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FROM SCIENCE TO POLITICS

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Universally, it is acknowledged that the term ‘Oekologie’ otherwise known as Ecology was coined by the German zoologist Ernst Haeckel in 1866 to refer to the scientific study of all those complex interrelations referred to by Darwin as the conditions of the struggle for existence (Allee, Emerson, Park, Park, & Schmidt, 1949; Attiwill & Wilson, 2006). It is important to mention that Haeckel sought to distinguish ecology from biology in the narrow sense of dealing with the structure and classification of organism themselves (Carnap, 1938). Unfortunately according to McIntosh (1985) rather than developing into a unified scientific discipline, since its creation ecology had never functioned as a whole for it had been divided into mutually exclusive subdisciplines ranging from natural science to social science which proceeded to prosper independently. For instance, on the one hand, according to *The shorter Oxford English dictionary on historical principles* (1973) and most science textbooks, Ecology is conventionally defined as a branch of biology that deals with the relations of living organisms to their surroundings, their habitats and modes of life. Hence, Ecological and Ecologist (Bennett, 1997). On the other, it is considered as an architectonic science or the study of everything because it encompasses not just natural science but also sociology, anthropology, psychology and religion (Anderson, 1966). That is because ecology has been interpreted in the public domain as a political movement, a source of moral values, and the intellectual leadership for environmental movement owing to the works of ecologists or authors inspired by ecology such as Rachael Carson (Bocking, 1997). So, how, when, who, and what was behind this change?

The essay attempts to demonstrate how that transformation happened by exploring the etymological genealogy of ecology. It intends to illustrate how the term evolved from its traditional use as a scientific inquiry into its contemporary use in the social science arena. The paper proceeds in three steps starting from the period prior to Haeckel's neologism of ecology, to the paradigm shift in ecological ontology from Clements to Gleason in the 1950s, and finishes with the transition or crossover from ecological science to political ecology otherwise known as environmental ethics in the public domain from the 1970s onwards. The discussion mainly revolves around the factors that alter the original or intended meaning of the terminology by Haeckel. Finally, the article concludes by arguing that based on its pedigree from the time of the ancient Greek up until the twentieth century, in the public domain, ecology or ecological thinking is speculated to be dealing more with ethics rather than going back to its root as a conventional scientific pursuit.

To begin, according to Golley and Keller (2000), it was the ancient Greek philosopher Theophrastus who was widely believed to be the founding father of ecology as a scientific discipline with his observation of how and why an octopus changes its colour to blend in with its surroundings. Based on that observation, Theophrastus (372-288 B.C.E) concluded that biota actively adapt to their surroundings through their internal responses to suit the changing environmental conditions (Zeller, 1963). Although these investigations of the biota and their environmental conditions interrelationship were continued by the Roman authors such as Pliny the Elder (23-79), it was not until the Renaissance that this Greek spirit of natural history began to flourish (Allee et al., 1949). In addition, some of the major contributors to the development of

ecology as a scientific pursuit include the Swedish botanist Carl von Linné (1707-1788) who explained that all interactions between organisms and the environment are controlled by the hydrological cycle with mechanistic precision, the French botanists George de Buffon (1707-1788) and Jean-Baptiste Lamarck (1744-1829) who speculated that species are not static categories but in fact evolve, the British economist Thomas Malthus (1766-1834) who emphasized the relationship between the environment and population through the link between food production and species reproduction, and finally Charles Darwin (1809-1882) who crystallized the theory of evolution arguing that there is an intimate connection between the makeup of organisms and environmental conditions (Golley & Keller, 2000). The interesting link between all these significant scientists and their works is that they were by and large influenced by one after another.

Ecology was then established as a formal scientific discipline in 1866 by the German zoologist/pro-Darwinism Ernst Haeckel (1834-1919) who coined the neologism "Oekologie or Ecology" in a textbook on the morphology, taxonomy, and evolution of animals (Haeckel, 1866). The new terminology was a combination of two ancient Greek words (*oikos* meaning house, not only of built houses, but of any dwelling place) and (*logos* connoting scientific knowledge), and hence ecology is defined as the scientific study of the earthly dwelling place (Odum, 1989). It is important to reiterate that as a social reformer and interpreter of Darwin's natural selection theory, Haeckel's motivation for coining this new word was to draw attention to the inclusive study of organism in the environment, in contradiction to the narrower study of organism in the laboratory (Golley & Keller, 2000). However, according to

Bramwell (1989), Haeckel was not the one who was responsible for developing the insights into the dynamic principles and concepts of ecology as a scientific discipline. Therefore, since its beginning there had been many contradictions in regards to some of the notions used by ecological scientists that contributed to the hindrance for ecology to develop as a unified scientific discipline (Golley & Keller, 2000).

The first example is the concept of community. While ecologists like Anton (1951) defined community as solely the taxonomic unit of species, others including Mobius (1877) described it as the area in which those species inhabit. The second definitional problem is niche, an ecological conception that resulted from the question of how the biotic element and the environmental element could be integrated (Golley & Keller, 2000). According to Whittaker, Levin and Root (1973), niche could be classified into three main concepts such as the biotic, the environment, and the links between biota and environment. That is because ecologists such as Gause (1964) equated niche to the habitat and its properties; others like Elton (1930) associated niche with the organism itself. The third problem is the idea of biological diversity. Glacken (1967) claimed that the modern concept of diversity is related to the ancient idea of plenitude which stated that a single group of species would cover the entire earth if it was allowed to breed freely. The crisis associated with this term is its contradictory uses in the contemporary discussions. That is while ecologists use the word diversity to refer to the taxonomic variety and the number of species in a community, area, or sample; in the popular domain the term has been utilized to describe the loss of species through extirpation or extinction due to human activity (Patrick, 1983). In short, the point here is that ecological concepts are subversive and grounded in many ways other than the

evolutionary concept, as Haeckel intended, each of which contributed to the obstacle for ecology to develop into a solid science because different conceptual interpretations potentially generate different approaches to research.

Despites some of these definitional problems, ecology continued to develop. The word was first used in the title of a book in 1885 by Hanns Reiter, and since then had captured the interests from the scientific community and began to develop considerably (Egerton, 1977). Universities began to offer courses in Ecology, and in 1913 the British Ecological Society, the first professional society, was established (Sheail, 1987). According to McIntosh (1985), it was the American ecologist Frederic Clements' concept of biotic community which was the mainstream ecological thought and dominant ecological ontology studied and discussed in the Western world academic realm prior to the 1950s. Based on his observations of the sample prairie plants, Clements (1916) asserted that groups of species living together in a given habitat would inevitably organized into a natural and integrated unit called the community. That community, according to Clements (1916), was an individual superorganism with its mature state set by the regional climate, and thus all the species in that community were predicted to eventually merge as a single state. Clements named the endpoint of this process the "climatic climax" of the process of plant succession (Clements, 1916). On the contrary, with his individualistic hypothesis of plant association, Henry Gleason (1939), an American ecologist, argued that plant communities are not organized associations; instead they are random groups of individual organisms. The genesis of this anti-Clements ecological ontology occurred when Clements' method was applied on the savanna prairie research in Illinois, and produced a dramatically different

conclusion from what Clements had predicted (Gleason, 1939). Gleason (1939) then concluded that the species composition of a site was indeterministic because the presence of species actually due to the chance of dispersal and their ability to invade and colonize and then compete for resources, grow, and reproduce. In short, where Clements saw predictability, uniformity, cooperation, stability, and certainty; Gleason saw nothing but individualism, competition, a blur of continuous change, and probability (Barbour, 1996).

It is rather captivating to realize that the ontological shift from Clements' biotic community to Gleason's individual organism took a considerable amount of time. That is because Clements's theory of vegetation was very strong that, according to Barbour (1996), it dominated the ecological thought in both the United States and most part of Europe for almost half a century albeit Gleason's efforts to revolutionize it. The Clementsian paradigm was so prevailing that Gleason's observations were discarded even though they were published three times (1917, 1926, and 1939) during his lifetime (Barbour, 1996). It was only after the 1950s that the support for Clements's paradigm diminished as it was observed that the prairie plants did not respond to the drought of the 1930s as predicted by Clements' biotic community model (Golley & Keller, 2000). In addition, the shift gained its full momentum with the help from some of the distinguished ecologists, such as Curtis (1959) who demonstrated that plants species responded to environmental factors individually as predicted by Gleason, and not collectively as Clements predicted. These new viewpoints led to the change in ecologists' perspectives; that is, a decrease in interests in Clements's paradigm and an increasing recognition of the validity of Gleason's observations (McIntosh, 1985). It is

interesting to note that this paradigm shift from Clements's to Gleason's ontology would serve as another validation of Thomas Khun's (1996) classic theory of scientific revolution examined in *The Structure of Scientific Revolution.*

So far, the assumptions in the preceding discussions are grounded in the belief that the etymological pedigree of ecology is scientific; nevertheless, the contemporary usage of the term in the public domain has become vaguely synonymous with environmentalism starting from the 1970s (Egerton, 1977). In fact, Golley and Keller (2000) argued that a quick review of the history of non-scientific ecological thinking showed that the movement had actually started since the 1700s by writers such as William Wordsworth (1770-1850), Henry David Thoreau (1817-1862), and John Muir (1838-1914). The motivation behind this new ecological thinking was to revolt against the core ideology of scientific ecology, the mechanistic worldview, which stated that nature works precisely and predictably according to the deterministic and casual laws of physics; and so all natural phenomena can simply be explained in terms of inert matter in motion (White, 1967). It is also argued in this scientific ecological thinkers perceive nature as banal and has no value in and of itself, unless it is utilized to meet human's needs (Locke, 1992).

Therefore, this new non-scientific ecological thinking, rigorously advocated in the 1970s by influential American scientists such as Aldo Leopold (1886-1948) and Rachael Carson (1907-1964), was more welcome in the realm of social commentary than the scientific community (Sears, 1964). While Leopold (1987) claimed that moral considerability should be expanded to include the entire biotic communities not just

human individuals, Carson (1994) argued that the using of pesticides was a classic example of anthropocentrism based on the misguided belief that human could control nature. Instead of changing the ecological thought in the scientific community, these works expanded into the realms of politics and prospered into a variety of environmental ethics disciplines such as “Deep Ecology” and its counterpart “Social Ecology” just to name a few (Golley & Keller, 2000). Deep Ecology, coined by the Norwegian philosopher Arne Naess in 1973, was supposed to represent the psychological awareness that the individualistic self is mutually connected to the larger biospherical self (Merchant, 1992). As a consequence, deep ecologists call for a complete transformation in science and worldviews that would replace the mechanistic framework of domination with an ecological framework of interconnectedness and reciprocity (Merchant, 1992).

In contrast to deep ecology, the basic concept of Social Ecology – the term developed by the French geographer Elisee Reclus and revived by the American socialist Murray Bookchin – states that the total transformation of political economy would be a better and more rational approach in comparison to deep ecology as it holds that the exploitation of nature is the result of unjust social frameworks (Merchant, 1992). As stated by Ellis (1996), Bookchin censured deep ecology as an ecological toxic dump rejecting the claims made by its supporters that it is a coherent new philosophy that attempts to provide humanity with a crucial ecological consciousness. In return, the ethic of Bookchin’s social ecology was severely criticised by Eckersley (1989) as predicted on the presumptuous and arrogant belief that human beings are enlightened enough to divine the course of evolution, a belief that is demonstrably unfounded. In

addition, Eckersley (1989) ironically asserted that a biocentric ethic is more able to fulfil Bookchin's promise than his own. Responding to the criticism, Bookchin had claimed that Eckersley misrepresented his position and had reiterated his critique of deep ecology (Light, 1998). However, Eckersley (1989) maintained that Bookchin's notion of active and ethically required intervention is dangerous and presumptuous arguing once again that ecocentrism's humility and nonanthropocentrism are preferable guidelines. An important note here is that the use of the word ecology and ecological thinking represented in this debate between deep ecology and social ecology had altered from the concept that deals with biota in their habitats to the concept that generate ethical and political guidelines to environmentalism.

To sum up, this essay had uncovered the etymological genealogy of ecology and illustrated how the term had evolved from its conventional scientific use since the ancient Greek time to its contemporary use in the realms of politics. Although the process was convoluted and arduous, the term had been resilient for it had developed itself into such a powerful concept that it is indeed a challenging task to provide an all encompassing definition to what exactly is ecology. Nevertheless, there are two main lessons that could be drawn from this paper. First of all, there had never been any unified vision of the essence of nature amongst the ecologists. That is while the mechanistic metaphor has gone a long way toward increasing our general understandings of biota and their environments; there are additional sources of meaning such as the aesthetic, spiritual, and social meaning that the mechanistic approach excluded and left to be explored by the political ecologists. Based on this observation, the second concluding remark is that attempts to establish ecology as a mechanistic

science full of mathematical rigor and free of moral overtones, such as physics, chemistry, and molecular biology, would represent a naïve and self-defeating thinking because as discussed above ever since the 1970s ecology and ecological thinking in the social realm is just as powerful as, if not stronger than, in the conventional scientific setting. As a consequence, there will never be an overall consensus on the form and objectives of ecological science. This lack of complete consensus or uniformity is not a sign of weakness; instead it is a sign of inclusive scope and normative significance making ecology a fascinating and opportune discipline.

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