Food Chains, Ecosystems and Myths: A Lasting Anthropological Concern

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Before the rise of environmental conservation movements in the 1960s, anthropologists had already begun to advocate concepts of ecosystem analysis as the key to understand how humans maintain sustainable interactions with their surroundings. This lasting concern, which crisscrosses temporal, regional, and disciplinary boundaries, led to investigations on how multifaceted cultural mechanisms are developed in this human-environmental feedback loop. For instance, questions can be asked: How have the domestication of plants and animals altered the substance and nutritional levels of our daily life? Or how have the availability and variations in food chains flows regulated the rhythms of social activities? Last but not least, how have folk tales and myths about these cultural mechanisms been incorporated internally to enhance and reinforce group cohesion and legitimize traditional cultures? Looking at these issues in the Chinese cultural context, we may conclude that Shen Nong worship is the counterpart of the holistic concept of ecosystems in anthropology.

Keywords: food chains, plant and animal domestication, sustainable agriculture, ecosystems, Shen Nong worship

RACHEL CARSON'S LEGACY

The watershed event of the recent century is, without doubt, the environmental conservation movement that began more than half of a century ago. It compelled us to question our ability, as stewards of the planet, to maintain a viable and sustainable life on earth before any self-induced annihilation overtook us. The most explicit and ominous warning about humankind's looming doomsday future came with the publication of *Silent Spring* by American marine biologist Rachel Carson (1907-1964) in 1962. Before I elaborate on the confluence of Carson's work with that of anthropology, I will highlight some of her insights in this context.

> The history of life on earth has been a history of interaction between living things and their surroundings. To a large extent, the physical form and the habits of the earth's vegetation and its animal life have been molded by the environment…Only within the moment of time represented by the present century has one species—man—acquired significant power to alter the nature of his world (Carson 1962:5).

The power that Carson alluded to, as we have all witnessed and as it continues to unfold today, is the seemingly uncontrollable and frequently toxic industrial pollution that permeates our air, soil, water, ocean, and even the blood and tissues of our body. In other words, Carson warned about the arrival of the Anthropocene, a human-centric era characterized by our insatiable desire for an improved standard of living

achieved through destructive extraction of earthly ingredients (organic, inorganic and mineral), wanton discharge of pollutants resulting in global changes in the physical environment and weather patterns, and the production of lethal weapons for assured self-destruction many times over.

Carson's argument against unbridled industrial development and her subsequent campaigns to remedy some of its deeply imprinted scars on the earth were partly successful in the ensuring decades, as seen in the worldwide ban on DDT as a weapon to eradicate mosquitos, and the prohibition of certain toxic chemicals in our food chains and living environment. In spite of such successes, there are however still some underlying attitudes, beliefs, and decision-making among some corners of contemporary societies, with people insisting on pursuing their insatiable desire for wealth through scientific development by plundering our natural earth and discharging toxic pollutants into our environment. Let me quote her again.

> The 'control of nature' is a phrase conceived in arrogance, born of the Neanderthal age of biology and philosophy, when it was supposed that nature exists for the convenience of man...It is our alarming misfortune that so primitive a science has armed itself with the most modern and terrible weapons, and that in turning them against the insects it has also turning them against the earth. (Carson 1962: 287).

This arrogant Neanderthal mentality of the almighty science has been fortunately recognized by more and more scientists in the 21st century, with the advancement of modern atmospheric and environmental sciences. The pronouncement of the arrival of Anthropocene age in 2000 clearly echoed the anthropological argument for an integrated human-environmental coexistence (Crutzen & Stoermer 2000). The following is a brief review of anthropological viewpoints for this stance.

EARLY ECOLOGICAL ANTHROPOLOGY

In 1956, six years before the publication of Carson's *Silent Spring* which created an intellectual storm that rocked not only academic circles but also political establishments in the West, American anthropologist Roy A. Rappaport (1926-1997) published an article entitled 'Nature, Culture, and Ecological Anthropology', heralding the arrival of an innovative vantage point for understanding human-environmental interactions, and the role of culture in this triangular dialogical connection. Borrowing heavily from evolutionary biology, ethnoscience and environmental science, Rappaport introduced many conceptual tools that would become the mainstays of future ecological anthropology. Let me use an example to illustrate his viewpoints.

A Japanese farmer by the name Takao Furuno (1950-), using his personal experience in managing a rice paddy terrace throughout his life, published a book entitled *The Power of Duck* in 2001. He demonstrated the interlinking relationships between humans, plants, animals, water, soil, sunshine, molecular growth, metabolism, and so on and so forth, that go to make up a viable ecosystem. We start with the concept of a "biotic community", i.e., all the living organisms and non-organic elements that co-exist in a clearly defined environment, in this case the rice paddy (See illustration below).

Within this biotic community there are different species of animals: human, ducks, snails, and perhaps some microbes. The green plants are rice, azolla, and a variety of weeds. The soil and water in the paddy field enhances the growth of plants through the photosynthetic process of the sunshine. Azolla not only turns the airborne nitrogen into fixed nitrate or ammonia for rice growth, but it also provides edible nutrients for ducks to consume. At the end of the growing season, the farmer harvests not only the ripened rice, but also the fattened ducks.

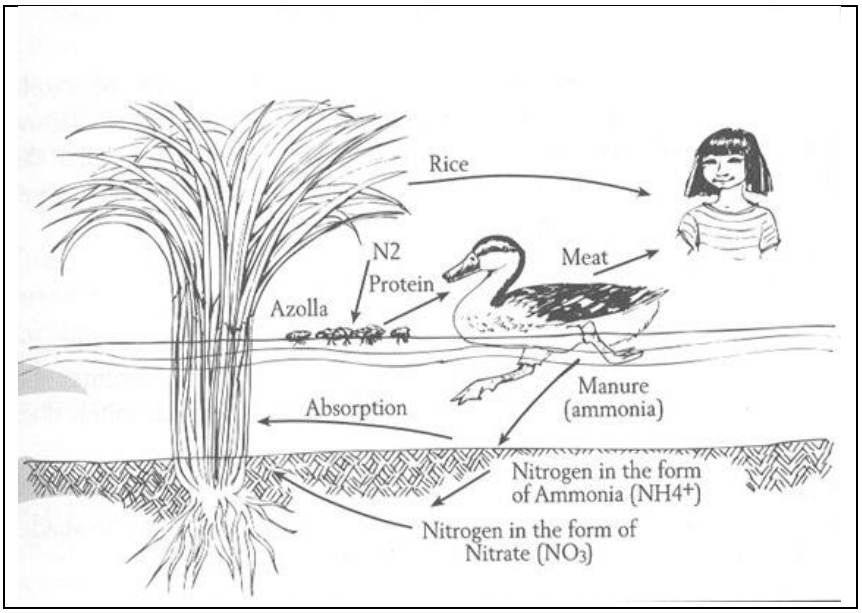

Figure 1. The Biotic Community in the rice paddy
(From Takao Furuno, 2001, *The Power of Duck*)

In this natural growth system, we see a quiet energy transmission process that involves many participants. The "primary producers," in Rappaport's term, are the green plants, rice and azolla, that convert solar energy into organic energy for plant growth. The "primary consumers" in this case are the rice plants that absorb nitrate from soil and azolla, and the ducks that eat azolla. The "secondary consumers" standing at the pinnacle of the "food chains" are humans, who consume not just the harvested rice but also the grown ducks. In southwest China, rice paddy farmers not only keep ducks in the ponds, but also fish for the same purpose. This energy transmission process, however, is not unilinear or one-directional. A reciprocal or reversed energy transmission cycle occurs simultaneously through the discharged bodily waste (of ducks and humans) and the decomposed dead bodies of plants and only keep ducks in the ponds, but also fish for the same purpose. This energy transmission process, however, is not unilinear or one-directional. A reciprocal or reversed energy transmission cycle occurs simultaneously through the discharged bodily waste (of ducks and humans) and the decomposed dead bodies of plants and animals. The circular movement of energy in an ecosystem can be seen in a couple of visualized models below.

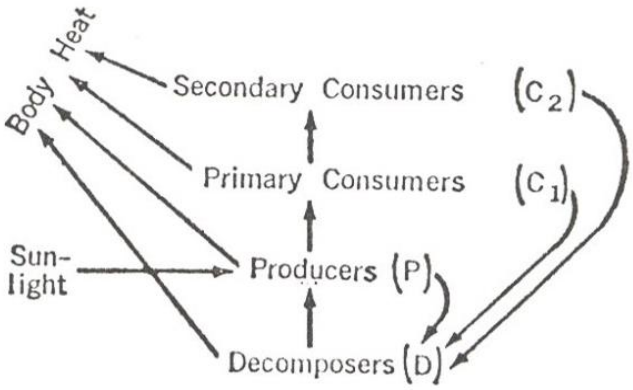

Figure 2. Structure of Food Chain in a Biotic Community
(From Andrew P. Vayda, 1969, *Environment & Cultural Behavior*).

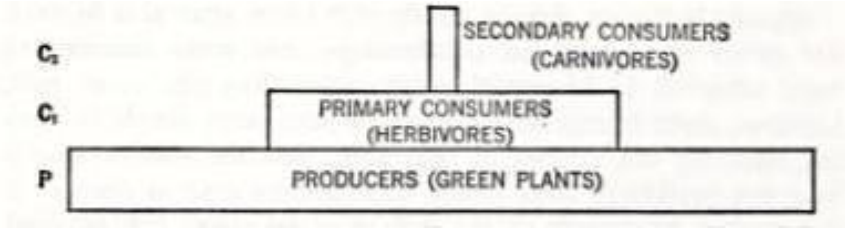

Figure 3. Generalized Community Structure of Biomass
(From Andrew P. Vayda, 1969, *Environment & Cultural Behavior.*)

Thus, in this biotic community we see mutually dependent or beneficial relationships among all organisms of the kind that can be characterized as "symbiosis (共生)". Under normal conditions, or "if everything remains constant", as scientists tend to say, this symbiosis in an ecosystem depends on a delicate balance among all the elements involved: organic, inorganic, climatic, atmospheric, and so on, to maintain the "homeostasis" (内在平衡). The change in one component in this balance will inevitably elicit changes in other areas of the biotic community, and may eventually lead to the reconfiguration of the entire equilibrium. In the biological kingdom, there are many examples of these disturbed equilibriums. The introduction of English rabbits to Australia or the introduction of Asian carp to the Great Lakes in the U.S. are examples of how an invasive species can tip the balance of the original homeostasis and occasionally lead to the extinction of the original native species.

Like Rachel Carson, Roy Rappaport has also been extremely critical about contemporary industrial development as the source of environmental degradation, as seen in his final comment:

> Increasing industrialization has generally been regarded by members of western society to be virtually the *sine qua non* of progress….But the general ecological perspective that we have advanced here, which assigns biological meaning, and biological meaning only, to such terms as adaptation, adequate functioning, homeostasis and survival, at the very least suggests to us that some aspects of what we have called progress or evolutionary advance are, in fact, pathological and maladaptive. (Rappaport 1956: 264).

Early ethno-scientists quickly grasped these ideas and investigated various domains of the traditional ecological knowledge and systems, such as indigenous classification systems for plants among the Hanunoo in the Philippines (Conklin 1954), the rotation cycle of swidden fields in Indonesia (Geertz 1963), or the interlocking relationships of crop growth, pig population increase, increased work load, intergroup conflict, and ultimately warfare in Highland New Guinea (Rappaport 1968). Stephen Lansing studied Bali island's ritual cycle and its impact on the regulation of rice paddy irrigation can be regarded as one of the most explicit efforts to link religious practices with ecological cycles (Lansing 1991). These studies have provided important examples to illustrate the synchronic interaction between ecosystem and other aspects of the cyclical human cultural rhythms.

All these studies began to take a critical view of modern scientific and industrial development, and indeed foretold the arrival of the most severe problems at the global scale, as noted by the contemporary environmental movement. Problems to be tackled include the irreversible pollution of our soil, water and the atmosphere; the increased global greenhouse effect caused by carbon dioxide discharge from burning fossil fuels; the depletion of non-renewable natural resources; the extinction of living species leading to a decrease in biodiversity; the increasing frequency of extreme weather events accompanied by volatile heat, blizzards, and floods; the rise of sea levels creating forced migration along coastal communities, and so on and so forth.

RECENT DEVELOPMENTS IN ECOLOGICAL ANTHROPOLOGY

The global environmental movement gained its major impetus in the late 1980s with the publication of the Brundtland Report, *Our Common Future* (1987). It is in this UN-commissioned report, led by Gro Harlem Brundtland (1939-), the former Prime Minister of Norway, that the concept of sustainable development was clearly articulated: "…it meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland et al. 1987: 16). The three stakeholders in this context are: the current generation of humans who exploit their natural environment to make ends meet; the fragile environment, which must endure the constant assaults of humans without been irreversibly damaged; and the future generation of humans who must rely on the inherited natural endowment of the planet for their own living needs. It is under this concern for sustainability that we began to see the multiplication of environmental conservation movements in various international domains. These movements have concerns that can be divided into two broad categories: 1) environmental health and 2) ecosystem sustainability (Gordon McGranahan & David Satterthwaite 2003).

Under environmental health, we find issues of concern such as:

- Pollution: air, liquid and solid waste.
- Non-renewable natural resources: petroleum, coal, other minerals, etc.
- Global warming: the greenhouse gas effect, increased carbon dioxide emissions, the broken ozone layer, etc.
- Environment and human health hazards: microplastics, PM2.5, dioxin, etc.
- Increased extreme weather events and rising sea levels.

Under concerns for sustainable ecosystem, we investigate:

- Preserving biodiversity: protecting endangered indigenous species.
- Environmentally friendly sustainable agriculture: organic farming, urban farming, etc.
- Development of renewable energy sources: solar paneling, wind farms, biofuel, etc.
- Reduction of greenhouse gases.

To tackle these issues, global grassroots movements have also arisen, especially among younger generations. The tangible effects include many international meetings sponsored by the U.N. to discuss how to counter the current trends in global warming through the reduction of carbon dioxide discharges and industrial waste. Both the Kyoto Accord (or Protocol) of 1997 and the Paris Agreement of 2015 have proposed carbon footprint benchmarks for individual countries to achieve in order to avert this trend.

Figure 4. The 17 Sustainable Development Goal
(From *The 2030 Agenda for Sustainable Development,* UN2015)

Based on this broad-based global concern, the United Nations issued *The 2030 Agenda for Sustainable Development* (UN 2015) that clearly articulated the 17 Sustainable Development Goals to be pursued by all member nations. This blueprint represents the global effort to alleviate major sources of human suffering, including hunger, poverty, gender inequality, and prejudice and discrimination based on race and beliefs, to enhance the general well-being of humankind.

On the academic front, we find new developments in ecological anthropology that try to incorporate the conceptual component of human culture into the science-based ecosystem analysis of the planet earth. In the name of 'sacred ecology' (Berkes 1999) or 'spiritual ecology' (Sponsel 2001), researchers pointed out the importance of "traditional ecological knowledge" (TEK) in managing the transition to a viable and sustainable environment. By spirituality or sacredness, we are obviously referring to the myths, legends, moral tenets, ethical commitments, and worldviews of a culture that are often lumped together into the catchall term "religion". As a pan-human phenomenon, human religion always contains certain cryptic information about how the universe was created (origin myths), how human ancestors arrived on the scene (creation myths), how other living beings were created (such as the Great Flood myth), and where our spirits go when our physical bodies die (tales about life and the after-life). Behind these primordial stories lie the basic assumptions about codes for proper behavior, normative standards and life goals that every culture prescribes for its members. It is only by following these culturally-specific ordinances that each and every member of the society confirms the meaning of existence and their own right to living in the universe.

The proponents of spiritual and sacred ecology, such as Sponsel and Berkes, however, argued against this lineal evolutionary model of science eventually replacing traditional ecological knowledge. They pointed out that traditional ecological knowledge itself contains multiple grains of truth that are a better fit for resolving our current global environmental crisis than we have previously realized. This hidden wisdom needs to be explored and articulated by anthropologists who stand at the foreground to confront the impending ecological crisis. It is in this context that we find renewed interest in the study of spirituality, myth, legends, the sacred, the supernatural and so on that can be found in association with traditional ecological knowledge.

MYTH AND TRADITIONAL ECOLOGICAL KNOWLEDGE IN TAIWAN

The current drive to fully integrate spirituality or sacredness of a particular culture with its natural environmental cycles can be best demonstrated in the renewed interest in myth or legends. Once regarded as unreliable or false history, and relegated to second-tier folklore studies, studies of myth or legends have gained respectability in the increasingly globalized world (Zong & Yang 1996). To anchor the local culture in an increasingly fluid universe, or to answer some of the unknown questions in our daily life, or to provide guidance in our seemingly futile search for the ultimate meaning of life itself, we find religiosity has gained momentum in contemporary Taiwanese daily life. Semi-secular religious movements such as engaged Buddhism (e.g., Ciji Compassionate Association 慈濟功德會, Dharma Drum Mountain 法鼓山, and so on) have gained greater attention both in the public and in the academic world. Less well-known but equally influential are some of the community-based religious groups that are hybrids of Buddhism, Daoism, ancestral worship, and spiritual beliefs.

Let me use a local temple in a corner of northern Taiwan that worships the legendary Emperor Shen Nong as an example to illustrate the juncture between environmental concerns and the search for individual identity at this time of uncertainty. Emperor Shen Nong was a legendary hero in ancient Chinese myth, credited with the discovery of farming and animal domestication, as well as the founder of Chinese herbal medicine some 5,000 years ago. What seems to have attracted the temple's followers is not the validity of the myth or the authenticity of Emperor Shen Nong's supernatural power. For most temple followers, it is the temple motto that concerns them most: promoting The Spirit of Shen Nong's Eightfold Powers (神農八功精神):

Awakening the Human Mind (人類覺醒)
Recapturing the Primordial Heart (找回初心)

Maintaining Ecological Balances (生態平衡)
Ten Thousand Species Living Together (萬物共生)

The explicit goals of Shen Nong worship include the full awareness of: returning to pre-industrial living, maintaining the symbiotic relationship between humans and other living beings, and the re-establishment of homeostasis in a balanced ecosystem. These seem to re-affirm the intrinsic meaning and importance of the ancient myth and its pivotal role in coping with contemporary global environmental crisis. It is in light of such developments that we hope we can resolve our global problems in the near future.

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