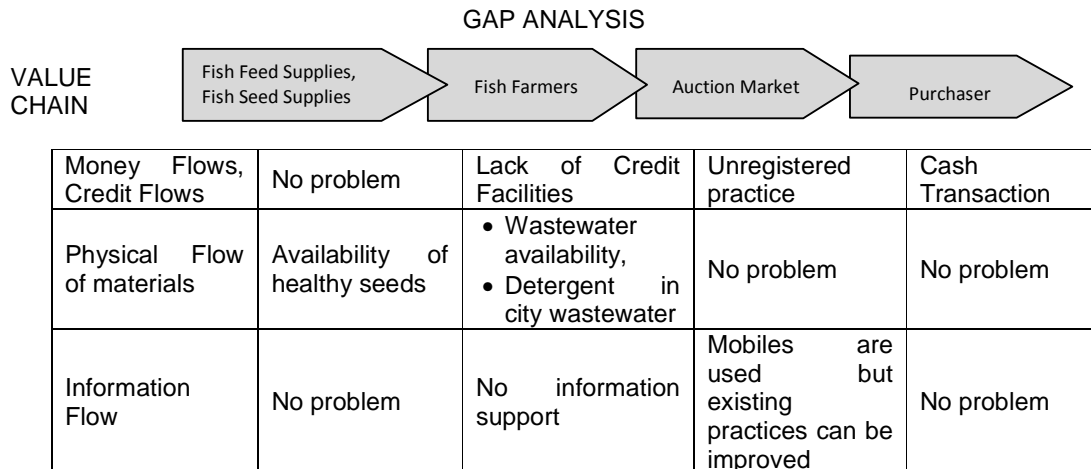


Fig. 8. Gap analysis of wetland fisheries value chain

Notes: *Credit facilities are available on relations of trust. No bank loan without collateral.

*No support from state plan projects.

*The city wastewater does not contain much of toxic substances in general or heavy metal content since there is hardly any industry in the outskirts of the city. Liberal use of water hyacinth to protect the banks is also known to adsorb heavy metals flowing along with wastewater.

some berserk business interest, their fanatic hunger for profit, where the first casualty in the battlefield is ethics. This is a pattern that binds the behaviour of the greedy set to grab natural resources, ecosystems, and wetlands for example.

Recently, in a panel discussion on genetically modified (GM) crops, organised within the fold of the Indian Science Congress (2015), J. L. Karihaloo, Coordinator of the Asia Pacific Consortium on Agricultural Biotechnology (the present author is keen to learn about the non-linearities in agriculture and agricultural ecosystems in Asia) spoke about how an academic paper by Gilles-Eric Séralini that pointed out the ill effects of GM maize on rats was withdrawn by the scientific journal *Food and Chemical Toxicology* where it had been published. This, said Karihaloo, was a proof that opposition to GM crops was baseless, and there is in fact no ill effect. So far so good. Aritra Bhattacharya, on 6th January 2015, in his article in *The Statesman*, mentioned a few things which Karihaloo did not. The fact is that “the paper was withdrawn after a Monsanto executive joined the editorial board of the Elsevier group which brought out the journal. The paper was republished by Springer group’s Environmental Science Europe journal with open access to raw data thereby proving its scientific prowess”.

Earlier, a review of the 50 years since the publishing of Rachel Carson's *Silent Spring* in the 31st May, 2012 issue of *Nature*⁵ disclosed that the agrochemical industry spent hundreds of thousands of dollars to fight the book's message regarding the mega lethality of pesticides.

I shall repeat a set of questions that has disturbed me ever since I read the above piece and I mentioned them in my book [12]:

Question one: Have those institutions fluent in using dollars to silence a voice of dissent taken leave from the floor of the earth, have the throttling machines been deactivated?

Question two: Do we consider the attempt to strangle to death the voice of science related to ecosystem destruction to be a

stray incident unthinkingly aimed at Rachel Carson or is this how things happen and will continue to happen unless the sun sets in the east?

Question three: It has been more than forty years since Rachel Carson's *Silent Spring* began to influence policy thinking to set things in a better stead in the matters of ecology and ecosystem management. Incisive scientific studies exposing the destructive impact on agricultural ecosystems have been published since then⁶. Other than NGO responses - some of them being determined and well meaning - today, very little is found reflected in the global or country level environmental policy or regulation in a manner it happened after Rachel Carson's expose. Do we read this as a shift in balance in favour of superprofit?

Question four: In case such abusive spending is still there to harass the voice of sustainable living and environmental conservation, should the learning, research and scholarships in ecology and ecosystem management remain restricted within the confines of safe and designated grooves?

I read *Nature* meticulously⁷ along with other leading journals of unquestionable reliability. I could nowhere locate the decay or disappearance of consortiums engaging themselves to douse Rachel Carson-like flames. Till now I have not traced even any surrender or setback on the part of the ambassadors of unhindered greed. I therefore assume they are there and the discipline of ecology will have to understand and anticipate their presence. In that case ecology, heralded as the philosophy of the future generations [14], will have to go beyond the prevailing limits of inequity.

It will require selfish avoidance to fail to see the pattern that has set in. It is time that we sink ourselves far deeper into understanding the crisis and construct the foundations of conservation initiatives capable of overcoming the lures and threats of *counter-ecological capital*.

⁵ The book concerns the perils of excessive use of pesticides at a time when pesticides were widely believed to be part of the progress of civilisation. 'The agrochemical industry spent hundreds of thousands of dollars to fight the book's message. There was, after all, much for the industry to justify.' (Dunn, Rob (31 May, 2012): 'In Retrospect – *Silent Spring*': *Nature*, Vol. 485, No. 7400, pp.578-579).

⁶ F. William Engdahl (2007): *Seeds of Destruction and John Wargo (1996) Our Children's Toxic Legacy: How Science and Law Fail to Protect us from Pesticides show how scientists have been sidelined or persecuted relentlessly for upholding their findings in contentious areas.*

⁷ A reading of *Nature* shows that if anything, the say of business in research in the sub-disciplines of science has only intensified over the years.

3.3 Protests and Protest Management

Protest against the conversion of the East Kolkata Wetlands started around the beginning of the 1980s. Before that about 10 sq km of wetlands (which were salt marshes earlier) was proposed to be taken over by the government to establish a planned urban settlement: The Salt Lake City as we know it today. There was no significant protest to thwart the establishment's move to permanently fill up wetlands. The work was done by importing engineering advice from the Netherlands and massive arrangements were made to transport sand and water mix from the river Hugli.

It was only after the research was initiated in 1981 by the State Planning Board of the Government of West Bengal to search for a feasible option to use the wastewater flowing out of cities that the outstanding practice of wise use I have been discussing here became a part of the city's history, heritage and economics. A grand new place for ecological research and understanding was born.

This period marked the beginning of protest initiatives to challenge the trend of real estate takeover of peri-urban wetlands. All this became a part of the ecological history of this region. The first recorded hallmark attempt to convert and construct in this wetland area was to contest the proposal to come up with a World Trade Centre (WTC) in 1991. While the Department of Environment was not in favour of this the battle had to have a wider support base particularly the one from conscious citizenry and most importantly the fish workers who would lose their livelihood. The battle lines were drawn and the matter went to the domain of jurisprudence. A Public Interest Litigation (PIL) was filed by a local non-government organisation, PUBLIC (People United for Better Living in Calcutta).

This confrontation with the real estate brought the best out of the local fishermen in arresting the arrogance of the powerful lobby of real estate. In January 1992, Honourable Justice Umesh Chandra Banerjee planned a site visit where the proposed trade centre was to be built. The caretakers of law and order were supersensitive and planted a large number of flags on the embankment of the fisheries to encircle the area Honourable Justice intended to visit to keep the place in question out of bounds for the local fish workers. The fish workers who were active on that wetland (*Chinta Singh Bheri*)

threw away those flags and marched together and pleaded a hearing to which Justice Banerjee obliged. The fish workers stated that they have been continuously active on that fishery for decades and that is their only livelihood and they are very much in command of the system. The builders had described the wetlands as rice fields and largely fallow (this is a routine falsehood employed by the real estate). This was followed by the historic wetland judgement of the Calcutta High Court ruling the 'trade centre' as an unacceptable proposition. It made the wetland map that I drew in 1985 as part of the judgement, disallowing any change of prevailing land use over the entire mapped area of 12,500 hectares without the consent of the High Court in each case of intended violation. The interesting part of the judgement was that it had nothing to say against the Department of Environment. Neither did the department move the higher court (in this case Supreme Court of India) with an appeal against the judgement.

For the next ten years, the Department of Environment patiently worked to prepare a satisfactory document that would impress the Ramsar Authority and get this unknown wetland an international recognition. The result of this tenacious work was getting the East Calcutta Wetlands included in the list of Ramsar sites in 2002.

Subsequently, the Department of Environment was to set up an authority for the management of this wetland. However, the performance of this authority was largely restricted due to the absence of enough implementing personnel, non-participation of major stakeholders in major decision making and also lack of adequate knowledge in ecosystem management within the authority.

More unfortunate was the breakdown of the solidarity of the fish workers but it was not for nothing that the spirit of the fish workers plummeted and that itself opens up an area of ecosystem research we have not sufficiently explored.

Our observation of the happenings through all these years and the current epistemological research that is being taken up consolidates my previous understanding (Ph.D. thesis I wrote in the late 1970s). Minimally, I have been able to identify three discernable tools used by the real estate masters to iron out the voice of protest most efficiently. These three tools are *fear, fantasy and falsehood*.

On the one hand, there is extreme fear. On the other there is the financial bait. A fish worker who is promised US \$4000 to US \$8000, in instalments, for which he will have to surrender his right to his livelihood once and for all, may, under the current reign of terror, succumb to this pressure. If he agrees, he will probably receive the first few instalments but there will be no one to give him the rest. The commitment of the real estate can fizzle out. There is, of course, no place to record their grievances, as there is nothing official about this. This is a trademark 'falsehood'.

One has seen descriptions of the natural beauty of the wetlands to sell dream housing projects. There is a veritable beeline of agents with their marketing outlets set along the road leading to possible conversion sites. This allure of the 'fantasy' along with the 'fear' and 'falsehood' form the unholy trinity of the strategy of what I am describing as counter-ecological urbanisation. Fear, of course, is set firmly in the minds of the poor fish workers who know of no other means to earn their basic livelihood. Fishing has been their vocation for generations. They are afraid of the local musclemen who work for the real estate agents, frequently in league with the local political masters. Either they have already been told to leave the fishery or will be asked to do so any day.

4. CONCLUDING THOUGHTS - EXPERIENTIAL KNOWLEDGE: THE ROOTS OF UNDERSTANDING ECOSYSTEM

The work I have discussed here is not even a good first step towards an alternative route in search of understanding ecosystem management. It has only made an exploratory attempt to come out of the confines of taxonomy or trips to virgin wilds and instead look into the march of mankind negotiating with nature ever since man came to this earth.

We are not even in a position to list our lessons learnt because we continue to doubt ourselves. Or maybe this happens to be our first lesson: to look at the phenomenon of 'certainty' differently. In an ecosystem very few things can be said to be certain. Most things that happen are unpredictable and nonlinear in the span of time.

There is no unique understanding of an experience. An observation depends upon observer-object relationship. So does

experience. It has been found to depend upon perception. Similar experience is perceived differently by different individuals, different groups of individuals and very importantly how the individual relates himself/herself to the ruling social power. There are many examples of variation in experience out of the same set of events. This is where we proceed to identify a prominent circularity: 'perception-experience circularity' that emerges as another generic lesson we are learning. Perception constructs experience, experience in turn changes perception. Changed perception reconstructs experience. This is a cognitive route to accumulate knowledge and enhance understanding.



Our next lesson has been to reinvent the importance of narratives in describing experience. Narratives were common in all kinds and variations of most religious scriptures. We have been able to discern how we recognise a good narrative. These are as follows:

- describing an observation in a manner that is understandable straightaway by the listeners/readers
- indicating generic lessons from local observations
- stating the condition/context of observation unambiguously
- stating the position/positions of observation from where the observation in question is not likely to be valid

Readers will bear with me for not being able to be sufficiently conclusive in my concluding section. We have started believing that management of ecosystem will have to be more inclusive and that is one of the keys to the survival of mankind. It is not managing the economy, not the flow of finance, black money or hedge funds, not the growing inequality, not obesity or hunger, it has to be all at a time, the way it is perceived by its foremost stakeholders/residents, that is what *management of ecosystem* effectively stands for. We will require brilliant ecological minds to combat the competence in rapidly growing counter-ecological capital.

DISCLAIMER

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COMPETING INTERESTS

Author has declared that no competing interests exist.

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