T12.2 CULTURAL LANDSCAPES

This Topic defines "cultural landscape" and outlines a classification system for Nova Scotia based on the principles of landscape ecology. The purpose is to demonstrate that all landscapes are a visual manifestation of integrated natural and cultural elements and processes and can be classified according to the ratio of these components. In this text, the term "landscape" implies a structurally distinct land mass varying in size that can be subdivided into ecosystems and habitats.

DEFINING THE CULTURAL LANDSCAPE

The phrase "cultural landscape" is used by geographers to define the interaction of humans with their environment. When viewed from an airplane, landscapes appear as a relatively homogenous matrix interrupted by patches and corridors. Some of these patches and corridors, e.g., forests and streams, are distinctly natural, while others, e.g., towns and roads, are predominantly man-made. The ratio of natural to human elements determines the nature of the landscape. For instance, we often use the term "urban landscape" to describe an area that is predominantly developed, such as the Halifax-Dartmouth area. Elements of "natural" forest, such as park land, may make up components of the overall landscape, but its structure and function are generally maintained by human influence. Likewise, a "natural or wilderness landscape", such as Kejimkujik National Park, may contain elements of human infrastructure, e.g., logging roads; however, it is considered a predominantly natural landscape.

Technically speaking, the cultural landscape is distinctively artificial and can be recognized by its appearance or structure.[1] The visible modification of the landscape often reflects the resources available in the area, e.g., the Sydney coal field or the Acadian dykelands of the Annapolis River.

It is also important to recognize more subtle cultural influences, such as the acidification of fresh water, that might have less immediate impact on the look or structure of a landscape and more of a long-term effect on the function. Using this principle, there are relatively few parts of Nova Scotia that have not to some degree been altered by humans. Our cultural landscapes are the result of cultural interactions with resources over time.

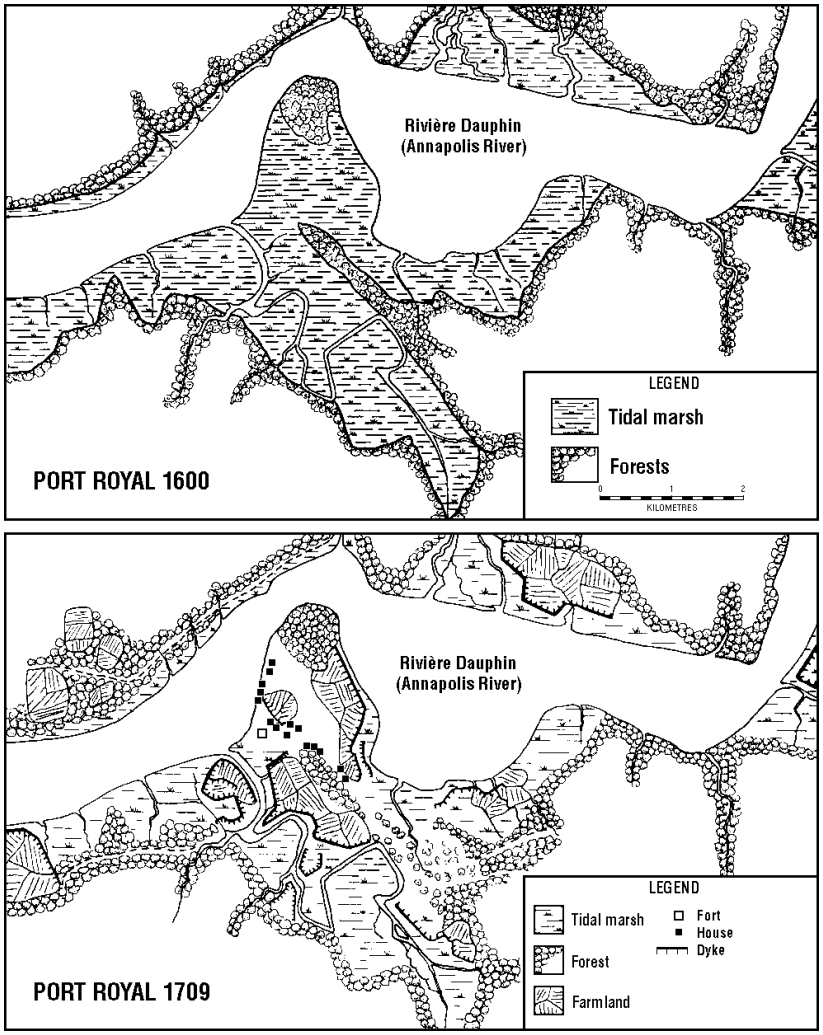

Figure T12.2.1: Plan view of cultural changes in the landscape between 1600 and 1709. A comparison of the natural tidal marsh and forest at the future site of Port Royal and the cultural landscape 100 years later shows the result of early European settlement. The conversion of tidal marsh to farmland is still evident at Annapolis and other coastal areas in the Bay of Fundy (District 610) today (see Plate T12.7.1).

A LEGACY OF CHANGE

On a geological time scale, humans have actually been a tangible factor in the evolution of Nova Scotia's landscapes for only a very brief time. (See Figure T3.3.5). However, during the last 10,000 years, we have interacted with biotic communities, influenced natural succession and modified the physical environment to various degrees.

The degree to which humans can alter the landscape relates to prevalent cultural values, technologies that allow us to access resources and the ratio of people to the resources. Native people, who were relatively few in number, developed a culture based on subsistence living. They were aware of the limitations of resources and accommodated their activities to fit within those limitations. European settlers were able to modify their landscape to a greater degree, but in relative terms they were also limited by available technology. Colonial settlement patterns in Nova Scotia were directly influenced by physical environment and proximity to resources (see Figure T12.2.1). Settlers tended to congregate around water, leaving relatively large uninhabited areas. Settled areas were modified for defense and aesthetics, as well as for survival. As new technologies and values were introduced to Nova Scotia through different cultures, more and more of the "natural landscape" was modified. The degree of modification increased proportionately to technological capabilities, changing values and population growth.

APPLICATION OF CULTURAL LANDSCAPES IN THE *NATURAL HISTORY OF NOVA SCOTIA*

The influence of culture on the landscape is reflected in the changes to its natural evolution. In the *Natural History of Nova Scotia*, Topics introduce the reader to the processes that create change in the landscape: formation and erosion of bedrock, glaciation, ocean currents, plant succession, etc. They also define the landscape features of which Nova Scotia is composed—drumlins, fields, coastal bays, forested uplands, etc.—and the elements such as plant and animals species. The systems that compose the landscape evolve naturally towards a steady successional state (see T10.2). Interruptions, such as fire, storms or other large-scale natural disasters, can radically alter the successional process. A mature system might now revert to an early-successional stage.

Ecologists define these changes as site history—what has happened to create the system that is there now. The cultural processes of land use are equally responsible for changing or maintaining a system in a certain successional stage. The obvious example is clear cutting a forest, which will generally return the system to a primary-succession stage. Human activity can also accelerate succession, for example, eutrophication of a lake (see T12.8). There are many variables involved when measuring the changes—geographical location, availability of seeds and nutrients, climate, etc. In *Volume 2, Theme Regions*, the association between physical environment and bi-

Plate T12.2.1: Windsor in two centuries. This similar view of Windsor from Ferry Hill shows how the landscape has changed since 1817. A reproduction of a watercolour painted by J.E. Woolford (*right*) depicts the military block house, docks and farmlands as the dominant cultural features. In 1995 (*facing page*) the block house is barely visible behind a residential and commercial built environment. Historical Plate: Nova Scotia Museum, Museum Services Division. Photo: A. Dauphinee

otic communities changes according to where you are in the province and the history of the area. For instance, pine tends to be the colonizing species in oldfield regeneration in southwest Nova Scotia, while White Spruce is the typical colonizer in most of the rest of the province (see H5.2).

Cultural processes are thus tangible factors in the shaping of the landscape. Cultural components, like natural ones, can be organized as features and processes. For example, resource uses, such as forestry, fishing, mining, farming and park development, are processes. They contribute to the evolution of the landscape by influencing the natural processes. Resource uses can be categorized as industrial, recreational, commercial, institutional and residential patches and corridors or features in the landscape. Elements can be broken down into individual houses, people or introduced plants and animals. These features, elements and processes also have regional variations that relate to settlement patterns in the province and can be overlain on the *Theme Regions*.

CLASSIFYING CULTURAL ACTIVITY IN THE LANDSCAPE

On a large scale, it is possible to define cultural regions in Nova Scotia. These areas tend to be a reflection of historical settlement patterns, where distinct cultures left deep imprints in the landscape (see T12.1). We tend to identify certain areas with distinct cultures, and we recognize these cultural landscapes in our naming of areas or routes: the French Shore, the Ceilidh Trail, Glooscap Fault. Elements of these cultures are interpreted in historical settings, such as at Annapolis Royal, the Highland Village and Louisbourg. The heritage parks are a spatial documentation of cultural history and human interaction with resources. They indicate that distinct cultural landscapes can be defined and that cultural changes can be interpreted from the landscape patterns, that is, the matrix of patches and corridors. By interpreting the composition of the pieces over time, it would be possible to see how the landscapes have changed and to relate this to different types of resource use (see Plate T12.2.1).

It is more difficult to define cultural history in the landscape when history and ecology blend together into heterogeneous areas without distinct divisions. However, it is generally possible to distinguish between cultural features, such as buildings, roads and reservoirs, and natural ones, such as forests, streams and coastal bays. Using this method, the landscape can be defined by the ratio of natural to cultural (see above—Definition of Cultural Landscape). However, in some cases it is not easy to classify a feature as natural or cultural. For instance, a reservoir is very similar to a lake in many ways and a forest can be managed. Which is natural and which is cultural?

"One of the tasks of landscape ecology is to understand the relationships of these heterogeneous components [in the landscape] including man and his works."[2]

Ecology studies the transfer of energy through systems and defines ecosystems based on their function. In his book *Ecology And Our Endangered Life Support System*, [3] Eugene Odum proposes a landscape-ecology approach to categorizing ecosystems, based on the type of energy used to maintain their function.

ENERGY-BASED CLASSIFICATION OF ECOSYSTEMS

This classification system broadly divides the landscape into three environments—developed, cultivated and natural. Using Odum's model, these environments can also be categorized as fuel-powered (both renewable and nonrenewable fossil fuel and human power), subsidized solar-powered and solar-powered. Odum demonstrates his model at the ecosystem level because this unit is traditionally defined by energy transfer in ecology. However, the model is applicable to both the landscape and the habitat level, using the ratio method for defining a landscape. For example, a cluster of developed ecosystems would be a developed landscape, and most of the habitats would also be developed; that is, they also would depend on fuel power from human input to exist. The model can apply to any level as long as the approach is consistent.

Ecosystems that depend entirely or mostly on imported energy to function, such as urban centres, are developed or built environments. These systems tend to produce more waste than they can absorb. Cultivated systems include farmland and managed woodlots, which are partly solar-powered and partly dependent on imported fuel energy. These are generally resource-management areas. Self-supporting systems, such as the ocean or the Taiga forest in Cape Breton Highlands National Park, which depend primarily on solar power, are natural systems.

To apply this model scientifically, one would need criteria for measuring the energy type in each system. However, as a simplistic model, the three categories demonstrate that the landscape can be classified in a way that accounts for cultural and natural distinctions and their interaction. Also, the cultural landscape can be organized in much the same way that we organize the hierarchy of natural land—habitat–ecosystem–landscape—in the *Natural History of Nova Scotia*.

Natural systems provide life support and biodiversity; cultivated systems provide that and the production of resources; developed systems provide shelter. Sustainable approaches integrate these three categories in healthy landscapes. We need to determine the balance desired in Nova Scotia—the optimum amount of spatial and functional change. The optimum matrix sequence changes through time. It is important to have the landscapes classified so we know that they are changing and can measure that change for both humans and natural resources.

CULTURAL HABITATS

The document uses the habitat as a manageable unit of classification, to demonstrate how processes and elements function together. The habitat can usually be defined on aerial photographs or maps as distinct polygons. The following is an inventory of cultural habitats in Nova Scotia. The list is incomplete, serving as an example of the classification method. The habitats are categorized according to whether they are developed or cultivated. Notice that both categories contain both natural and cultural elements. The ratio of elements defines the structure or appearance of the habitat. The function is defined by the energy used to maintain it. This relates to the type of resource use involved. As soon as the activity is abandoned, such as an old quarry or naturally regenerating clear cut, the habitat is considered to be natural, because the primary energy input is solar. That is why the oldfield habitat (H.2) is included in the natural habitats. The natural habitats are defined in the Habitats section that follows in the Topics section of the *Natural History of Nova Scotia*.

CHARACTERISTICS OF CULTURAL HABITATS

The general characteristics of cultural habitats are as follows:

1 They are often unstable and, if not maintained by human activity, would be the first stage of succession towards a naturally occurring vegetation and habitat type (see T10.2). In very disturbed areas, this may be a long process.
2 The conditions that occur are special and can be tolerated by relatively few species, which may be present in large numbers.
3 The habitat may be occupied primarily by introduced species (see T12.10 and T12.11) as opposed to native species. These may be cultivated species, escaped species or species that are normally found only in association with human activities.
4 Primary production may range from very low in areas with low nutrient, light and moisture levels to high in areas with artificial nutrient

enrichment and adequate light and moisture levels.

5 The site may be degraded in an ecological sense by continued disturbance and the removal of nutrients through erosion and harvesting of crops.

DEVELOPED HABITATS

Buildings and Furnishings: These habitats are dominated by built structures requiring constant fossil-fuel-energy input. The habitats provided within domestic and industrial buildings provide food and shelter for a variety of fungi, arthropods, mammals and birds. These species mainly utilize stored food and organic materials in clothes and furnishings. Because of low light levels in buildings, there is normally low primary production, unless indoor plants are used. The animal species include those with long human associations, such as the house mouse and silverfish, as well as species that are parasitic on humans or domestic animals, like fleas and bed bugs. These species may be sufficiently abundant that they cause economic loss or become health hazards and need to be controlled as pests.

Disturbed Land (gravel pits, transportation routes, waste grounds): The active removal or disturbance of soil produces conditions intolerable for the majority of plant and animal species. The absence of soil results in dry, nutrient-poor conditions; the absence of vegetation, particularly trees, allows for extremes of temperatures and exposure to light and wind. Some hardy plant species are able to colonize this hostile environment, e.g., Coltsfoot and Plantain. Cultivated habitats, such as ponds and drainage ditches (see below), are often associated with transportation routes.

If the site is abandoned, a slow succession will eventually provide a more diverse and dense cover of mainly introduced plants. Eventually shade-intolerant trees such as Chokecherry, and Wire Birch, will become established on the site (see H6).

CULTIVATED HABITATS

Marine Docks and Pounds: The quality of the seawater may be affected by chemical or thermal pollution or concentrations of organic waste, and this may limit or enhance the occurrence of some species. The normal marine plankton, nekton and benthos communities prevail in the absence of these pollutants. On wharves, the appropriate pattern of intertidal zonation will be well defined on vertical structures. Submerged structures will have the same benthic community as rock bottoms (see H1.2 and H2.1).

Water Conduits: The seawater intakes and outfalls of thermal and tidal electricity-generating stations, industrial plants and sewage treatment plants will be colonized by benthic epifauna. As there is no light, plant life does not exist, and the animal species assemblage is mainly limited to particulate-feeding types, such as Blue Mussels and barnacles (see T11.17). These species may become sufficiently abundant to reduce water flows, and they need to be controlled by chlorination and other techniques. In fresh water, fouling by organisms is not a regular problem. Crustaceans and oligochaete worms, such as *Tubifex*, may occur (see T11.16).

Reservoirs and Canals: These are basically freshwater lake and stream habitats (H3) but subject to unnatural seasonal water-level changes. The most significant ecological change is hypolimnetic withdrawal or the removal of bottom water. The shallow-water (limnetic zone) flora and fauna are often poorly developed, but these habitats may be biologically active. Good examples are the dam and canal systems of Gaspereau River (Units 422 and 451) and Wreck Cove hydroelectric systems (District 210).

Ponds and Drainage Ditches: These are small bodies of water, often with marked seasonal variations in water level, having most water in the spring (vernal ponds). They may be subjected to nutrient enrichment or concentrations of road salt and herbicides and the margins are often trampled by cattle. These are basically pond habitats, subject to vegetation succession and progressive infilling (H3.4, H3.6). Roadside ponds created during highway construction often support large populations of amphibians due to the lack of aquatic predators (fish) and the warm temperatures, and have helped to disperse some species to areas where they were not previously found. Due to isolation and disturbance, aquatic invertebrate fauna may be poor. At one time, there were many ponds established for sawmills, but few now remain. There are, however, many farm ponds and impoundments on tidal marshes that provide important wildlife habitat (see T12.8). Some ponds are artificially stocked with fish (see T12.11).

Fields under Cultivation: The objective of agriculture is to control the nutrient, moisture and light resources of land to produce a desired crop species.

This process involves cultivation of the land, use of fertilizers, seeding, application of herbicides to control competitive plant species (weeds), application of fungicides and pesticides, control of moisture (such as dykelands) and harvesting. The main crop species is often accompanied by other hardy plant species, usually introductions, and the habitat may be used by various species of wildlife as a source of food and shelter. When abandoned, the successional process to oldfield (H.2), forest (H6) or tidal marsh (H2.6) begins. Dykelands in Nova Scotia are interesting examples of the change from natural to cultivated habitat and back again. The process that maintains the function and structure of a tidal marsh is one of the most uncontrollable forces that humans have to contend with. This is the twice-daily flooding of tidal areas (see T6.1). Managed dykeland quickly reverts to tidal marsh when the sea breaches the dykes that enclose the marsh. If these dykes are not constantly maintained, the vegetation will soon return to salt-tolerant species (see T12.7).

Orchard: The characteristics of this habitat are similar to those of fields under cultivation, but the species in the monoculture are trees. The ground flora is generally composed of grasses and introduced meadow plants. Domestic animals may be grazed amongst the trees and beehives are common. This habitat type is particularly common in the Annapolis Valley (Unit 610).

Pasture: Pasture is maintained grassland habitat used as a feeding area for cattle, horses, sheep and goats. Dry upland or wet lowland pasture will be used for the most suitable animals. This habitat needs to be maintained through grazing or removal of shrubs, otherwise it will rapidly revert to forest through the oldfield succession. Apart from the effects of a concentration of grazing animals, which include fertilization and compaction of the soil through trampling, the pasture habitat may be in relatively natural state and utilized by native plant and animal species like American Robin (see T11.3), as well as the introduced species.

BETWEEN CULTIVATED AND DEVELOPED

Parks, Gardens and Greenhouses: These are examples of sites with intensive human management and control of conditions. Shade, fertilization and moisture are manipulated to maintain growth of nonnative plant species. However, such habitats are susceptible to unwanted plants (weeds) and animal species, which need to be actively controlled. Furthermore, garden slugs, earwigs, sowbugs and other invertebrates are all introductions which thrive well in the conditions made available in this habitat. Control of pest species is often through the use of herbicides, fungicides and pesticides. Colonization by some plants, such as lichens, may be limited by air pollution in city centres.

Quarries: Active quarries, in which the rock face is continually being blasted and removed, provide a very sterile habitat. In formations where the rocks are fossiliferous, however, there is a constant supply of raw material exposed. Where a quarry is abandoned, it continues as a cliff habitat (H5.3), eventually becoming colonized by plants and animals according to the conditions of height, rock type and aspect (north-facing slopes tend to be cool and moist, south-facing slopes dry and hot). Progressive weathering and rock fall will result in the accumulation of a talus slope (H5.4).

Mines and Tunnels: Active mines and other tunnel structures often have carefully regulated conditions that do not favour colonization by plants and animals. The absence of light prohibits the growth of green plants. Following abandonment, the tunnel will change to a cave habitat (H5.5). Percolating water and decomposing timbers will result in the formation of a thin soil. This soil will become colonized by fungi and soil animals, particularly where there is enrichment with nutrients and organic material from the droppings and carcasses of animals using the tunnel as a hibernaculum. Old mines deep or long enough to have a stable temperature and humidity regime throughout the year are potential hibernacula for bats.

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Associated Topics

T3 Landscape Development, T6.1 Ocean Currents, T10.2 Successional Trends in Vegetation, T11.3 Open-habitat Birds, T11.16 Land and Freshwater Invertebrates, T11.17 Marine Invertebrates, T12.1 Colonization by People, T12.7 The Coast and Resources, T12.8 Fresh Water and Resources T12.10 Plants and Resources, T12.11 Animals and Resources

Associated Habitats

H1.2 Benthic, H2.1 Rocky Shore, H2.5 Tidal Marsh, H3 Fresh Water, H5.2 Oldfield, H5.3 Cliff and Banks, H5.4 Talus Slope, H5.5 Cave, H6 Forests

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