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How Did Infields Shape the Scandinavian Cultural Landscape?

Mention of the Swedish countryside often evokes images of sweeping fields, beautiful pastures, and wooded meadows. For many the presence of idyllic grasslands is a necessary component of the romanticized traditional Swedish landscape. However, it is more than just their beauty that makes seminatural grasslands so interesting: their existence tells a captivating tale of human development, and how it gave form to the Swedish cultural landscape. "Seminatural" suggests these grasslands were partly managed and maintained by humans, primarily through grazing and mowing—practices that persisted over several centuries, as indicated by the presence of grasslands on old cadastral maps from the seventeenth and eighteenth centuries. Today, in addition to preserving a richness of plant life free from the influence of fertilizers and plowing, these grasslands also harbor an abundance of insects, birds, and fungi.

The corresponding author of this paper (Ove Eriksson) first became involved in research focusing on Swedish cultural landscapes during the late 1980s, when the Swedish government initiated programs that sought to conserve seminatural grasslands. The government supported farmers by means of subsidies to assist them in managing and maintaining the land, usually through cattle or sheep grazing. I was intrigued: How had these beautiful grasslands come about? How had they been sustained for more than 1,000 years, and to what effect? In my search for answers, I had to move beyond my own background in evolutionary plant ecology and embrace the less familiar fields of history and archaeology. But crossing the scientific boundaries between natural sciences and the humanities is challenging—research methods and concepts are different, and even communication, not to mention direct collaboration, can be difficult.

That is why *Niche Construction: The Neglected Process in Evolution* by Odling-Smee, Laland, and Feldman was an eye-opener when it was published in 2003. The book captures the essence of how to study interactions between species and their environment, and it laid the foundation for a conceptual basis for research on the controversial issue of "culture versus nature." Since then, the study of human niche construction has matured and developed, in part through the work of scholars in the humanities.

Accordingly, the coauthor of this paper, Matilda Arnell, and I recognized the value of this theory as a tool to trace the development over time and the enduring presence of infield systems in the Scandinavian cultural landscape.

Infields through the Lens of Human Niche Construction

The infield system in Scandinavia is believed to have been developed during the first centuries CE (the early Scandinavian Iron Age), and it was maintained as a component of agriculture until the late nineteenth to early twentieth centuries. Infields are the areas that farmers once used for making hay or as crop fields; close to farms, they were enclosed to prevent uncontrolled grazing by livestock and wild herbivores. Farmers used the extensive outlying land beyond the infields to graze livestock and to collect natural resources, such as twigs and leaves, firewood, and wild fruits. Typically, twigs and leaves were harvested from coppicing and pollarding—pruning methods to stimulate new growth—for use as winter fodder. Towards the end of the nineteenth century, farmers abandoned outland livestock grazing and began to use the crop fields to produce winter fodder for livestock, rather than as seminatural hay meadows. Of course, agricultural technology changed considerably between the early Iron Age and the nineteenth century, but the essential elements—the enclosed infields and the outland—remained broadly the same over a period of approximately 1,500 years. Today, remnants of infield systems are small and isolated and have become a focus of conservation programs.

The construction and maintenance of these infields had a significant impact on the development of cultural practices in Scandinavia and the resulting biodiversity in the region, making niche construction theory an appropriate starting point for our analysis. Odling-Smee et al. define niche construction as "the process whereby organisms, through their metabolism, their activities, and their choices, modify their own and/or other species' niches" (2003, 419). Human niche construction theory in particular can help to reveal the interactions between humans and nature, given that it involves human culture in all its manifestations. Human niche construction implies that there is a continuous reciprocal interaction between human culture (including for example management methods, cultural perceptions, and social relations) and the environment (including wild species of plants, insects, birds, and fungi), affording us a unique perspective on the effects of culture on nature, and vice versa.

A Haven for Biodiversity

Long before people created infields, vast areas in southern Scandinavia were deforested, creating pastures and smaller areas of cropland. Agriculture was introduced in Scandinavia around 4000 BCE, so when the infield system was introduced during the first centuries CE, the landscapes already had a long history of openness (an important characteristic of infields). Farmers invested time and labor in creating and maintaining infields, fences, and stone walls and building byres to house livestock indoors during winter; this ensured that the cultivated land and its structures became more stable, permanent fixtures than they had previously been and therefore needed to be maintained over time. Ecologists call this a spatiotemporal stabilization of the grasslands habitat. In fact, we know from archaeological evidence that many farms still in existence have been located in the same place since around the fifth or sixth centuries CE. Moreover, some farms in Sweden retain pre-Christian names today. Since Christianity was only introduced in Scandinavia during the eleventh and twelfth centuries, this is further evidence of their stabilization in time.

This spatiotemporal stabilization—the result of sustained management through hay cutting and controlled grazing—led to conditions that favored several plant and animal species that were able to colonize the grasslands. Continuous management guaranteed these species populations a very low risk of local extinction. Thus, over time, they started to accumulate in the infield grasslands and the neighboring outland, the effect of which is still visible today. For example, well-managed former hay meadows may harbor over 50 different plant species per square meter.

Infield management also created other ecological patterns. Farmers often cultivated trees—primarily deciduous trees, such as ash, elm, birch, and lime—within the infields as an important source of building material. Trees were also subject to pollarding, and the harvested twigs, leaves, fruits, and nuts were a source of winter fodder for livestock. Large trees may also have been maintained for religious reasons. The presence of trees created a structure of semi-openness in the landscape and supplied substrate for numerous insects and fungi that exploited the tree trunks. Overall, the infield system created a niche space for a tremendous diversity of organisms, and it is this diversity—along with our appreciation of the cultural landscape—that has prompted modern conservation efforts. These efforts are also similar to human niche

construction, although the mechanisms behind niche construction are different. Because the areas of seminatural grassland that remain today are small and remote and it is very difficult to maintain the management practices used historically, the "modern" version of the historical cultural landscape is subject to new dynamics, only to some extent reflecting the past.

Evolving Cultural Concepts

Spatiotemporal stabilization not only had an important influence on the natural environment, but resulted in fascinating cultural developments as well. Since people invested such a great deal of time and effort in creating functional hay meadows (especially wooded meadows), enclosure systems, and additional buildings, it makes sense that they would be more inclined to view this land as their private property. However, though history shows that various status objects, and most likely livestock and slaves, had long been owned and controlled by high-status persons—most evident, perhaps, during the peak of the Bronze Age (ca. 1500–500 BCE)—it's uncertain if people in Scandinavia had considered the concept of land ownership prior to the implementation of the infield system.

A few remarks in the classical literature, such as Caesar's *De bello Gallico* (written 58–52 BCE) and Tacitus's *Germania* (written 98 CE) indicate that "Germanic people" did not typically own land privately. In the Old Norse literature (written 800–1200 AD), including the Icelandic Sagas, there is much reference to land ownership and to a family's right to their property, often based on alleged succession lines of their ancestors. Scholars believe that this literature reflects cultural perceptions that are several centuries older, suggesting that people at the time recognized private land ownership and considered it important to prove that they and their families had an inherited right to their land. Land ownership also laid the foundation for a much more structured society, ultimately developing towards the chiefdom society suggested by finds such as the Swedish Vendel graves (similar to the more famous Sutton Hoo grave, now on display at the British Museum in London).

Tools are a further cultural feature of the infield system: metal tools such as leaf knives, iron sickles and scythes, and hay rakes appear around the same time as the infield system became established. The presence of shears also suggests that clothing was in-

Figure 1:
A present-day view of remnants of the infield system. The photo shows a former cattle path leading out from a farm through the infields to the outlying land in Yttra Berg, Halland province, Sweden (courtesy of the author).

creasingly made from wool from domesticated sheep, replacing earlier material from cattle and wild animals. Over time, as the management systems improved, the size and form of these tools changed, for example the length of blades on scythes. Today, we can still see evidence of the temporal sequence of meadow management (which likely developed quite early): some areas continue to use old-fashioned methods to make and harvest hay, such as spring raking (the removal of dead leaves and grass), after-harvest grazing by livestock (which also ensures nutrients are cycled back into the meadow), and pollarding.

The Challenge of Complex Interactions

We have thus far concentrated on the interaction between "culture" (tools, management systems, perceptions, and social inequality) and "nature" (vegetation types, structure of the landscape, and biodiversity) as a dual causal relationship, where cultural phe-

nomena *lead* to natural phenomena and vice versa. Some might consider this to be an oversimplification. Take ownership as an example, which involves several interrelated factors: (i) physical objects such as houses, enclosures, and tools; (ii) living creatures such as livestock, trees, grasses and forbs, and wild game for hunting; (iii) management procedures such as hay cutting, pollarding, crop rotation, herding livestock, and food and clothing production; and (iv) cultural perceptions such as "family," "home," and "religion." If we try to connect all these factors, we soon realize that we are dealing with a complexity that is far beyond a simple reciprocal causal interaction. Furthermore, while infields were certainly part of the evolution of the concept of ownership, such a perception was of course influenced by many other factors. People in Scandinavia have long been part of a much wider geographical context, and it is now quite clear that Bronze Age societies were involved in complex networks of interactions across much of Europe. Although interactions were far more localized from 500 BCE onwards due to the local production of iron, people in Scandinavia were still traveling and trading across Europe, making the influence of the Roman Empire inevitable.

So, how to account for these convolutions? While it may not be able to explain every one of the aforementioned interactions, human niche construction nevertheless remains an extremely valuable tool to understand them, shedding light on how the human construction and management of infields maintained a spatial continuity that significantly altered, and continues to influence, how humans and other organisms have developed.

The infield system—a complex of interactions that existed and developed over 1,500 years—may have changed over time, but the essential element of a spatiotemporal stabilization was preserved. This stabilization impacted developing phenomena related to both cultural and ecological systems, affecting people's way of living as well as patterns and processes in "wild" nature. Using the theory of human niche construction provides a means to cross scientific boundaries and is an important step in untangling the multiplex interactions that govern our world. It will be fascinating to see how this history continues to unfold.

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