

Introduction

INTRODUCTION

Without self-understanding we cannot hope for enduring solutions to environmental problems, which are fundamentally human problems.

Yi-Fu Tuan, 1974

World societies are at present experiencing phenomenal social changes greatly owing to technological development and cultural upheavals. As prosperity grows and cultural taboos break down, millions of people in modern industrialized societies are left with several choices to increase their standard of living. Sociology is about trying to understand the social world, but it is also about trying to understand ourselves, and how societies make us who we are.

Human activity affects the functioning of ecosystem through the disruption of pattern, rate of matter and flow of energy through ecosystems. Extraction, transport and transformation of resources driven by societal and economic pressures change our landscape. These processes influence biodiversity, redefine the ecological state of ecosystems and impact both on society and the economy (Cornelia *et al.*, 2007).

The holistic nature of human ecology is the study of human social systems in relation to the total environment. Study of sociology can help us to understand how people are affected by the environmental factors, and how people's behaviour exerts an impact on the environment. Human ecology or social ecology is a branch of sociology which has been largely concerned with the environment of animal kingdom and plants. Park and Burgess were the pioneers in this field, whereas their student, McKenzie formulated its basic principles. Environmentalism emerged during the late

1960s and the early 1970s. Over the past three decades environmental sociology has developed a considerable breadth of approaches examining the factors underlying environmental degradation and, more recently social organizational arrangements promoting environmental improvement. Environmental sociology has to deal with the complicated interplay between a number of factors and functions at different system levels. At the root of human ecology lie two fundamental concerns: the concern for integrity of the ecosystems of the biosphere on which mankind's existence depends and the concern for the health and well being of the people (Shanthi and Gajendran, 2009).

There has been an observable increase in the desire of conservation biologists and ecologists for concepts such as biodiversity and ecosystem functions to be expressed as part of a mainstream economic philosophy of value (McCauley, 2006). Scientific research concerning the interrelationship between society and environment is rapidly evolving all over the world. The growing proliferation of contributions from the most diverse areas of specialization seems to confirm this impression, whereas environmental problems became important concerns, although restricted to certain groups.

Social impact is defined as the process of assessing the social consequences that are likely to arise after the project development with its policy and legislation. It also includes the cultural consequences to human populations of any private or public actions that alter the ways in which people live, work, play, relate to one another so as to organize to meet their needs and generally cope as members of society (Burdge and Vanclay, 1996). Carley and Bustelo (2000) stated that, a Socio-economic impact is regarded as an integral part of environmental impacts.

Ecosystem services support human economies and societies. They are usually irreplaceable, or can only be substituted for, at great cost. The savings achieved by protecting natural capital can provide convincing economy, in addition to the well-known environmental arguments, for sound environmental management. Human impacts on the environment have led to increasing diversity in the number and kinds of environmental problems and advantages existing in different parts of the countryside. It is increasingly recognized that research and policy for rural areas need to take into account the interactions of social, environmental and economic factors (Huby *et al.*, 2007).

Environmental sociology is normally defined as the sociological study of societal-environmental interactions, although this definition presents the insolvable problem of separating human cultures from the rest of the environment. Although the focus of the field is the relationship between society and environment in general, environmental sociologists usually place special emphasis on studying the social factors that cause environmental problems, impact of those problems on society, and efforts to solve the problems.

Environmental sociology is the study of the reciprocal interactions between the physical environment, social organization, and social behaviour. Environmental sociology explores the ways in which historical and contemporary patterns of human evolution have created ecological problems; why harmful effects of pollution often disproportionately affect disadvantaged groups; and which types of social movements have mobilized to protect ecosystems and communities from environmental degradation. A diversity of paradigms, themes and levels of analysis has characterized environmental sociology. However, despite this diversity, a minimal identity of the sub-discipline has been established through significant empirical research and a

theoretical contribution "self-consciously fashioned as a critique to 'mainstream' sociology" (Buttel, 1987).

Environmental sociology, as a scientific and academic production, emerged along with the social protest movements that arose in the early 1960s and the evidence of the emergency situation caused by the degradation of natural resources and industrial development. Environmental sociology assumes a significant position in studying the divergence and conflict about nature (understood here, in its broadest sense, as both the natural and constructed) and the causes and extent of environmental problems among the diverse actors involved (Buttel, 1987; Redclift and Woodgate, 1997; Catton and Dunlap, 1978).

This type of orientation developed, especially in the mid 1980s contributing to theoretical revitalization and to a greater projection within the discipline. This is motivated partly by the growth of environmental movements and the increasing concern for the global effects of environmental risks (Mol, 1993). Environmental sociology can help us to understand how people are affected by the environment, and how people's behavior makes an impact on the environment. Since the end of the 1970s, indigenous people's political actions and processes of constructing identity have been related to ecology, environmentalism and conservation, which coincide with the process of the internationalization of environmental law.

Giuliani (1998) points out that sociology is marked by a thinking that makes society independent from nature, a concept seen as a conquest of modernity, whereas Buttel (1992) points out the ambiguous relationship of sociology, in its developmental stage, with the natural sciences.

Environmental sociology analyses the influences of economic, political, technological, cultural and other forces and factors in men and their life. It also endeavors to examine the influence of biological and geographic factors in men also. The practice of social scientists began to change after the Second World War. Sociologists paved the way for others transforming political sociology and economic sociology, as early as in the 1950s, in important sub-groups within the discipline. The post war years integrated the social processes with political implication or intentions, pressure groups, protest movements, community organizations and the like and helped to introduce a new area called environmental sociology. This initiative to introduce environmental debate and the environmental dimension within sociology may have happened not only as a consequence of this process, but also as a response to the intensification of negative socio-environmental impacts due to economic expansion or to the explosive social reaction against the evidence of degradation.

As with other sub-disciplines, over the years environmental sociology has undergone fragmentations like sustainable agriculture (Beus and Dunlap, 1990), Energy and fuels (Rosa *et al.*, 1988), Environmental movements (Dunlap and Catton, 1979; Buttel, 1987), Hazards and risks (Dunlap and Catton, 1979, Rosa, 1998), Leisure/recreation (Dunlap and Catton, 1979), Natural resources, Social impact assessment (SIA) (Freudenburg, 1986) and sustainable development (McMichael, 1996).

Water is one of the most common elements, which is the most precious resource on earth without which there would be no life on earth. Pollution is a serious problem as almost 70% of India's surface water resources and a growing number of its groundwater reserves have been contaminated by biological, organic and inorganic pollutants (Claramma and Joseph, 2010).

Rivers are vital and vulnerable freshwater systems that are critical for the sustenance of all life. However, the declining quality of water in these systems threatens their sustainability and is therefore a cause for concern. Rivers are waterways of strategic importance across the world, providing main water resources for domestic, industrial, and agricultural purposes (Faith, 2006).

A multitude of human activities is usually connected with severe impacts on the environment which also includes human settlements (Decker *et al.*, 2002). The growth of human population over the last decades and their concentration in large cities (Montgomery, 2008) contribute to the deterioration of water quality due to intensifications in the industrial processes, domestic sewage discharge as well as agricultural chemicals and eroded soils (UNESCO, 2003). Urban populations have exploded worldwide over the last 50 years (Bloom *et al.*, 2008). Today about 50% of the global population are living in urban areas (Dye, 2008), placing one-third of their inhabitants into slums (UN-HABITAT, 2003), and creating huge challenges to their environment and sanitation (Cohen, 2008). In many countries, the rapid development in the last century was not equally followed by equivalent measures to protect the environment. Most cities on this planet are located close to rivers which serve as transport routes and water supplies (Paul and Meyer, 2001). Too often these rivers are also used as dump sites for waste water and sewage.

A population of thousands of millions is growing at 2.11% every year. Over 17 million people are added each year. It puts considerable pressure on its natural resources and reduces the gains of development. As the human population increases, there is a greater competition from domestic, agricultural and industrial users for freshwater supplies. The WHO estimated that over 40% of the worlds' population will live in areas where water is scarce in the next 50 years (WHO, 2006). Hence, the

greatest challenge before us is to limit the population growth. India has often been described a rich land with poor people, where poverty and environmental degradation have a nexus between them. A vast majority of people in India are directly depending on natural resources for their basic needs of food, fuel, shelter and fodder. Environment degradation has adversely affected the poor who depend upon the resources of their immediate surroundings. The population growth is essentially a function of poverty because, to the poor, every child is an economic asset.

Urbanization is a continuous process in developing countries like India and this has naturally led to aggregation of population. It is a complex phenomenon, associated with a large array of changes in environmental and lifestyle factors that have been implicated as causes of major non-communicable diseases (Yong-Guan Zhu *et al.*, 2001). Many studies have described apparent urban versus rural differences in disease incidences. Some epidemiological studies of chronic diseases show demographic differences in incidence; in particular, migrants to high-risk regions acquire a similar disease incidence profile to host populations, probably as a consequence of altered environmental influences and lifestyle factors (Yong-Guan Zhu *et al.*, 2001).

Urbanization and population growth have been common features of modern society. They naturally lead to the increase in the level of pollution of a particular area; Parajuli (2001) states that environmental pollution is a common feature of modern developing society. Gurung (2004) writes that the development of cities has always proved a mixed blessing. The cities on the one hand are mostly acknowledged as basic to an advanced society and civilization, which otherwise also invite innumerable complexities making the urban milieu, inhospitable to healthy and agreeable settlement.

However, it is unclear whether urban versus rural differences reflect: (1) causal associations with individual-level environmental and lifestyle exposures; (2) differences in community-level macro-environment exposures such as access to healthcare provision, education, housing, transportation, and communication; (3) confounding, diagnosis bias and measurement (primarily reporting) errors; or (4) (possibly) a combination of all of those.

With more than half of the world's population now urbanized, implementing appropriate policies to protect the environmental health of this expanding demographic composition, both at the individual and the community level, is important. The challenge is establishing actual risk factors and effective interventions rather than selectively reporting associations gleaned from comparisons of extreme groups and false positives (Yong-Guan Zhu *et al.*, 2001). Due to rapid industrial growth and increase in population in developing countries, people of such places are facing severe water scarcity. They are also suffering from many water borne diseases, because of the unavailability of treated drinking water (Velmurugan and Srithar, 2010).

Socio-economic status of a family would mean the ranking of the family in the milieu to which the family belongs, in respect of defined variables *viz.*, physical assets, economic status, education, occupation, social position, social participation, caste, muscle power, political influence, *etc.* Some elements of the above variables have a tendency to go together (Tiwari *et al.*, 2005). Economic status describes how individuals and communities make choices regarding scarce resources.

The duality of the human condition rests with cultural uniqueness and evolutionary traits. From one perspective, humans are embedded in the ecosphere and coevolved with other species. Humans share the same basic ecological dependencies

as other inhabitants of nature. From the other perspective, humans are distinguished from other species because of their innovative capacities, distinct cultures and varied institutions. Human creations have the power to manipulate independently, destroy, and transcend the limits of the natural environment (Buttel and Humphrey, 2002). The concept of sacred and nature have long been interlinked. Various cultural aspects such as religion, faith, traditions bring people closer to nature and the natural environment.

Socio-economic and environmental aspects of development are closely interrelated and interdependent, and should therefore be treated within a single framework (Vintar Mally, 2006). The processes of deepening of social and economic disparities on the one hand and of increasing environmental problems on the other, have characterized global and regional development patterns of the last decades. Accordingly, a comprehension is coming to the fore that it is possible to solve contradictions of socio-economic and environmental development only in a joint framework, such as a concept of sustainable development (Vintar Mally, 2007) as a new developmental paradigm for humankind.

The forest dependent people of India are raising their voice strongly against the loot of natural resources in the name of delivering development, saving the environment and combating climate change. They are bringing forth the issues of people's political economy of protection of natural resources and protection of livelihood the elite and capitalist interests on the natural resources. Environmental movements are networks of informal interactions that may include individuals and groups who have no organizational affiliation, organizations of varying degrees of formality (including even political parties, especially green parties) that are engaged in collective action motivated by shared identity or concern about environmental issues (Diani and Donati, 1999). In recent years, so may grass root environmental

movements launched against the developmental activities that have threatened the ecological balance. The other angles by which we look upon the cause of emergence of environmental movements are the socio-economic reasons. Most of the environmental movements in India are, in a way, related to this aspect. The location where these movements have started is dominated by tribal people. Those people have strong beliefs regarding their forests, land and water (Aviram Sharma, 2007). The new social movements are indicators of the pulse of the people that they are no longer ready to accept the developmental paradigms that keep them out and preclude their participation.

Environmental movements of various countries have made significant contribution to the development of ecosystems. They have emerged due to various reasons. In India it is basically due to prevailing environmental quality of the locality. The environmental movements in the north are basically related the issue of quality of life, whereas the environment movements in the south arise due to certain reasons, including the conflicts over control of natural resources. Environmental degradation is also an important cause which many time leads to environmental movement. One such example is the silent valley. Another example is the movement against the limestone quarrying in the Doon Valley in the late 1970s and early 1980s which arose due to the degradation of local environment. In this case, the retired officials and executives of the locality formed the 'friends of the Doon' and the 'Save Mussoorie' committees to safeguard the habitat of the valley. The environmental awareness is increased due to various reasons as a result of this, and people start protecting their environment. Some of them are the local movements to protect the purity of different rivers such as Ganga and Yamuna. The greening of many Indian cities also comes under this category, e.g. the Bhagidari movement of Delhi.

Community-based environmental movements usually emerge as the consequence of conflicts between state and capitalist interests, and local communities in order to use and control ecosystem resources (Kousis, 1997). These local environmental movements seek, among other things, to cure or to prevent environmental degradation and its impact on their communities (Gould *et al.*, 1993). The reasons and stimuli that define the emergence of these movements vary significantly from case to case, however, local mobilization usually is not developed only around environmental protection issues, but also around health, economic, political or social issues as well (Kousis, 1997).

Many developing countries are experiencing rapid industrial growth, which is leading to rising prosperity and better living conditions. At the same time, this growth has serious consequences to the environment. To fight against the consequences of environment particularly economic soundness is important because economic consideration is the main reason why there has been so much reluctance to take action against ecological changes, in both rich and poor countries. Environmental degradation and its social impacts have been understood at the global level in 1972 that manifesto of the international conference on climate change in Sweden declared that there is direct correlation between degradation of environment and increasing poverty.

Clean and adequate good quality water is one of the most crucial inputs for human survival and sustainable development, thereby necessitating its careful management and use. Increasing population, urbanization, and growing demand from agriculture and industry have brought the water resources under pressure. A direct relationship exists between water, sanitation, health, nutrition, and human wellbeing. Consumption of contaminated drinking water, improper disposal of human excreta,

lack of personal and food hygiene and improper disposal of solid and liquid waste have been the major causes of many diseases in developing countries like India (Benny George, 2009). Conservation of natural resources has held utmost importance for mankind's survival and sustenance. The protection of nature for religious purposes is an ancient practice that has recently gained attention in conservation literature.

Tourism industry in India has several positive and negative impacts on the economy and society: Generating income and employment, source of foreign exchange earnings, preservation of national heritage and environment, developing infrastructure, promoting peace and stability, undesirable social and cultural change, increase tension and hostility, creating a sense of antipathy, adverse effects on environment and ecology (depletion of natural resources, pollution, destruction and alteration of ecosystem) (Lalnunmawia, 2010).

Climate change, biodiversity loss, pollution of air, water and soil, and resource shortages are some of the environmental challenges of the 21st Century. India is rich in water resources, being endowed with a network of rivers and blessed with snow cover in the Himalayan range that can meet a variety of water requirements of the country. However, with the rapid increase in the population of the country and the need to meet the increasing demands of irrigation, human and industrial consumption, the available water resources in many parts of the country are getting depleted and the water quality has deteriorated. Most of the fast growing cities and urban centers were centered at the banks of rivers or streams (Shital, 2006; Ramakrishna and Babu, 2010).

Among the Indian rivers, Tamiraparani is the only perennial river flowing in the Southern Tamil Nadu. It originates from Pothigai hills at Tirunelveli district and empties itself at Thoothukudi district with the running distance of more than 125 kms.

It is the main source for both the district people for drinking, irrigation, industrial production, domestic use, and most importantly cleaning vehicle, animals and for various human activities. Due to higher sewage discharge, agricultural practices, domestic wastes, industrial effluents, urbanization and allied activities increases the pollution threat over the past decade (Murugesan *et al.*, 1994; Murugesan *et al.*, 2002; Murugesan *et al.*, 2002a; Murugesan *et al.*, 2004; Umamaheswari, 2004; Thillai arasu *et al.*, 2007; Hema and Muthalagi, 2009; Murugesan and Mophin kani, 2010; Jhon De Britto and Peter Baskaran, 2010; Chandrasekaran *et al.*, 2010). The ramification of pollution is indeed more severe in the developing countries (Joshi *et al.*, 2000; Karr, 1991; Adeyemo, 2003; Paul and Meyer, 2001).

One of the challenges in the twenty-first century is to supply safe drinking water. The demand for water is constantly on the rise. On the other hand, the quality of water resources, which are unevenly distributed over the earth's surface, is deteriorating due to the anthropogenic activities. Freshwater is a valuable resource with benefits extending beyond "just keeping us alive" by "quenching our thirst" (Syme, 2002). Agriculture, industry and the population at large are able to generate many different types of economic and social benefits from freshwater supplies (Roberts *et al.*, 2006). Water scarcity can impact society in different ways; for example, limiting both population and economic growth, impacting wildlife, reducing the potential for well-being from domestic gardening and home-grown food.

Environmental influences play a major role in determining health status of individuals. An ecological study is an epidemiological study in which the unit of analysis is population rather than an individual. Epidemiology is the study of the distribution of disease as well as its determinants and consequences in human populations (Bhopal, 2002). It is the science and practice which describes and

explains disease patterns in populations, and puts this knowledge to use to prevent and control disease and improve health. In other words, epidemiology is invariably defined as a population science. It is primarily concerned with reaching an understanding of disease through the comparison of pattern of disease in populations over time, between places and types of people.

Population epidemiology attempts to unravel causal mechanisms of disease with a view to prevention. Since most diseases are determined by multiple genetic and environmental factors, exposures to single risk factors are usually neither sufficient nor necessary causes of disease. Every eight seconds, a child dies out of water related diseases around the globe. In developing countries, 50% of people suffer from one or more water-related diseases; 80% of diseases are caused by contaminated water (Anumakonda, 2006). The population pattern of disease is not solely depending upon the characteristics of individuals but also on the interaction between individuals with each other and the environment in which they live. Distinctive population patterns of diseases arise from differences in the interaction of individuals in a social setting.

The swift move to urbanization following the industrial revolution, still continuing in the industrialized nations and accelerating in the developing ones, has exposed billions of people to new environments, disease agents, and different forms of human interaction. Migration and population mixing has a profound impact on the disease patterns of society (Bhopal, 2002).

As India's population has tripled since 1950, water demand has climbed to where it may now be double the sustainable yield of the country's aquatic resources. As a result, water tables are falling down all over the country and wells are running dry in thousands of villages. Tamil Nadu is one among the worst water-deficit states in India (Tamil Nadu Social Development Report, 2000). Due to uncontrolled

urbanization in India, environmental degradation has been occurring very rapidly and causing shortages of housing, worsening water quality, excessive air pollution, noise, dust and heat, and the problems of disposal of solid wastes and hazardous wastes (Sutapa and Praween, 2005). Indiscriminate sand mining from river beds has been playing havoc with rivers as well as structures like bridges and water table in the neighbouring areas considerably. Tamil Nadu is in the grip of water crisis, with demand far outstripping supply. As the economy of the state grows, this crisis is going to become ever more serious (Ramesh Bhatia *et al.*, 2006). The indiscriminate sand mining in Tamil Nadu has reached a critical level affecting even the ecological equilibrium (The Hindu, 2007). The pollution load on rivers has increased over the years due to rapid urbanization and industrialization. Urban water supply and sanitation are important basic needs for improving the quality of life and enhancement of productive efficiency of the people and its environmental management is one of the most pressing issues as the trend of urbanization continues globally.

Cities are very dynamic because people from rural areas or small cities migrate into cities with the hope of a better life. Many of them settle in undeveloped areas with insufficient sanitation standards, worsening the already existing problems. Usually the development of cities is hardly controlled and informal settlements within the city lacking any sanitation and clean water are the rule (Batty, 2008). Their waste is washed into nearby rivers which is the case in all developing countries. Due to the high demand for water in a city, the river water is often used repeatedly and fed into water works before it leaves the city (Varis, *et al.*, 2006).

Rivers are playing major task of an important water resource for our planet. Unfortunately, river is being polluted by indiscriminate disposal of sewerage, industrial waste and plethora of human activities, which affects its physicochemical

characteristics and microbiological quality (Koshy and Nayar, 1999). The lifeline of majority of population in cities, towns and villages are considered sacred. In the recent past, expanding human population, industrialization, intensive agricultural practices and discharges of massive quantity of wastewater into the river have resulted in deterioration of water quality. The impact of anthropogenic activities has been so extensive that the water bodies have lost their self-purification capacity to a large extent. Water is playing a significant role in the transmission of human disease and an indicator of microorganisms (Scott *et al.*, 2003).

Rural areas are highly diverse in terms of their physical environment, ecology and patterns of land use and in their socioeconomic characteristics. The natural environment with its numerous living and non-living resources is man's most precious heritage. Like other nations, India too bears the scars of damage done to its natural environment resulting in a wide array of environmental problems affecting the well-being of its citizens. Health is inextricably linked to environment and social conditions. Various incentives, regulations and other policy interventions intended to promote sustainability work through influencing human behaviour in various parts of the globe.

In South Asian countries such as Nepal, India and Bangladesh, pollution of rivers is more severe and critical near urban stretches due to huge amounts of pollution load discharged by urban activities. The Bagmati River in the Kathmandu, Yamuna River at Delhi, Buriganga River of Dhaka, Tamiraparani River and Ruva River, suffer from severe pollution. Water of river Hindon was found to be more polluted than river Narmada. The results of the study conducted by Karunanithi (1999) reveals that the pollution due to pilgrimage in river Tamirabarani is increasing. The pollution of Pamba River is due to the Sabarimala pilgrimage, free flow of

sewage, domestic waste and faecal matters into the river (Joseph and Claramma, 2010; Prakasan and Joseph, 2000).

The present study was conducted for the enumeration of socio-economic, socio-environmental, religious beliefs and ecological imbalances and its impacts on the livelihoods at the banks of river Tamiraparani and to justify the perennial river is at the edge of severe pollution due to high human interferences and anthropogenic activities. The present study contributes to this surging area of integrated literatures as well as the sociology of health by focusing on an often overlooked form of environmental degradation with potentially devastating human health and ecological consequences like river water pollution in Tamiraparani.