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Trade-off between conservation of environment and economic development? A case study of East Kolkata Wetland

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This paper is dedicated to those marginal poor who have made a great contribution towards conservation of natural resources but remain unrecognized from the greater society.

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List of Acronyms

EKW:	East Kolkata Wetland
GDP:	Gross Domestic Product
CVM:	Contingent Valuation Method
WTP:	Willingness to Pay
IWMED:	Institute of Environmental Studies and Wetland Management
DLRO:	Digital Low Resistance Ohmmeters
ICDP:	Integrated Conservation and Development Projects
IUCN:	International Union for Conservation of Nature
SEED:	Centre for Socio Economic and Ecological Development
WB:	West Bengal
BOD:	Biochemical Oxygen Demand
COD:	Chemical Oxygen Demand
MDG:	Millennium Development Goal
HH:	Household
EKMA:	East Kolkata Management Authority

Abstract

The debate between conservation of environment and economic development is being discussed worldwide. Several natural resources like; forests, wetlands, agricultural fields are being converted for urban development or industrial development all over the world. Environmentalists give evidences in the support of environmental conservation as environment yields benefit for future generation if it has been used at its full potential. Often marginal poor depend on the natural resources for their livelihood. Market failure in value discernment of environment goods often does not help them for their social and economic upliftmnet in the process of conservation. On the other hand economic development provides with new opportunities in terms of livelihoods and better access to markets to the poor people. Applying this debate in the case of East Kolkata Wetland this paper followed the trajectories of broader debate between economic development and environmental conservation focusing on livelihood perspectives of the rural poor and tried to do a comparative analysis across the villages and households located in the wetland area classified according to their choice of livelihood strategies. Based on primary and secondary data analysis the paper showed that the process of economic development in the wetland area improves the quality of life of the people living in the area through upliftmnet in their socio-economic indicators. The paper raises some issues of concern like; uneven integration of rural poor into urban economy and increase in work burden of the female of the household as an outcome of economic development. This paper also argues for a further in depth research to analyze compatibility of conservation of environment and economic development rather than a trade off between them.

Keywords

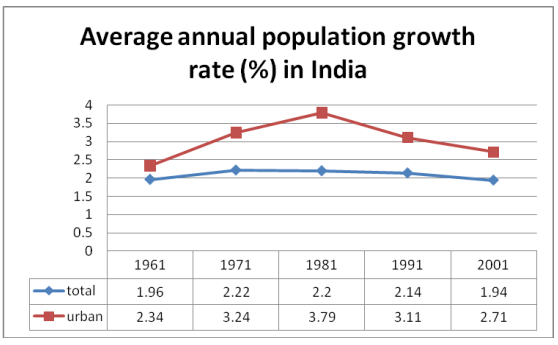
Conservation of wetlands, economic development, diversification of livelihood, Socio-economic conditions, East Kolkata Wetland, India.

Chapter 1
Introduction

1.1 Introduction

India as a growing economy, its percentage of share to GDP is switching from primary or agricultural sector to tertiary or service sector. This sectoral shift of India's GDP implies that the dependency of Indian economic growth is declining from primary sector, including agriculture, forestry, fishing, and mining from 44.8% in 1972–73 to 27.6% in 1999–2000 (Bhalla and Hazell 2003) in contrast to more secondary sector including, manufacturing, construction and tertiary sectors including, trade, transportations, communications, real estate, public and private sector services. In the year 1991, percentage contribution to Indian economy by primary, secondary and tertiary sectors are 32.8%, 27.4% and 39.8% respectively while an estimation in 2008 shows the sectoral contribution to Indian GDP as 17.2%, 29.1% and 52.7% respectively ('India GDP Composition Sector Wise' 2009). The continuous increasing trends of Indian economy growth in the tertiary sectors have lead to several controversial issues. This sectoral shift accelerates the process of urbanization and industrialization. In addition, continuous pressure of population growth (Fig. 1.1 and 1.2) become a threat to natural resources in terms of filling up of agricultural land, loss of inlands and wetlands, and degradation of forests.

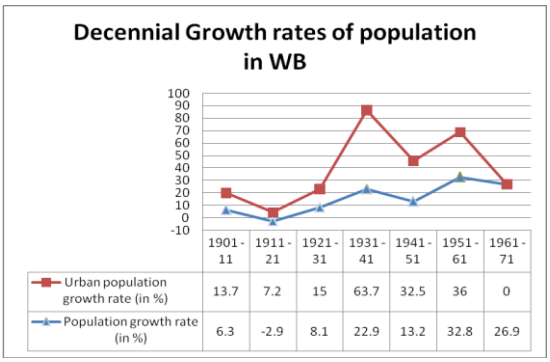
Figure 1.1: Population Growth rates in India



	1961	1971	1981	1991	2001
total	1.96	2.22	2.2	2.14	1.94
urban	2.34	3.24	3.79	3.11	2.71

Source: (Dyson et al. 2004)

Figure 1.2: Growth rates of population in West Bengal



	1901-11	1911-21	1921-31	1931-41	1941-51	1951-61	1961-71
Urban population growth rate (in %)	13.7	7.2	15	63.7	32.5	36	0
Population growth rate (in %)	6.3	-2.9	8.1	22.9	13.2	32.8	26.9

Source: (Bose A. 1974)

The losses of natural resources become a threat to greater society as well as for the direct users (often rural poor) of these resources, who depend on these resources for their livelihood. At the same time the process of development tries to integrate these rural poor into urban economy.

There is an ongoing debate between development and conservation of environment. Conservation of environment is necessary for future generation, as it yields benefit for future generation, especially while if it maintains its potential

to meets the need and aspiration of future generations. But should it be carried out at the cost or expense of people development? (Andrew-Essien and Bisong 2009).

1.2 A case study of East Kolkata Wetland

Taking forward this issue into a micro level the debate is investigated through the case study of East Kolkata Wetland (EKW). Among the natural resources, values of the wetlands are increasingly receiving due attention worldwide for its contribution to a healthy environment in many ways. The Ramsar convention[1] on wetlands of international importance defines wetlands as

> " Areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters." (Maltby 1986).

Wetlands play an important role towards conservation of environment. It holds excess water during rainy season, thus controls flood and supply water to the soil strata for irrigation of agricultural land and in the fisheries. Fisheries and different kinds of vegetables produced in wetland areas provide resources for food supply and facilitate food storage. Varieties of Algae, aquatic plants grow in wetlands and through the photosynthesis process, supply oxygen in the air and therefore allow pollution abatement and air purification. Wetlands permits to grow different kinds of aquatic plants and animals therefore, known as "diversity of life in a Vessel" (Ghatak n.d.). Wetlands have a variety of uses. They are important interms of environmental, social and economic value. Wetlands have its importance for both the rural poor who live on wetlands and also for the rich people for its aesthetic and bequest values. Several scholars have estimated the value of wetlands and shown that people also pay attention for the preservation of wetlands. Despite of all these value and cost benefit analysis wetlands are being threatened worldwide and incidences of conversions of wetlands are very customary. The plausible reasons behind filling up of the wetlands may be; continuous pressure of urban growth, ignorance at the Government level, human negligence, improper or lack of information regarding the value analysis of wetlands, market failure in internalization of the social and economic value of wetlands etc.

EKW being the world's largest waste water eco-system created to sustain successive resource recovery systems in the form of vegetable farms, fish ponds and paddy fields (Creative Research Group 1997). Taking forward the debate between conservation of environment and economic development in the case for EKW the paper aims to make a contribution to the knowledge around the debate.

The outline of the paper is as follows. The chapter 1 of the paper describes a brief overview on the current situation of EKW and the rationale be-

[1] The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

hind choosing the research topic and research site. Chapter 2 reviews the related literature around the debate and the framework to conceptualize the debate. Chapter 3 describe sampling process and data used to analyze the issue. Chapter 4 explores results and findings from data analysis. Chapter 5 provides the concluding remarks.

1.3 Background and location

EKW is known as the *kidney* of Kolkata metropolitan city and surrounding areas. Drainage water from all over the city and its surrounding areas comes to this wetland and here the water is being treated in natural and traditional ways and used for agriculture, pisciculture and vegetable farming.

Figure 1.3: Drainage water coming to EKW

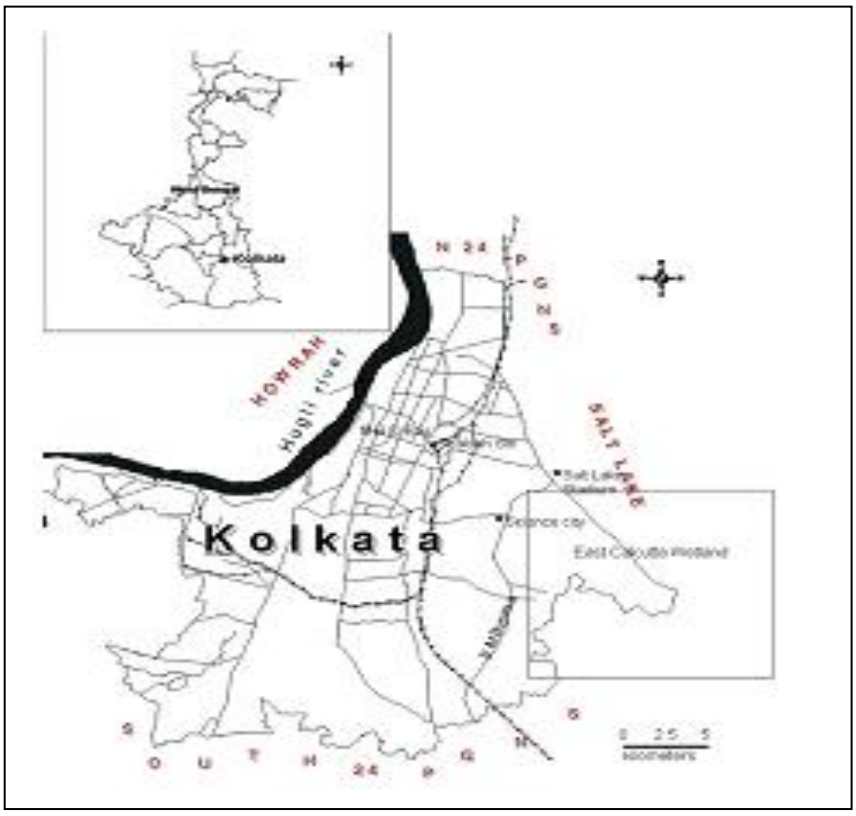
Source: photo taken by author during field visit

Figure 1.4: The non functional water treatment plant set up earlier at EKW

Source: photo taken by author during field visit

The wetlands to the east of Kolkata, a natural capital asset stand out as a natural waste treatment system and a unique life supporting, peri-urban facility for a large and teeming metropolis and its suburbs still today. (Creative Research Group 1997). EKW, as its name suggest, situated in eastern part of Kolkata with the districts of North and South 24 Parganas of West Bengal, India, a part of the mature delta of river Ganga Presently the total area of the wetland is 12,500 ha, among which 4000 ha is the water body.

Figure 1.5: Location of EKW



Source: The poster 'Waste Water Utilisation in East Calcutta Wetlands From Local Practice to Sustainable Option' (Ghosh 1999)

The total EKW area can be divided into four types of land use classes. These are (i) substantially water body oriented area, (ii) Agricultural area, (iii) productive farming or garbage farming area and (iv) settlement area (see table 1.1). The settlement area can be sub divided into urban settlement area and rural settlement area.

Table 1.1: Land use status in EKW area

Land Use	Area (in Hectare)
Substantially water body oriented area	5852.14
Agricultural area	4718.56
Productive farming area	602.78
Urban / rural settlement area	1326.52 (91.53 ha. Urban + 1234.99 ha. rural)
Total area	12,500

Source: (Kundu et al. 2008)

EKW is unique for its natural water treatment process because the core Kolkata has not been provided with any fund for constructing sewage treatment plant under the Ganga Action Plan. (Creative Research Group 1997) The multifunctional wetland eco system "comprises 254 sewage fed fisheries, small agricultural plot and solid waste farms. The EKW nurtures the world's largest waste water fed aquaculture system" (Kundu et al. 2008).
The wetland provides significant ecological and economic security of the region. A large population lives in and around the wetland and depends on the water body for sustenance. Around 60,000 working population directly depend

on the EKW for their livelihoods. The main livelihood activities of the inhabitants are fishing, agriculture, pisciculture, garbage farming[2] and trade related to these primary activities. Beside this group of direct users of wetland, the city of Kolkata and its surroundings depend on the wetland indirectly for its significant contribution in supply of agricultural food production like; paddy, vegetables and fish, and also as other non-economic environmental service provider. The waste water comes to the wetland and treated naturally meets the demand for agricultural activities and helps to maintain the ground water level.

One part of the EKW area (near Eastern Metropolitan Bypass) is used as the garbage dumping ground of Kolkata city and its surrounding areas. The people of wetland practice garbage farming which helps to conserve the environment and at the same time it is an income generation activity for the wetland economy. Wetland is providing with services through its economic contribution as well as its non economic contributions which are not in less importance as compared to economic contributions. The contributions of wetland economy are 4.471 metric ton[3]/hectare from agro farming, daily 152.41 metric tons of fresh vegetables, more than 150 metric tons of vegetables per acre, 370.65 metric tons/ hector per year from garbage farming (Majumdar. 2010). Kolkata city receives about one third of its daily requirement of fish from the sewage fed fisheries (about 11,000 metric tonnes per annum). Beside these economic contributions, wetland is providing several non economic contributions in terms of natural treatment of drainage water to be used for agriculture, maintaining ground water level, conservation of environment, retention of nutrients, flood control, conservation of variety of species and recreational and aesthetic utility.

In the year 2002 the wetland was designated as the site of international importance (Ramsar Conservation Site) for its unique ecological features, as a model of world renowned multiple use of resource recovery system in a natural way. After being designated as Ramsar site, the Supreme Court of India announced that construction within EKW area as illegal. At present 1005 wetland sites of 116 countries are included in Ramsar list of wetlands of international importance, among which EKW is the only entry from India as one of the signatory countries of the convention.

1.4 Relevance and Justification of the research

EKW is the world's largest natural recycling centre for soluble and solid wastes. EKW caters daily roughly 600 million litres sewage and waste water generated by Kolkata Municipal Corporation area and more than 2,500 tonnes[4] of garbage every day. (Ray Chaudhuri et al. 2008). Because of its significant social, economic and environmental values and after being designated as the

[2] Garbage farming is the farming done in the landfill sites, dumped with wastes from the city.
[3] 1 metric ton = 1000 Kilograms
[4] 1 ton = 1016.064 kilogram

site of international importance under Ramsar Convention, there is a high necessity for the conservation of the EKW area.

The conversion in EKW has both ways effect on environment as well as on the livelihood of people living in the wetland area.

Loss of EKW and its surrounding area is definitely a threat to the local bio diversity. With a present of floristic resources, EKW has immense value in terms of global biodiversity containing 51.5% diversity in family level, 32.23% diversity in generic level and 14.19% in species level as compared to national level.

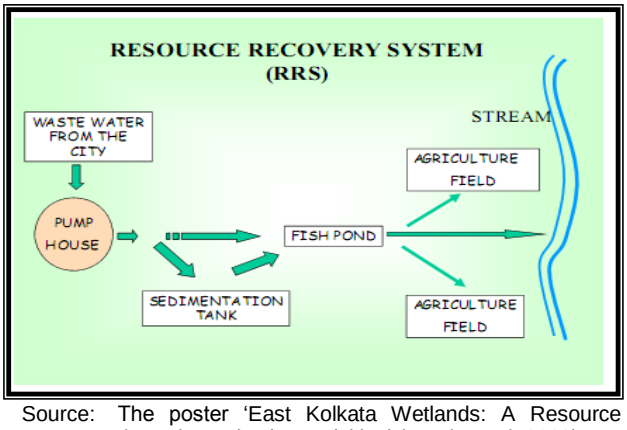
Table 1.2: Availability of species in East Kolkata Wetland area

Name of species	Types available in Kolkata city	Types available in East Kolkata Wetland
Aquatic insects	-	14 types
Fish fauna	-	37 types
Amphibian fauna	50 types	4 types
Reptilian species	146 types	19 types
Bird species	649 types	66 types
Mammalian species	188 types	16 types

Source: (Kundu et al. 2008) , (J.R.B. Alfred, A.K. Sanyal, A. Roy, S. Tiwari, S. Mitra, B. Bhatta. n.d.)

Three are at least 12 aquatic vascular hydrophytes in and around the EKW that are significant for their bio-filtering potentialities particularly with respect to BOD, COD, Nitrate and Phosphate level (Creative Research Group 1997). The unique feature of EKW lies in its efficiency of recycling the waste in which the microbes are the key players transforming the complex organics of the sewage into simple nutrients for the growth of paddy, vegetables and different plank tonic community that again sustain the fishery resources of the system (Creative Research Group 1997). The habitats of the wetland play an important role in the conservation of environment through their livelihood activities. The local people of wetland developed the resource recovery system (Fig. 2.3) through the ages and providing with water supply for agriculture and pisciculture through the recovery of nutrients in an efficient manner by using the water bodies as solar reactors and complete most of their bio-chemical reactions with the help of solar energy. (Kundu et al. 2008).

Figure 1.6: Recourse Recovery System of EKW



Source: The poster 'East Kolkata Wetlands: A Resource Recovery System through Productive Activities' (Kundu et al. 2008)

Loss of wetland may be an issue of concern interms of its ecological importance in the long run, but the conversion of the wetland like; filling up of fisheries, filling up of agricultural land have immediate effects on the livelihood of the rural poor who depend directly on the wetland. The conversions results into loss of job of these rural poor and compel them to integrate themselves into urban economy through diversification of their livelihood from wetland based to non wetland based livelihoods.

Table 1.3: Area Transferred to Towns

Police Station	Transferred to Urban Areas in Census Years (hectare)				
	1951	1961	1971	1981	1991
Rajarhat	Nil	Nil	1108.56	2301.78	2581.79
Bhangar	Nil	Nil	Nil	Nil	2417.56
Sonarpur	Nil	600.21	600.21	1505.42	1505.42

Source: (Chattopadhyay 2000)

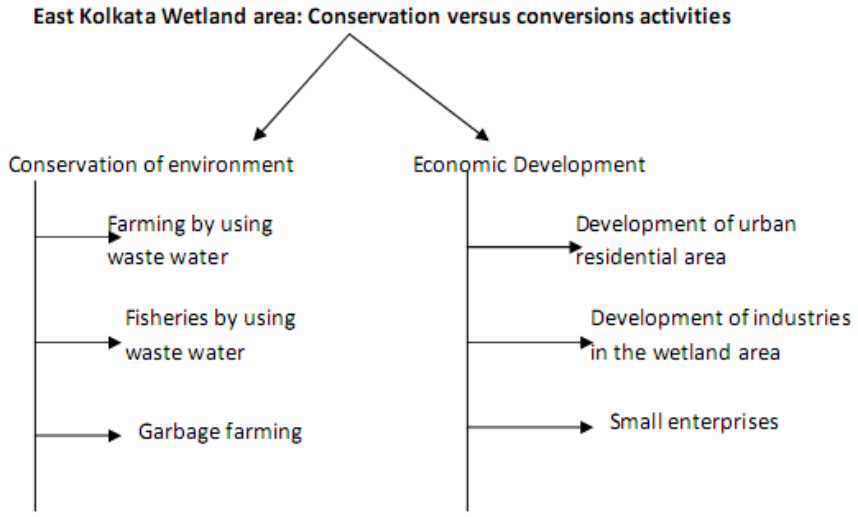
According to an order of honourable Supreme Court of India, the State Government of West Bengal (WB) decided to shift all the pollution making tanneries (leather factories) to some villages like; Karaidanga, Kantatala, Haripota, Khorkhali, Tardah (approximate 4000 acres) under EKW areas in order to keep the city clean and pollution free. But construction of tanneries and other industries does not ensure either participation or job openings of local people into these factories. Process of urbanization, industrialization and policies of Government itself is responsible for the degradation of the wetland. In 1977 the present ruling party, the Front Government came into power and as an initiative of land reform they tried to redistribute land from major land holders to small land holders or among land less people. But they completely ignored the characteristics of this acquired excess lands and ignores the proper utilization of the wetlands. This ignorance leads to crisis in the life of the rural marginal worker and lead them to jobless and insecure future. The polluted water released from tanneries to the wetland (without any treatment[5]) becomes a great threat to the fisheries (locally called verries) in the wetland. To meet the demand for land for urbanization a major part of wetland area has been urbanized. Several major cities have build up in the wetland namely; Salt Lake, Rajarhat-Newtown (presently Jyoti Basu Nagar) etc. Initially all the people living in the EKW area were dependent on wetland based livelihood activities. With the process of urbanization and industrialization the wetland started to convert to land for development. The first conversion had been done in the EKW area in 1960s with the construction of Salt-lake city. Since 1990s rapid conversions were started in the EKW area. With filling up of verries and agricultural land in the wetland area, people who directly depended on wetland lost their agricultural land and verries as well as their means of livelihood. Under the situation they have to diversify their livelihood strategy to non wetland based livelihoods like; daily wage labourer in formal and informal sectors, construction worker, and domestic labour in nearby urban areas. Thus with the process of develop-

[5] According to a study done by Dr. Dhrubajyoti Ghosh, the system showed the presence of dissolved Pb (led) and Cr in its aquatic phase, the concentrations of Pb being more than the permissible limit (0.1 mg /I). (Creative Research Group 1997).

ment, a process of integration of rural poor into urban economy was also initiated.

To my knowledge, studies around EKW only focuses on the environmental impact due to conversions of wetland but there is no contemporary study made on comparative analysis among the households to analyze the effects of these diversifications of livelihood strategies of rural poor and integration process to urban economy. Selection of the research site for this study is purposive and strategic because of its international importance as a site of preservation and proximity to urban area to analyze the implication of the debate on the direct user of the natural resource.

According to the interest of my paper I have classified the livelihood



strategies undertaken by the people of the EKW area under three broad head. The first strategy is entirely dependent upon wetlands like; sewage irrigated agriculture, sewage fed pisciculture and vegetable farming on garbage substrate, homesteads and homestead fisheries (sewage / non sewage based) etc. which expresses both restraint towards the market economy and failure to be successfully involved in it. These activities in turn help to preserve the ecology of the wetlands. In contrast, the second strategy is accumulating income from economic development (people do not have to depend on wetlands for livelihood) like; development of buildings and complexes to extend the residential area for the growing urban population, development of industries in the wetland area, setting up of small enterprises etc. These activities lead to degradation of the ecology of the wetlands. The third strategy is the combination of both the strategies. Depending on the above classification, the population living in the wetland area are classified into three communities based on their choice of livelihood strategies. The details of the groups are discussed in chapter 3.

1.5 Research objective

Through a comparative analysis of three different communities[6] located in the EKW area, classified according to their choice of livelihood strategies, the aim of this research paper is to analyze the effects of these differences in choice of livelihood strategies on the socio-economic conditions of the people living in the wetland area and make a contribution to the broader debate between conservation of environment and economic development.

In order to meet these research objectives, the paper will be guided by the following questions.

- ✓ What are the factors associated with the household decisions of choice of livelihood strategies?
- ✓ Are there differences in the socio-economic conditions of the people (i) across villages and (ii) across the households living within these villages, living in the wetland area?
- ✓ What is the relationship between household choice of livelihood strategies and engagement of female of the household in labour force both at village and household level?
- ✓ What are the initiatives taken at Government and NGO level to protect this site of ecological importance?

1.6 Limitations of the research

The scope of my research has been limited in the following ways.

The study from the very onset depends only on three representative villages from the EKW area and a sample size of 100 households due to time and budget constraint of field data collection. For selection of household in the survey (for collection of primary data) the voter list has been used. Thus, I may have failed to interact with some migratory populations and population less than 18 years to realize their perceptions regarding the issue of debate though they have been included in my sample size because of their engagement with wetland or non wetland based activities in the EKW area. The study does not focus on the ecological valuation of the wetlands or its impact on environment primarily; rather it aims to analyze the importance of EKW in terms of dependency of rural poor on the wetlands for their livelihood. For the interest of my research I have clubbed fish farming, agriculture and garbage farming as wetland based livelihood activities. But sensibly fish farming and garbage farming has conservation impact whereas, agriculture as such does not have any impact towards conservation of wetlands. Rather, some agricultural lands are developed against loss of wetlands as a policy of ruling government. The analy-

[6] As will be discussed, there are three communities living in the wetland area. A community living solely on the wetland area and earns its living from environmental conservation work, a second community which has fully converted to urban and industrialized area, and a third community which earns its living from economic work as well as from the conservation work.

sis of the paper is based on analysis of primary cross section data, which fails to confine the trajectories of development dynamics around the debate.

Chapter 2
Literature review and conceptual framework

2.1 Overview

This chapter presents an overview of the theory and practices of conservation of wetlands and the development process going on in the wetland area, and the consequences of the development process such as loss of wetlands, diversification of the livelihood pattern of the people of the wetland and impact on their socio economic conditions.

The literatures present a number of different perceptions on the relationship between biodiversity conservation and development in terms of generation of wealth and livelihood security, while linking conservation and development and advocated for conservation of environment, because of its significant value towards society. The conservation oriented literatures shows a direct conflict between traditionally viewed local community welfare and development and development is often identified as a main causal agent of biodiversity loss. (Brown 2002). In the past two decades there has been a major paradigm shift in thinking about conservation. These shifts are reflected in contemporary discourses on conservation and development. Blaikie and Jeanrenaud (Blaikie and Jeanrenaud 1997) identify three conservation paradigms: the classical approach, populist approach and neo-liberal approach. The classic approach sees local people as a direct threat to biodiversity; the populist approach sees participation and empowerment of local people as a key to finding solutions to more sustainable use of biodiversity, whereas the neo-liberal approach sees institutional, market and policy failures as undermining biodiversity, and the solution in adding economic value to biodiversity. (Brown 2002).

2.2 Review of the existing literature on the issue of debate

Conceptualization of the debate between conservation of environment and economic development is essential to be able to contextualize two distinct forms of livelihood options for the rural poor.

Within the broader context of environmental management and sustainable development, conservation aims to improve the total quality of life as well as maintain the ecological character of the natural resources, while loss of natural resources are obvious in order to meet the demand for new developmental projects, new agricultural land and other economic development which is demanded by increasing population growth, foreign aid, and modern technology (Maltby 1986). Instances of loss of natural resources are observed worldwide. Government of Netherlands allowed some drilling in the Wadden Sea for gas exploration, irrespective of the fact that this wetland area has an international importance for migrating birds from Scandinavia. The United States has lost as estimated 54% (87 million hectares) of its original wetlands. (Maltby 1986). In USA Everglades are suffering from shortage of water as its river water supply

is used for cotton field. In Ireland extensive peatlands are dug up for fuel and in south East Asia Mangrove forests have been converted to fish and shrimp cultivation ponds (Turner et al. 2000). Some conversions of wetlands are in benefit of human society and yields higher return but sometimes wetlands are use only for limited benefits.

> "The interaction of man with wetlands during the last few decades has been of concern largely due to the rapid population growth accompanied by intensified industrial, commercial and residential development further leading to pollution of wetlands by domestic, industrial sewage, and agricultural run-offs as fertilizers, insecticides and feedlot wastes". (Prasad et al. 2002).

Irrespective of several international agreements signed in or policies implemented to protect wetland,[7] loss or threat to wetland remains a worldwide problem because of:

(1) The public nature of many wetlands products and services;

(2) User externalities imposed on other stakeholders; and

(3) Policy intervention failures those are due to a lack of consistency among government policies in different areas (economics, environment, nature protection, physical planning, etc.). All three causes are related to information failures. (Turner et al. 2000).

According to the propositions of World Resources 2005, presently economic growth becomes the important means for lifting up poor from extreme poverty in the developing world; but they recommended on the enhancement of the capacity of the poor to participate in the economic growth to share in its benefits and natural resources as the building blocks of pro poor growth strategy. "For many of the 1.2 billion people living in severe poverty, nature has always been a daily lifeline – an asset for those with few other material assets" ('United Nations Development Programme, United Nations Environment Programme, the World Bank, World Resources Institute September,', 2005). Ecological systems can be the wealth of the poor, especially for the rural poor. Harvests from forests, fisheries and farm fields are the primary sources of rural income and also provide a fall back when other sources of employment tail off. Income from ecological systems or environmental income can be fundamental for the economic employment of the rural poor. This requires the management of eco systems by the poor to support stable productivity over time. But failure

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[7] "The 1980 World Conservation strategy of the International Union for Conservation of Nature and Natural Resources regard conservation as the management of human use of the biosphere such that it yields the greatest benefit, while maintaining its potential to meet the needs and aspirations of future generations. The World Development Report (1992) regards development to be the improvement of man and his living conditions." (Andrew-Essien and Bisong 2009). "According to the IUCN (1994), for protected environments to be effective in maintaining and conserving the biological diversity in its jurisdiction, several obstacles must be overcome; such as having a thorough understanding of the values attached to regions designated as protected areas, their design, and acceptance of area protection, and indigenous education, conflict situations with local peoples, and management role in sustainable development." (Andrew-Essien and Bisong 2009).

of Government interventions, lack of legal ownerships, lack of access to eco systems, political marginalization etc. restrict the poor to reap benefit from it.

On one hand development offered a greater choice of occupations, an expanding consumer base for services and trade, increased transport availability to markets and the competitive advantage of proximity for perishable agricultural products. On the other, urbanization brought intense competition for land, increasing land values and driving land use change with consequent deterioration and loss of access to natural resources traditionally used for livelihoods (Gregory, Pam and Mattingly, Michael 2009), and compel them in joining to the unskilled daily labour force of the cities newly developed.

Direct dependence of people of developing countries on the natural resource base is conspicuous. (Pearce 1988). "Spatially localized natural assets are of the utmost importance to the worlds' poor" (Dasgupta 2002). Damage of wetlands, inlands and coastal fisheries, woodlands, ponds and lakes and grazing fields for urban extensions or the construction of large dams, push traditional dwellers, who are among the poorest in the society into further vulnerability. Frequently there are no ready alternative sources of livelihood to their local resource base in contrast to rich eco tourists for whom there are alternatives often somewhere else. "The range between a need and a luxury is enormous and context ridden". (Dasgupta 2002).

The process of conservation is not always easy as desire as it comes along with conservation of their dynamism as well. Decisions about the conservation or use of coastal areas always raise conflicts of values, interests and political power. Conflict in the wetland area can be seen as the outcome of diverse interests and come down to whose values count in society. (Adger et al. 2002). Thus, conservation and degradation may take place simultaneously within a small holder community owning to the diversity of household strategies, due to heterogeneity within the rural communities in terms of access to and control over resources.(Birch-Thomsen et al. 2001).

According to classical economists[8] "An increase in GNP is the key to economic development and poverty elimination"[9]. (Dasgupta 2002). The overall worth of an economy's capital assets is named as wealth, is based on a comprehensive listing of assets, that includes not only manufactured capital (roads and buildings; machinery and equipment; cables and ports) and what economists refer to as human capital (knowledge and skills), but also natural capital (oil and minerals; fisheries, forests and, more broadly, ecosystems) (Dasgupta 2002). The management of natural resources has practically no history of providing support to rural poor. (Gregory, Pam and Mattingly, Michael 2009). "Economic development in the guise of growth in per capita GNP can come in tandem with a decline in the wealth of some of the poorest members of society". (Dasgupta 2002).

Several scholars estimated the valuation of wetlands and showed people's willingness to preserve the wetland eco system. Despite all these efforts wet-

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[8] Adam Smith's "An enquiry into the Nature and causes of the Wealth of nations."

[9] An enormous literature adopting this view point, like; World's bank annual World development Report 1986 (New York: Oxford University Press).

lands are being encroached worldwide. There are a number of reasons behind this like; State interference, the growth of markets etc. 'in one set of goods and services can weaken the incentives people have for remaining in long term relationships involving transactions in other goods and services'. (Dasgupta 2002). "Much of the scientific attention to wetland management has been directed towards the apparent (or ecological) reasons for wetland loss and degradation are changes to water regime, physical modification of the habitat, eutrophication and other pollution, and invasion by exotic pest species. Lists of threats to wetlands have been compiled but these rarely address the non-ecological reasons that have resulted in so many wetlands being lost or degraded." (Finlayson and Rea 1999).

The authors emphasized that non-ecological causes of wetlands loss and degradation need to be as well understood as the ecological causes like; economic development in wetlands, bureaucratic obstacles, lack of information or poor access to information and poor general awareness of the values and benefits derived from wetlands. (Finlayson and Rea 1999).

Examining indirect (non ecological) causes, Davis and Froend found considerable evidences like; lack of coordination between State and local Government agencies and their reluctance to unify over wetland issues; planning inadequacies and lack of articulated strategies, poor ecological understanding by developers, isolated management of wetlands that share a regional aquifer and the financial strain on local communities to ameliorate the impacts of urban sprawl. (Finlayson and Rea 1999).

This dynamic conceptualization of the debate helps me to understand the implications of the debate at micro level and the contradictions between the theories conceptualized by the scholars and the practical situation of the people of the wetland area, undergoing with the experience. In this study I took Hatgachia village as core wetland village and Uchhepota as the converted village because of development.

2.3 Conceptual framework

2.3.1 Diversification of livelihood

The issue of diversification of livelihood of the rural poor is the core components of analysis of this research since, the immediate consequence of conversion of wetland is loss of job of people depending on wetland and diversify their livelihood strategy as a coping method. Decisions of diversification of livelihood strategy are driven by two sets of motives, the push factors and the pull factors. Push factors driven by risk reduction, diminishing factor returns to stabilize income flows and consumption. Pull factors are driven by local engine growth like; proximity to urban area (Barrett et al. 2001). The ex-ante endowment of financial capital, skills, education or market access appears to increase the probability of participation in higher-return nonfarm activities (Barrett et al. 2001). Social relations and strategies influence environmental change and influence the livelihood diversification, seen as part of strategy to retain access

to control over land. (Birch-Thomsen et al. 2001)In the debate between environmental conservation and economic development local change, diversity and indigenous knowledge are increasingly emphasized. But social differentiation, growing poverty and diversity of livelihood strategies render insufficiency to understand how natural resource conservations are sustained from below. In the process of conservation success stories always focused on the outcome of success, but stories of loss, marginalization and poverty are always under estimated in the process (Birch-Thomsen et al. 2001). Their conviction was conservation and degradation may take place simultaneously within a small holder community because of the presence of heterogeneity within the rural community in terms of access to and control over resources. (Birch-Thomsen et al. 2001). The study on waste recovery system of EKW area recommended saving the people to save the wetland. (Kundu et al.).

As a consequence of development process, proximity to a city presents barriers as well as opportunities for livelihood change, potentially forcing the poorest people into greater vulnerability where this transition is poorly managed. (Gregory, Pam and Mattingly, Michael 2009).

> "The peri urban interface forced livelihood transition which was complex, fragmented and chaotic and forced a dichotomy of opportunity that depended on the livelihood assets people were able to mobilize." (Gregory, Pam and Mattingly, Michael 2009).

"Casual unskilled labouring was the primary income generating activity for many peri-urban poor people whose lack of education and skills barred them from salaried employment". (Gregory, Pam and Mattingly, Michael 2009) .

Poor, especially the rural poor often depends on earnings from natural resources , but the management of natural resources hardly has any history of providing them support. The state of world poverty significantly depend on the traditional , natural resource based livelihoods and with the process of urbanization and industrialization a transition is happened to rural people into urban economics. Knowledge of their livelihoods based on traditional and natural resource and the way that rural people accommodate themselves to dynamically changing circumstances is important for helping rural people to become a part of productive elements in the city. Pam Grogory and Michael Mattingly described this process as 'migration without any movement'. As the process of economic development extends, it influence the pressure for livelihood transition increases. All people living in the wetland area are likely to be affected as a consequence of either conservation or conversion of the land for development.

People, especially living in the peri urban areas experience continuous shifting in their livelihoods and problems in opportunities. However, expansion of economic development presents barriers as well as opportunities for livelihood change, which may potentially force the poor people into greater vulnerability because of poor management of transition process. Until now there is a very little focus on the transition of livelihood change in the literatures published. However, the management of natural resources remains important during the transition to urban life. The process of urbanization forced livelihood transition is complex, fragmented and chaotic and a dichotomy of opportunities (Gregory, Pam and Mattingly, Michael 2009). On one hand ur-

banization offered a more choices of occupations, an expansion of markets for services and trade, increased access to market in terms of important in transportation and provide them competitive advantage for agricultural good. Whereas, on the other hand urbanization bring intense competition for land, by increasing land values, driving change of land use with consequent deterioration and loss of access to natural resources traditionally used for livelihoods. The dynamic needs of people for cash income pressurize them to move into cash based economy. Gregory P. and Mattingly M. observed two particular characteristics a trend away from natural resource based livelihoods and the acquisition of new livelihood thread. (Gregory, Pam and Mattingly, Michael 2009). But because of many interlinked reasons the rural poor people failed to extract benefits from livelihood changes from urban development. The peri-urban poverty exhibited the characteristics of rural and urban poverty interms of loss of natural resources and growing importance of inclusion into monetized economy. The habitants become more vulnerable – "Poor people lacked control over the changes that shaped their livelihoods"-(P. Gregory and M. Mattingly 2009 as quoted in 'Goodbye to natural resource based livelihoods? Crossing the rural /urban divide', Local Environment, 14: 9, pp 886). The authors concluded that the process of shifting from traditional skills and knowledge to urban livelihoods would lead to more rural poor into urban economy. "This research found that both livelihood opportunities and threats were chaotic, fragmented and dynamic within the changing and heterogeneous environment of the peri-urban interface." (As quoted in 'Goodbye to natural resource based livelihoods? Crossing the rural /urban divide', Local Environment, 14: 9, pp. 888)

> "The studies clearly showed rural people continuing to use natural resources while the economic or physical expansion of a city brings them into an urban economy. The authors described natural resources as the fundamental for bridging livelihood transition." (Gregory, Pam and Mattingly, Michael 2009)

The most prominent consequence of the conversions on the people living in the EKW area is diversification of their livelihood strategy from wetland based livelihood to non wetland based livelihood with the process of conversions in the area. This concept of diversification of livelihood enable me to understand the integration of the rural poor into urban economy and the implications (such as employment security, access to education and health facilities etc.) of this integration into urban livelihoods on the socio economic conditions of the rural poor.

2.3.2 Market Failure and trade-off

The concept of market failure is another focal component of this research. Since value perception of natural resources are very little or no value which minimizes its decision power. Often nature's services do not come under monetary price valuation because the property rights to natural capital are often not specified. The reason behind changes in the size and composition of natural capital are in large measure missing from national accounts is that Nature's services most often do not come with a price tag. (Dasgupta 2002).

The return from conservation of environment comes only in long term relationships. Private returns from conservation are too low because of failure of

market to internalize the value of the wetland. Thus there is a trade off going on between conservation of wetland and economic development around the wetlands. "Trade-off analysis is one means of bridging the gap between the scientific management of eco systems and development planning for society and the wider economy". (Adger et al. 2002). Because of the low private return from the conservation process the rural poor trade-off their references between short term and long term gain. The priority for local people is for immediate livelihood improvements and not long-term environmental protection. (Copsey et al. 2009)

Despite of all its value contribution to the society, importance of wetlands are still neglected in the society, the failure to properly account for the total value of environmental and natural resources results in socially undesirable overexploitation and degradation of complex ecosystems. (Kaplowitz 2000).

Thus, conceptualization of Market failure is necessary to be able to comprehend the motivations behind the conversions in the wetland area. Wetland based livelihoods are seasonal and provides no earning during off seasons. In such uncertain situation a rational decision maker will comprehend the significance of the uncertainties with her preferences for possible consequences or outcomes and lead to the trade off between conservation which yield long term gain as opposed to economic development which provide her immediate return. Taking this concept to EKW, the paper would like to argue that failure of the market in value perception of the EKW leads to low returns from wetland base livelihood, and compel the direct users to diversify to non wetland based livelihood, which successively initiate degradation of EKW as well.

2.3.3. Gender and Market oriented economy

Conceptualization of gender and market oriented economy is necessary for the study because, gender promises to be a useful variable since the institutional environment differs by gender, as women have different property rights and power, work and responsibilities and knowledge and values.

Women's work participation is driven mainly by economic imperatives, poverty and differ across caste groups (Bhattacharya et al. 2009). The consequences of urbanization are different on women's livelihoods which make the choices more limited for women like; access to better jobs in off farm activities; paid employment etc. women also faced cultural barriers to undertake activities outside the family enterprises. Women faced barriers in accessing information, resources, training to diversify their livelihoods. (Gregory, Pam and Mattingly, Michael 2009). Scholars showed that responses of women to peri-urban pressure tended to be different from those of men. (Gregory, Pam and Mattingly, Michael 2009). "It was considered socially degrading for Indian women to have to undertake work outside the family enterprise". (Gregory, Pam and Mattingly, Michael 2009). Programmes of economic stabilisation and structural Adjustment aim to reduce inflation; increase the rate of growth of output and exports; and increase productivity and efficiency. Typically they involve devaluation, a reduction in public expenditure, decontrol of prices and of the allocation of imports and foreign exchange, and attempts to improve incentives for the production of goods which are internationally tradable and to switch resources away from the production of goods which are not internationally tradable (Elson 1995). Thus, market failure to internalize the value of

wetlands leads to 'switching resources from the production of non tradable to the production of tradable'. (Diane Elson 1995). As wetlands are being filled up there is a shifting of gender role within the household. Conversions in the wetland area results in loss of job or decrease in the number of days of employment for the male members of the household, where they failed to integrate themselves into urban economy. After the loss of job of the male head of the household, women have to come out of the family enterprise for earning and support their family's subsistence. Unlike wetland based activities such as fish farming in local / nearby wetlands or in own pond, domestic work or factory work in nearby urban areas cannot be undertaken at the same time as reproductive work. Children can be supervised while farming or fishing or crops picked, but not during work in factories or urban complexes. To cope up with the present situation and to make a balance between home and work place women have to curtail on her leisure time. "The sexual division of labour in the household is resistant to change" (Diane Elson 1995). Gender barriers to the reallocation of labour are likely to mean unemployment for men displaced from non tradable activities and extra work for women, as earner is added to unpaid domestic work (Diane Elson 1995). However, it may be argued that the income earned by women brings independence and better bargaining power within the household. But this is a subject of considerable debate, the details of which are beyond the scope of the present paper. Engagement of women into paid work force may give the family a better economic fallback position but the extent of the benefits depends very much on the context in which women enter into the labour market. (Diane Elson 1995). In situations of economic crisis women are often forced into 'distress sales', selling their labour on very disadvantaged terms in an overcrowded market in which wages and conditions of work are worsening, in order to ensure survival for the family. Recent evidence from Latin America suggests that rising female participation rates in urban areas represent such distress sales rather than the opening up of new liberating opportunities for women. (Diane Elson 1995). Women may be forced through poverty to leave their children untended, but this is a source of intense anguish, not simply another rational economic decision. (Diane Elson 1995).
The linkage between the concept of Gender and development proposes insights to comprehend the relationship between household decision on choice of livelihood strategies and women in the household in the case of EKW.

2.4 Concluding remarks

Analysis and conceptualization of dynamics of market, livelihood perspective of the direct users of natural resources and gender issues enable for a deeper insight of the issue of debate between conservation of environment and economic development, from a narrower perspective of environmental sustainability to broader issues of livelihood perspective of the rural poor. Loss of natural resources may be seen from environmental perspective but marginal poor depend directly on these resources for their livelihood. Failure of market to perceive the social and economic value of natural resources cause loss of natural resources which compel rural poor to diversify their livelihood strategies and integrate themselves into urban economy which may be dreadful in cases. Thus loss of natural resources may harm to ecological diversity in long run but

in short run it may push rural poor into further vulnerability, which is a more issue of concern in the short run.

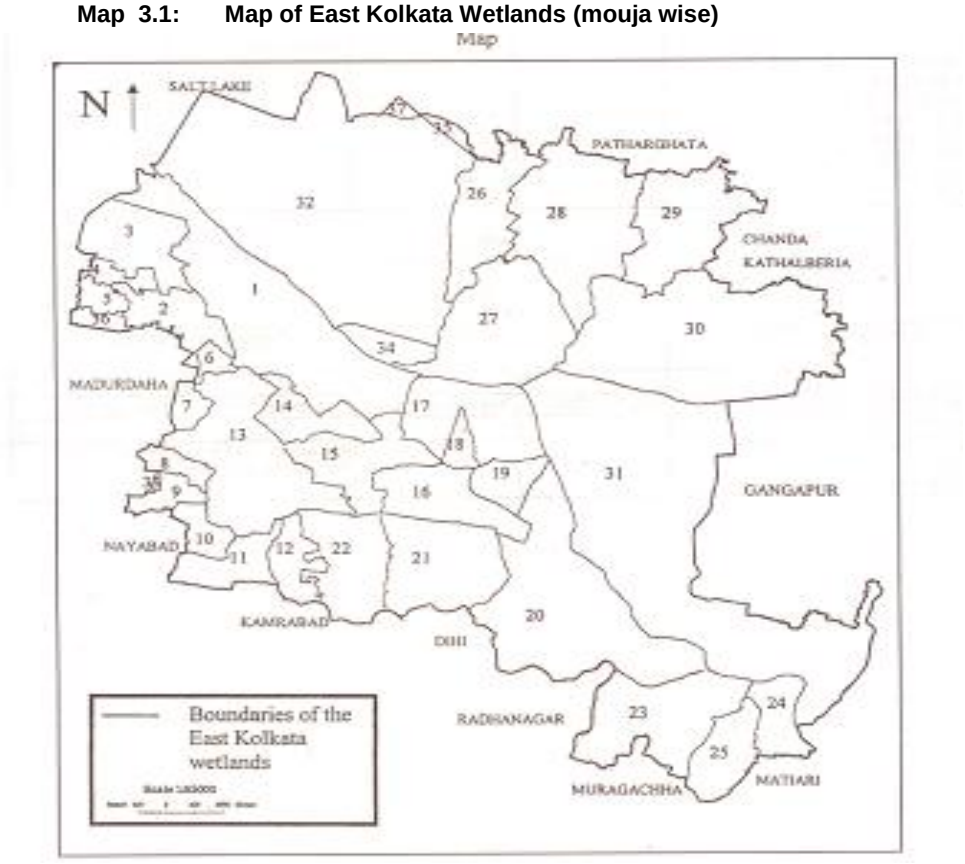
Chapter3
Sampling process, field work and the data

3.1 Overview

To examine the research questions mentioned above, the study embarked on a combination of both quantitative and qualitative research with use of both primary data and secondary data.

Research site: EKW, India

Map 3.1: Map of East Kolkata Wetlands (mouja wise)



13: Bhagabanpur Mouja[10] (Uchhepota is one of the villages of this mouja)

16:Kheyadah Mouja (Kheyadah is one of the villages of this mouja)

26: Hatgachia Mouja (Hatgachia / Hatgacha is one of the village of this mouja).

[10] Mouja refers to a locality within which there may be one or more settlements.

3.2 Sampling process for generating primary data

Presently the land use nature of EKW has two characteristics. Some parts of the wetlands remain as core conservation areas comprising of water bodies or verries and some part of the EKW have been filled up and converted for development. Livelihood strategies of inhabitants of the specific areas have changed accordingly. On the basis of the livelihood strategies adopted by the households in the EKW area, they are categorised into three groups. The first category of households depends on the wetland based livelihood activities, which includes farming using waste water from the city, fishing in verries whether in own verries or as wage labour in verries, collection of food wastes from the hotels of Kolkata and supply of these wastes as foodstuff for fish in the verries, several works related to fisheries other than fishing or drawing nets etc. The second category of households depends on both wetland based livelihood as well as non wetland based livelihood activities. The third category of households depends on non wetland based livelihood activities for their earning. The non wetland based livelihoods comprises wage labour in formal and informal sectors in the nearby urban areas, domestic labour, construction labour, working in MNREGA[11] etc. One village from each category had been chosen as representative of the three communities for the purpose of the survey. Thus, village Hatgacha is chosen as a representative of first category, Kheyadah village is chosen as the representative of second category and Uchhepota village[12] is the representative of third category.

The reasons behind the choice of these three villages are purposive and strategic. Firstly, all the three villages come under Ramsar site[13]. The geographical locations of all of these villages are equally proximate to urban areas, in the sense that people of these villages have the access to both types of livelihoods. The primary cross section data was collected on the basis of a sample of 100 households, located in the EKW area. The sample size for the purpose of the survey had chosen pragmatically considering time, space and budget for the field work. The sample represents 4.26% of the total population of the sample villages.[14]

Field survey was conducted with the help of structured questionnaire as well as open ended interviews to realize the perception of the people living in the wetland area regarding the conversions of the wetlands.

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[11] Mahatma Gandhi National Rural Employment Guarantee Act.

[12] As revealed during survey, eight out of the eleven moujas under Kheyadah II GP. Viz. Chak Kalar Khal, Karimpur, Jagatipota, Mukundapur, Atghara, Ranabhutia, kantipota and Bhagabanpur have faced the onslaught of real estate takeover of which illegal conversions of verries have taken place (since the eighties) mostly in Chak Kalar Khal , Karimpur, Jagatipota, Mukundapur, Atghara, Ranabhutia and Bhagabanpur (Uchhepota) moujas.

[13] The EKW has been delineated into 37 moujas. The entire EKW has been divided in full and part mouzas according to area designated under Ramsar site.

[14] The sample represents 4.46% of population of Hatgacha, 3.89% of Uchhepota and 4.46% of Kheyadah village.

The questionnaire

The questionnaire used for the household level survey had comprised of following section of information:

Section 1: general information of the sample household.

Section 2: demographic information of the sample household.

Section3: socio-economic condition of the household, household assets and income.

Section 4: livelihood information of the sample household.

Section 5: development indicators, indebtness and saving status of the sample household.

The survey was conducted over a period of two months; July and August 2010. The local people are randomly chosen from the three villages for the purpose of the interview. The household selected to be surveyed were chosen randomly on the basis of latest voter list available of these three villages at the Panchayat level. The person chosen from the voter list is my respondent of that particular household. In most of the cases I have been able to talk to the person, chosen from the voter list. Only in few cases the unavailability of the particular respondent in the household at the time of my survey, makes me to choose either the head of the household or any other respondent from the particular household for the survey.

Semi structured interviews were done with the Government officials from Department of Environment, Department of fisheries, Government of West Bengal, India, owner of the fisheries (verries) and the officials from NGO SEED, working in the wetland area.

3.3 Secondary data

The secondary data is collected from Government Offices and NGOs working in the wetland area. The sources of the secondary data are Department of Environment, Government of West Bengal, India, and the NGO SEED working in the wetland area. Website of Census, India and various other websites are used to obtain secondary data.

Apart from the field survey, secondary research of books, periodicals, documents, notes, literature and other miscellaneous data bases were consulted for formulating the research design. A pre study survey was also done before the actual survey.

3.4 The Data

These three villages are constituted in the district of South 24 Parganas, relatively developed districts (its rank is 8 according to composite index of rank of districts in West Bengal) in West Bengal, a eastern state of India. According to census data 1991, the three moujas have a high degree of illiteracy. In Hatgacha 55.75% amongst men and 79.32% amongst female, in Bhagabanpur 44.05% amongst men and 64.9% amongst women and in Kheyadah 46.95% amongst men and 73.18% amongst women are illiterate. The Household data of the survey done by Kunal Chattopadhyay, explained that poverty figure on the basis of consumption data was on an average 24% in EKW area. (Chattopadhyay 2000). The demographic features of these three moujas are:

Table 3.1 : Demographic information of sample mouja

Mouja	Population			Population below 6 years		
	Male	Female	Total	Male	Female	Total
Hatgacha	2061	2021	4082	388	391	779
Kheyadah	754	757	1511	120	140	260
Bhagabanpur	1605	1473	3078	241	228	469

Source: (Creative Research Group 1997), population figures as per Census of India, 1991.

Mouja	Schedule Caste (SC)			Schedule Tribe (ST)		
	Male	Female	Total	Male	Female	Total
Hatgacha	1977	1956	3933	NA	NA	0
Kheyadah	645	652	1297	9	9	18
Bhagabanpur	1582	1451	3033	22	22	44

Source: (Creative Research Group 1997) population figures as per Census of India, 1991.

Table 3.2 : Geographical information of sample mouja

District	Mouja	Village	Police station	Judiciary Line (J.L.) No.	Area in Hectare
South 24 Parganas	Hatgachia	Hatgachia	Bhangar	4	298.66
	Kheyadah	Kheyadah	Sonarpur	11	246.03
	Bhagabanpur	Uchhepota	Sonarpur	8	568.17

Source: (Creative Research Group 1997) population figures as per Census of India, 1991.

The distinct features of these three villages are, Hatgacha is still a core wetland area, almost all the people living in this area depends on wetland for their livelihood and the main occupation of the people in this area is related to verry or fisheries. On the contrary Uchhepota village has been fully converted into an urban area, all the wetlands in this area are filled up and land nature has changed. Even if some scattered water bodies are found here and there are either sold out to promoters, or filled with water-hyacinth. Many people living in this area switch their livelihood from wetland based activities to non-wetland based activities like; engaging themselves in daily wage labour force etc. One interesting features found in Uchhepota village is, that a major percentage of people engaged before in verries or fisheries, after filling up of the verries they mobilize themselves into various kinds of livelihood activities like; daily wage labour in urban informal sector, seasonal wage labour in other fisheries etc. Some habitants still stick themselves to wetland based activities but the pattern of activities has changed like; from drawing net in fisheries to fish sellers in local fish market or become collector of food for fish from hotels waste. Kheyadah village has in turn both of these features. Most of the people living here are engaged in farming using waste water, at the same time proximity of this village to urban area allow the habitant of this area to join to the urban labour force. So people of this area are privileged to engage themselves in wetland based livelihood activities as well as non-wetland based livelihood activities.

Chapter 4
Results and findings

Overview

This chapter provides results and findings of the data analysis based on the household survey and interviews done in the EKW area. The comparative analysis had done in two levels. First, the comparative analysis of different socio-economic indicators had done among the three villages, which represents three different livelihood strategies of the household. Secondly, comparative analysis had done across households within these villages to examine differences in socio-economic indicators.

4.1 General statistics

The study covers 100 households consists of 434 individuals in 3 villages of 3 moujas. Almost all the people came under this survey were found of local origin, belongs to economically weaker section of the society, though a few were found to be migrant. Only 14% of my sample knows about the importance of wetland and 49% of my sample recognized EKW as their main source of income. 30.65% of the total sample is illiterate and 21.66% female are illiterate in my sample. The general statistics shows the overall picture of the sample covered under the survey.

In my sample size, three villages represent three types of livelihood strategies. To analyze the differences in socio-economic conditions among the three villages, the analysis process starts with the comparative analysis of the three villages.

4.2. Household characteristics associated with household decision on diversification of livelihood strategies

Model specification and Regression results

There may be several factors affecting the decision of the household for allocation of their labour time to wetland based or non wetland based livelihood activities. Since the analysis is based on cross section data, to know the livelihood information of the household, the respondent was asked whether the household has diversified livelihood strategy from wetland based to non wetland based. To analyze the factors responsible for household decision of choice between wetland based livelihoods or non wetland based livelihoods, the model is specified as:

$$time\_nonwet = \alpha + \beta_1 land + \beta_2 age + \beta_3 caste + \beta_4 sex + \beta_5 hhsize + \beta_6 illt + \beta_7 pri + \beta_8 \text{sec} + \beta_9 young + \beta_{10} wage + \beta_{11} cattle + \beta_{12} vill2 + \beta_{13} vill3 + \varepsilon$$

The β s are coefficient to be estimated and ε represents unobservable factors which may influence the decision of diversification. Based on the as-

sumption that ε follows a normal distribution, this equation may be estimated using a Tobit model[15].

The dependent variable is the amount of time spent by household on non wetland based livelihood activities. From the literature (section 2.3.1), decision of household to diversify livelihood strategy depends on the endowment of the household. Thus to analyze factors associated with household decision with diversification of livelihood strategies, *time_nonwet* may be treated as a function of household endowment variables like; age and sex of the head of the household, household size, caste (dummy variable), household access to land (comprises of owned land, land used for share-cropping, tenancy and leased-in land), daily wage in non-wetland livelihood, livestock (cow as main livestock of household), educational endowment of the household like; number of illiterate members in the household, number of primary (upto level iv) and secondary level (upto level x) educated member in the household as compared to higher level (above class x)educated member in the household, location of the household, human resource endowment like; number of young members (ages 16 to 40 years).

One could argue that household access to land may have positive correlation (Table 4.1 in appendix 2) with decision of labour time allocation of the household. But here, though the land market is in operation it is not dynamic in nature. Because of immense poverty level, the people living in the EKW area remain in selling side only.

Results:

Interpreting the results (Table 4.2, appendix 2) inferred from Tobit model (marginal effects):

Effect of education

Higher education of the household members influence to spend more time on non wetland based livelihood activities. The regression results showed that if the household has secondary level educated adult in the household as compared to household with higher level educated adult members then the amount of time spent on non wetland based livelihood activities decreases.

Interview with Amal Majumder, a local political leader expressed that increase in the level of education at the household level and more awareness on education discouraging the young generation to involve in wetland based livelihoods. Educated youths are becoming reluctant to join in fisheries or in farming and engage themselves in non wetland based livelihoods.

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[15] The dependent variable for the analysis is the time allocation of household on non wetland based livelihood activities, which is a limited dependent variable model (LDV) ranging between zero and 480. Here the dependent variable is discrete in nature and contain some corner solutions for some nontrivial fraction of the population such as zero time spent on non wetland based livelihood. In this a case linear model (OLS) will likely lead to negative predictions for some families. Thus Tobit model is used for analysis of factors associated with household choice of livelihood strategy. (Wooldridge 2009).

Effect of daily wages in non wetland based livelihood

Holding other variables constant, increase in daily wage in the non wetland based livelihood, increases the chance of household to spend more time on non wetland based livelihood activities.

Effect of demographic feature of the household

An increase in the number of members in the household has positive association with the amount of time spent on non wetland based livelihood activities. Households headed by male are less likely to spend more times on non wetland based livelihood activities.

Effect of location of the household

Location of the household has a significant relation with household decision of diversification of livelihood strategy. If the household is situated either in Uchhepota or Kheyadah as compared to Hatgacha the amount of time spent on non wetland based livelihood increases. This result is quite obvious since, in both of these villages due to the process of urbanization and industrialization livelihood opportunities in wetland based activities has decreased. During the field visits, I observed both Uchhepota and Kheyadah are well connected with the nearby urban area; road conditions are quite good while Hatgacha is not well connected to the nearby urban area.

Effect of land

Access to land holding of the household has no significant relation with household time allocation decision.

This result can be explained in terms of lack of property rights of the direct users. The major chunks of wetlands are hold either by Government or influential people and the people living on the wetland mostly do not have the property rights on the wetland. The land considered as own land, is actually the vested land distributed amongst the marginal farmers and fishers through the process of land reforms in WB and they do not have selling rights of these vested lands. During the field visit, the local people expressed that if they have selling rights on these vested lands; they will sell those lands for a one time lump sum amount and diversify to non wetland based livelihoods.

Personal interactions with the local people of these three villages bring up the picture that the people living in the wetland area, the direct user group of EKW are socially marginalized people belongs to economically weaker section of the society, really do not care for either conservation of environment or bother about ecological importance of EKW. Only 14% of my sample responded that they have heard about the ecological importance of EKW. They depend on wetland to meet their livelihood demand and in turn they conserve the ecology of the wetland. Given a choice of preferences between wetland based livelihood and non wetland based livelihood, a very few number of households in my sample expressed their choice towards wetland based livelihood. Most of the respondents express their choices in terms of their earning. A considerable response was in between. They consider it highly difficult to judge a difference in importance and consequently express the view that both are of equal importance as long as they can meet their livelihood demand. The

people of Hatgachia village were asked if they want to change their livelihood from wetland based earnings to daily labour force in urban areas. Almost every respondent express their reluctance for switching their livelihood. As reasons they showed that they are coming to this occupation by heredity and consider themselves best knowledgeable in this occupation and feel comfortable in this occupation. Some young people, working as wage labour in nearby urban areas replied that wetland based livelihoods are seasonal and during the closed season there are no earnings. They said that if protection of wetland is really important, then Government should take initiatives and help them by providing alternate livelihood options. They expressed that incomes from non wetland based livelihoods are more reliable than income from wetland based livelihoods. From the above discussion it is clear that the primary concern of these direct users, are to compete with variability in their respective livelihoods and the monetary returns from them. The principle desire of them is the economic support for their livelihood, though some of them voice for conservation of the wetland. They hope for better Government interventions for better future.

4.3 Comparative analysis of the three villages of the study area - descriptive analysis

Demographic features

Table 4.3: Household demographic features village wise

	Hatgacha	Kheyadah	Uchhepota
Variable		Mean	
Age of head of the household	46.75 (12.24)	51.12 (9.52)	45.74 (13.01)
Sex of the head of household	0.29 (0.46)	0.41 (0.51)	0.17 (0.38)
Average age of household members	28.46 (9.58)	30.47 (7.84)	28.86 (6.89)
Caste	2.08 (0.28)	2.76 (0.44)	2
Household size	4.52 (1.64)	4.65 (1.8)	3.94 (1.11)

Source: Authors calculation on the basis of field data collected through survey
Standard errors are in parentheses

Table 4.3 shows the comparative summary statistics for different demographic features of the three villages. The average values of the households of the three villages show that the households in the three villages have more or less similar characteristics.

Income and livelihood status

Table 4.4: Household income and livelihood status village wise

	Hatgacha	Kheyadah	Uchhepota
Variable		**Mean**	
Total income of the household (monthly)	4181.25 (2085.61)	5470.94 (2375.27)	3929.23 (2942.33)
Percentage of income from Wetland based livelihood	84.5 (23.83)	52.31 (27.72)	24.09 (32.42)
Household time spent (monthly) on wetland based livelihood	280.83 (135.5)	167.06 (110.33)	87.66 (154.57)
Percentage of income from non Wetland based livelihood	15.5 (23.83)	47.69 (27.72)	75.91 (32.42)
Household time spent (monthly) on non wetland based livelihood	160 (228.67)	480	445.71 (114.85)
Per capita income of the Household	965.63 (426.56)	1405.95 (1007.62)	1002.5 (686.36)
% of female in labour force	17.71 (27.75)	69.019 (32.87)	30.95 (35.73)

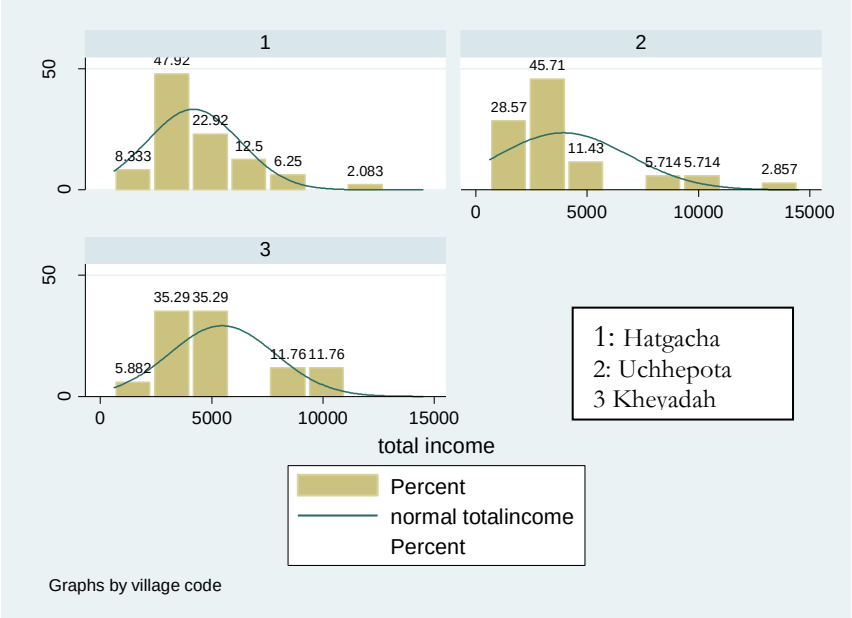
Source: authors calculation based on field data collected through survey
Standard errors are in parentheses

Table 4.4 shows the comparative status of households of the three villages of the study area with breakdown of household income source and comparative average income level. The data shows very clearly that with the process of conversions there is a clear difference in the choice of livelihood strategies of the household and as compared to initial period people are now more dependent on non wetland based livelihoods in Kheyadah (47.69%) and Uchhepota (75.91%) village. This transition of local people from wetland based livelihood to non wetland based livelihood indicates the limited future prospects of EKW in terms of providing livelihood opportunities.
Interaction with the local people of the EKW area during the field work reflect an important issue that, due to conversions in the wetland area and loss of wetlands there is a change in the pattern of the wetland based livelihoods. Such as, people shifted their livelihoods from drawing net in verries or working as wage labour in verries to sellers of fish in the local fish market, collection of food wastes from hotels of the nearby urban area for the foodstuff of fishes.

The total income of the household described in the table 4.4 comprises of cash income as well as non cash income converted according to the local market price. Non cash income consists of the amount of paddy from their agricultural land, fish they have in homestead and the income comes from the poultry or cattle they have at household level. The data shows that the average income in Kheyadah village is the highest (5470.94) among the three villages and lowest in Uchhepota village (3929.23).

The calculation of average per capita income also showed that Kheyadah has the highest average per capita income while Hatgacha has the lowest average per capita income among the villages. It can be inferred from the above statistics that number of employment within a household is also highest in Kheyadah village.

Figure 4.1: Distribution of income in three villages



Source: authors calculation based on field data collected through survey

The above graph shows income distribution of three villages. In Hatgacha village distribution of income is normal. In Uchhepota and Kheyadah, the histogram shows quite non normal distribution. Thus, though average income of the household is highest in Kheyadah Village (refer to table 4.4) distribution of income inequality exists among the households. Interactions with local people during the field visit revealed that, in Hatgacha most of the people are engaged in fisheries and receive more or less equal wages. But for the other two villages, people tried to integrate themselves with non wetland based livelihood activities, and the income distribution shows that there are uneven integration into urban economy. Even if some households are able to assimilate themselves into urban economy, for some households this transition in livelihood is not so smooth. Thus an unequal income distribution is observed in these villages.

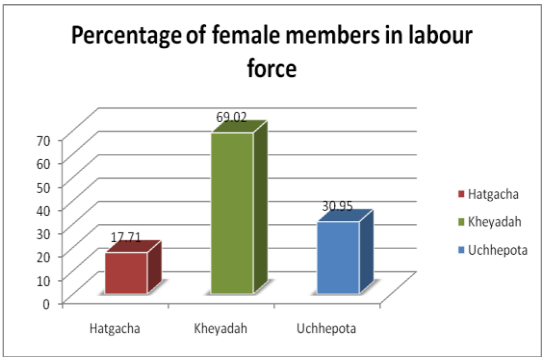
Table 4.5: GINI Coefficient across villages

Village name	Gini Coefficient
Hatgacha	0.52
Kheyadah	0.83
Uchhepota	0.65

Source: Author's calculation on the basis of field data collected during survey

The conversions of wetland have gender differentiated impact. One interesting finding of the survey is difference in the level of engagement of female members of household in labour force in these three villages. Engagement of female members in labour force is higher in those villages which are converted or more dependent on non wetland based livelihood strategies.

Figure 4.2: Percentage of female members in the labour force



Source: Descriptive statistics table 4.4

Interaction with the local people during field visits revealed that most of the household in the study area are based on male bread winner model. The loss of wetlands displaced many of the male earning members of the household from their bread winner role either because of loss of their job or decrease in the number of days of employment. Thus females of the household have joined into the labour force to support their family. The graph above shows that percentage of female members in labour force is highest in Kheyadah village, though most of these participations are into the unskilled labour force like; involving in domestic labour or daily wage labour force in informal industries of the nearby urban area. The survey data showed very low rate of female literacy in Kheyadah village. According to my sample 65.11% female in Kheyadah village are illiterate or can only sign their name. The people living in Kheyadah village are more open to both types of livelihood options. The village is well connected to the nearby urban area so people can easily engage themselves in wetland based livelihood options as well as non wetland livelihood options. Thus, it can be inferred that this female participation in work force leads to the unskilled labour force.

Interview with Bhabananda Chatterjee, the former Assistant Director of Department of Fisheries expressed that development in the EKW decreases the trend of migration. Newly build urban complexes and industries providing new job opportunities for women to work and support their family and thus prevent male members to migrate for earning.

Educational status

Table 4.6: Household educational status village wise

	Hatgacha	Kheyadah	Uchhepota
Variable		Mean	
Illiterate members in the household	0.67 (0.86)	1.24 (0.66)	0.57 (0.78)
Household members can Sign their name only	0.48 (0.74)	1.41 (1.42)	0.8 (0.72)
Primary level (upto class IV) educated members in the household	0.96 (0.94)	1.06 (1.19)	0.8 (0.9)
Secondary level (upto class x) educated members in the household	1.27 (1.53)	0.82 (1.07)	1.4 (1.09)

Higher level (above class x) educated members in the HH	0.29 (0.62)	0.06 (0.24)	0.29 (0.86)
% of child enrolment in school	67.19 (47.21)	54.9 (49.91)	78.09 (41.18)

Source: authors calculation based on field data collected through survey
Standard errors are in parentheses

The comparative analysis of the descriptive statistics show that average number of illiterate members in the household is highest in Kheyadah village about 1.24 whereas the number of illiterate member in the household is much lower in Hatgachia and Uchhepota village 0.66 and 0.57 respectively. The average number of household members attended higher education is also lowest in Kheyadah village is about 0.06 while for the other two villages the average is similar about 0.29. Condition of house is more or less similar for all three villages.

Socio economic condition

Table: 4.7: Household socio economic condition village wise

	Hatgacha	Kheyadah	Uchhepota
Variable		Mean	
Household access to land (in acre)	0.51 (1.47)	0.74 (0.53)	0.13 (0.41)
Holding saving account in financial institution	0.71 (0.46)	1.12 (0.33)	0.83 (0.38)
Condition of the house	2.35 (0.79)	2.71 (0.59)	2.03 (0.86)
No. of meals per day	3.17 (0.43)	2.94 (0.24)	3
Household has Mobile phone	0.6 (0.49)	0.41 (0.51)	0.89 (0.32)
Drinking water in the house	0.17 (0.38)	0.47 (0.51)	0.14 (0.36)
Household have access to Electricity	0.58 (0.49)	0.29 (0.47)	1
Household have Sanitation facility	0.58 (0.49)	0.29 (0.47)	0.66 (0.48)
Access to health facilities	2 (1.85)	0.82 (1.51)	0.97 (2.18)

Source: authors calculation based on field data collected through survey
Standard errors are in parentheses

Households living in Hatgacha village are having more meals per day (3.17) as compared to households living in Kheyadah village (2.94) and Uchhepota village (3). Condition of house (taken as a proxy variable to observe economic condition of household) is better for the inhabitants of Kheyadah village as compared to other two villages. Access of households to health facilities as an indicator of development reflected that access to health facilities in case of illness is highest in Hatgacha village as compared to Uchhepota and Kheyadah. This shows that the process of development does not provides with better education and health facilities

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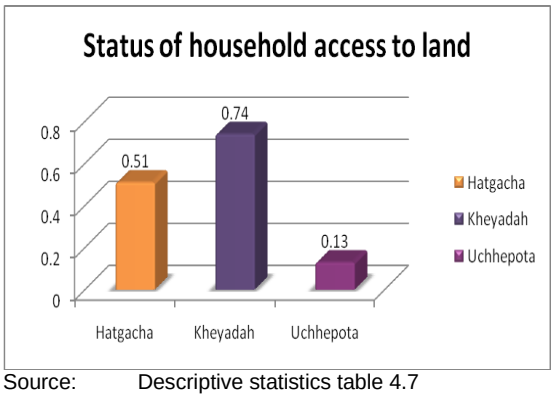
Figure 4.3: Land holding status of household



Source: Descriptive statistics table 4.7

Household access to land comprises of owned land, land used for share-cropping, tenancy and leased-in land. Table 4.7 showed that amount of land holding (both agricultural land and verries) is highest in Kheyadah which is 74%. People living in Hatgacha (in my sample) hold 51% land and in Uchhepota land holding is only 13%, which is the lowest among the three villages. This statistics is quite obvious, because Hatgacha is still a core wetland area and majority of the population in Hatgacha depend their livelihood on wetlands. In Hatgacha 84.5% (Table 4.4) of income is coming from wetland based activities. Uchhepota is the village which is almost fully converted from wetland to land for other economic development. Lands are almost filled up, and constructions of new buildings are very common observations in Uchhepota. Thus the data showed that only 24.09% (Table 4.4) of the total income comes from wetland based livelihoods. On the contrary, Kheyadah, the village where people have agricultural land for farming as well as proximity to urban area gave them opportunity to engage themselves into the urban labour force. The data showed majority of their income share comes from wetland based livelihoods i.e. 52.31% (Table 4.4). Status of saving (holding savings account in financial institutions, formal or informal) is higher in Kheyadah and Uchhepota village as compared to Hatgacha village. The result of status of saving not only complementary with income status also reflects awareness of the people and access to financial institutions.

Analysis of comparative asset holding status in the three villages showed that if the household is located either in Hatgacha or Kheyadah, as compared to if the household is located at Uchhepota village the asset level of the household decreases by 0.59 and 1.09.

Table 4.8: Household Asset level village wise

VARIABLES	Asset
Hatgacha	-0.597**
	(0.280)
Kheyadah	-1.093***
	(0.372)
Constant	0.472**
	(0.213)
Observations	100
R-squared	0.090
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

Source: authors calculation based on field data collected through survey

According to the interest of the paper, the assets included in the asset index are the modern assets like; television, bike, mobile phone, modern amenities like; cooking gas, refrigerator and assets like land owned by the household and cattle, which indicate involvement of the household to more wetland based livelihood activities are excluded. Thus, the process of development in EKW areas provide household with more consumer durable items.

During my field visits I observed difference in standard of living of people in these villages. Hatgacha is a village where electricity is yet to be connected. But Uchhepota is more exposed to the urban standard of living. Televisions and other modern amenities are found in the household level. Thus, the process of development provided people with consumer durables.

Some examples or cases

Example 1:
Ananta Mondal is a villager resides at Uchhepota village, the village that is fully converted from wetlands. Before conversion Ananta was engaged with local verry and used to draw nets in the wetlands. The monthly income from fishery was Rupees 1200/ month. After the conversion of the verry he had started his own business of supply of materials with the money he received as compensation of being filled up of the verry. His current monthly income from business is Rupees 10,000. Modern household amenities like; freeze, cooking gas etc. are found in the household. Being interviewed the household expressed that they are happy with the conversion of wetland. They expressed that filling up of the verry provide them new business opportunity and the process of conversions in the village area helps to flourish in the business. They are economically and socially well off now.

Example 2:
Goba Chand Khan is now mentally imbalanced. He was engaged in drawing nets in a verry at Uchhepota village. After the conversion of the verry he lost his job and tried to involve with urban livelihood. He experienced difficulties in finding jobs in nearby urban areas. He felt himself unskilled and incapable to support his family. Currently his wife is working as domestic labour in nearby urban areas and she is the only earning member of the household.

Example 3:
Priti Sona, the daughter of Jhunu Sona of Kheyadah village had experienced a road accident during her travel to the plastic factory, where she works as a daily wage labour. The factory is located in the nearby urban area. Priti reported that the provisions of roadside lights are inadequate. Most of the times these lights remain switched off. Due to the insufficiency of lights she had to encounter with the road accident. She became in attendant in the factory for five months. The employer of the factory did not give her any compensation. Now she is fit and joined the factory again. She has also reported that this kind of road accidents occur quite frequently during their travel to the workplace.

These examples draw attention on the facts of uneven integration of the rural poor into urban economy and point out that process of development did not provide these rural people with enough infrastructural support.

Source: Interaction with local people during field visits

Now, within these three villages there are variations among the households according to their choice of livelihood strategies. To analyze the differences in the socio-economic conditions, all the households in these three villages are classified into two categories. The first category of households who do not have diversified their livelihood strategies to non wetland based. The second categories of the households are those who have diversified their livelihood from wetland based to non wetland based.

4.4 Comparative analysis of the households classified according to their choice of livelihood strategies – descriptive statistics

Table 4.9: comparative analysis across household classified according to their choice of livelihood strategy

Variables	Mean	
	Households do not diversified their livelihood strategies	Households diversified their livelihood strategies
Total income of the household (monthly)	3980.45	5086.57
Household access to land (in acre)	0.40	0.43
Household have savings account in financial institutions	0.74	0.93
Total female in the workforce	0.51	1.07
% of female in the workforce	23.09	49.67
Per capita income of the household	945.52	1305.08
Condition of the house	2.4	2.07
Number of meals per day	3.1	3
Access to health facilities	1.55	1.16
Own land (in acre)	0.30	0.25
Own house	0.97	0.93
Household have mobile phones	0.63	0.77
Household have bikes	0	0.07
Household have Scooters	0	0.07
Household have Television	0.54	0.63
Household have cattle (cow as main livestock)	0.59	1.13
Household have modern amenities like; Freeze, Cooking gas etc.	0.04	0.17
Facility to drinking water within the household	0.14	0.37
Household have access to electricity	0.65	0.73
Facility of sanitation within the household	0.56	0.57

Source: authors calculation based on field data collected through survey

This comparative analysis showed that the household who have diversified their livelihood to non wetland based is better off in terms of income and savings. The data showed average income is higher in households who have diversified (5086.57) as compared to those households (3980.45) who do not diversify their livelihood strategy. The socio economic indicators such as; having modern consumer durables (mobile phones, bikes, televisions, access to drinking water and electricity in the household) are better in diversified households.

But access to health facilities, number of meals per day are better for the households who do not diversified livelihood strategies.
Interview with Bikas Munda, the Panchayat Pradhan expressed that technological improvement in agriculture increases food security since, 3 -4 times farming per year is now possible and people can have 3 times meals per day.

To analyze the status of inequality within the households, Gini coefficients are calculated.

Table: 4.10: Status of income inequality

Source of income	Coefficient	% change[16]
Wetland based livelihood activities	0.37	-0.014
Non Wetland based livelihood activities	0.51	-0.008

Source: authors calculation based on field data collected through survey

Table 4.10 shows that the GINI coefficient is high for the income source coming from non wetland based livelihood activities as compared to source of income from wetland based livelihood activities. Calculation of GINI coefficients indicate that there are more income inequality among the people depends on non wetland based activities for their livelihood. Thus though the average income is higher for the household diversified their livelihood strategy, income distribution is unequal.

Educational status across the households

Table 4.11: comparative analysis of education level of household members classified according to their choice of livelihood strategy

Variables	Mean	
	Households do not diversified their livelihood strategies	Households diversified their livelihood strategies
% of child enrolment	63.69	81.11
Incidences of child drop out	1.51	0.2
Illiterate members in the household	1.37	1.73
Primary level educated members in the household	0.91	0.93
Secondary level educated members in the household	1.17	1.4
Higher level educated members in the household	0.29	0.17

Source: authors calculation based on field data collected through survey

Percentage of child enrolment is higher and incidences of child drop out are lower in the households who have diversified their livelihood strategy. Numbers of illiterate members are higher in households who have diversified their livelihood strategy.

[16] Refers to the impact that 1% change in the respective income source will have on inequality.

One possible explanation of this result may be higher average income and better access to education facilities, which encouraging the diversified households to invest on child education.

4.5 Household decision on livelihood diversification and female of the household

To analyze the relationship between the livelihood choices made by households and engagement of female of the household in labour force at household level, the model has been specified as:

$$f\_time\_nonwet = \alpha + \beta_1 wage + \beta_2 wet\_income + \beta_3 land + \beta_4 eduhh1 + \beta_5 eduhh2 + \beta_6 eduhh3 + \beta_7 age + \beta_8 male + \beta_9 meal + \beta_{10} caste + \beta_{11} hhsize + \beta_{12} mdivers + \beta_{13} cattle + \varepsilon$$

Here, the dependent variable is time spent by female members of the household on non wetland based livelihood activities. The rational for choice of the dependent variable (time spent only on non wetland livelihood) refer to the sec 2.3.3 in chapter 2. Literature shows, to engage themselves into non wetland livelihood activities women have to curtail on their reproductive work and their leisure time. Based on the discussion in the preceding section, the dependent variable may be treated as a function of variables capturing the overall economic position of the household and household characteristics. The overall economic position of the household is captured by the amount of land, cattle (cow as main livestock), number of meals per day, income of the household, choice of livelihood strategy of the male head of the household. Household characteristics are captured by education level of the husband, caste.

The results from simple OLS[17] method (table 4.12, appendix 2) shows that decrease in household income from wetland based livelihood activities increases time spent by female members of the household on non wetland based activities. On the contrary, diversification of livelihood of the male members of the household, increase in the size of household has positive impact on time spent of female members on non wetland based livelihood activities. One possible explanation of this may be as reviewed in the conceptual framework that the diversification of livelihood of male members results in job insecurity either in terms of loss of job or decrease in the number of days of employment and thus, to cope up with the situation and to support the family female members engagement in urban labour force. In the regression results per day wage rate in non wetland livelihood and education level of the husband shows no significant result on decision of joining of female members into urban labour force, which prove the concept of 'distress sale of labour' as discussed in conceptual framework earlier (sec. 2.3.3).

Interaction with women in the EKW area during my field work make me realize that they are more comfortable working as domestic labour rather

[17] Ordinary Least Square method

working as agricultural labour since, in case of later they are more exposed to nature and do not have proper sanitation facilities.

> "I am happy to work as domestic labour, since I do not have to expose to high sun burn and rain and also get proper sanitation facilities in work place" (Sankari Bar, Uchhepota village).

They also expressed that they earn regular and higher wage in non wetland based livelihood as compared to wetland based livelihood.

> "To work in the plastic factory I have to walk a long way from my residence but at the end of the week I receive good wage, which I never earned as agricultural wage labour". (Sonamoni Sapui, Kheyadah village)

> "Now I receive regular wage at the end of each week but as agricultural labour I only earned during the season. The rest of the year *I* used to be jobless'. (Pritikana Munda, Kheyadah village)

4.6 Role of Government and NGOs

Interviews with Government officials from Department of Environment, Department of Fisheries, local political leaders, Union members of Verries, Panchayat members revealed that there are no specific programmes or policies of Government for either the people living in the wetland area or any incentives for them to encourage the process of conservation of the wetland. The official from Department of Fisheries reported that there are several laws in place namely; Inland Fisheries Act 1995[18], The Bengal Public Demand Recovery Act 1913[19] to prevent conversions in the wetland area. But still conversions cannot be prevented because of lack of coordination from the local administrative level and political pressure in the wetland area. He also stated that mostly illiterate people are engaged with wetland based livelihood in EKW area, depend only on their traditional knowledge base and fail to capture modern technologies for proper maintenance of EKW. He explained that Government classified all the fisheries in West Bengal into three categories. Profit making fisheries (type A), non profit making fisheries (type B) and loss making fisheries (type C).[20][1]

The Panchayat Pradhan of Kheyadah village explained that proximity to city Kolkata, improvement in transportation, and increase in the land prices are influencing people to diversify their livelihood. Since employment opportunities in wetland based livelihoods are shrinking, unemployed youths are engaging themselves in transaction of land selling.

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[18] The detail of the Inland Fisheries Act is in appendix 3.

[19] The detail of The Bengal Public Demand Recovery Act can be found at http://sdobishnupur.gov.in/Acts%20and%20Rules/Dictionery/0224.pdf ('Bengal Public Demands Recovery Act, 1913' n.d.).

[20] There are total 102 fisheries co-operatives in EKW area. A type fisheries – 36, B type fisheries – 28 and C type fisheries - 38 .

Amal Majumder, the local political leader and secretary of Verry Welfare Association explained that proximity to urban area is one of the reasons behind the conversion of the wetlands. Another reason he stated is the abolition of cow-sheds from the city. Initially, the waste water released from the city and used in fisheries and farming contains cow-dung, which is very useful fertilizer for farming and good food for the fishes in the fisheries. But nowadays the waste water released from the city contains more of acid, released from the factories rather than containing cow-dung. So this waste water is no more useful for fishing or firming. On the other hand the underground sewage pipes through which this waste waters flow are closing due to lack of maintenance. Poor farmers does not have the financial capacity to afford swallow pumping so they are keep losing interests from farming or fishing and more interested towards non-wetland based livelihoods. He described that Government has a plan to develop a zoo in EKW area to promote eco tourism. But as the land rights are not specified Government is not been able to proceed with this idea.

Arijit Banerjee, Director of Institute of Environmental Studies and Wetland Management expressed very strongly that protection of wetland should not be expected merely from rural or suburban poor but also from the affluent members of society who should be proactive in preserving the environment since, environmental degradation, in its truest sense is caused by affluent lifestyles through the use of various modern amenities and by generating a variety of wastes. Accesses to such products are beyond the reach of the poor. In addition, he expressed that State Government of WB is well aware of the issue of degradation of EKW but at the same time economies of scale necessitate development of EKW as a part of overall development programmes from various agencies of the Government. Thus the institute is focusing on building awareness on value of wetlands, adverse affect of filling up of wetlands etc. He informed that post enactment of East Kolkata Management Act (EKMA) in 2008, there are hardly any incidences of wetland conversions. Regarding shifting of livelihoods he said every citizen has right to make their livelihood decision. Interview with him helped me to understand that conservation is costly for rural poor. Though awareness is going on for Vermi composting, use of organic fertilizers, these are not affordable for rural poor.

SEED, a local level NGO is working in the EKW area towards conservation of the wetlands. SEED took several initiatives to encourage the local habitant towards the conservation process. Formation of women's group for pisciculture and leasing out ponds to these groups, capacity building of these groups on breeding of fish, construction of Pen and Cage fishing, rain water harvesting are some of the initiatives taken by SEED. But the local people are not really interested because of low returns from these activities. Interview with Mr. Mrinal Kanti Bhattacharya, the Secretary of SEED helped me to realize that negligence of Panchayat and local block level administration and land reforms policy in WB are the key responsible factor for the degradation of EKW.

4.7 Concluding remarks

Interviews with Government officials and NGO people clearly indicate that there are no specific programmes either to preserve the wetland or to motivate

people for conservation. This clearly indicate the market failure of value analysis of EKW as argued in chapter 2. The above analysis clearly shows a trajectory of diversification of choice of livelihood strategies among the people living in the wetland area. The three villages considered for the study have more or less similar demographic features but there are differences in income level, choice of livelihood strategies, educational status and socio economic conditions of the households. In depth analysis to dig out the reasons behind these differences divulges the fact that the most motivating factor behind diversification of the livelihood strategies of rural poor is the dynamism of land price. The process of development increases the land prices and people are selling out their land for a lump sum gain against the land. Since rural marginal workers does not have specified land rights they are not been able to sell their vested lands otherwise there are no other motivations for these marginal workers to continue with wetland based livelihood strategies. The comparative analysis across households unveiled that households who have diversified their livelihood strategies from wetland to non wetland based have higher average income though unequal income distribution has also been observed among the three villages. These households are better off in terms of having modern consumer durables like; mobile phones, bike, cooking gas, refrigerator etc. Percentage of child enrolment is also high in these households which indicate that these households have better access to school as compared to households who do not diversified their livelihood strategies. The comparative analysis revealed that incidences of child drop out are lower in diversified households. Moreover, the diversified households have better facility of drinking waters and more access to electricity within household.

The most interesting result came out of this comparative analysis is the relationship between household choice of livelihood strategy and female of the household. More female members are found to be engaged with non wetland based livelihood in the households who diversified livelihood strategies. Now whether this engagement of female members in labour force should be considered as empowerment or as coping strategy to combat poverty is beyond the scope of this paper.

Thus it can be concluded that irrespective of household's decision on choice of livelihood strategies, diversified households have better socio economic conditions as compared to households who do not diversified. This comparative analysis is based on mean or average values, hence, it cannot be concluded whether this upliftmnet in socio-economic indicators leads to inclusive growth or not.

Chapter 5
Conclusions

The above analysis on the issue of the debate between conservation of environment and economic development reveals some crucial points for consideration, fundamentally arguing to look into the debate beyond loss of environment and interms of livelihood perspective of the marginal poor, who depend on natural resources. The shrinking of EKW can be seen as a process of environmental degradation that lowers the potential of production and integration of rural poor into urban economy through diversification of livelihood strategies.

From the above analysis it is clear that people living in the wetland area and dependent on wetland for livelihood are now depending more on non wetland based livelihood activities and wetland becomes secondary source of income or subsistence income. The marginal people living in the wetland area or the direct users of EKW are effectively playing no role on the conversions of the wetland. They either do not have proper land rights or any role to prevent the loss of wetland. Rather, they have to struggle to integrate themselves into urban economy through the diversification of their livelihood strategy. The comparative study across three villages and across households within the villages, located in the EKW area showed that the diversified households are better off in terms of income, and other socio-economic indicators. The comparative analysis revealed that average income and per capita income are higher in those households who depend on non wetland based livelihood. Holding of modern consumer durables like; cooking gas, mobile phone, refrigerator, facility of drinking water and access to electricity are higher in these households. Educational status is also better in these households. So it can be concluded that the process of development in the EKW have uplifted the socio economic conditions of the direct users of the wetland. Despite of the fact that conversions in EKW area provides with high income but the issue of concern remains whether this upliftmnet leads to inclusive growth or not since, high income inequality has been observed in the distribution of income of the three villages. Welfare is a combination of growth (measured in terms of average income) and income inequality. Since, income inequality also exists among the household who have diversified, welfare depends on the relative strength of the two factors. In addition, there are instances of engagement of female members into unskilled labour force in these household. According to the analysis in chapter 4, it can be inferred that though diversification of livelihood lead to better socio-economic conditions, there may be uneven integration of rural poor into urban economy. The higher engagement of female members into labour force can be considered as a coping strategy of the household where male members have failed to integrate themselves into urban economy and to combat sudden exposure to poverty because of the diversification of livelihood strategies of the household. This pseudo upliftmnet of socio economic conditions of the household supports the assumption of 'infinite capacity of women to absorb the shock of adjustment through more work and making do with limited resources' (Dian Elson).

Interviews with the Government officials reflect that there are no Government level interventions to support or encourage wetland based livelihoods. According to MDG Goal 7[21] target 9[22] the principles of sustainable development should be integrated into country policies and programmes and Government should take initiative to reverse the loss of environmental resources. The states that do the most to protect their environment also have the strongest economies. (Feiock and Stream 2001). But in the context of EKW, Government have no specific policy either to encourage people towards conservation of wetlands or to protect the wetlands from being converted for economic development. It seems that the conservation of the EKW become solely dependent on the direct users of the wetland area, who indirectly preserve the wetland through their livelihood activities. But the market return from these wetland based livelihood activities are very low, and in addition, the poverty level of these people does not give them enough incentive to take care of the social returns from the wetland and continue with the wetland based livelihood activities. As a result, despite of being a site of international importance EKW is now under immense threat and conversions are still vigorous in the wetlands area.

This descriptive research describes the characteristics of the debate between conservation of environment and the economic development around the wetlands interms of diversification in the pattern of livelihood of the people and integration of them into urban economy. Furthermore, this descriptive research requires an exploratory research for better insights and comprehension of the issue and also to draw definitive conclusions.

Considering the case of Kheyadah village, compatibility of conservation of environment and simultaneously new livelihood opportunities through the economic development may provide with more sustainable results interms of livelihood of the people and also protect the natural resources. Referring the case of Kheyadah village it may be concluded that instead of trade-off between conservation of environment and economic development rather compatibility of the two which can help rural poor to came out of the poverty. But the Integrated Conservation and Development Projects (ICDPs) does not come out always as a successful means for the poor. There is plenty of evidence that it is the expectations and implementation that have been problematic, with design and implementation mistakes being repeated in apparent dis regard of experiences reported from the field. (Wells and McShane 2004). Further in depth research is required to analyze whether these ICDPs are applicable for EKW. Institutional reform of environmental policies provides the promise to overcome trade-offs between economic and environmental policy goals and de-

[21] MDG Goal 7 - Ensure environmental sustainability.

[22] To integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources.

serves much more attention from scholars of environmental policy and public administration. (Feiock and Stream 2001).

The study wind-up raising the issue of concern that, implication of the debate in EKW shows that economic development provided better socio-economic indicators and upliftmnet of the people living in the area. But this upliftmnet of rural poor occurs at the cost of degradation of environment which may harm the whole society in long-run. For rural marginal people, immediate concern is to meet their livelihood needs rather concerning for environment. It can be well called 'tragedy of commons'. Calculation of utility, the rational human being finds that cost of degradation of wetlands is much lower than the share of cost to preserve the wetland (Hardin 1998). Thus, if the wetland has to be preserved because of its international ecological importance, the society and Government should concern for it rather demanding from marginal rural poor to preserve environment at the cost of their quality of life.

Appendix 1

Figure A.1: Mouja wise area demarcation of EKW as per Ramsar designation

EAST KOLKATA WETLANDS

The East Kolkata Wetlands(EKW) has been delineated into 37 mouzas. The entire EKW has been divided in terms of following full and part mouzas. Certain strips are added to the boundaries of the EKW systems, so as to maintain the integrity of the whole system.

List of Mouzas involved in Ramsar Designated East Kolkata Wetland

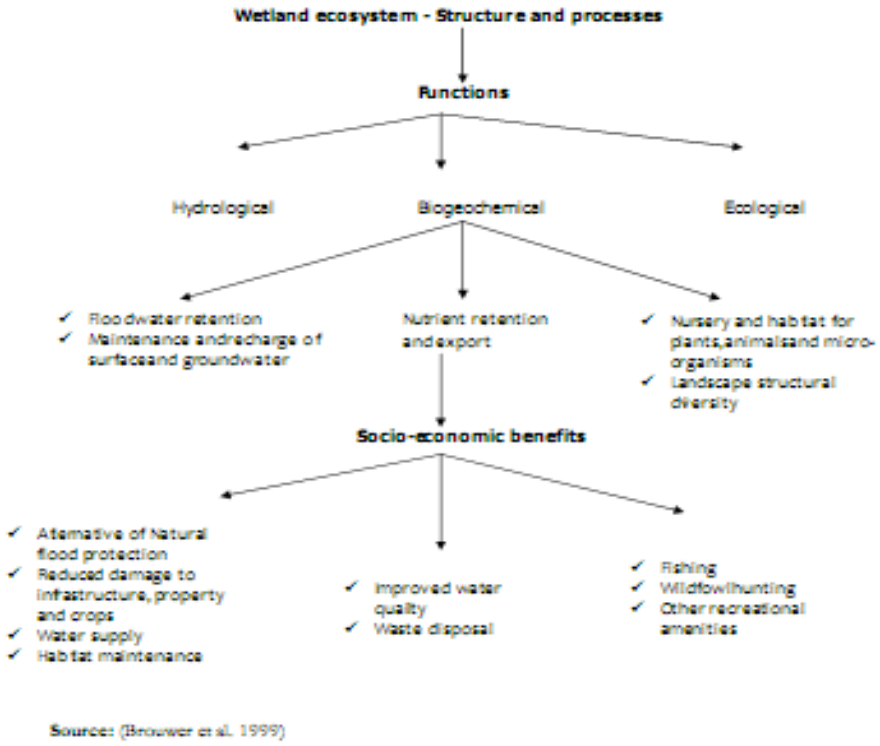
District	Police Station	Sl no.	Mouza	Jl No.	Status
South 24 Pgs	Tiljola	1.	Dhapa	2	Part
		2.	Chowbaga	3	Full
		3.	Bonchtala	4	Part
		4.	Dhalenda	8	Full
		5.	Paschim Chowbaga	9	Full
	Sonarpur	6.	Chak Kolar Khal	1	Full
		7.	Karimpur	2	Full
		8.	Jagatipota	3	Full
		9.	Mukundapur	4	Full
		10.	Atghara	5	Full
		11.	Ranabhutia	6	Full
		12.	Kantipota	7	Full
		13.	Bhagabanpur	8	Full
		14.	Kharki	9	Full
		15.	Deara	10	Full
		16.	Kheadaha	11	Full
		17.	Khodahati	12	Full
		18.	Goalpota	13	Full
		19.	Kumarpukuria	14	Full
		20.	Tardaha	15	Full
		21.	Tihuria	16	Full
		22.	Nayabad	17	Full
		23.	Samukpota	91	Full
		24.	Pratapnagar	92	Full
		25.	Garal	93	Full
	Kolkata Leather Complex	26.	Hatgachha	4	Full
		27.	Hadia	5	Full
		28.	Dharmatala Pachuria	6	Full
		29.	Kulberia	7	Full
		30.	Beonta	27	Full
		31.	Tardaha Kapashati	38	Full
North 24 Pgs	South Bidhan nagar	32.	Dhapa Manpur	1	Part

Added Mouzas

District	Police Station	Sl no.	Mouza	Jl No.	Status
South 24 Pgs	Purva Jadavpur	33.	Kalikapur	20	Part
	Kolkata Leather Complex	34.	Dakshin Dhapa Manpur	1	Full
		35.	Kochpukur	2	Part
	Tiljola	36.	Nonadanga	10	Part
North 24Pgs	Rajarhat	37.	Thakdari	19	Part

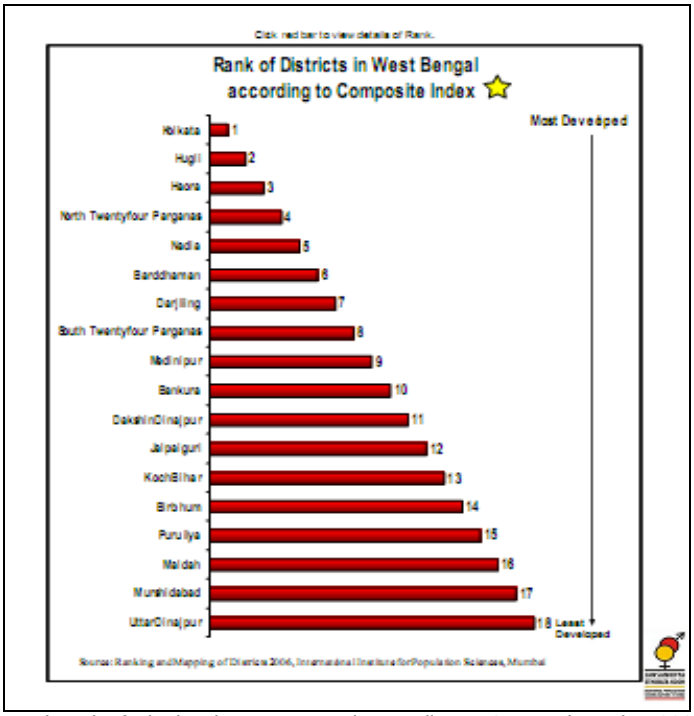
Entire East Kolkata Wetland area has been classified according to the four land use classes. These are Substantially Waterbody Oriented Area, Productive Farming Area, Agricultural Area and Rural/ Urban Settlement. To finalize the schedule ground truthing was done jointly by IWMED and DLRO.

Figure A.2: Function of wetland eco system



Source: (Brouwer et al. 1999)

Figure A.3: Rank of districts in WB



Source: ('Rank of Districts in West Bengal According to Composite Index' 2006)

Appendix 2

Table 4.1: Correlation coefficients

```
. corr time_nonwet tot_land age_hhh caste1 hhsize illeterate primary secondary noofyoungmembers1640yrs wage_nonwetday v
> ill2 vill3 male1
(obs=100)

             | time_n~t tot_land  age_hhh   caste1   hhsize illete~e  primary second~y noofyo~s wage_n~y    vill2
-------------+------------------------------------------------------------------------------------------------------
 time_nonwet |   1.0000
    tot_land |   0.0261   1.0000
     age_hhh |   0.1182   0.0902   1.0000
      caste1 |  -0.1618  -0.0486  -0.1622   1.0000
      hhsize |   0.1787   0.2043   0.2356   0.0490   1.0000
  illeterate |   0.3078   0.0951   0.3167  -0.3388   0.3172   1.0000
     primary |  -0.0606   0.1660   0.1714   0.0452   0.2172  -0.1759   1.0000
   secondary |  -0.0440   0.0117  -0.0103   0.1436   0.4126  -0.2113  -0.2057   1.0000
noofyoungm~s |   0.0437   0.0354  -0.0376  -0.0598   0.5668   0.1780  -0.0631   0.4212   1.0000
wage_nonwe~y |   0.5970  -0.0041   0.1713  -0.2140   0.1911   0.2157  -0.1152   0.1740   0.2202   1.0000
       vill2 |   0.4258  -0.1945  -0.0849   0.3321  -0.1928  -0.0640  -0.0911   0.0895  -0.2090   0.3202   1.0000
       vill3 |   0.3312   0.1370   0.1490  -0.7165   0.0919   0.4243   0.0650  -0.1436   0.1078   0.2771  -0.3321
       male1 |  -0.0628  -0.1089  -0.2334   0.2644  -0.0122  -0.1455  -0.0270   0.0254  -0.1258   0.0344   0.1629

             |   vill3    male1
-------------+---------------------
       vill3 |   1.0000
       male1 |  -0.1445   1.0000
```

Source: authors calculation based on field data collected through survey

Table 4.2: Tobit marginal effects of factors associated with household's decision on livelihood strategy

VARIABLES	OLS estimates	Tobit coefficients	Tobit marginal effects		
			$\Pr\ y_i > 0$	$E\ y_i / y_i > 0$	$E\ y_i$
Total land	-19.01 (14.17)	-53.95 (35.14)	-0.0463 (0.0317)	-39.02 (25.27)	-48.92 (31.71)
Age of the head of the household	-0.270 (1.332)	-0.386 (1.925)	-0.000331 (0.00166)	-0.279 (1.391)	-0.350 (1.745)
Household belongs to Schedule Caste	31.52 (52.61)	51.95 (79.98)	0.0500 (0.0864)	36.25 (53.74)	46.26 (69.76)
Size of the household	64.28*** (17.15)	88.22*** (23.68)	0.0757*** (0.0279)	63.81*** (17.25)	79.99*** (21.29)
Illiterate members in the household	-23.22 (20.22)	-34.84 (27.80)	-0.0299 (0.0242)	-25.20 (20.47)	-31.59 (25.39)
Primary level educated members in the household	-40.81 (25.49)	-57.38* (33.57)	-0.0493 (0.0321)	-41.51* (24.20)	-52.03* (30.32)
Secondary level educated members in the household	-49.90*** (16.92)	-73.31*** (25.71)	-0.0629** (0.0264)	-53.03*** (19.04)	-66.47*** (23.42)
No. of young members (16-40yrs) in the household	-18.14 (20.99)	-20.20 (30.13)	-0.0173 (0.0267)	-14.61 (21.62)	-18.31 (27.21)
Daily wage in non wetland livelihood	0.858*** (0.232)	1.202*** (0.317)	0.00103*** (0.000374)	0.869*** (0.220)	1.090*** (0.279)
Household located in Uchhepota village	247.8*** (50.56)	338.4*** (68.97)	0.231*** (0.0698)	263.3*** (57.42)	311.6*** (62.69)
Household located in Kheyadah village	261.1*** (57.72)	361.4*** (84.58)	0.155*** (0.0512)	307.1*** (77.62)	345.5*** (81.43)
Head of the household is male	-66.27* (35.20)	-93.47* (49.94)	-0.0696* (0.0379)	-70.39* (38.79)	-86.17* (46.41)
Cattle	4.95 (9.12)	4.97 (11.48)	0.0043 (0.010	3.58 (8.23)	4.49 (10.37)
Constant	46.76 (95.56)	-107.1 (150.2)			
Observations	100				
R-squared	0.624				
Robust standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

Source: authors calculation based on field data collected through survey
Standard errors are in parentheses

Table 4.12: OLS estimates of relationship between household's decision of choice of livelihood and female of the household

VARIABLES	time_f_nonwet
Percentage of income from wetland based livelihood	-0.758** (0.370)
Total land	-6.813 (10.80)
Age of the head of the household	0.0667 (1.082)
No. of meals per day	-38.30 (39.58)
Head of the household is male	33.72 (28.39)
Household belongs to Schedule Caste	-92.98*** (33.76)
Male head of the household diversified livelihood strategy	64.02** (31.08)
Head of the household is illiterate	84.75 (84.72)
Education of the head of the household – primary level	81.89 (86.11)
Education of the head of the household – secondary level	32.58 (90.09)
Daily wage in non wetland livelihood	0.0348 (0.181)
Household size	31.69*** (8.150)
Household have cattle	0.905 (8.175)
Constant	57.58 (151.3)
Observations	100
R-squared	0.412
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

Source: authors calculation based on field data collected through survey
Standard errors are in parentheses

Appendix 3

Chronology of EKW

1992: Court proceedings begin with the first writ petition By PUBLIC (People United for Better Living in Calcutta), a Kolkata based NGO and has led to repeated judgments prohibiting changes of land use in the Waste Recycling Region of the wetland area.

1995: PUBLIC had accused leading government officials of contempt of court, A criminal offence, for not having adequately safeguarded the wetlands, particularly with respect to the leather complex and several other minor encroachments.

1995: A report was prepared by the National Environmental Engineering Research Institute that detected that presence of chrome-based tanning among Kolkata tanners, with inappropriate wastewater drainage and collection systems, was causing serious environmental, health and hygiene problems.

1996: Supreme Court order directed these and other inner city tanners from Tiljala, Topsia and Pagla Danga districts to shut shop and relocate to the Bantala Leather Complex, 15 km away from Kolkata.

2002: EKW has been designated as a Ramsar Site

2004: The tanning association formed. The association of the tanners approached the state government to manage and operate the common effluent treatment plant.

2005 East Calcutta Wetland Management Act was formed. The act has the power to demarcate the boundaries of the wetlands as well as to take measures to stop, undo or prevent any unauthorized development project or illegal use of the wetlands.

2005: The management of the Tannery plant was transferred and it was with around 40 relocated tanners. The present charges are Rs 14 per kl of treated effluent.

2006: East Kolkata Wetlands Conservation and Management Bill, 2006, which aimed at including 12, 571 hectares of land into the East Kolkata Wetlands, was passed. Any illegal construction will be penalized up to 1lakh according to the bill. The state government decided not to dislocate 50,000 villagers who were already living in the five moujas that had been included in the wetlands. According to the bill all the pre existing constructions within the wetland had to be demolished.

2006: PUBLIC filed a petition alleging that KMC had selected an area for its water supply project at Bointala in Dhapa which fell under the purview of the

East Calcutta Wetland Management Act (2006).

2006: The tannery association emphasized that Dalmiya had failed to construct the common effluent treatment plant, as promised. "WWF, other environmental groups, MoEF protested the action.

2007: 433 of the 550 tanners have been allocated land at the Bantala Leather Complex and 125 tanners have already started operations.

2008: The state environment department is "in principle" against the Calcutta Municipal Corporation's (CMC) plan to set up a water treatment park on the EKW, where the high court has banned construction activities.

2008: An order was issued barring local authorities (municipal corporations, Panchayat, etc) from issuing licenses or sanctioning building plans for commercial activity without a clearance from the East Kolkata Wetland Management Authority (EKWMA).

2008: Kolkata High Court on Wednesday granted conditional approval to Kolkata Municipal Corporation (KMC) to set up a water treatment plant in the east Kolkata wetlands. While giving the nod, the division Bench imposed strict conditions, including compensatory greening, creation of water bodies, minimization of ecological damage and specifying the quality and nature of materials to be used. The court also appointed a three-member committee (comprising two former university vice-chancellors and a professor) to monitor and report on the KMC's compliance with the restrictions.

2009: The Supreme Court on Monday admitted the matter filed by Kolkata's non-government action group PUBLIC, objecting to Kolkata Municipal Corporation's plan to locate the facility of Rs 100-crore water treatment plant at Dhapa inside East Kolkata Wetlands, a Ramsar site. The state will have to respond at the next hearing on May 8.
Source – www.rainwaterharvesting.org, accessed on 4th September 2010.

Inland Fisheries Act

The West Bengal Inland Fisheries Act, 1984 (with amendment in 1985 and 1993) is directed towards proper use of water bodies (excluding the small ones). The Amendment Act of 1993 prohibits any conversion of water area into solid land for other use than fishery subject to certain conditions. Moreover the component authority may decide to take over the management and control of such water areas in cases of contravention of those conditions for a period not exceeding 25 years. The component authority may transfer the management and control of such water area to any person for proper utilization for pisciculture purposes for a period not exceeding 10 years. The co-share or co-owner of the water area shall be entitled to receive rent for taking over the management and control of such water area by the component authority. The Amendment Act also provides for penal action for any offence committed by contravening the provisions of this Act ('Inland Fisheries Act 1995 ').

Appendix 4

Profile of the key resource persons interviewed during the survey

Sl. No.	Name	Designation	Organization	Age	Sex	Place of interview
1	Arijit Banerjee, IFS	Director	Institute of Environmental Studies and Wetland Management, Department of Environment, Government of West Bengal	48	M	Institute of Environmental Studies and Wetland Management, Salt Lake, Kolkata, India
2	Bijon Mondol	Deputy Director	Department of Fisheries, Government of West Bengal	54	M	Office of Department of Fisheries, Esplanade, Kolkata, India
3	Bhabanada Chatterjee	Former Assistant Director	Department of Fisheries, Government of West Bengal	63	M	Kheyadah village, during a training session of fish breeding
4	Bikas Munda	Panchayat Pradhan	Kheyadah No. 1 Panchayat	36	M	Panchayat office, Kheyadah
5	Dipali Sapui	Panchayat Member	Kheyadah No. 1 Panchayat	35	F	Panchayat office, Kheyadah
6	Sukumar Biswas	Owner of Bherry		48	M	Bherry, Hatgacha
7	Nishith Sapui	Owner of Bherry		47	M	Verry, Hatgacha
8	Sailen Mondol	Local Political leader		60	M	Party office, Uchhepota
9	Samar Mondol	Union member, Bherry Labour Union		57	M	Verry, Hatgachia
10	Amal Majumder	Local Political leader		70	M	Person's residence, Anandapur
11	Mrinal Kanti Bhattacharya	Secretary	SEED	45	M	During field visits

Profile of the local informants interviewed during the survey

Sl. No.	Name	Age	Sex	Location of interview
1	Swapan Sapui	45	M	Hatgacha
2	Bholanath Malik	42	M	-do-
3	Abani Pramanik	44	M	-do-
4	Minu Mondal	32	F	-do-
5	Kashi Nath Mondal	45	M	-do-
6	Sundari Munda	40	F	-do-
7	Ashalata Mondal	30	F	-do-
8	Provash Mondal	24	M	-do-
9	Harani Mondal	39	F	-do-
10	Sankari Bar	35	F	Uchhepota village
11	Madhabi Bar	30	F	-do-
12	Gopal Bar	42	M	-do-
13	Asima Jele	45	F	-do-
14	Nitai Bar	50	M	-do-
15	Samir Mondal	33	M	-do-
16	Madhabi Gayen	60	F	-do-
17	Naresh Bar	30	M	-do-
18	Bishu Bar	23	M	-do-
19	Nimai Sapui	25	M	-do-
20	Kesab mondal	48	M	-do-

21	Biva Bar	47	F	-do-
22	Sulekha Bar	43	F	-do-
23	Soma Khan	30	F	-do-
24	Sonamoni Sapui	22	F	Kheyadah
25	Pritikana Munda	19	F	-do-
26	Saraswati Sardar	46	F	-do-
27	Mana Mondal	19	F	-do-
28	Rashi Munda	49	M	-do-
29	Satish Sardar	55	M	-do-
30	Mandira Sona	45	F	-do-
31	Usha Munda	24	F	-do-
32	Sunil Bijli	45	M	-do-

Name of the respondent has been changes in some cases to maintain confidentiality.

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