# INDIGENOUS AND NEOTRADITIONAL KNOWLEDGE SYSTEMS AND THEIR ROLE IN CREATING AND MAINTAINING ECOLOGICAL SUSTAINABILITY

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## Summary

Holistic knowledge systems have enabled many indigenous and some neotraditional groups to survive for hundreds of years and in some cases thousands without damaging the resilience of ecological systems. These knowledge systems exist within the collective memories, practices, daily activities, beliefs, artifacts and ecoscapes of indigenous and local peoples and are credited with the creation and maintenance of much of the planet's biological diversity. For the past 500 years, those sharing the western worldview have diminished and destroyed much of the planet's cultural and biological diversity and now threaten its sustainability. As awareness of the value of traditional knowledge (TK) to sustainable development has grown, the definition of indigenous knowledge (IK) has evolved. This article discusses the contested and

evolving concept of indigenous and neotraditional knowledge systems and their role in the creation and conservation of sustainable, resilient and adaptive ecosystems.

## 1. Indigenous and Neotraditional Knowledge

Indigenous knowledge (IK), alternately called traditional knowledge, is recognized as a dynamic, holistic system of explicit and implicit information, behaviors and practices, norms and values, language and worldview. Indigenous knowledge systems (IKS) have been developed collectively by groups of people living in fixed areas for long periods of time, in some cases millennia. Such knowledge systems have enabled, and continue to enable, diverse indigenous peoples throughout the world to adapt to and survive environmental change. Recent research has also examined long-established groups – many of which have mixed with native populations – that have developed knowledge systems to successfully manage their local resources. Such groups are called neotraditional. Both neotraditional knowledge systems and IKS are situated in time and space. This *situatedness* – the interconnected development of community (natural and social) and knowledge in time and space – provides non-individual frameworks for learning and increases the resilience of ecosystems by providing individuals with a sense of connectedness.

Until recently, IKS were perceived primarily through the lens of western thought. In the 1300's when this paradigm emerged in renaissance Europe, indigenous knowledge began to be referred to as superstition, witchcraft or folk belief. Fifteenth century explorers, colonists and missionaries, the first to contact indigenous groups outside Europe, defined the knowledge of those they encountered as it befitted them: as riches to be commodified, as heretical beliefs to eradicate, or as valuable insights that facilitated life in new and different environments. As theories of natural selection and evolution were embraced, indigenous knowledge began to be regarded as primitive, while western knowledge was regarded as evolved or civilized. These classifications were corroborated by classical economic theory.

Together, science and economic theory provided justification for the commodification of knowledge; knowledge from the western perspective then began to be regarded as an individually created product that could be owned, bought and sold. At the time of discovery, conquest and colonization, western scientists collected, studied and compared the beliefs, folk tales, traditions and artifacts of various traditional cultures, while western museums, books and magazines displayed the exotic customs, art and artifacts of indigenous peoples to the interested public.

Simultaneously, as the women's and the human rights' movements were gathering momentum from the $18^{th}$ to $20^{th}$ centuries, social, environmental and economic concerns prompted by a history replete with environmental degradation and numerous wars, pushed many individuals, like Rachel Carson, Jacques Cousteau, Aldo Leopold and Linus Pauling, to focus on the interdependence of society and nature. Their realization that humans are distinguished from nature primarily by their power to alter it, coupled with the philosophical critiques of those who scrutinized the hegemony of the western scientific worldview, enabled indigenous knowledge to be recognized as a unique but valid alternative means of understanding the world.

By the latter half of the 20th century, the concept of ecology began to play a central role in western science. Researchers like Barry Commoner, Herman Daly, Paul Ehrlich, Garret Hardin, William Rees and Mathis Wackernagel reflected on the works of earlier scientists and economists and began voicing concerns about the negative impact of western society on the natural environment. When interdisciplinary studies of indigenous knowledge revealed strong connections between such knowledge and sustainable development, many anthropologists and ecologists began to focus on traditional environmental knowledge (TEK). Although some warned that the study of such knowledge in isolation undermines its holistic nature, research reveals that much TEK provides a means of understanding complex ecosystems. Increasing acceptance of TEK as valuable prompted many governmental and non-governmental organizations (NGOs) to recognize the value of indigenous knowledge and to take steps to protect it. Indigenous peoples also began to define the concept of IKS from their varied perspectives. The increased valuing of IKS has prompted its integration into educational curricula and development efforts.

Nevertheless, western knowledge--a global collective knowledge system characterized by its homogenizing tendencies-- has subordinated IKS and TKS, dismissing them as lacking value and credibility. Simplistic comparisons firmly contrast indigenous and western scientific systems of knowledge. The former is considered to be subjective knowledge based on observation, while western scientific knowledge is considered objective, based on replicable experimentation. IK is holistic in the sense that knowledge and value are inseparable, woven together by spiritual and religious ideas that codify human behavior. Western knowledge is fragmented, and scientific knowledge and spiritual/religious knowledge are seen as incompatible. Indigenous societies generally regard themselves as part of nature, not separate from it as westerners see themselves. In addition, the situated nature of IK in time and space grounds people in place and encourages collective learning, while western knowledge encourages mobility, specialization and individual learning.

Finally, in the ongoing disputes over knowledge integrity, many experts argue that western scientific knowledge is no more value free than IK. They also warn that the romantic perception which claims indigenous and neotraditional knowledge systems (both alternative knowledge systems) to be environmentally friendly needs to be questioned.

## 2. The Development of Alternative Knowledge Systems

The products of learning and the frameworks for learning of IK are the results of centuries of complex, continuous interaction of indigenous people with their environments. Through a trial-and-error process, people make sense of their world, attribute meaning to what they experience, and construct new realities. As a result of substantial thought and consideration, explicit and implicit knowledge essential to a group's survival become embedded into its cultural framework, forming a worldview which facilitates communication and decision-making. Such knowledge is generated and transformed by observing local conditions, experimenting with solutions and negotiating meaning with others. Because people are constantly recreating their cultural and natural worlds, they are continually generating new knowledge as they adapt to

changing environmental, socioeconomic and technological situations. For this reason, IK is said to be dynamic; the knowledge that impedes survival is discarded and knowledge no longer deemed essential frequently loses prominence and is slowly lost.

Within indigenous groups, knowledge is neither equally distributed nor equally produced. What people learn is in large part determined by their societal roles, gender and class. Gender, the primary social differentiation among economically active adult members of society, results in the development of differentiated knowledge domains. Development literature talks about the primary roles of men and women: women undertake reproductive, productive and community managing activities while men undertake productive activities and are involved in community politics. These gender roles occur, with some variation, within indigenous groups. Childbearing, childcare and other domestic responsibilities – maintaining the home, cooking and gardening – usually fall to women. By gathering, propagating and marketing wild food resources to serve the nutritional and medical needs of families and communities, women play a significant role in managing ecosystem diversity. Men, more frequently than women, work in exchange for money, goods or services. Because of this, when an indigenous group comes into contact with western society, men assimilate more quickly. At the community level, men more frequently than women work in political organizations or serve in specialized roles like that of shaman, priests and chiefs. In these roles they often provide a link between the physical and spiritual world and provide a historical link to the group's past.

The above gender differences, coupled with social position and class, usually result in a differentiation between the knowledge of elite members of a group and the knowledge of the lower class. For instance, in Polynesian areas, elites or *aliis* were more often keepers of navigational, land management and military knowledge.

### 2.1. Ways and Results of Knowing

The term *ways of knowing* refers to how people perceive, feel, intuit information, become conscious of and form ideas or opinions. The knowledge that individuals hold – the result of societal roles, class and gender, as seen above – affects how they come to know the world and how they interact with it. Many indigenous groups rely on a greater variety of ways of knowing than the five typically accepted by western society. As a result, the senses are trained differently and experiences are organized differently. Within most indigenous cultures, spiritual ways of knowing are embraced and integrated into patterns of behavior, tradition, daily practice and production. Indigenous groups – and increasingly westerners – accept that the body affects how the mind comes to know.

As a result of knowledge, worldviews are formulated. Worldviews are mental frameworks that define how a people understand their relationship to the social and natural environment. Worldviews are institutionalized by language. People's imagery of their relationships with the world springs from the words, tenses and syntax of their languages. The structure or syntax of language – the predominance of nouns, verbs or specific verb tenses, the use of gender markers, letter order (SVO, SOV, VSO), etc. – and the meaning of words are key to a speaker's understanding and treatment of the

world. Linguists hypothesize that speakers of languages with multiple past tenses, for example an imperfect and a preterit, are more sensitive to evidence than speakers of languages that rely heavily on the subjunctive tense. Speakers of languages which depend heavily on the subjunctive tend to credit forces beyond themselves with a great deal of control over the natural and social world, while speakers of languages that avoid the subjunctive share worldviews that grant them greater control over their environment.

Indigenous systems of knowledge and perception are sustained by worldviews that stem from a solid understanding of the fusion of the natural, social and spiritual worlds. For example, among traditional groups in Fiji, the environment (land, water and human environment), *vanua*, is regarded as an indivisible unit. This integration of the spiritual and sacred with everyday life is substantiated by the work of ritual and political specialists – shamans, village headmen and artists.

Another aspect of the language/environment relationship reveals that both the language of a group and a group's environment affect the development of specific vocabularies and determine whether concepts are classified as nouns or verbs. Westerners who speak Indo-European languages frequently share classification systems that do not exist among indigenous peoples speaking languages stemming from different roots. For indigenous and traditional groups, their specialized vocabularies and the naming of plants and animals reflect unique solutions for dealing with the elements in their particular ecological niches. Frequently these names connote recognition of specific qualities. In Ethiopia, for example, farmers over millennia conceptualized and created a particular sorghum that has been named *sinde lemine*, which means, "Why bother with wheat." In Pacific Island areas where knowledge of water is critical to life, more than 20 terms for different types of water exist. The same multiple classifications for the word "snow" exist among the Inuit languages of the north.

Besides words that respond to unique environmental conditions, classification systems developed by indigenous groups are considered important for the research of anthropologists and ethnoecologists. Seasons are a particularly common example of how annual weather conditions are classified to enhance the survival of neotraditional and indigenous groups. The traditional Javanese seasonal cycle called *pranata mangsa* is one example of this. The calendar reflects the uneven seasonal monsoon cycle of the area and supplies people with information on when to plant and harvest various crops.

Still another example of the results of the knowledge and language process among indigenous and neotraditional peoples are placemaking and the sense of place. It is now surmised that much of the earth's landscape has been shaped by waves of migration and habitation. What western scientists used to consider wild resources and wild areas are actually the products of ecoevolutionary relationships between humans and the natural environment. Ethnobotanical studies of plant use have revealed management practices for many species that result in modified landscapes. The use of fire, soil modification, and selected cutting, planting and transplanting have modified landscapes from almost the beginning of human life on earth. In the process of dealing with subtle differences in soil and climatic conditions, people have selected appropriate seed and plants for conditions, changing their natural surroundings and modifying their lifestyles to create a balance between extraction and input.

Finally, the creation and naming of places provides space for interaction, communication and the negotiation of meaning (learning). Through this process, people grant significance to places, people and things, decide who the players are, what the boundaries for action are and what rules govern interaction. These boundaries and rules comprise resource management systems, and those resources (social structures, locations, natural resources, etc.) conserved through this process provide opportunities for future learning and action. Meaning or knowledge accumulated over time through individual and collective learning is linked to and stored in the environment – in organizations, communities of practice, materials used in practice, and in the biophysical surroundings. A good example of this is *Mateo Tepee* in the American Southwest, better known as Devil's Tower. This is a sacred site linked to some American Indian cosmologies by a myth that traces the origin of the Pleiades to the escape of small girls from a grizzly bear.

### 2.2. Knowledge Transmission among Indigenous Groups

Within indigenous cultures, the transmission of knowledge is primarily oral and kinesthetic. Children and young adults observe their elders and replicate their behaviors. Knowledge also is transmitted through the use of symbols and designs (i.e., Incan knotted strings or quipu), petroglyphs, signals, and less frequently with writing. Knowledge and values are also transmitted through games, music and dance.

Different genres – poetry, stories, proverbs, song, etc. – affect how people think and feel about transmitted information. Within these genres, not only can specific rhyming patterns, meter and beat be used to impart additional information, but by changing patterns information may be lost. For example, among some Australian aboriginal groups there are stories that illustrate the environment along traditional trails. If these are not told at a walking pace, the story becomes confused and information is lost.

A group's perception of time also influences their communication and how they interact with the environment. For example, western cultures regard time as an objective, quantifiable absolute. Consequently, communication is linear and direct. Many indigenous groups feel time is abstract and circular. As a result, much communication is circuitous.

In regards to knowledge transmission, within indigenous and neotraditional groups, all knowledge is not shared by all members. For example, it has been discovered that some island clans in the Truk Islands in the Pacific held certain knowledge that was passed down from lineage relatives. Sometimes IK is kept a secret. Such information sometimes can be purchased and may be acquired as a gift. Other times, such knowledge, especially that acquired from a spirit or through a vision quest, is taken to the grave.

Recent research into age-based knowledge also reveals that indigenous and neotraditional children, because of their different interactions with the environment, develop knowledge that is different from adults. Young people, however, usually rely on the knowledge of more experienced and wiser elders. These individuals frequently are consulted before important actions are taken or decisions made.

Finally, a new development related to IK is that it is increasingly being transmitted through text and via computer databases. This *ex-situ* conservation and transmission of such knowledge separates explicit information from its implicit context.

## 3. Sustainable Development

The concept of sustainable development can be traced back to the 1972 Stockholm *Conference on the Human Environment* and to the 1980 *World Conservation Strategy*. In 1987 the concept was featured in the Bruntland Commission Report, *Our Common Future*, when the United Nations (UN) issued a mandate for more sustainable economic development. It was defined as development that "meets the needs of the present without compromising the ability of future generations to meet their own needs." Five years later the Convention on Biological Diversity (CBD) was written, again calling for the global community to work toward sustainable development.

The United States soon contested the call for the more affluent to adopt lifestyles within the planet's ecological means. It has refused to sign the Kyoto Protocol and the Convention on Biological Diversity and has contested the evolving definition of sustainable development. Instead of agreeing that ecology sets limits on development, the U.S. proposed that there were tradeoffs between the economy and ecology. The U.S. also proposed that human-made capital could be substituted for natural capital. As a result of this and the western worldview that embraces continued growth of consumption and production, the notion of sustainable development is still contested. Radical environmentalists claim environmental sustainability is not compatible with sustained economic growth. Others argue that continued economic growth endangers ecological resilience.

The sustainability of human systems is dependent upon the sustainability of a multitude of other biophysical systems, many of which are considered part of the commons. These systems function at a variety of scales. Human understanding of these different scales is imperative if human groups are to interact with these systems to ensure the resilience of these resource systems and the resilience of human systems.

### 3.1. Resilience and Scale in Development

Resilience is central to adapting to change. On-going research, which has explored conditions that promote successful transformations in human and natural systems, sees three characteristics, which define resilience. They are: 1) the amount of change a system can undergo and still retain the same controls on function and structure; 2) the degree to which a system is capable of self-organization; and, 3) the ability to build and increase the capacity for learning and adaptation. Further research has identified four key ingredients for resilient, sustainable human-nature interactions. These include: 1) a clear and widely shared understanding of ecosystem responses to human use; 2) a widely shared inventory of short and long-term ecosystem utilities; 3) an avoidance of bias based on differences in organizational and individual power; and, 4) social networks that bridge gaps between interest groups and hierarchic levels. Further discussion and research about resilience have led to increased interdisciplinary

investigations into links between social and ecological systems. IK plays a vital role in this research.

As for the scale of development, indigenous knowledge plays a role in the deeper understanding of this concept. Time and space are issues of scale. Humans develop IKS in place as they interact with local environments. Through this close interaction, an understanding of the rates of time required by various systems to cycle (the planting and harvest cycles of different crops; the seasonal variations that bring monsoons, hurricanes, and dry seasons) and an understanding of spaces (ecological niches) are integrated into knowledge systems. These understandings are encoded into language, myths and stories, practice and tradition. For example, the concept of *milpa* (cornfield) is more than a spatial and temporal concept; it is an agricultural institution and process that has been passed down over generations by Mesoamerican farmers. But, because IK is situated and is not readily transplanted to new environments, when traditional groups relocate or are displaced, their knowledge system may not provide understandings necessary to continue sustainable practices. If sustainable practices are to continue, these knowledge systems must change. These necessary changes are enhanced by higher levels of resilience. IK and western science clearly differ with respect to space, one aspect of scale. Many indigenous groups perceive the physical and metaphysical worlds as indivisible. Spiritual and religious concepts are interwoven into language, thought and daily practice. In one Mayan dialect the verb *to do*, can also be translated *to think* or *to dream*. On the other hand, western culture has drawn such a firm line between the physical and metaphysical worlds that some find it difficult to understand or accept the metaphysical world.

Time, another aspect of scale, is also regarded quite differently by alternative knowledge systems and the western system. IKS tend to consider time as fluid and changeable. Western science, on the other hand, perceives nature's time as strictly ordered, operating in linear fashion according to predictable rules or laws. Furthermore, by understanding that knowledge is a collective endeavor, many indigenous groups also view time as intergenerational. For the westerner who sees knowledge production as an individual act, time is more likely marked by an individual's productive lifespan. Furthermore, language – the uses of verb tenses and pronouns and whether concepts are considered as nouns or verbs – is an indicator of how time and knowledge are considered. Among the Hopi of the American Southwest words like lightening which are typically nouns in western languages are instead verbs. Of necessity, these diverse worldviews result in very different treatments of the environment by the indigenous and western mind.

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