Commentary
Arthur Tansley, “The Use and Abuse of Vegetational Concepts and Terms” (1935)
Libby Robin

This paper is part of a long and fruitful transatlantic conversation that resulted in the definition of the “ecosystem” as a tool for modern understanding of the function and organization of nature. British and North American ecology had developed in rather different ways, and in 1911, Arthur George Tansley (1871–1955) organized a new international event, the first International Phytogeographical Excursion (IPE) to the Norfolk Broads in England, to facilitate dialogue between perspectives from both sides of the Atlantic. The excursion was also part of the British Vegetation Survey (which in 1913 became the British Ecological Society).

Henry Chandler Cowles, from Chicago, commented that Tansley’s IPE had “internationalized” plant geography and served to “divest it of . . . provincialism.” In this paper Tansley warmly acknowledged the importance of Cowles in theorizing the concept of succession (p. 284), and much of the paper is directed at differences between the prairie-driven ecological theories of North America (particularly those of Frederic Clements) and the Old World ecology of Britain and continental Europe. It was written to clarify the vegetational concepts used in what Tansley liked to call the “New Ecology.”

“Use and Abuse” is abridged here to about a third of its original length. The omissions mostly relate to an extended discussion of the philosophical basis for vegetational concepts put forward by South African philosopher-biologist John Phillips, in his 1934 paper “Succession, Development, the Climax and the Complex Organism: An Analysis of Concepts.” Phillips’s ecology was founded on the ideas of ecologist Frederic Clements, and its holism drew on ideas of South Africa’s famous international statesman Jan Smuts. Tansley was a scientist inspired by modernity, who rejected the notion of a plant community as an “organism,” as expressed by Phillips and Clements. He favored a more physical conceptualization of nature and resisted analogies with sociological and holistic concepts. His “idea of the new” was evident in his early journal The New Phytologist (1902) and extended to his work in the “new psychology” in the 1920s with Sigmund Freud in Vienna.

The abridged paper sheds light on the key concept of the “ecosystem,” and the question of how to conceptualize landscapes modified by human action. These have proved the most long-lasting contributions to global change thinking. Like his compatriot, animal ecologist Charles Elton (see Part 8), Tansley was conscious that humans were just one animal among many, and that animal com-
munities and human communities changed the environment in ways that con-
cepts like the ecosystem needed to take into account. Tansley considered both a
human and a plant community to be quasi-organisms, but neither was an organ-
ism. Even the universe itself became an organism, under the broad definitions
suggested by Phillips; thus the term effectively became too broadly conceived
and inclusive to be of practical scientific use to the modernist Tansley.

A. R. Clapham, a crop physiologist at Rothamsted Experimental Station,
coined the term ecosystem, but Tansley defined it functionally for the discipline
of ecology, including inorganic as well as organic factors. Soils and climates were
important elements in an ecosystem, “the habitat factors in the widest sense.”
More than a biome, an ecosystem became properly the subject for study by physi-
cists, soil scientists, and chemists, along with biologists, thereby promoting eco-
ology itself as a meta-discipline, rather than a mere subdiscipline of biology. The
close attention to soils (echoed in Sears in Part 4) is part of the rapid growth of pe-
dology (soil science) in this era. “Edaphic” (soil) factors included non-living ele-
ments such as nitrogen, rock types, and slope, which determined rates of erosion.
While climate had been recognized as significant as far back as von Humboldt
(see the previous essay), the ecosystem was a new tool that integrated the study
of plants, soils, and climate into one realm of knowledge. While ecologists since
the 1990s, such as Daniel Botkin, now dispute the idea of climax ecosystems, or
the “perfect dynamic equilibrium” discussed by Tansley, the ecosystem concept
itself has remained remarkably robust for seven decades.

Natural and human-modified systems alike need the same conceptual treat-
ment, Tansley argued: “We cannot confine ourselves to the so-called ‘natural’ en-
tities and ignore the processes and expressions of vegetation now so abundantly
provided us by the activities of man. Such a course is not scientifically sound,
because scientific analysis must penetrate beneath the forms of the ‘natural’ en-
tities, and it is not practically useful because ecology must be applied to conditions
brought about by human activity” (340).

Ecosystems and their successional processes include anthropogenic change,
but not catastrophic events (like elephants and volcanoes). Change must be
along a continuum to be properly the subject of ecological laws, but the forces
of change can be natural or human. Catastrophes “are unrelated to the causes of
vegetational changes” (289). Tansley resisted the idea of an idealized scientific
concept not relevant to the working situations where scientists found themselves.
If ecologists were to become “experts” for working landscapes, they needed theo-
etrical concepts inclusive of applied situations.

Tansley was deeply interested in human society, especially its evolutionary
past (the herd instinct). In The New Psychology (1922), he argued that the mind is a
highly evolved organism, but “of nature,” not apart from it. Its most fundamental
activities are non-rational and unconscious, “inherited from primitive man and from man’s non-human forerunners” (23). Three decades later, in his preface to *Mind and Life* (1952), Tansley held the same line: since humans are animals, biology must come before psychology (p. vi).

Vegetational science had always had an applied and practical edge, which dated back to the *Survey and Study of British Vegetation* begun in 1904. This continued in Tansley’s definition of “wild nature,” relevant to the later part of his career, when he became chairman of the new Nature Conservancy in 1949. In Tansley’s thinking, wild nature must be understood in terms of its human history, so his nature conservation was cast in a “heritage” mold. Tansley was not drawn to New World wilderness thinking, nor to transcendental understanding of landscapes. He recognized the “unspoilt landscapes” of Britain as the handwork of generations of farmers, rather than nature evolving in isolation from people. In 1950, he was awarded a knighthood that acknowledged the usefulness of his science to the nation in the practical planning and management of the countryside.

**Further Reading**


Principles and Concepts Pertaining to the Ecosystem and Biogeochemical Cycles

EUGENE P. ODUM

1. Concept of the Ecosystem

STATEMENT

Living organisms and their nonliving (abiotic) environment are inseparably interrelated and interact upon each other. Any entity or natural unit that includes living and nonliving parts interacting to produce a stable system in which the exchange of materials between the living and nonliving parts follows circular paths is an ecological system or ecosystem. The ecosystem is the largest functional unit in ecology, since it includes both organisms (biotic communities) and abiotic environment, each influencing the properties of the other and both necessary for maintenance of life as we have it on the earth. A lake is an example of an ecosystem.

EXPLANATION

Since no organism can exist by itself or without an environment, our first principle may well deal with the “interrelation” part of our basic definition of ecology. . . . The portion of the earth which contains living organisms and, hence, in which ecosystems operate, is known as the biosphere. Since life extends for only a relatively few feet below the earth’s surface, the biosphere is the thin outer shell of the earth, including the oceans and the atmosphere. The biosphere is important not only as a place where living organisms can exist but also as a region where the incoming radiation energy of the sun brings about fundamental chemical and physical changes in the inert material of the earth. These changes result chiefly from the functioning of various ecosystems.