Chapter–2

Social Ecology: Concept, Approach and Application

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"A human being is part of the whole, called by us, universe. We experience ourselves, our thoughts and feelings as something separate from the rest. A kind of optical delusion of consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest to us. Our task must be to free ourselves from the prison by widening our circle of compassion to embrace all living creatures and the whole of nature in its beauty. The true value of a human being is determined by the measure and the sense in which they have obtained liberation from the self. We shall require a substantially new manner of thinking if humanity is to survive". (**Albert Einstein)**

Social Ecology: General Concept

The concept of social ecology is interdisciplinary in nature. It draws evidence from various disciples in order to set up social, moral, philosophical, economic, ecological, environmental policies to identify and implement the principles, policies, and actions that are necessary to protect the environment and enable the survival of all ecological communities in the future. Nevertheless, 'Social Ecology' is best regarded a social science. Ecology is the methodical study of the relations of living beings with each other and their surroundings in the biosphere. Social Ecology analyses the impact of human actions upon the biosphere, and proffer descriptions about the relations between the environment, and all organic species, as well as make forecasts about the future scenarios. Social Ecology is reflexive and normative, offering prescriptions and manifestos about how humans ought to behave in relation to the environment, other species, and all extended ecological communities, to ensure their mutual co-existence. (Richards, K., 2008,) Kofi Anan in his Nobel Prize acceptance speech says, "*Social Ecology leads us to see that we are a global community, able to act and think locally and globally. Once I see that I am socially interdependent on everyone, and that I gain any freedoms in unison with others, then I can see the moral imperative to care and share for others. I must look after my 'sisters and brothers'. Once I give everybody else, 'value' and recognise that they are 'worthy', then I must look after them. I do not need any belief in a 'god' to give me the authority to care for others: only to believe in the value and worth of all others".*

This chapter envisages the viewpoints of several authors who have contributed significantly to the naive discipline of social ecology.

Aristotelian concept of '*eudaimonia*'

The concept of social ecology has recourse to the Aristotelian concept of eudaimonia. According to Aristotle, individuals who can comprehend their function and completely actualize their nature are capable of reaching eudaimonia (happiness or, the flourishing life). He views this as the action of one's soul or virtue. He further claims that eudaimonia is the ultimate good; human beings crave for a good and flourishing existence as an end in itself (Schyff, 2010). In his vision, the virtues of the good life go beyond any single set of norms or constructs. A contemporary

definition of social ecology recognizes it as the interactions within the social, institutional, and cultural contexts of people-environment relations that make up welfare. This approach takes on an unambiguously systemic approach in highlighting on the interdependencies of social systems. Hence, such an approach like this one, possibly lays that the underpinning reasons of ecological crises in social structures, or a political unrest may originate from environmental paucity, or numerous causal sequences may as well arise linking socio-economic status and health. Thus, it is imperative to look for methodological interventions in order to study the system behaviour and its complexity. (Schyff, 2010), in his article "The Ethical Experience of Nature: Aristotle and the Roots of Ecological Phenomenology" details the concept of *eudaimonia*.

Social ecology is a pragmatic idea wherein the laid up issues of the society like food insecurity, malnutrition, poverty and many others, would not rely on solutions given from uni-disciplinary study. It moreover, relies on multi-disciplinary research that deals the matter holistically. As a noted theorist said, "one must think relationally". Without pretending to be able to model systems comprehensively, one must respect the complexity of integrated systems, and this requires a multiplicity of perspectives even to study relatively bounded phenomena.

Prof. Alvin Goldman, an American professor of Philosophy and cognitive science, in his open e-book talks about the term social epistemology and its relationship with social ecology. He puts forth his view that individuals derive knowledge from others and learn how to interpret nature from individuals, groups, institutions, to the building blocks of social ecology and social freedom. Further, he adds on how social ecology is liaised with social epistemology saying that individuals are born with abilities, attributes, and aptitudes. Moreover, that we all have the ability to speak different languages but the exact language depends upon where, and to whom, we are born. Our abilities and skills are determined culturally and our freedom is in association with others, a social freedom. In his 1967 paper, "A Causal Theory of Knowing", Goldman proposed that knowledge amounts to true belief appropriately caused by the fact that makes it true. Later, he claimed knowledge amounts to true belief that is produced by a reliable process. He believed Social epistemology, with essentials like knowledge and truth as facts may possibly develop it as a science and a philosophy.

Roszak (1969) argues that the most important element while examining people's mindscape is their feel of the world around us in true sense. In deeper logic, it is important that people realize the reality and the taste that discriminates the subtle difference between knowledge and fantasy. **Pepper (1989)** holds similar beliefs saying that 'It is of prime significance for us to study the real and tangible physical environment, how different groups and individuals perceive that environment and the nature of the ecologically, socially and culturally based presuppositions which colour this perception, or as some express it, their cultural filter.' If people are to alter the ways in which they behave, they are going to have to alter the ways in which they conceive their culture and traditions, and their relationships with all others, not just their family. This means that we have to think and act local and global.

J. Kelvyn Richards (2008) has similar point of view to that of Goldman's. He further clarifies that Social ecology can be regarded as significant only if one considers that the facts of our social interactions, our experiences, experiments, and observations, provide us with knowledge, and lead us to truths, which guide our lives, actions, perspectives, and relations with other organisms that is, the analysis of facts and events leads us to identify truths.

Alan Drengson further suggests that "*individuals do not exist in isolation, but in relationships; and that individual existents are unique by virtue of the special set of relationships in which only they are*

*embedded. The world is therefore, seen in organismic terms rather than mechanical ones - in terms of interacting processes and fields rather than isolated things, and socially, in terms of an extended ecological community rather than in terms of essentially separate, competing individuals". (*Alan Drengson, Fox, 1995)* [Fox, Towards a Trans personal Ecology, 1995]. Social ecology is based on **realism** [that there is something outside the mind that causes mind to know objects]; **materialism** [the material world, that is outside of consciousness, is primary to thought]; **empiricism** [sense experience is the ultimate source of all concepts and knowledge]; **social dependence,** [resulting from interaction with others]; **social constructions** [the products of words and categories, languages devised by others]; and **social relativity** [that different communities give different significance to different objects]. Social Ecology has to be accepted as an expression of empiricism, realism, and materialism, is in opposition to the values of most peoples in the world, today. Social ecologists, on the other hand, belong to the school of 'empiricism' according to which sense experiences, based on facts, observations, investigations, experiments, evidence, are the ultimate source of all concepts and knowledge and truth.

Robert B. Talisse argues that social epistemologists are concerned to evaluate the social processes by which information is gathered and transferred, the social institutions responsible for disseminating knowledge, the reliability of accepted experts and epistemically esteemed institutions, the social norms governing dissent, and so on. The aim is to acknowledge and examine the ways in which social institutions and relations influence, constrain, and enable knowledge-seeking. The argument is a social epistemic one insofar as it emphasizes the moral and prudential risks to which we are all subject in virtue of the fact that each of us is profoundly and unavoidably dependent for true beliefs upon social institutions. That is, each of us is individually, epistemically, dependent upon others for many of our factual and normative beliefs. This dependency consists not only in the fact that many of our beliefs ultimately have their source in the testimony, experience, research, and expertise of others, but also that our epistemic habits are socially derived. Our epistemic habits include not only the ways in which we form, revise, and maintain our beliefs, but also how we select those to whom we show epistemic deference and the extent of that deference. The explanation of a social ecology has led us to explore the evidence and reformulate the basis of our relationships with each other, with nature, and the environment, and the universe, including genes, particles and waves. We have already seen how it is not possible for an individual human to exist or to know in isolation. A key institution for the acquisition of knowledge is the family. The newborn baby is able, naturally, to cry, hold, suckle, excrete, and sleep. S/he learns words, names, categories, constructs, concepts, the language of their cultural community, from their parents, siblings, friends, and relatives, over a long period of time. Individual organisms are dependent of all others. They exist as part of nature, a matrix of extended ecological communities. Humans are not to see themselves in competition with nature or the wilderness, but as part of nature. Individual genes, and the individual organisms that they create, are not only selfish, but also cooperative, altruistic, contributing to all ecological communities

Professor Bernard Lievegoed

Social ecology is a mode of participative thinking and social practice developed by Professor Bernard Lievegoed and his colleagues in the Dutch NPI centre from the 1950s [1]. In 1969, they published a seminal work on the organization as a living and developing organism going through 3 phases – the pioneer, differentiated and integrated – the last phase rarely reached.[2] The methodologies included the U-Process, later developed as U-Theory and Theory U. The NPI social ecology movement developed internationally into a variety of community development practices and formed social ecology associates in the USA, Europe, Brazil, South Africa and elsewhere.

Social ecology was also developed often by independent but related movements. Russell sees the roots of social ecology in the Hawkesbury Diploma in Rural Extension, first offered in 1970 in Australia.[3] As Russell also notes, Gregory Bateson [4] developed an important cybernetic "ecology of mind" that led in turn to the work of such figures as Varela and Luhmann. Many different conceptual approaches have also been realised with varied intentions, not always with reference to the founding ideas and methods.

Murray Bookchin

There is the important critical social theory founded by Green author and activist Murray Bookchin. Conceptualized as a critique of current social, political, and anti-ecological trends, it espouses a reconstructive, ecological, communitarian, and ethical approach to society. This version advocates a reconstructive and transformative outlook on social and environmental issues, and promotes a directly democratic, confederal politics. As a body of ideas, social ecology envisions a moral economy that moves beyond scarcity and hierarchy, toward a world that reharmonizes human communities with the natural world, while celebrating diversity, creativity and freedom. Bookchin suggests that the roots of current ecological and social problems can be traced to hierarchical (or more specifically kyriarchical) modes of social organization. Social ecologists claim that the systemic issue of hierarchy cannot be resisted by individual actions alone such as ethical consumerism but must be addressed by more nuanced ethical thinking and collective activity grounded in radically democratic ideals. The complexity of relationships between people and nature is emphasized, along with the importance of establishing more mutualistic social structures that take account of this.

In the words of Murray Bookchin

"The notion that man must dominate nature emerges directly from the domination of man by man… But it was not until organic community relations… dissolved into market relationships that the planet itself was reduced to a resource for exploitation . This centuries-long tendency finds its most exacerbating development in modern capitalism. Owing to its inherently competitive nature, bourgeois society not only pits humans against each other, it also pits the mass of humanity against the natural world. Just as men are converted into commodities, so every aspect of nature is converted into a commodity, a resource to be manufactured and merchandised wantonly." (Post Scarcity Anarchism 1971, p. 85).

Oelschlager (1990) confirms this view in his book, The Idea of Wilderness. He argues that the perception of 'wilderness' depends on the historical and cultural filters humans used in different periods. The modern historical lens obscures the idea of wilderness in ancient times: 'Through the lens of history, human experience takes place outside nature'. Nature is seen as a commodity. Other people are seen as commodities.

The calls for change lead us to review our assumptions, our perceptions, our cultural filters. According to David Pepper, such perceptions function as cultural filters, determining how we perceive the environment, and other people, now and in the past. For example, recent work, in 2008 by Mary Richardson of the University Laval,Quebec, Polycultures of the Mind, has shown how changes in cultural values, rather than directives or orders, lead farmers and consumers to be 'organic', and reject industrial farming.

It is important that we develop a ‘social ecology’, whereby we learn to exist in cooperation with each other, other species, and with the environment, and accept our interdependence and

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interconnectedness and work together for our mutual benefit by protecting each other and the environment in which we live ' as an extended ecological community'.

David Russell describes that roots of social ecology are embedded in the fertile soil that was the Hawkesbury Diploma in Rural Extension, first offered in 1970, at what was then known as Hawkesbury Agricultural College and now the University of Western Sydney. The program changed its title to Graduate Diploma in Extension in 1974, and again in 1982, to Graduate Diploma in Social Communication. During this period the key features of the program remained the same: it was always highly experiential; it overtly fostered the learner's growth in self esteem; and it espoused the goal of measuring learning against a yardstick of social relevance.

Gregory Bateson (1972), Anthony Wilden (1980) and Murray Bookchin (1982) described the co-evolution of any system and its environment. Not only do the players evolve; but so do the patterns of relationships that link them and so does the context in which these players act. Another connecting theme was the pursuit of an improved quality of relating - people to people and people to their natural environment. The term *social ecology* seemed to more appropriately signify this evolving understanding and so the formal, and presumably final, change was made in 1987. *Social ecology* is not a term in common use. It has been chosen to express an integrating and contextual focus. The use of the word *social* underlies the belief that it is people who make meaning. Meaning is not out there in nature, or in the events themselves that we participate in. Meaning is understood to be a social construction (cf. Berger & Luckman, 1966). *Ecology*, the second word in out title, conveys the community of living and non-living things, and all the intricacies of their coherence and change. Social ecology is then a way of integrating the practice of science, the use of technology, and the expression of human values. It draws from any 'body of knowledge' in its pursuit of designing activities that result in self-respecting, sensitive and social behaviours which show an awareness of social and ecological responsibilities. The context for action and the subsequent critical reflection on the consequences of those actions need to involve the actor's relationship with the physical environment, the cultural setting and its history, organisational aspects, and an understanding of the constraints and possibilities set by an individual's cognitive processes.

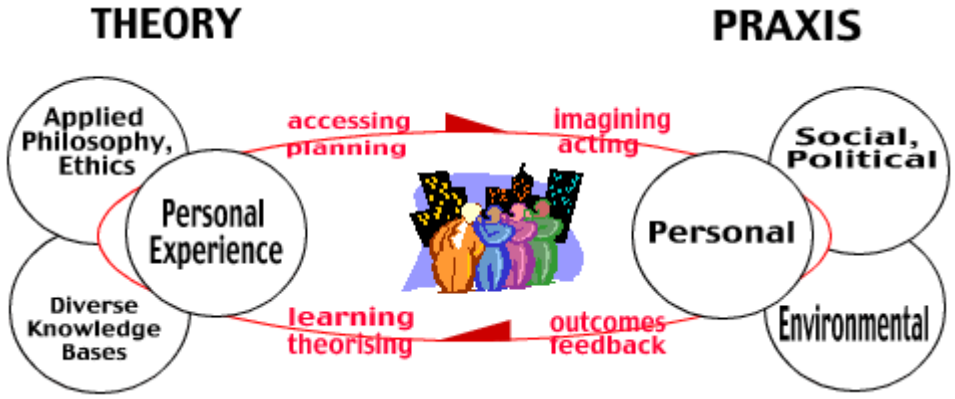
The commitment to the fundamental importance of one's day-to-day experience of living, as constituting the raw material for the educational process, has been consistent throughout the development of the various programs that function under the social ecology banner. One's acting in the world is seen to be the primary experience; how this experience is then interpreted and made sense of, flows from this essential experience as the actor reflects upon what has happened. While the act of reflection is not essential to the actual living in the world, it does represent the very heart of the educational process and, when linked with the world of experience, constitutes a very satisfying and stimulating endeavour. Social ecology is a label that emphasises relationships over events and discrete elements. It was chosen because we rejected the belief in an objective world 'out there', one that is proposed to exist independent of the act of the proposer.

Social ecology is built on the experiential foundation that an individual constructs the world in which she lives and we share the meaning of these constructions through the process of communication. The common ground which is the basis of our ability to communicate with one another, comes about through the use of the common process of perceiving and conceptualising. What we can't share is information about the world even if we frequently behave as if we could transfer knowledge willy-nilly from one to another.

The academic domains of self-directed and lifelong learning that have developed particularly since the 1960s have also played their part in shaping the practice of social ecology. The formative influences have been the writings of Carl Rogers (1969), Alan Tough (1968), Malcolm Knowles (1975), and David Boud (1981). The strengths and weaknesses inherent in a commitment to this movement, and which resonate with our experience over the past twenty years, have been detailed in Philip Candy's recent (1991) systematic synthesis of the field.

Professor Stuart B. Hill

According to Professor Stuart B. Hill , Social Ecology (SE) is an emerging meta-discipline that gives a urbane and critical framework for the making of holistic theory, deep understanding, and effective, responsible action. It derives its theory and direction from *applied philosophy* (critical reason, ethics, world-views, imagination), *personal experience* (postulation, action, reflection, contemplation) and *diverse sources and systems of disciplinary, cultural and contextual knowledge* (education, particularly ecological thinking, and spirituality).SE emphasizes actions and reflective practice that integrate personal, social, political and environmental concerns and possibilities. End goals include wellbeing and health, in the broadest sense, equity and social justice, and the fostering of mutuality and caring relationships, personal meaning, organizational learning, co-evolutionary change and ecological sustainability. These relationships are illustrated below.



Source: Hill, 2000.

Relationships between sources of theory and praxis in social ecology

At UWS-Hawkesbury, SE had its **origin** in the mid-1980s in social communication. It was initially located within the Faculty of Agriculture and Rural Development and was primarily concerned with adult education in applied social and community settings. The change of name to Social Ecology reflected a drive to bring ecological thinking and concern for the environment into the nexus of key relationships. The educational goals of SE are pursued within a **learning community** in which opportunities for both students and staff to learn from one another are facilitated and encouraged. This process of learning is alive, exciting and empowering for all concerned. The knowledge and theory generated and the actions taken are at the cutting edge of personal, social, political and environmental thinking.

Globally **the term social ecology** was first used in the mid-1960s by the United States anarchist, Murray Bookchin (1982) to characterise his particular critique of the centralised, hierarchical, naively simple, exclusionary and ecologically uninformed structures and processes that were (and still are)

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dominant in western society. Whereas Bookchin emphasised a philosophical analysis and was critical of deep ecology (Devall & Sessions 1985), SE at Hawkesbury had a more inclusive and practical approach. It drew its inspiration particularly from Carl Rogers (1969) conception of whole-person-learning, David Kolbs (1984) experiential education, Paolo Frieres (1972) view of education as liberation, Mary Belenky et als (1986) feminist perspectives, and Peter Reason and John Rowans (1981) participatory action research.

Subsequently, numerous other concepts have been incorporated. These include Gregory Batesons (1972) ecological or recursive epistemology, Peter Senges (1990) learning communities, Mary Clarks (1989) interdisciplinary approaches to global problems, Humberto Maturana and Francisco Varelas (1987) biologically-based constructivist mind, Peter Checkland and Jim Scholes (1990) soft systems methodology, Kurt Lewins (1935) force-field analysis and Fran Peaveys (1994) strategic questioning. Others are reflected in the selections included in the extensive collection of Readers that have been prepared for the subjects offered in social ecology by the academic staff.

Social ecology: Approaches

Qualitative studies

1. Typology – It is a categorization system, taken from patterns, themes, or other kinds of groups of data [John Lofland & Lyn Lofland]. The categories should be mutually exclusive and exhaustive if possible. For examples read John Lofland and Lyn Lofland's book on Analyzing social settings, 3rd edition.

2. Taxonomy – It is often used together with Domain analysis. The taxonomic analysis is a sophisticated typology with multiple levels of concepts. The higher levels are inclusive of lower levels. Super ordinate and sub-ordinate [James Spradley]. It is utilizing the relationships between symbols and referents to identify domains in a source(s). [Onwuegbuzie, 2012]

3. Constant Comparison/Grounded Theory - It is a widely used method developed in the late 60's. It is a systematic methodology in the social sciences involving the construction of theory through the analysis of data. (Martin et al.,1986; Faggiolani, 2011). Anselm L. Strauss (1987) in his work Qualitative analysis for social scientists highlights this method in details.

4. Analytic Induction – It is one of oldest methods. F. Znaniecki, Howard Becker, Jack Katz have worked on it. The process begins by developing a hypothetical statement of what happened in an event. Then look at another similar event and see if it fits the hypothesis. If it does not, revise hypothesis. Begin looking for exceptions to hypothesis, when find it, revise hypothesis to fit all examples encountered. Finally, there will be a hypothesis that will account for all observed cases [Jack Katz 1983].

5. Logical Analysis/Matrix Analysis - An outline of generalized causation, logical reasoning process. Use of flowcharts, diagrams, etc. to pictorially represent these, as well as written descriptions. Matthew Miles and Huberman (1994) give hundreds of varieties in their huge book Qualitative Data Analysis.

6. Quasi-statistics - Prominent quali-tative researchers such as Howard Becker and Martyn Hammersley have supported the inclusion of what Becker called "quasi-statistics": simple counts of things to make statements such as "some," "usually," and "most" more precise (Maxwell, 2010).

7. Event Analysis/Microanalysis (a lot like frame analysis, Erving Goffman, Frederick Erickson, Kurt Lewin, Edward Hall. Emphasis is on finding precise beginnings and endings of events by

finding specific boundaries and things that mark boundaries or events. Specifically oriented toward film and video. After that find boundaries and subsequently phases in event by repeated viewing.

8. Metaphorical Analysis (usually used in later stages of analysis) Michael Patton, Nick Smith Try on various metaphors and see how well they fit what is observed. Can also ask participant for metaphors and listen for spontaneous metaphors. "Hallway as a highway." Like highway in many ways: traffic, intersections, teachers as police, etc. Best to check validity of metaphor with participants - "member check".

9. Hermeneutical Analysis (hermeneutics = making sense of a written text) It does not look for objective meaning of text, but meaning of text for people in situation (Manen, 1990). This analysis tries to pull out the self and let the respondents respond. Make use of their words, less interpretive than other approaches. There are layers of interpretation of text. Knowledge is constructed from the meaning of text from background and current situation. Further there is the context - time and place of writing is taken care of in order to understand. Lawrence (2008) has described the Hermeneutical Analysis in details.

10. Discourse analysis (linguistic analysis of ongoing flow of communication) James Gee Usually use tapes so they can be played and replayed. Several people discussing, not individual person specifically. Find patterns of questions, who dominates time and how, other patterns of interaction.

11. Semiotics (science of signs and symbols, such as body language) Peter Manning (1987) describes how the meanings of signs and symbols are constructed where assuming the meaning is not inherent. Meaning comes from relationships with other things, sometimes presented with a postmodernist emphasis.

12. Content Analysis – Content analysis has been defined as a systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding (Berelson, 1952; GAO, 1996; Krippendorff, 1980; and Weber, 1990). Holsti (1969) offers a broad definition of content analysis as, "any technique for making inferences by objectively and systematically identifying specified characteristics of messages" (p. 14). Under Holsti's definition, the technique of content analysis is not restricted to the domain of textual analysis, but may be applied to other areas such as coding student drawings (Wheelock, Haney, & Bebell, 2000), or coding of actions observed in videotaped studies (Stigler, Gonzales, Kawanaka, Knoll, & Serrano, 1999). In order to allow for replication, however, the technique can only be applied to data that are durable in nature (Stemler, 2001)

13. Phenomenology/Heuristic Analysis. It lays stress on the effects of research experience on the researcher-personal experience of the research. It questions the researcher that how does this affect me as researcher. Much like hermeneutical analysis, but even more focused on the researcher's experience. Some use the term "phenomenology" to describe the researcher's experience and the idea that this is all research is or can ever be (see Lofland and Lofland, p. 14). Also, read Manen (1990) and Kleining (1995).

14. Narrative Analysis (study the individual's speech): **Narrative inquiry** or **narrative analysis** emerged as a discipline from within the broader field of qualitative research in the early 20th century Riessman (1993). Narrative inquiry uses field texts, such as stories, autobiography, journals, field notes, letters, conversations, interviews, family stories, photos (and other artifacts), and life experience, as the units of analysis to research and understand the way people create meaning in their lives as narratives Clandinin et al., (2000) .

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15. PRA: Social ecology studies can also be carried out by applying "Participatory rural appraisal analysis (PRA) Chambers (1997).

Quantitative studies

Data Analysis: Data analysis can be used to decipher the interaction between and amongst the various elements of social ecology. It uses sample information to explain/make abstraction of population "phenomena". Correlation, anova, manova , regression, econometric modelling etc. are some of the data analysis techniques.

Multivariate Analysis: It is based on the statistical principle of multivariate statistics which involves observation and analysis of more than one statistical outcome variable at a time. In design and analysis, the technique is used to perform trade studies across multiple dimensions while taking into account the effects of all variables on the responses of interest.

Artificial Neural Networks: They are a well-known nonparametric tool for pattern recognition, data mining, and the prediction of complex systems. Their strength lies in their ability to cope with nonlinear dependencies in data sets that other tools, e.g., multivariate linear regressions or principal component analysis, cannot (Shlens 2009; Frey et al., 2013). As described above, the relations of success factors in CPR settings are very likely to be nonlinear. Neural networks have already been successfully used in other fairly diverse areas.

Binder et al., 2013, suggested in his paper entitled "Comparison of Frameworks for Analyzing Social-ecological Systems" used several established frameworks for making comparison amongst them. According to him, conceptualization of the social system and its dynamics, conceptualization of the ecological system and its dynamics, conceptualization of the interaction between the social and ecological systems and its dynamics were some of the important criteria for framework comparison.

The several frameworks discussed in his work include, the Driver, Pressure, State, Impact, Response (DPSIR) framework (Eurostat 1999), the Ecosystem Services (ES) framework (Boumans etal. 2002, Limburg et al. 2002, de Groot et al. 2002),the Earth Systems Analysis (ESA; Schellnhuber 1998,1999, Schellnhuber et al. 2005),the Human-Environment System (HES) framework (Scholz and Binder 2003, 2004, Scholz et al. 2011a,b),the Material and Energy Flow Analysis (MEFA/MFA) framework (Ayres 1978, Baccini and Bader 1996, Haberlet al. 2004, Brunner and Rechberger 2005),the Management and Transition Framework (MTF; Pahl-Wostl 2009, Pahl-Wostl and Kranz 2010, Pahl-Wostl et al. 2010), the SES framework (SESF), pivotal in this Special Feature of Ecology and Society, (Ostrom 2007, 2009; M.McGinnis and E. Ostrom, unpublished manuscript), the Sustainable Livelihood Approach (SLA; Scoones1998, Ashley and Carney 1999), the Natural Step (TNS) framework (Burns 1999); and he Turner et al. (2003) Vulnerability framework(TVUL; Turner et al. 2003a).

Social network analysis has been used to understand how bridging organizations enable coordination among actors (Olsson et al. 2007), however, research is just beginning to explore how bridging organizations contribute to the structure and functioning of networks for robust natural resource management (Marín and Berkes 2010).

Social ecology: Application

Social Ecology, arises from the growing awareness amongst those of the natural sciences, the Green Movement, ecology, environmentalists, animal welfare groups, development agencies, peace organizations, and world trade organizations, that the nature and the future of the animals and plants on the land, in the seas, and in the atmosphere are subject to the actions and priorities of humans

across the world. The range and diversity of animals and plants is subject to the actions and decisions of human groups. It is dependent upon humans to survive and thrive, and so are humans dependent upon nature. They are interdependent.

There is fast decline of plant and animal species due to deforestation, as well as increasing temperatures. The study of the impacts of human actions on the environment or the Social ecology provides elucidations about our concerns of the environment, and all other species as well conditions our behaviour towards the environment so as to make it sustainable. Social Ecology as conceived by Prof. Alvin, is a philosophy and a morality.

Social ecological manifestos should be available to be adopted by any type of organization, government, or group; from a dictatorship, or a plutocracy, democracy or a parliament, or a corporation, or a local authority, or a municipality, to a neighbourhood.

- Devise models of a steady state economy, which will stabilize consumption and growth

- emphasize the need to care and share, and for communities to provide welfare for the benefit of all by redistributing wealth.

- Significant social change if adopted by local, central government, direct or participatory democracy, hierarchical, or non-hierarchical organizations.

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[61] In any scientific investigation and research, a comprehensive review of literature is very essential. Its main function apart from determining the work done before concerning the problem area i.e. area of investigation, it provides an insight into the methods and procedures and create a basis for interpretation of findings. As direct references of all the items are not in abundance, certain specific references along with some indirect references have been incorporated in this chapter for the purpose of meaningful use. In the present study, reviews of literature have been summarized among following heads.

[62] Energy and Farm Management

[63] Energy Metabolism in Farming

[64] Energy Economics and Energy Management

[65] Farm Metabolism and Energy Equivalence

[66] Social Ecology and Farming

[67] Energy and Development

[68] Energy Policy and Planning

[69] Energy Use in Agriculture