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Landscape Ethnoecology

Concepts of Biotic and Physical Space

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Chapter 1

Toward a Theory of Landscape Ethnoecological Classification

Eugene S. Hunn and Brien A. Meilleur

We propose that landscape ethnoecological classification represents a semantic domain worthy of systematic comparative analysis. A landscape ethnoecological classification is a set of named categories such as "marsh," "cliff face," "old-growth forest," "hedgerow," "mangrove swamp," "oak copse," and "lawn," each of which refers to a perceptually and functionally distinct landscape feature. We propose a comparative analysis of such terminological sets modeled on that which has proved to be productive with ethnobiological (Berlin 1992), ethnoanatomical (Brown 1976), toponymic (Hunn 1996), color (Kay and Berlin 1997), and kinship classifications (Atkins 1974). As with these better-known domains, their successful analysis requires a clear formulation of the formal relationships among the elements classified and an appreciation of the nature of the experiential realms ordered by the classification. We offer the following sketch as an initial step toward that end. Our analysis involves "heroic" simplifications that we hope will prove justified by future results.

Toward a Theory of Landscape Ethnoecological Classification

First, we define a landscape ethnoecological classification as a partition of a "subsistence space" into *patches,* such that every point of that space will fall either within a patch or on the boundary between adjacent patches. Such boundaries may be sharply drawn or diffuse. These patches are tokens of types we prefer to call *ecotopes,* that is, "the smallest ecologically-distinct landscape features in a landscape mapping and classification system." "[E]cotopes are identified using flexible criteria ... a combination of both biotic and abiotic factors, including vegetation, soils, hydrology, and other factors ... In 1945 Carl Troll first applied the term to landscape ecology" (Ellis 2009). This term is roughly synonymous with "kind of land," "biotope," or "habitat," but we prefer ecotope because it does not imply a focus on land forms (versus features of rivers, lakes, or the sea) nor on biological or, more often, botanical markers as definitive. Nor does the term ecotope have the ecological implications of the term "habitat," that is, a home for some particular species of plant or animal, including *Homo sapiens*.

The boundaries between ecotopes, that is, *ecotones*, may be of particular significance to local subsistence practice. As noted, such boundary regions may be more or less distinct. When patches grade one into another broadly, boundaries may not be recognized as such. However, when patches are sharply defined, boundaries may be named as distinct folk ecotopes, e.g., "shoreline" or "forest edge."

Ecotopic patches should map onto closed regions of the earth's surface. Here we are pursuing a structural analogy with ethnobiological classification and nomenclature. In the ethnobiological case names for plants and animals in theory denote categories of similar organisms such that the *biodiversity space* of known living things maps onto a basic, or generic, set of folk biological taxa. That is, each and every individual tree we call a "pine" (i.e., a token) is a member of the pine tree category (the type), and, theoretically, every individual living organism will be classifiable as belonging to one or another named folk biological taxon. This conceptual mapping between names and concepts in the ethnobiological case is complex and "imperfect," as has been widely noted (e.g., Hunn 1982), but by no means random. Might we expect something comparable in the landscape ethnoecological domain? For the sake of argument we would like to offer a series of assertions to that effect.

First it is essential to recognize, as Mark, Turk, and Stea and Meilleur (see also 1986) here note, that there is a fundamental difference between biosystematic classifications and ecological or ecotopic classifications. The former reflect "natural discontinuities" generated by evolutionary processes of speciation (Hunn 1976). The latter reflect more or less continuous patterns of variation along a range of partially independent dimensions, such as soil chemistry and plant associations. As noted in the volume introduction, ecotopic classifications in general do not isolate physiographic, biotic, and cultural significata in defining culturally significant landscape elements. Nevertheless, we believe it is useful to assess potential similarities between ethnobiological and ethnoecotopic classification and nomenclature across a range of languages.

We expect that many folk ecotopes will be characterized by distinctive associations of organisms, particularly of plants (which by virtue of their rootedness will be more predictably associated with particular landscape patches than will animals). We will argue that folk ecotopes should also entail culturally salient ecological distinctions. We are alert to the possibility of a hierarchy of ecotopes (e.g., "forest" < "rain forest" < "temperate rain forest" < "cedar grove"; cf. Abraão et al. on Baniwa forest categories, this volume) but believe that—as in the case of ethnobiological classifications—there should be a *basic-level ecotopic partition* of each local landscape, the elements of which are particularly salient to the people who employ that classification. As with ethnobiological classifications, we might expect that elements at this basic level will be consistently and concisely named in the local language. Elements at a higher or lower level of generality may be named by modifying basic-level ecotope names or by complex descriptive labels (Meilleur, this volume, 1986).

Variation in the number of named ecotopes may reflect differences in the level of analysis. Ellen suggests in his contribution to this volume that some languages may explicitly recognize many lower-level categories that in other languages remain implicit or covert. There is a parallel in ethnobiological classification, in that languages vary in the degree to which they employ "binomials" to recognize folk specific and varietal taxa (Hunn and French 1984).

We expect also that the distinction between general-purpose and special-purpose categories, elaborated in theoretical discussions of ethnobiological classification (e.g., Hunn 1982), will also be relevant to landscape ethnoecological classification. For example, "sacred place" would appear to be a special-purpose rather than a general-purpose ethnoecological category, since "sacred places" may coincide with a variety of ecotopes (see Johnson's account here of Kaska landscape classification).

Furthermore, given that we are dealing here with a spatial partition, the formal properties will be "partonomic" rather than taxonomic (Brown 1976), that is, relations of contiguity are more fundamental than relations of similarity (Meilleur, this volume, 1986). We also expect that the ecotopes will be structured around prototypical regions (Berlin 1992: 24).

We propose the following hypotheses for test:

- Ecotopes are "natural categories" in that particular species of plants and/or animals will be predictably associated with certain ecotopic patches. However, they are often intergradient rather than discontinuous, which problematizes their systematic recognition.
- People cannot do with just any landscape ethnoecological classification, but will adopt and maintain systems of distinctions that maximize the spatial predictability of local biotic and other resources.

Where Do Place Names Fit?

So far we have mentioned two intersecting classifications, that of plants and animals (the ethnobiological), about which we know quite a lot (Berlin 1992), and that of ecotopes, about which we know little. But there is a third semantic realm that must be integrated into this plan of investigation, to wit, the toponymic, the system of geographic place names that is recognized in every society. We believe that landscape ethnoecological classifications function to integrate efficiently the information captured within the ethnobiological and ethnogeographic domains. For example, Fowler's analysis here of Southern Paiute landscape concepts emphasizes the intimate relationship between these domains. A key issue here is the nature of the system of systems by which the three classifications are integrated.

Biological taxa and ecotopes are *spatially distributed* types, that is, each species and each ecotope occur repeatedly across space. Place names, by contrast, denote—as proper names—unique spots on the landscape. Named places do not exhaustively partition space (except for the special case of nation states and their administrative subdivisions), but rather are scattered across it, often with much "empty" space in between (Hunn 1996). We have found that in many languages place names are binomial expressions in which ecotope names serve as the "head" element, e.g., "Long Swamp," "Fork's Prairie," "Walden Pond." However, some languages do not employ such transparent constructions, e.g., Sahaptin of the Columbia Plateau of northwestern North America (Hunn 1996), or a mix of the two approaches is used.

Landscape ethnoecological classifications, like ethnobiological and toponymic systems, are recognized in every human language. Why should this be? First, biological species categories are recognized presumably because they are motivated by compelling perceptual discontinuities and because the organisms distinguished by name differ one from another in useful ways (Hunn 1982). In fact, there is strong evidence that humans are innately programmed to recognize nomenclaturally within their subsistence space on the order of 500 each of basic plant and animal categories (Levi-Strauss 1966; Berlin 1992). Places are named presumably because such focal points of the landscape preserve in memory critically important information needed to locate and acquire resources, including, of course, plants and animals. These are elements of what Mithen identifies as the "natural history intelligence," one of three "multiple intelligences" critical for the evolution of modern *Homo sapiens* (2006: 62). Place names also index social relations and emotional ties at the foundation of personal identity (Basso 1996) and may represent spiritual anchors and legal claims to the land (Thornton 1995). There is evidence that people will name in the neighborhood of 500 places also within their subsistence space (Hunn 1996).

Hypothetically, if people knew which of 500 named plants and 500 animals occurred at each of 500 named places, there would seem to be little need to recognize and classify ecotopes, since species could be located simply by canvassing one's toponymic inventory. However, we believe that naming ecotopes saves mental energy and enhances the efficiency of subsistence activities by facilitating the integration of these two massive data bases, the ethnobiological and the toponymic. To appreciate this point, consider the following thought experiment.

If we recognize 500 plants and 500 animals, that equals 1,000 kinds of organisms. If, in addition, we recognize 500 named places, we will have 500,000 (1000 × 500) bits of information about the environment to keep track of. On the other hand, if we were to define a few dozen ecotopes such that the organisms and places were evenly distributed among them (each plant and animal and each place uniquely associated with one and only one ecotope), the task of locating a particular organism at a particular place would be substantially simplified.

Of course, these assumptions represent an ideal case that one would never encounter in the real world. In particular, more realistically, ecotopes with biotic content will differ from one another in their organismic inventories to some less-than-perfect degree. Nor will organisms be distributed uniformly within ecotopes. Nor will places necessarily fall within a single ecotope. However, if there is a substantial statistical correlation between species and ecotopes, the efficiency of recognizing even less-than-perfectly distinct ecotopes should justify their recognition.

Potential ecotopic distinctions may be ranked in terms of the predictive power they offer (Meilleur, this volume, 1986). We have suggested that landscape ethnoecological classification is characteristically "natural." We believe this to be the case because the spatial distribution of organisms (especially of plants) is strongly determined by a few fundamental topographic, climatologic, and edaphic dimensions, most notably those that determine the availability of (1) solar energy, (2) water, and (3) mineral nutrients. Among these factors, clearly, are latitude, elevation, aspect, and placement with respect to global and regional atmospheric currents. Also salient are geological factors that determine soil chemistry. Finally, patterns of human disturbance will play a key role (Meilleur, this volume, 1986; Krohmer, this volume).

We expect that ecotopic distinctions will be recognized explicitly in the local vernacular vocabulary in order of their predictive power as defined above. As is typically the case with ethnobiological names, terms naming basic-level categories and those that are more inclusive will be given simple or complex but "unproductive" names (cf. Conklin 1962). More specific ecotopic categories will be named by productive compound expressions. Examples include plant associations named for indicator species, such as the Kaska ***gǫ́dze tah*** 'among pines' and ***gat tah*** 'among spruce' (Johnson, this volume); Anishinaabe ***okwokizowaag agimakoog*** 'black ash grove' and ***okwokizowaag geezhigoog*** 'cedar grove' (Davidson-Hunt and Berkes, this volume); Sahaptin ***patat-naq'ít*** 'ponderosa pine [forest] edge' (Hunn 1996).

Other basic ecotopes may be differentiated by productive morphosyntactic processes such as reduplication to generate two or more related terms naming variants of a single theme, as in the case of Sahaptin ***tnan-naq'ít*** 'cliff base' versus ***tnán*** 'cliff' and the Burkina Faso differentiation of hills of various sizes: e.g., ***waamnde*** is a mountain or large hill while ***baamngel*** is a smaller hill; ***tilde*** is an elevation lower than ***waamnde,*** while the diminutive variant ***tilel*** is a very small hill (Krohmer, this volume). Though these pairs of terms are not related as type and subtype, the diminutive variants are clearly defined in terms of the unmarked terms of the set, a pattern described by Hunn and French as "horizontal" versus "vertical" subordination in the Sahaptin ethnobiological nomenclature (1984). Distinctions may remain implicit or covert, defined by the intersection of named basic terms drawn from intersecting dimensions. Ellen's account of the Nuaulu system is exemplary: "[T]here is evidence for subtle and extensive understanding of variation, and of the ecological properties of different vegetative associations. However, only a small number of categories are shared and consistently organized, and there is a low degree of formal lexicalization" (Ellen, this volume).

Finally, academic biogeographic classifications based upon climatological, hydrological, geological, phytosociological, and successional patterns will tend to correspond with landscape ethnoecological classifications. When ecological classifications—whether academic or folk—*do not* so correspond, conceptual emphases of particular cultural significance—symbolic or historical—likely motivate such "departures" from a "natural" ecological partition. In our hypotheses we have emphasized "practical" or "empirical" considerations, but we are open to the possibility that landscape elements defined by reference to aesthetic, emotional, or spiritual qualities may play an important role.

Discussion and Examples

The Geo-hydro-edapho-logical Substrate Problem

We seek to define a semantic domain that might appear to defy recognition on the basis of shared substantive attributes, as it includes elements as diverse as "piney wood," "eddy," "salt lick," "cliff," "hedgerow," and "road." That is, the named elements that partition space are predicated not only on botanical and zoological associations, but may also highlight geological, hydrological, and edaphic features (which in turn constrain biotic species associations), and reflect both the "natural" and the "built" environment.

A key question is whether multiple spatial partitions will be recognized as corresponding to the several substrates we have noted—that is, will we find that cultures distinguish biotopic, geotopic, hydrotopic, and anthropotopic partitions as separate and distinct from an ecotopic partition? Mark, Turk, and Stea here define "ethnophysiography" in terms of the geotopic dimension. Aporta describes a system of ecotopes characterized by snow and ice. Ellen contrasts a number of studies focusing on forest ecotopes. However, we are inclined to the view that it should be possible to recognize a single multidimensional landscape ethnoecological partition without regard for the predominant type of feature that may serve to define elements of the partition. Furthermore, most elements of a given ecotopic partition will likely exhibit some biotic aspect. For example, the geotope "talus" in the Columbia Plateau homeland of the Sahaptin-speaking Indians is named ***pshwá-pshwa,*** literally 'many rocks', and recognized as the unique habitat of a rare plant, *Lomatium minus*, ***nak'únk*** in John Day River Sahaptin. This plant is sought for its edible roots. Sahaptin speakers also recognize ***shám*** 'lithosol patch' as habitat for several staple root food plants.

Hydrotopic features may likewise serve to target important biotic resources. For Sahaptin again, ***xaat'áy*** 'shallow stream bed of pale, flat rock' indicates a site sought for spear fishing, as migrating salmon are clearly exposed in such situations. In Micronesia, Palauan fishermen recognize a convergence zone of sea currents downstream from islands that they call ***hapitsetse.*** This zone is characterized by exceptionally rough water at certain seasons that can be hazardous to fishermen in canoes, but it also helps define the daily movements of certain prize fish such as tuna (Johannes 1981: 101–109). Aporta's fascinating analysis of the relevance of sea ice patterns for Inuit subsistence practice provides another example. Krohmer's meticulous account of Fulani classification of their desert environment illustrates the multidimensionality of these classifications.

Anthropogenic Ecotopes

Anthropogenic features also mark resource locations and predictable resource associations. For example, in the French Alps of Savoie, Alluetais peasants call a cultivated field rockpile ***le mordjé.*** Waste rock is cleared from plowed fields and piled on the field borders. The rock is useless, but after some years a distinctive biota develops on these rockpiles, characterized by several species of brambles (*Rubus* spp.) and elderberry (*Sambucus nigra*), both of which provide edible berries in season, and a species of ash (*Fraxinus excelsior*) with multiple uses (Meilleur 1986: 84, 98). Huastec Maya cultivate dozens of herbal medicines in an area they call ***wal eleeb*** 'dooryard edge', the margin of the cleared space they maintain around their houses.

It may be the case that every ecotope is to some extent "anthropogenic." Prairies in the Pacific Northwest of North America depend upon systematic burning (Boyd 1999). The Huastec forest ***te'-lom*** is often planted to coffee or carefully tended to encourage useful forest species (Alcorn 1984). This is reminiscent of the Yucatec Mayan ***pet kot,*** forest patches now known to be thoroughly anthropogenic (Gómez-Pompa, Flores, and Sosa 1987). Posey has argued likewise that certain forest patches in southern Amazonian savannahs were established by local Indians quite intentionally (1984).

We suspect that communities will vary along a continuum of intensity of local resource management between hunter-gatherers and agriculturalists to modern urbanites. We expect that agriculturalists will be more likely to recognize anthropogenic ecotopes than hunter-gatherers, since farmers interact more intensively with their local landscape. Our several previous examples would seem to bear this out. What might be called a *monocrop ecotope* should be characteristic of agricultural systems with a commercial emphasis. Names for such ecotopes are often productive binomial compounds, such as "apple orchard," "banana plantation," or "wheat field." The basic-level categories are "orchard," "plantation," and "field," appropriately modified by specifying the species to which the plot is devoted. Alluetais terms of this sort include ***le tsnavyé*** 'hemp plot' and ***la vnyé*** 'vineyard'. Huastec terms are ***pakab-lom*** 'sugar-cane field', ***weey-lom*** 'henequen plantation', and ***lanaax-lom*** 'orange grove'. This usage is not limited to such anthropogenic plots however, as ***te'-lom*** is a forest, literally 'tree-land' (Alcorn 1984), and in Alluetais, ***lèz arkosè*** is both the plural of 'green alder' (*Alnus viridis*) and a site at which green alder grows in dense thickets on wet mountain slopes (Meilleur 1986). Even hunter-gatherers may name plots dominated by single plant species, as in the Sahaptin ***tawshá-tawsha*** 'many sagebrush' and ***wiwnú-wiwnu*** 'many huckleberries', each formed by reduplicating the name of the predominant species of the association, though the Sahaptin ecotope 'huckleberry patch' may have been shaped by the systematic use of fire to enhance the productivity of this valued biotic resource.

Are There Urban Ecotopes?

Our analysis obviously foregrounds rural subsistence-oriented communities. As with the study of ethnobiological classification systems, modern urban societies lurk in the background as exceptions that prove the rule. How might an urban landscape be organized conceptually by the urban "native"? Spradley's classic ethnography of Seattle's homeless (1999) suggests one answer. He found that the semantic domain most highly elaborated for these "urban nomads" was that of "flops," that is, places to sleep.

Clearly our emphasis on biotic and other subsistence resources does not readily generalize to the urban core. Critical resources for urbanites are elements of the social or built environments; less often are they of the non-urban (wild or rural) environment. Still, we may recognize such urban ecotopes as "park," "parkstrip," "yard," "lawn," "garden," "P-patch" (a small urban community garden), and "zoo." These are likely to be less salient than such environmental features as "playground," "mall," "intersection," "cloverleaf," and "high-rise." We might enquire in this regard whether these latter "urbotopes" are conceptually equivalent to the ecotopes of more "natural" human environments, a question parallel to the comparison of folk biological taxa and categories of artifacts, such as "furniture," "vehicle," and "building" (cf. Brown et al. 1976; Wierzbicka 1984).

Ecotopes as Multipurpose Categories

Ecotopes are multipurpose concepts, good not only for finding key plant and animal resources, but also for marking social and spiritual spaces and their boundaries. To cite just a few examples: Mixtepec Zapotec (Oaxaca, Mexico) speakers respect wetlands and distinguish several, such as ***guièl*** 'lake', ***gòdz*** 'marshy spot', and ***xliàn*** 'spring'. Such water sources may be "enchanted" and are thus approached with a mixture of awe and fascination. The enchanting spirits may take offense and depart, leaving these spots dry, as happened a few years ago to one of San Juan Mixtepec's two main water sources, an event attributed to the rash of forest fires that plagued the region that year. In this vein, Sahaptin speakers consider landslides, or ***txápnash,*** a spiritual resource, for here one is likely to encounter ***shúkat,*** literally 'knowledge', a spirit ally that may take animal and human form. Yet these features are also ecotopes with distinctively valuable flora and fauna. San Juan Mixtepec lakes and marshes support a sharply distinct flora, while Sahaptin slide areas are known to harbor certain species of game.

Conclusions

We do not claim to have discovered the phenomenon of ecotopic classification. Consider the comments of three of our predecessors, an anthropologist, a botanist, and a geographer. In a 1946 article, the anthropologist David Thomson described an Australian Aboriginal classification system, that of the Wik Monkan. According to Thomson, the Wik Monkan classify "the country into 'types' based on its geographical and botanical associations, as critically as any ecologist" (1946: 165). In fact, "so detailed and accurate is their knowledge of these areas that they note the gradual changes in marginal areas as one association merges into another and they often use distinctive names not listed here, for each transitional area … [they are also] … able to relate without hesitation the changes in fauna and in food supply in each association in relation to the seasonal changes" (1946: 166). Wik Monkan use a domain-specific prefix, roughly meaning 'place', to help distinguish the lexical set of 'types of country' from other domains of natural phenomena.

Likewise, the botanist Harley Harris Bartlett noted in 1936 that the Maya recognized natural groupings of plants. Wherever he traveled, he found that the native people distinguished and named plant communities as well as noting the dominant species within each. Such categories were used by his consultants to predict the whereabouts of resources while out gathering and hunting. Though unfamiliar with the local vegetation, Bartlett found the habitat categories of the local people immediately comprehensible. In fact, he was able to employ them as would a native classifier to predict where certain plant species would be found.

In 1973, the human geographer Bernard Nietschmann, in his ethnographic monograph *Between Land and Water,* described patterns of Nicaraguan Miskito Indian environmental classification and use, documenting over twenty folk "biotic communities": "The Miskito recognize many biotopes, mostly in terms of structural composition. They perceive the relation of specific … species to certain biotopes and direct their [resource]-getting activities accordingly" (1973: 168).

Table 1.1 Summary of landscape ethnoecological categories of ten cultures

Group	Ecotopes	Other categories	Source
Alluetais, France	20	+34 other landscape features	Meilleur 1986
Huastec Mayan	30	ecotopes +19 milpa stages	Alcorn 1984
Koyukon, Alaska	33	including all ecotopes	Nelson 1983
Sahaptin, NW US	44	including all ecotopes	Hunn 1990
Mixtepec Zapotec	31	ecotopes + 3 milpa stages	Hunn 2008
Wola, New Guinea	13	vegetation associations only	Sillitoe 1998
Yanyuwa, Australia	47	including all "land units"	Baker 1999:46
Kaska, Yukon Terr.	60	including all "kinds of place"	* Johnson
Fulani, Burkina Faso	102	all landscape units	*Krohmer
Baniwa, Brazil	88	forest types < 4 broad categories	*Abraão et al.

*essays included in this volume

The examples we have reviewed to date (see Table 1.1 and several chapters below) support our initial claims as follows: ecotopic classifications are widely reported and include roughly twenty-five basic-level ecotopic categories. The total number of topographic feature terms, however, may range to 100 or more, depending on how the terminological set is delimited. These ecotopic classifications partition the subsistence space of the community by creating a mosaic of ecotopic patches (which may be linked by transitional zones). Local people use these ecotopic categories to guide them in locating resources and otherwise journeying through their home territories. Ecotopic concepts are rarely very general or very specific in application; most appear to be basic-level categories, though instances occur of a shallow hierarchy of named ecotopes. Named places are located with respect to basic-level ecotopic categories.

The systematic comparative study of landscape ethnoecological semantic domains is just beginning. This domain is of special interest because it involves the conceptual coordination at a higher level of abstraction of two basic domains of environmental knowledge, that of species and that of places. Together these three domains constitute a system of systems with clear adaptive value.

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