CHAPTER – III

RESEARCH DESIGN AND METHODOLOGY

"In practice we all start our own research from the work of our predecessors, that is, we hardly ever start from scratch. But, suppose we did start from scratch, what are the steps we should have to take? Obviously, in order to be able to posit to ourselves any problems at all, we should first have to visualize a distinct set of coherent phenomena as a worthwhile object of our analytic effort".

(Joseph Schumpeter 1954)

Research is a process of proper understanding and analysis of a problem aiming pragmatic and theoretical end with clear objectives. However, pre-analytic cognitive readings on related paradigms are inevitable to identify a research problem or scratch. The proposed study recognises that theoretical complexities of economics and its extended analytics to development issues and ecological problems are subject matter of Ecological Economics research. The analytical perplexities among the economic school of thoughts and the connectivity of nature to economy have been discussed among economists and ecologists having a long rooted history since the age of Physiocrats. Here, Physiocratic (rule of nature) economic analysis could be understood on the basis of a single physical factor: the productivity of nature.

3.1 TO THE BASICS

Economics is the science of means and ends with normative questions, where concerns of an economic nature are inextricably connected to those matters regarding the creation of good society (Aristotelian paradigm). This Aristotelian tradition is visible in Smith's theories that economics is intimately connecting with ethical and political problems. *This connection and tension regarding the concept of economics has been lost over the last 100 years. The economy has*

increasingly been understood as an end unto itself (Christensen 2003). The emergence of "Newtonian paradigm" as well as the industrial revolution diverted economics from restrictive and religious norms (value norms) followed by the legitimacy of new capitalist form of production. *The main problem in the industrialised part of world is no longer the abolition of general poverty and creation of further growth ; rather, it has become a matter of transforming the growth in a more distributive and ecological manner, making it more socially and ecologically sustainable at both the national and international levels* (Christensen 2003). Therefore, the integration of economy and ecology - both in theory and practice as well as political discussions is needed.

Economics is the science of "scarce resources"; resources are scarce relative to people's wants and it is recognised that the human economy has passed from an "empty world era" to current "full world era". While human-made capital was the limiting factor in the empty world era, natural capital has been become the limiting factor in the later era (Costanza 2001). The basic economic logic states that maximising the productivity of scarce resource as well as increasing its supply could create balance between means and end. "Increase in Supply" will decrease the stock of non-renewable resources; which creates further scarcity of resources. Moreover "productivity maximization" requires additional energy (throughput). Europe's economic growth in the 19th century depended heavily on coal as an energy source for industrialization. Thereafter oil displaced coal in the 20th century. 'Natural capital' viz. land, natural resources, are essential for economic growth and the politics of colonialism and the recent euro-centric politico-economic hegemony has to be understood on this ground. It is to be recognised that scarcity of resources - manmade and natural capital along with scarcity in energy supply – is making economic and environmental problems multifaceted. Presently, the human economy and natural economy are in chaos because of the scarcity of 'absorptive capacity of environment' to manage waste products of industrial development and a sophisticated lifestyle. "The neo-classical utopia"

(Cole, 1999) can neither take action to solve these scarcity issues nor able to address pursuing ecological problems.

According to Smith, economics is a science that relates to the laws of production, distribution and exchange. These economic activities focus on basic economic problems viz. what to produce, how to produce and for whom to produce putting unlimited wants, scarce resources and maximization of satisfaction as the foundation of economic life. The three economic activities – production, distribution and exchange – are interrelated and multidimensional in nature, and are "maximizing human pleasure" supported by "market mechanism". Since this renovated classical economics, 'value neutral' Newtonian positivism entered as a heterodox into the profession and systemised the pedagogy of economics which explicitly fortified theorization. This 'standardisation' and 'standard classification' tend to ignore the diversity that exists within the profession, and many new ideas that are being tried out. Standardised classifications, even though they emphasize a moderately narrow orthodox core of the profession, go against the conventional dynamic entity of economics that hold diverse set of ideas and multiple views (Colander et.al, 2003).

Economics is "the logic of rational action" as defined by Ludwig Von. Mises. Clearly, a rational individual plays a significant role in economic activities. Theories of consumers' behaviour and producers' behaviour analyse this 'rationality' under a standardised frame. In this analysis, a rational individual, either be a producer or a consumer, has identical objectives. A rational producer is concerned as to how to maximize production and profit as well as how to reduce production cost (efficiency); on the other hand, a rational consumer tries to maximise satisfaction or utility from a set of goods or services (Soderbaum, 2000). Here, producers' and consumers' behaviour is self-motivated. On this ground the role of 'neo-classical economics' (standard classified economic knowledge) and the

'heterodox modern economics' has been minimized as a problem-solving quantitative static tool to measure GDP, GNP, economic cycles, cost-benefit etc.

'Heterodox' economics of the present time- the environmental economics which has evolved over the past four decades - is an attempt to analyse environmental issues and significance of natural resources with their vast prospects and gravity, locally and globally. However, as stated by the Global Environment Outlook III, 2003, "*the world has made great studies in placing the environment on the agenda at various levels from international to local . . . the level of awareness and action has not been commensurate with the state of the global environment today; it continues to deteriorate".* The debates on growth and development on one side and population growth with dwindling supply of natural resources on the other, together with all kinds of environmental pollution (the negative externality or the co-product of industrialisation and growth) is making environmental economics chaotic and its paradigm, recede to static quantitative analysis (cost-benefit, environmental valuation etc.) incapable of addressing real ecological and development concerns in an integrative way. Environmental economics concerns 'environment' as a source of materials and energy and 'economy' as economic agents, institutions and market. Environment is a *supplier of resources* and a *sink* for waste products (Hanley et.al, 1997).

A question of concern that arises in the above frame work is - why does this newly evolved economics heterodoxy (or environmental economics) fall short of contemporary international socio-politico-ecological arena. The primary reason is that the *Neo-classicism* (foundation of environmental economics) *as an ideology can be exemplified by the reductionist tendencies to connect welfare with GDP per capita and with the view of individuals as maximizing utility or of organizations as firms maximizing monetary profits. Other views are thereby automatically played down or excluded* (Soderboum, 2000). Therefore, environmental economics focuses on pollution minimising programmes,

environmental valuation, new environmental taxes, pricing of environmental goods and services and management of environmental commons.

3.2 BASIC ECONOMIC MODELS

A basic building block of economic theory is the standard "circular flow" model of an economic system. As illustrated in Figure 3.1, this model shows exchange of goods, services, and factors of production between two types of economic actors, consumers (households) and producers (firms). However, the ecology and the natural resources, which make economic production possible, do not appear in the usual version of this model.

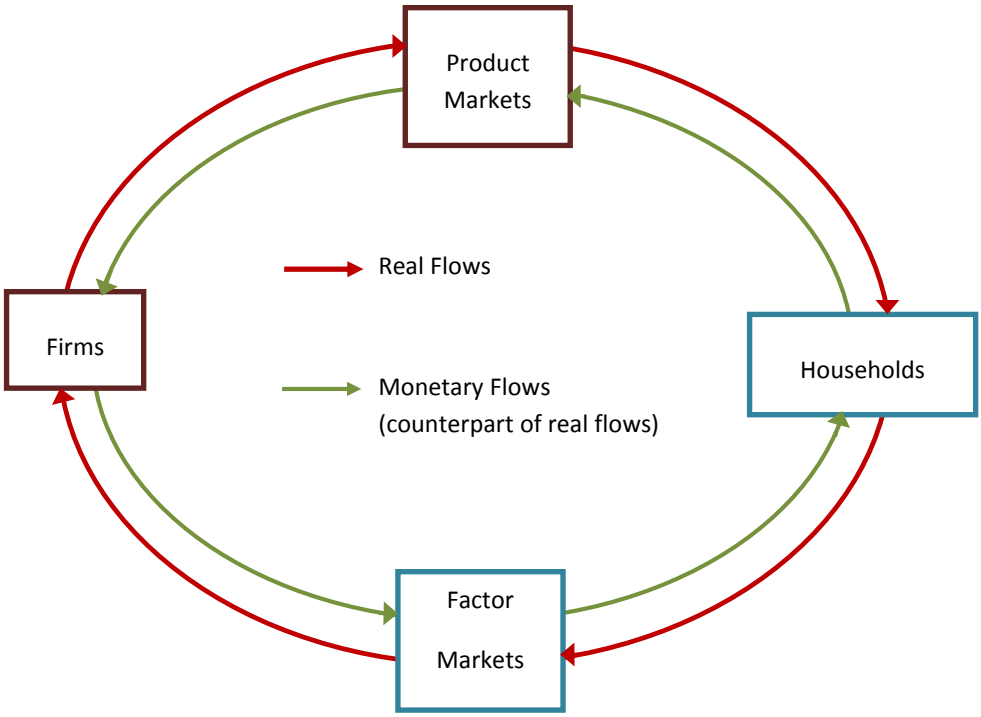

Fig. 3.1 The Standard Circular Flow Model

Since the beginning of economics, as pedagogy, natural resources, including minerals, water, fossil fuels, fisheries, agricultural land and forests have generally fallen under the inclusive category of “Land.” The two other major production factors, labour and capital, continually regenerate through the economic circular flow process. To regenerate natural resources for future economic activities, the

sphere of economic activity (the "economic sphere") is embedded in the biosphere and the previous graph needs to be replaced by a more complete one that represents the diverse flows of inputs and outputs between the biosphere and the economic sphere as well as within the economic sphere. This is shown in Figure 3.2.

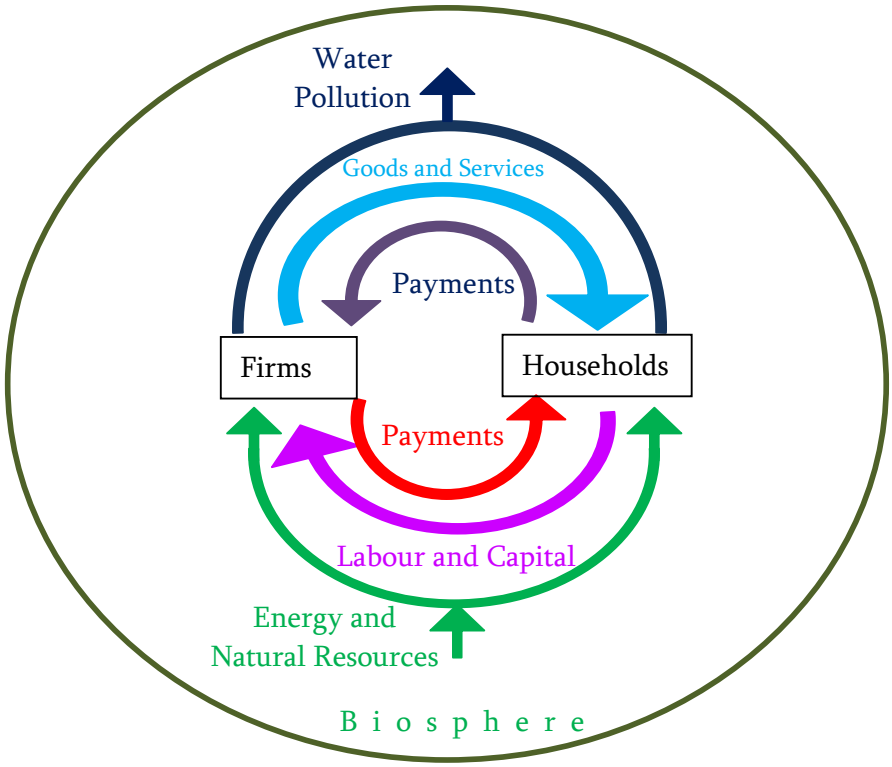

Fig. 3.2 The Circular Flow Linked to the Biosphere

(Adapted: Harris and Marie Codur- 2004)

The circular flow model depicted in Figure 3.2 is not wide-ranging and neglects the waste and pollution problems ascertained by the proponents of this model, "*some of the wastes and pollution rejected in the biosphere are naturally recycled through biological processes and geophysical processes. For instance, wetlands play an essential role in purifying polluted waters. A few of the wastes of the production process are also recycled through the industrial system itself (including some paper, glass, and metals) and re-injected again into the production process as raw material*" (Harris and Marie Codur 2004). Therefore, the new model of

"circular flows with energy and recycling" as depicted in Figure 3.3 recognizes that, the earth itself is not a closed system and exchanges flows of energy with outer space - the energy flows it receives from the sun and the flows it releases in space (heat loss).

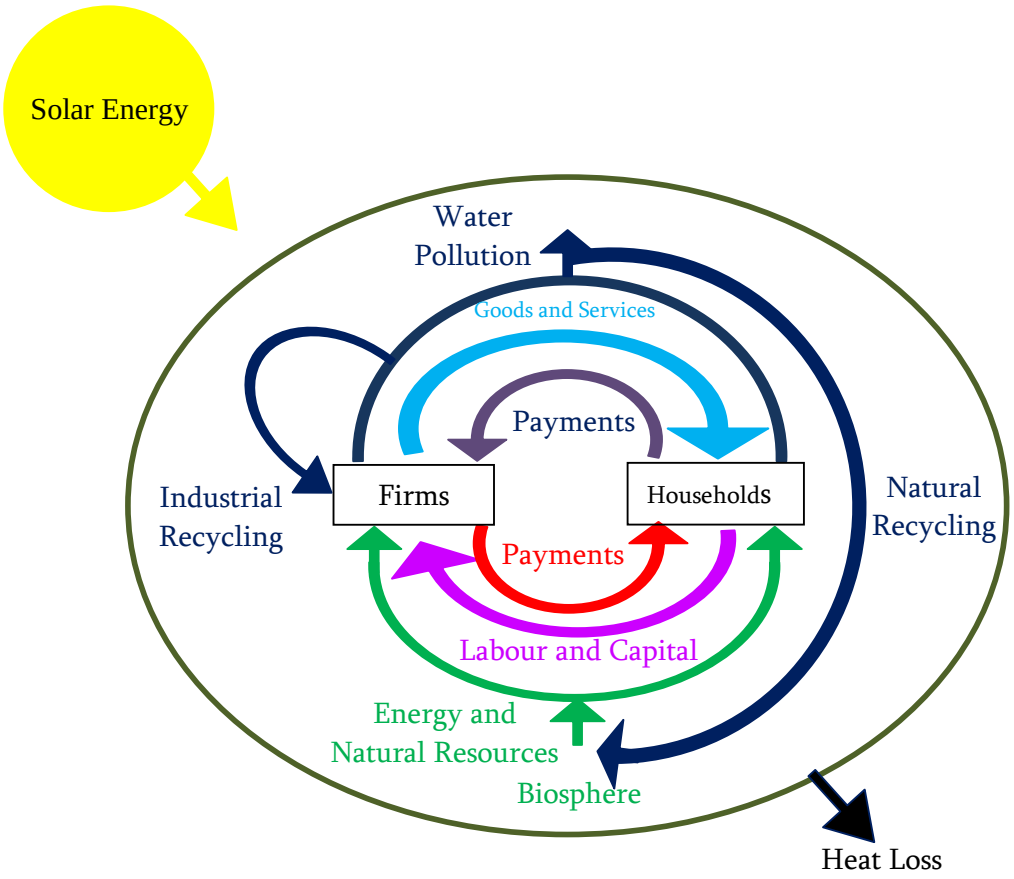

Fig. 3.3 Circular Flows with Energy and Recycling-
"Environmental Economics Model"

(Adapted: Harris and Marie Codur- 2004)

The standard circular flow diagram also omits the effects of waste and pollutants generated in the production process. The wastes from both firms and households must flow back into the biosphere, either through land disposal or as air and water pollution. In addition to the simple extraction of resources from the ecosystem and returning waste to it, economic activities also affect broader biosphere in more subtle and pervasive ways.

However, this model is incapable of handling interrelations of ecology and economy more constructively with cognitive insight. In relation to waste recycling and pollution minimizing issues, such an "environmental economics circular flow model" is more legitimate than other closed circular flow models. This model tries to address waste recycling and pollution problems by natural resource and environmental economic tools that are static such as the demand for non-market goods; environment valuation (stated preference, contingent valuation, cost- benefit analysis and hedonic pricing methods); new market practices (green labels, eco-friendly); new policy frames (polluter pay principles, externality analysis and pollution taxes) and new environmental regulations to reduce pollution and wastes.

3.3 TO ONTOLOGICAL CONSTRUCTS

The 'basics' and models pointed earlier, follow strict neo-classical static analytics and as such are inappropriate to address contemporary socio-economic issues, besides having an intergenerational intensity. Therefore, it is not possible to limit attention exclusively to positive economics but rather have a 'multi-dimensional construct'. This does not mean a 'paradigm shift' but rather a 'paradigm co-existence' that requires a trans-disciplinary research approach. The search for 'ontological constructs', therefore, re-examine the existing disciplinary (economic, social and ecological) tools and concepts through interdisciplinary studies that aim to develop a 'New Ecological Economics Model' (NEEM). The NEEM is based on five constructs viz. Philosophical, Ecological, Social, Economic and Institutional constructs, that have been explained more comprehensively in the fourth chapter (Environmental Domains and Economics). It is notable that the NEEM provides a multidimensional evaluation of an economic system with the help of grassroots level cultural, social, ethical and ecological pulses of a society, which are intangible in nature. So the NEEM is not a mathematical, econometrical or

quantitative model, although it accounts the socio-economic and ecological well-being qualitatively.

3.3.1 The Philosophical Construct

Basically, Economics and Ecology share a similar philosophy - "survival of the fittest" in general - although mainstream economists may deny this argument. Ecology works with the 'adaptive capacity' notion, while economic system can exclude one person from the market who has relatively less purchasing power. Meanwhile, "Economics is the logic of rational action" that places humankind over other beings and 'logic' or 'rational action' requires a newer dimension than what economists, particularly neo-classisists' and modern economists, imply. Particularly, zoo-centrism, eco-centrism or bio-centrism and deep ecology along with 'alternative economic paradigm' are applicable in the new philosophical construct, without undermining the place of human beings.

3.3.2 The Ecological Construct

Ecology is a self-evolving entity that extends adaptive and absorptive capabilities to the living beings and environmental domains. It is the sole entity that converts solar energy into other biotic products and re-uses and re-cycles wastes with symbiotic relationships. The ecological construct concerns ecology as a universal set and other entities as the sub-set of ecology. Ecosystem is the only system which follows the law of conservation of energy (the law of thermodynamics, "energy can neither be created nor destroyed; it can only be converted from one form to another").

3.3.3 The Social Construct

Society is the only system that can manage all members of the ecosystem with human logic and rational action. Self-interests, as central entity, will not promote well-being among individuals and societies globally. Humankind, who is ethically right, ecologically vigilant, socially conscious, ideologically straight and

psychologically passionate as well as harmonious among economic-ecological activities, and needs to be responsive to the prospects of intergenerational resource distribution. Man should neither be a free rider nor be a sheer exploiter of the ecosystem. Rather as governors of the ecosystem, human beings must maintain societal and ecological contact and social co-ordination among the present population, other beings and future generations.

3.3.4 The Economic Construct

Economics is the science of self; utility-maximising consumer, profit-maximising producer, wealth- increasing individual and growth-aiming nation states; where pedagogy itself is an end of human-centred logic and rational action. The new economic construct is an attempt to evaluate the ethical quality of economic activity in two ways: effects of economic activity on individual consumer, on society and on ecology and secondly, the nature of desire at the root of any economic action. In the case of pricing and valuation, the new construct takes commodities' ability to meet the need for well-being. Considerably, the new economic construct is a realization of true well-being and true consumption that does not harm oneself or others. In short, the new construct of economics is neither a production-based supply-push economics nor a consumption-based demand-pull economics; it is simply the right economics for right well-being guided by promised need-based consumption.

3.3.5 The Institutional Construct

Ecological succession is a product of institutional behaviour that starts from microbial bacteria's institutional actions and progresses through the participation of complex organisms that are symbiotically organised for a common cause which is survival. Obviously, all living beings in the ecology are interrelated to each other, mutually or symbiotically. This can be called an institution since there is a shared common feature, common environment, growing and reproducing within the system. As a single being it is difficult to survive without sharing nature's

commons - water, air, soil and energy. The new institutional construct considers the whole ecosystem as an institution without undermining the functions and role of micro institutions like human being, vegetation, animals, birds, micro organisms, marine species, earth-worms, reptiles and abiotic substance; and positively looks for a harmonious existence among all institutions with their capability to regenerate and restore the ecological functions.

3.4 NATURE OF NEEM

The NEEM helps to analyse the present economic system on the basis of ontological constructs initiated from the limitations or scratches of conventional models. Thus, the components of the model contain a wide-ranging meaning absorbed from the new philosophical and economic constructs. The model has six frames viz. ecology or biosphere, natural capital, social capital, human capital, man-made capital and right economic action frames. The model begins with the differentiation of ecology and natural capital, which conventional models have used interchangeably. While the term capital implies tangibility of resources, some ecological services and amenities cannot be quantified tangibly. Every frame of this model operates with an ecological consciousness that emerges from an ontological construct of synthesis focusing on right well-being and right economic actions. Here, the whole economic system lying within the natural capital frame enjoys unpaid ecological services and amenities supplied by abiotic ecological domains originating from the ecological frame.

3.5 OPERATIONAL METHODOLOGY OF THE STUDY

The thesis begins with real scratches of economic theories and recognises its incapability to address ecological and development issues. The study tries to put forward some new constructs and proposes a 'model' called NEEM with the expectation that fundamental ecological-economic issues can be addressed by the NEEM. The purpose of the study becomes more detailed as it progresses development of theory, theory testing, generalisation, understanding, explanation,

decision support and communication. The study goes through interdisciplinary methods and trans-disciplinary concepts with deductive and inductive reasoning.

3.5.1 Why Deduction and Induction

Two broad methods, often referred to in logical reasoning are deductive and inductive approaches. Deductive reasoning works from the more general to the more specific and is called a 'top-down' approach. The thought process begins with a theory that possibly relates to the researcher's topic of interest. Then it narrows down into more specific hypotheses and testing, further down to the collection of observations that address the hypotheses and confirm(or reject) them. Inductive reasoning works the other way, moving from specific observations to broader generalizations and theories also called a 'bottom-up' approach (Rothchild 2006). The following flow chart (Figure 3.4) provides a clear understanding on deductive and inductive reasoning.

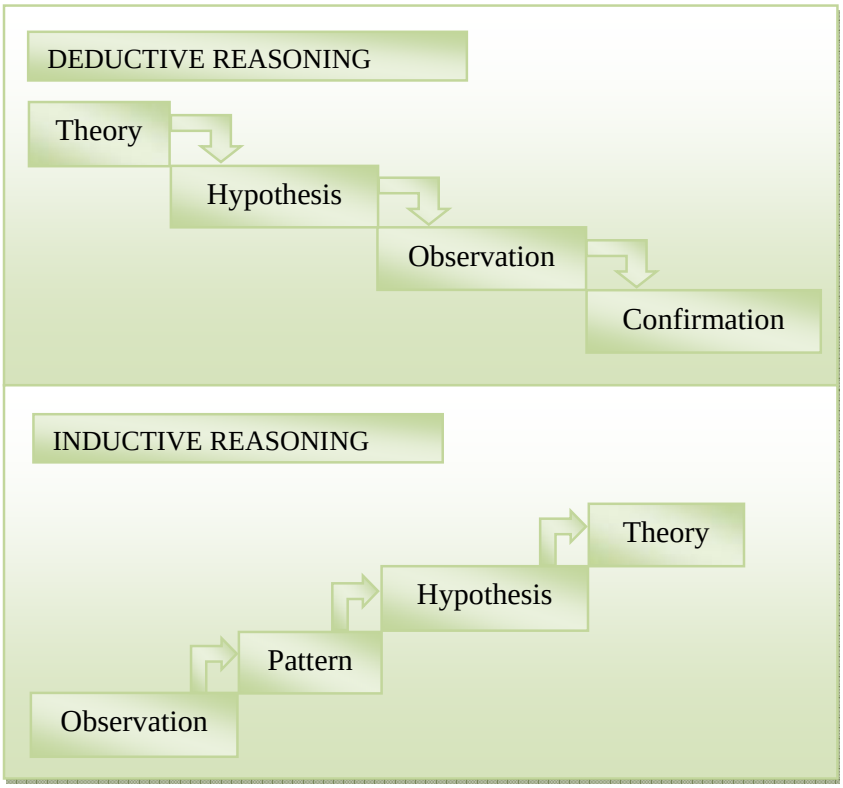

Fig. 3.4 Deductive and Inductive Reasoning Process Chart

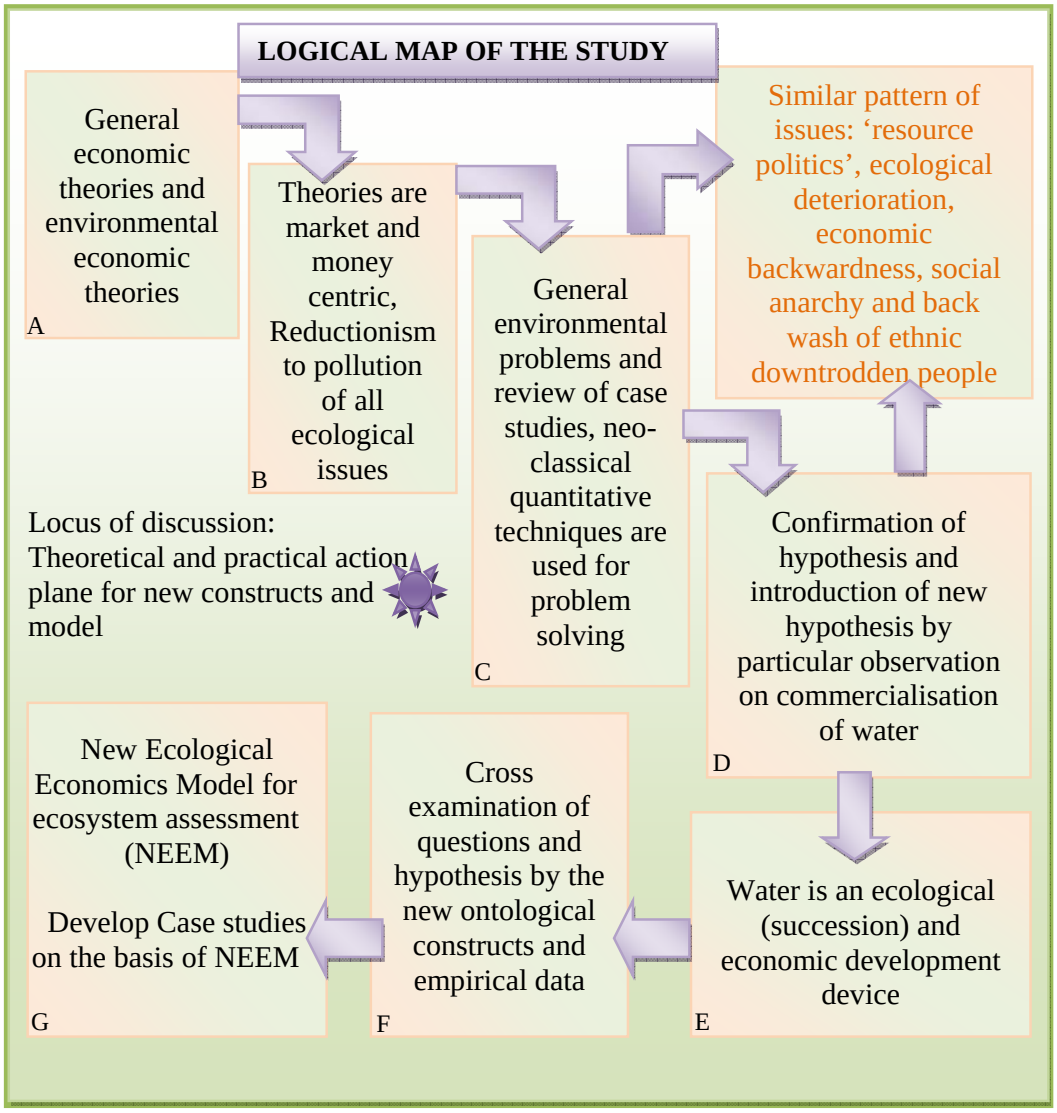

Fig. 3.5 Logical Map of the Study

The present study starts from the critical analysis of the general theories of economics in general and environmental economics concepts in particular and develops the hypothesis that monetisation of all beings, together with their positive relation to the ecosystem and market-centric explanations of externalities are the core of economic analysis. Other normative questions are excluded or diluted from the central concerns of economics. The observed environmental issues strengthen the hypothesis and it is found that all issues moderate to environmental pollution problems, and are solved by the neo-classical quantitative techniques. The available environmental economic case studies and international

policy frameworks confirm that the hypothesis is clear and valid. Nevertheless, in the proposed study, deductive conclusion doesn't serve the functions of the new paradigm. Thus, inductive reasoning becomes inevitable with empirical observations.

The general observation on environmental issues follows a pattern, evidently overlapping with international or national 'resource politics', ecological deterioration, economic backwardness, social anarchy and back wash of ethnic and downtrodden people. The proposed study develops a case study by particular observation on "commercialisation of water", which holds the similar pattern of environmental issues and consequences as well as being more visible and universal than other ecological issues. The study poses a number of wide ranging questions followed by the hypothesis that "water is an ecological (succession) and economic development device". These questions and hypothesis are cross examined by the new ontological constructs and empirical data. A blend of deductive-inductive reasoning process (Figure 3.5) is employed in the study and concludes with an ecosystem assessment model called NEEM whereby the "commercialization of water" problem is addressed with an integrative perception/cognizance.

3.6 WATER AS AN EMPIRICAL DEVICE

The present study has chosen water as an empirical device to develop a new theoretical framework rather than case studies. The problems related to water are more severe and visible and have local and global political dimensions than other environmental domains such as air, soil and forests. It is not to undermine the role of other domains in ecosystem management. However, water related issues are more visible than air pollution, widespread than soil deterioration and direct means of income generation than forests. The world's thirst for water is likely to become the most pressing issue of the 21st century because of its dwindling supply and growing demand due the population growth and pollution. Therefore the linkages of water to ecosystem have to be understood as an ecological-economics

subject with a new vision that provides resolution in resource conflicts. To sharpen the insights and to handle the research process in a systematic way, the proposed study is limited to "commercialization of water", considered to be the gravest political and ecological issue in contemporary economic panorama. These issues are unsatisfactorily managed by neoclassical environmental economics.

3.7 THE WATER WISDOM

While a human being may survive without food for several days, water deprivation can kill a person within a matter of hours. Water is also a requirement for the most basic activities vital to sustaining human life, including agriculture, cooking, and sanitation. Yet while water sustains life, it can also bring death if contaminated. Some of the deadliest diseases, which kill millions around the world each year, are carried in unclean water. Access to adequate amounts of clean water, for both consumption and sanitation, is a prerequisite for a healthy life. The Universal Declaration of Human Rights declares: "all human beings have the right to life"; this includes the right to water.

Similar to the new ontological constructs, the study broadly works on three basic sustainable development pillars - social, ecological and economic- that concern water as a social good, an economic good and an ecological good. Rights on water- human and ecological, equity on water- intra-generational and intergenerational - equity between species, and protection and management of water with basic precautionary, ecological and economic principles hold greater attention in the proposed study. After all, ***rain does not fall on one roof alone*** (African Proverb) and no one can cease the rotational flow of water.

3.8 TOOLS AND METHODS

In general, the study employs a three-pronged research approach viz. case study methods, explorative research methods and descriptive method. The latter two methods support the former and also work independently for the conclusion of

theories mainly for clarity on issues occupying the central theme of the study. The study uses secondary data from reports and articles and adopts a historical analysis. The primary data are obtained through participatory research techniques, semi-structured interviews, focused group discussion, observations and conversation with people and interviews with selected experts.

3.8.1 Participatory Research techniques

Participatory research is known by many other names, including action research, collaborative inquiry, emancipatory research, action learning, and contextual action research, but all are variations on a theme. Put simply, Participatory Research (PR) is "learning by doing" - a group of people identifies a problem, make efforts to resolve it, see how successful their efforts were, and, if not satisfied, try again. Participatory research is commonly using in the fields of agricultural research, ecosystem management, forestry management, tribal development programmes, and watershed management by the support of stakeholder associations or groups.

"*What separates this type of research from general professional practices, consulting, or daily problem-solving is the emphasis on scientific study, which is to say the researcher studies the problem systematically and ensures the intervention is informed by theoretical considerations. Much of the researcher's time is spent on refining the methodological tools to suit the exigencies of the situation and on collecting, analyzing, and presenting data on an ongoing, cyclical basis*"(O'Brien 2001).

The present study applies such participatory research methods, fairly revised as per the research objectives and circumstances. The study focuses mainly on two case studies viz. Plachimada water commercialisation problem and Attappady Wastelands Comprehensive Environmental Conservation Project (AWCECOP). Both case studies differ in their operational objectives: while the former focuses on

the ground water exploitation and commercialization and aftermath socio-economic-ecological problems, the latter case study- AWCECOP- takes into consideration ecological re-restoration and socio-economic well-being with the community development programmes where water re-charging activities play an important role. Barring geographical differences, the socio-economic conditions of the people are same in both case study areas. Therefore, the study employs separate tool kits for each case study even if they are fundamentally same.

3.8.2 General Steps

Collection of available resources: Collection of all relevant information should be the first step in any research process because it saves time and duplication of effort, and because it prepares the researcher for interactions with the community. Existing environmental data, ecological and geographical maps, as well as social or anthropological studies are particularly helpful (Guarino, Rao, and Reid, 1995).

Sampling: An important initial consideration for the collection of socio-cultural data is the level of aggregation and the units of analysis to be used. While the "household" is often used as a key point of reference, the definition of household varies according to cultural context. In order to use the household as a basic unit of research, it is necessary to clearly define what is meant by a "household" in a particular community, and to analyse it as both a productive and social unit. Using the "household" as a unit of analysis may hide disparities of knowledge, experience, and power among individuals. At the same time, focusing on individuals alone diminishes the important social and cultural dynamics that take place between household members. Selection of households for more detailed data collection may take place on either a random or a directed basis (Davis-Case,1990). This study uses random sampling.

Participant Observation: Participant observation is a classical anthropological tool which has been used to gain baseline information about human communities,

behavioural or management patterns, as well as social structures and human interactions. This information can be used to develop a sampling strategy for more in-depth research or to support other types of data.

Participatory Rural Appraisal: This is an intensive, iterative, and expeditious form of research, which relies on small multidisciplinary teams that employ a range of methods, tools and techniques specifically selected to enhance understanding of rural conditions by tapping the knowledge of local inhabitants. Its most outstanding characteristics are flexibility, minimal resource requirements, and the central role given to intensive dialogue, varied types of communication, and researcher-community cooperation in order to access community knowledge. A general understanding of community characteristics can help to guide the development of a sampling strategy for more further research, while more extensive community knowledge can be used to supplement other types of qualitative and quantitative data.

3.8.3 The Basic Tools-which Study Employed

Transect Walking: The purpose of transect walks is to provide a good representation of the social or biological variation within an area being studied, as well as to document as much information as possible from direct observation of the community and the local environment.

Community Mapping: Study of resource management requires knowledge of both the spatial distribution of resources and of how these resources are utilised. These exercises involve the community in mapping with the purpose of generating information about the local environment and social systems, gauging community perceptions of ownership, responsibility, physical or social boundaries, and clarifying relationships between environmental factors and agricultural activities.

Semi-structured Interview: Semi-structured interviews are interviews conducted with individuals or groups based around a particular issue. While an interviewer may have a checklist of information that they want to cover, interview questions are not rigidly structured and may be adapted according to the directions that responses take. In other words, the interaction is based upon open frameworks which allow for focused, conversational, two-way communication. This type of interview is useful because it allows researchers to obtain specific quantitative and qualitative information from a sample of the population, to probe for unknown information, and to get a broad range of insights.

Seasonal Calendars: Preparing seasonal calendars with communities which outline an entire agricultural season, the crop sequences grown, and associated tasks can supply information on environmental factors, as well as management decisions, value systems, and labour responsibilities.

Labour Calendars: A similar seasonal calendar tool, which focuses on the labour tasks performed throughout the agricultural season. This tool is especially useful for illustrating gender-differentiated responsibilities and management of crops.

Group Interviews: A group interview is a gathering of people with a facilitator for discussion of an issue. The meeting can involve a large number of people or a smaller number who focus on a specific problem or purpose. Semi-structured interviews are those in which there is a specific agenda to be discussed, but there remains a degree of flexibility. This ensures that the individuals discussing the issue are able to modify the direction of the interview according to the information that is revealed.

Focus Group Interview: Focus group meetings are made up of people with similar concerns, who can communicate comfortably with each other, and who share a common problem and purpose. Focus group meetings can be used as a tool to elicit

knowledge shared by a certain group which is not expressed in the context of a larger gathering. This information can be compared with that generated by the larger group.

Individual Interviews: These are interviews conducted with one informant in order to elicit the specific knowledge of the individual. Key informant interviews are interviews with individuals who are particularly knowledgeable about a particular issue, who are accessible, and who are willing to talk.

Questionnaires: Questionnaires are lists of questions designed to elicit specific information from individuals or from the primary research samples being studied within a community, e.g. households, groups working on the same agricultural plot etc. They are usually used with selected samples that have been chosen out of the entire population by means of a rough characterisation tool, such as focus groups. Questionnaires gather quantitative and/or qualitative information. While they may be in the form of a survey which the participant fills out, they are usually a series of questions delivered orally by a researcher who then records the individual responses. Data from questionnaires is pooled and may be analysed in order to obtain information and statistics related to specific issues.

3.9 DATA SOURCES

The present study not only uses case study methods but also employs explorative and historical methods to collect data from various sources such as books, pamphlets, periodicals, surveys, other case studies and electronic sources. Reports and scientific studies published by various NGOs viz. VAK, MAK and AHADS have been helpful for the purpose. Human Development Reports, World Water Reports, World Development Reports, Millennium Ecosystem Assessment Report, various government policy papers and statistical reports have contributed much data to the present study.

3.9.1 Techniques Adopted for Plachimada Case Study

The study is a descriptive one. The Perumatty Panchayat has been selected based on purposive sampling since it was subject to water exploitation by the Hindustan Coca-Cola Beverages Pvt. Ltd. Company that was established in the year 2000 March, which produced Coca–Cola, Fanta, Sprite, Limca, Kinely Soda, Maaza, ThumpsUp etc. This soft drink producing factory pumped out daily about 5.0 lakh litres of ground water from 6 bore wells and 2 dug wells, as per the information given by the Company. Since the production of soft drinks by the company, the water level in the wells of the surrounding colonies has shown a sharp depletion. The quality of the water–its odour, taste, hardness– has got worsened. It has become non–potable. The people of Plachimada have been forced to fetch water from a distance of three to five kilometres. Several uncommon diseases have erupted. The farmers around the plant have stopped cultivation due to severe shortage of water that has taken away their daily meagre earnings. Thus, the study adopted the following data collection techniques along with a questionnaire (see Appendix I).

1. **Participatory method is used**
    a. To understand the severe water-related social problems by conversations with the people who are victimized by the over exploitation of water by Coca-Cola Company.
    b. To understand the consequence of water scarcity on employment opportunities.
    c. To understand how far people have to travel for safe drinking water.
    d. To analyze their cultural sacrifice and entertainment loss due to the excessive exploitation of water.

2. **Semi-structured interviews with the farmers is used**
    a. To understand the agriculture pattern of the study area (before and after the exploitation of water by the Cola Plant).

b. To understand the productivity of agriculture in the area (before and after the exploitation of water by the Cola plant).
c. To analyze the socio-economic standards of the farmers (before and after the exploitation of water by the Cola plant).
d. To understand how much employment are they usually offered (before and after the exploitation of water by the Cola plant)

3. Observation and Conversations with the Women is adopted

a. To understand the health problems they are facing after the arrival of the plant.
b. To understand the financial constraints they are facing after the arrival of the plant.
c. To understand the food pattern and quality, which they are practicing after the arrival of the plant and subsequent water pollution.

4. Interview Methods is employed to elicit information from

a. Panchayat President to understand the local people's voice on natural resources.
b. Panchayat Secretary to understand the impact on the village by MNCs entrepreneurship.
c. Vilayody Venugopal, who is the Patron of the strike against Coca-Cola Plant, to understand the local resistance for survival of the people and nature.
d. Plachimada study forum Convener to understand the theoretical background for the local democracy and power over the local natural resources like water.
e. Scientists to analyze and understand the quality of water, nature of its pollution and the environmental cost imposed by the plant.

3.9.2 Techniques adopted for AWCECOP Case Study

Attappady Wastelands Comprehensive Environmental Conservation Project (AWCECOP) was inaugurated in 1996 and had the goals of ecological restoration of degraded waste land in Attappady and development of replicable models of participative eco-restoration, so as to prevent further degradation and promote sustainable method of livelihood among the local people in harmony with the resource base. The project runs on 745sq.km land that was declared as Tribal Block by the Government of Kerala. It achieved participatory eco-restoration whereby the process of empowerment of the poor, especially tribal women and a change in quality of life from total deprivation has been initiated. All these changes are occurring with the support of 146 micro watersheds put into action by the people themselves with the help of Attappady Hill Area Development Society (AHADS).

A participatory approach was used to study the well-being and links between water and ecosystem services. This Participatory approach was based on behavioural and epistemological principles shared by Participatory Rural Appraisal. The case study is developed with the systematic tools discussed earlier. Researcher participated and intervened in group-based discussions, community-based workshops of AHADS and interviewed User Association secretaries and AHADS volunteers to enrich the data base. Systematically designed questionnaire (see Appendix II) also helped the study to conduct semi-structured interviews in the field. Interviews of office staffs of AHADS and open-end discussions with agronomists and geologists are adopted to understand the scientific data and features of the case study area.

3.10 ECOLOGICAL CONCERNS

The ecological concern of the people is the metaphysical/philosophical theme of the study. To understand the ecological issues, economic behaviour and social harmony of the case study areas the study conducted an open-end discussion that focused on 10 themes (see Appendix III) viz. ecology, water, development, quality

of life, local ecology, agriculture, institutions or organizations, social life, ecological rights and self esteem; those synchronising a rural-agrarian individual to his/her ecology, society and polity for a sustained socio-economic-ecological future. The observed behavioural pattern, ideological insights and ecological knowledge of the individual rated on 5 point scale - money-centrism (1), ego-centrism (2), socio-centrism (3), eco-centrism (4) and radical socio-centrism (5). That helped the study to develop and analyse the Ecological Quotient (Ec. Q) of the individual and community.

3.11 LIMITATIONS OF THE STUDY

The study encountered many political persons and faced pressure group interventions at the time of data collection and the local people viewed the data collection process with a sceptical mind. Technically, participation research requires stakeholders group, which is a collective action of a group of researchers, experts and other technical assistants as participants in the research. The study overcame this problem with the help of Plachimada Study Forum along with Plachimada Samra Samithi regarding the issue of "commercialisation of water" as well as AHADS and KFRI in the AWCECOP case study. Ecological Economics is a recent development in the multidisciplinary research paradigm; therefore availability of theoretical discussions and case studies are limited. This limitation was overcome by intensive reading on the philosophies of ecology and economics theory and developing new constructs for research based on the conventional critiques of economics.

REFERENCES

Chambers, R. (1983). *Rural Development: Putting the Last First*, London: Longman.

Chambers, Robert (2004). *Ideas for Development: Reflecting Forwards*. IDS Working Paper 238. Institute Of Development Studies Brighton. Sussex. England

Christensen, Erik (2003). *The Paradigm of Ecological Economics- a Linguistic Rediscovery of the Aristotelian Concept of Economics*. Paper presented at 6th Nordic Conference on Environmental Social Science (NESS) June 12-14, 2003. Turku/Abo. Finland.

Colander, David; Ric Holt and Barkley Rosser (2003). *The Changing Phase of Mainstream Economics*. Discussuion Paper No.03- 27. Middlebury College Economics. Middlebury, Vermont. USA.

Cole, Ken (1999). *Economy-Environment-Development-Knowledge.* Routledge. London.

Costanza, R. (2001). *Visions, Values, Valuation, and the Need for an Ecological Economics*. Bio Science June 2001 Vol. 51 No.6: 459-468.

Davis-Case, D'Arcy (1990). *The Community's Toolbox: The Idea, Methods, and Tools for Participatory Assessment, Monitoring, and Evaluation in Community Forestry.* FAO Community Forestry Field Manual 2. Rome. Italy.

Guarino, L., Rao, V.R., Reid, R. (eds.) (1995). *Collecting Plant Genetic Diversity Technical Guidelines.* CAB International. Wallingford.

Hanley, N., Shogren, J. F., and White, B. (1997). *Environmental Economics in Theory and Practice*. Oxford University Press. New York.

Harris, Jonathan M. and Anne-Marie Codur (2004). *Macro Economics and the Environment*. GDAE Teaching Tools. Global Development and Environment Institute. Tufts University. USA.

O'Brien, R. (2001). "*An Overview of the Methodological Approach of Action Research".* In Roberto Richardson (Ed.). Theory and Practice of Action Research (English version). João Pessoa, Brazil Universidade Federal da Paraíba. online on Feb. 2, 2007 http://www.web.ca/~robrien/papers/arfinal.html.

Rothchild, Irving (2006). *Induction, Deduction and the Scientific Method: An Eclectic Overview of the Practice of Science*. The Society for the study of Reproduction. Inc. (SSR). Madison, Wisconsin. USA.

Schumpeter J. (1954). *History of Economic Analysis*. Allen & Unwin. London.

Soderbaum, Peter. (2000). *Ecological Economics- A Political Economics Approach to Environment and Development*. Earthscan Publications Ltd. London. UK.