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Bio-regional patterns and spatial narratives for integrative landscape research and design

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Abstract

Land patterns are beautiful, fascinating, dynamic, and significant to so many life processes. Capacity to understand landscape patterns can arise from very different paradigms; i) through the fine arts, an ability to *see* patterns; ii) from language arts, the gift to *read* and *describe* the landscape; iii) from the geographic sciences, the ability to *map, measure*, and *interpret* patterns; and iv) from environmental design, the drive to *integrate* the above capacities. Under many circumstances, landscape studies or conservation could be enhanced using multiple approaches to capture the complex dynamics of people and land in a holistic framework. Long-held paradigms about how knowledge is acquired and applied in the ecological sciences may be

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trespassed. Linking bioregional *patterns* and qualitative *narratives* offers a creative solution. In this paper I discuss how bioregional patterns can be used to form narratives connecting sequences of a landscape story with environmental analysis. More specifically, I suggest a meshing of qualitative knowledge with geographic and ecological sciences to synthesize *spatial* narratives for conservation design. The spatial narrative is a conceptual framework to bring the qualitative experience of *place* together with the geoscience analysis of *space*.
Keywords: bioregions; conservation planning; cultural and ecological sustainability; GIS; narrative; pattern language; space and place

Introduction

Quality and narrative in science

To achieve depth in landscape and conservation planning involves a search for cultural attachment to place, and a means to capture that humanistic meaning within a plan or design outcome that gives *spatial form* to the cultural-ecological dynamic. Décamps (2000) argued that, "…the concept of landscape appears as a particular relationship a society keeps up with its environment" (Décamps 2000).

Ecosystem and species approaches are still important and well accepted among conservation biologists (e.g. Hess and King 2002; Sanderson et al. 2001). Some larger conservation organizations, such as The Nature Conservancy now use ecoregional assessments to strategize priorities for conservation (The Nature Conservancy 2001). But cultural and spatial understanding of landscape is also needed to incorporate knowledge of human ecosystems in landscape studies, to capture and build upon community awareness and relationships, and thus activate greater involvement in stewardship.

Ecological sustainability, Décamps (2000) says, is not enough. It must be combined with a cultural sustainability, where the survival of local environments depends on human attention. A mutually sustainable future for humans and other life forms can best be achieved by means of a *spatial framework* in which people live as rooted, active, participating members of a reasonably scaled, naturally bounded, ecologically defined territory, or *bioregion* (Thayer 2003).

The intent of this paper is to present an integrative approach to sustainable landscape research and design. The spatial narrative is a conceptual tool formed around the framework of a bioregion that links together environmental patterns and science with cultural knowledge of place. It intends to speed the process of knowing a place holistically, and to combine efficiently knowledge of space and place for bioregionally-based research and design.

Although the reductionist approaches that dominate current science have significant analytical power, they tend to break environmental and cultural components apart. As Bradshaw and Bekoff (2000) noted, integration implies combining not only the two formerly separate objects of study (humans and nature), but also the subjects (human observer and scientist). There is a growing set of scholars who will attest that a holistic framework for understanding and enhancing places as a community–environment dynamic is crucial to both spiritual and ecological health (e.g. see Tress et al. 2001; and Palang, Mander and Naveh 2000).

Some scholars are recognizing that even objective scientific research is highly influenced by the observer's perspective, experiences and situation (Allen et al. 2001). As ecologists, we in fact form *narratives*. We arrange and tell a story, in that as narrators, we are selective in what we report and the meaning our story imparts. By

recognizing the inevitable narrative in science, and accepting qualitative information in our analysis model, we are more likely to advance a holistic, integrative framework. Geographical information contained in maps, for example, can include both objective abstractions of physical reality and subjective symbolic representations (Bradshaw and Bekoff 2001; Soini 2001). The creative processes of map-making are increasingly considered products of culture, reflecting the worldviews of the cartographers, or we might say, the narrators (Monmonier 1995).

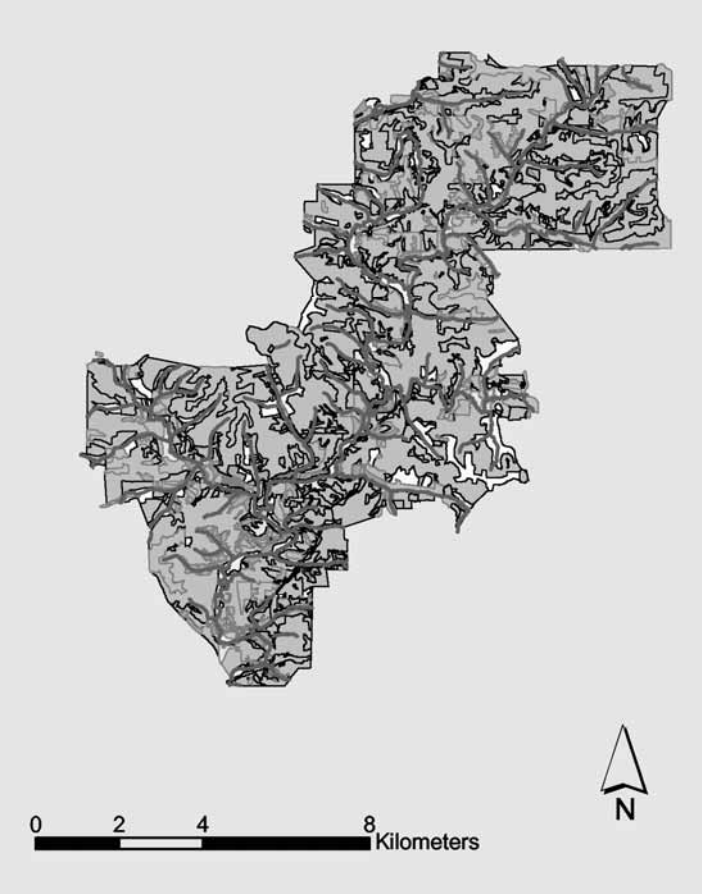

Figure 1. Land-cover map of a portion of the Kickapoo River Valley in southwestern Wisconsin, USA, an example of how contemporary maps represent abstract *space*. Still, the map units do reflect natural features within the valley (evident by the organic shapes and lines) and political boundaries (evident by the straight edges). Map produced by author, with spatial data from Wisconsin Dept. of Natural Resources, 2004

Space and place – connected sequences

In his book, 'Mapping the Invisible Landscape', Ryden (1993) pointed out a profound distinction between *space* and *place*. Modern cartography, he explains, is concerned mainly with the spatial distribution of things for a purpose, but stops short of dealing with meanings. Maps regularly show cultural things, such as roads, buildings, etc., but rarely convey much about the sacrality of a small bay, or the community festival that occurs between two non-descript town blocks. In the geographic sciences, space is abstract, geometrical and undifferentiated. The Public Land Survey System, for example, divided much of the American landscape into rectangular parcels, evident in a contemporary GIS map of land cover (Figure 1).

Place, on the other hand, is about experience, which might be better captured by a watercolour than a map (Figure 2).

Figure 2. Painting of a similar southern Wisconsin stream valley (Sugar River) also reflects natural features as well as political/parcel boundaries, evident by the depicted stream, vegetation and fence lines. The painting, however, conveys more about the place and experience of this stream valley (albeit the artist's experience) than it does about geographic *space*. Oil on paper, Dagny Quisling Myrah, reproduced by the Dane County Cultural Affairs Commission; owned by Gail Parr

Geographer Yi-Fu Tuan, who wrote the seminal book 'Space and Place: The Perspective of Experience' (1977), also explained that space is more abstract than place. "What begins as undifferentiated space becomes place as we get to know it better and endow it with value" (Tuan 1977, p. 6). The concept of place imbues both locational detail and experiential meanings (Soini 2001).

Cognitive, or mental maps are an explicit example of a spatial and visual expression of place–people relationships. Images of space marked in the minds of a people were at the very heart of aboriginal cultures (Aberley 1993). In studying Inuit map accuracy, Rundstrom (1990) found that mapping was one of a set of cultural acts that united individuals with their environment and is thought to have been an important form of intracultural communication. Tyson (2001) suggested that we learn to communicate in connected sequences and with symbols or icons. Connected sequences applied to mapping may be one way to better understand the landscape as a whole. Maps provide a way of making sense of space; connected sequences can help us make sense of human–ecological relationships. Symbol maps, used in combination with other visual culture, spatial data and methods, could be valuable tools in building sequences for landscape research, but, Soini (2001) points out, their application is still relatively uncommon. The key to building empowering cognitive maps of bioregions, Aberley (1993, p. 14) argued, is based entirely upon experience in the landscapes of place.

Bioregionalism as a framework

In his book, 'Life-Place: Bioregional Thought and Practice', Robert Thayer (2003, p. 144) notes that bioregional planning as yet has few established paradigms or methods, but that theory and practice are beginning to coalesce around *bioregional patterns*. It suggests that for every bioregion, there is a unique set of practices of planning, design and management that will result in a bioregionally unique set of landscape patterns. Awareness and care for one's bioregional territory and its patterns is a first step to community-based stewardship; to cultural and ecological sustainability. Clearly this kind of place-based awareness is invaluable for planning, design and conservation at regional scales for multi-functional landscapes. However, a premise of bioregional thought is that people acquire awareness, care, and ultimately sense of stewardship for place most when they have been there a long time.

For Thayer, the process of belonging to his own life-place in the Sacramento Valley of California has been gradual and based on experience. In practice, we designers, planners, ecologists and consultants are not often in place for long, and are thus challenged to know a place as the inhabitants do. At best we may come to know it only partially over many years of working with the communities in an area. And yet, given the pace of land development, operating too slowly risks loss of significant resources to unguided development. How then can we speed the process of knowing to engage in integrated, bioregionally-based research and design? Can we outline an efficient process for biocultural regional work? The combined abilities to visualize and to measure landscape patterns offer possibilities. Bioregional patterns can suggest ways of:

1. linking cognitive/symbol maps to environmental data;
2. connecting sequences of symbols and patterns in place and time;
3. giving spatial form (through design) to future landscapes; and
4. achieving combined ecological and culture sustainability.

In the remainder of this paper I first describe a way of reading and interpreting landscape patterns. Secondly, I explain how we can use bioregional patterns in connected sequences to form integrated spatial narratives of place, which can then enrich conservation plans and landscape research.

Seeking and using bioregional patterns

Defining bioregional patterns

A number of simultaneous trends toward relocalization are happening. There is an upswell of grassroots action toward awareness, support and protection of local places, environment and culture, in contrast to 20th century globalization and information technology. The bioregion, a unique area defined by natural boundaries and supporting distinct living communities, is emerging as a meaningful geographic framework for understanding place and designing long-term sustainable communities. Thayer (2003) uses the term *life-place* synonymously with *bioregion*. The study of life-place connects natural place, sacred place, identity, local arts, practices, food and wisdom into a holistic knowledge set. Finding patterns of place builds awareness and is invaluable for planning, design and conservation at regional scales. Bioregional patterns are regionally unique and fit with geomorphic, climatic, biotic and cultural influences of a place.

Architect Christopher Alexander et al. (1977) explained in 'A Pattern Language' that, "Each pattern describes a problem which occurs over and over again in our

environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice".

Thayer (2003) found Alexander's method elegant but limited in that it says little about the unique bioregional framework in which a pattern and problem exist. Bioregionally-based planning can actually narrow the problem and solution, or help participants to acknowledge the limitations of a place and its resources. Accepting the vulnerabilities a region might have to natural disturbance or cultural change, or to limited resources (e.g. water in the southwest USA) will likely lead to more sustainable, regenerative outcomes.

The concept of mapping environmental patterns, gaps and networks is already prevalent in the conservation field. Briefly, environmental patterns in the Pacific Northwest bioregion of the U.S. were mapped in an atlas called 'Rainforests of Home: An Atlas of People and Place' (Wolf, Mitchell and Schoonmaker 1995). The bioregional focus of this work does, in fact, capture much about the cultural heritage as well as the natural resources. Other efforts to map environmental patterns for strategizing conservation needs include the works of the Gap Analysis Program (Scott, Tear and Davis 1996), green-infrustructure mapping (Benedict and McMahon 2001), and ecological networks (Bouwma et al. 2004). Likewise, many landscape-ecology studies are aimed at describing the composition and arrangement of biotic and abiotic landscape elements, and emphasize the interaction between those spatial patterns and ecological process (Kareiva and Wennergren 1995; Silbernagel et al. 1997; Turner 1989).

Patterns of landscape elements, repeated in similar form throughout, naturally form a *language* (Thayer 2003). That language thus forms the basis for our spatial narrative. Anne Whiston Spirn (Spirn 1998, p. 15) wrote in 'The Language of Landscape' that "… landscape has all the features of language. It contains the equivalent of words and parts of speech – patterns of shape, structure, material, formation, and function…. Like the meanings of words, the meanings of landscape elements (water, for example) are only potential until context shapes them".

Wisconsin landscape architect Philip H. Lewis, Jr. designed for regions based on the pattern-language concept. He said that once we learn this pattern language, we begin to *see* the landscape continuum as a collective work of art and a complex design composition rather than a set of distinctively individual elements. It is like "a mosaic of patterns of ordered elements" (Lewis 1996, p. 88). Even earlier Alexander et al. (Alexander, Ishikawa and Silverstein 1977) imagined the value of connecting patterns into sequences for communication. They suggested that a *sequence of patterns* is also the base map from which you make the language for your own project, by choosing the patterns that are most useful to you (Alexander, Ishikawa and Silverstein 1977).

Interpreting and applying bioregional patterns

In the way that Thayer (2003) believes bioregional patterns suggest limitations and unique solutions, Lewis (1996) similarly described how understanding the patterns, colours and textures of the rural landscape gives a logical order to the system. Once identified, these ecological patterns and spatial resources are logical form determinants – they suggest the spatial form to guide plans toward sustainability. In my regional design studio I often tell students to 'blur' their eyes to see the patterns or form when studying a regional map or satellite image. In fact Lewis (1996) discovered patterns by curiously studying composite night images of the U.S. and imagining the concentration of lights around cities to be *regional constellations* as if

looking at patterns in the night sky. Lewis tells us that identifying biocultural regional patterns provides solutions for where to build and where not to build. In the case of a Midwestern-U.S. regional constellation, the place not to build is the 'hole of the donut' – Wisconsin's scenic unglaciated area in the southwestern part of the state (Figure 3). And growth should be guided toward the ring connecting Chicago to the Twin cities (Minneapolis-St.Paul, Minnesota), where interruptions have already occurred (Lewis 1996).

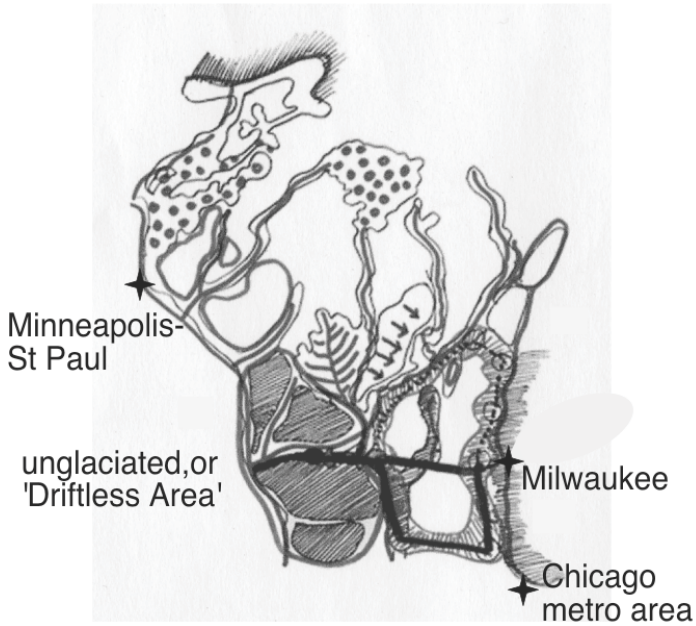

Figure 3. A broad brush sketch of biocultural regional patterns in Wisconsin, USA in relation to population centres (Lewis unpublished, modified by author, Nov. 2004). Black line represents the Milwaukee railroad transect that Lewis proposes as a state rail park linking the urbanized Milwaukee area to the east, with the rural scenic unglaciated area in the west

Lewis also suggests that one can discern patterns that diminish the quality of life, sense of place, and sustainability, as well as patterns that enhance these features. It is important that we become keen observers, able to recognize the source of landscape patterns and discern those that are not congruous with the regional landscape (e.g. sprawl, fragmentation). *Range of natural variability*, for example, acknowledges that disturbance is a vital attribute of most systems. Considering the history of ecological systems and their inherent range of variability can help planners set goals that are within the capacities of the natural systems, and at the same time, more likely to meet social values for an area (Landres, Morgan and Swanson 1999).

Building a spatial narrative from bioregional patterns

A conceptual framework

By way of several conservation projects in the northern Great Lakes region, I developed a conceptual framework to help synthesize visual and experiential sources with more traditional environmental or GIS data and metrics. The framework suggests connecting sequences of spatial patterns that reflect cultural-landscape history, knowledge and experience, along with environmental science, giving legitimacy to forms of knowledge that are not in conventional GIS format. It suggests that if

conservation and landscape-planning projects had a model for synthesizing a pattern language along with environmental data, the concept of building narratives could lead to building community awareness of place and a shared sense of stewardship.

The tool and its compilers

So, while Allen et al. (2001) and others propose *quality and narrative* for science, I suggest using bioregional patterns to form *spatial narratives* for conservation and integrated ecological studies. Narratives unfold much like a storyline, illuminating different meanings and elements of place along the way. This spatial-narrative framework explicitly recognizes the dialectic between objective geographic space and subjective experiential place, and the value of both to conservation planning. It is a *synthesis* of multiple ways of knowing about a place, rather than an *analysis* of multiple layers of data. One concept of a spatial narrative would be that of connected spatial sequences of culture–land associations assembled from visible evidence of landscape patterning or from visual culture such as paintings, sketches and photography that contain locational information. For example, artists and photographers capture and express characteristics of place in their work that are often important to those who live there. We can see such expressions reflected in postcards, festival posters and traditional gifts. Early travellers documented their first impressions of places through journals and sketches, which provide clues to early cultural-landscape patterns. In a sense, the visible evidence is like a set of vignettes into cultural meaning of places, and is linked *with* the geographically mapped *spaces*. The conventional GIS model is based on the McHargian vertical layering of spatial data geo-referenced to a common coordinate system, as if there are imaginary pins holding the layers in place (Figure 4).

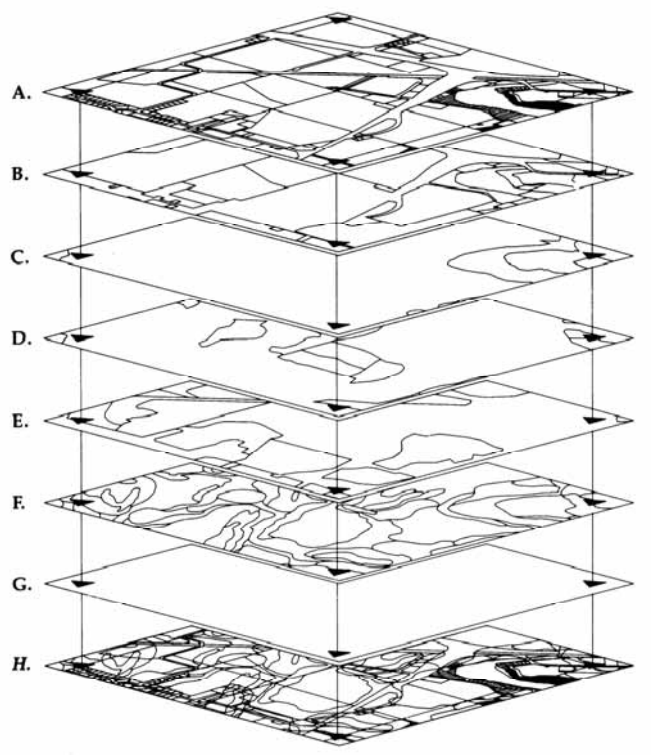

Figure 4. Concept for a Multipurpose Land Information System, illustrates the vertical layering of geo-referenced data sets, the basic GIS model. First published in the Wisconsin Land Information Newsletter, Volume 2, Number 2, 1984

The spatial narrative, on the other hand, is a horizontal, non-chronological sequence or storyline comprised of maps, descriptions, sketches, photos and artwork. The compilers of the narrative may rearrange and overlap the pieces as needed to better understand the spatio-temporal landscape story. Some pieces may come into the story and then fade out. Other elements used for a spatial narrative may be less visual, such as audio and oral histories and traditional symbology, as in Native American beadwork of rice harvest. The physical form of the narrative will depend on the particular application. Spatial narratives may be of varied forms, with the intent to understand and convey locational information, patterns and meaning (Figure 5).

With current GIS applications, we can introduce qualitative data by, for instance, making a link from map features to imagery, video, audio or textual descriptions of place. Technological trends in GIS are heading toward concurrent time–space capture. The Electronic Cultural Atlas Initiative, (ECAI, http://ecai.org), is a collaborative project to bring humanities data together with geo-science technology using global mapping, imagery and texts. ECAI provides scholars and other users with a research resource based on digital technology which presents complex combinations of data from multiple disciplines visually and immediately. And Eco-trust has developed a

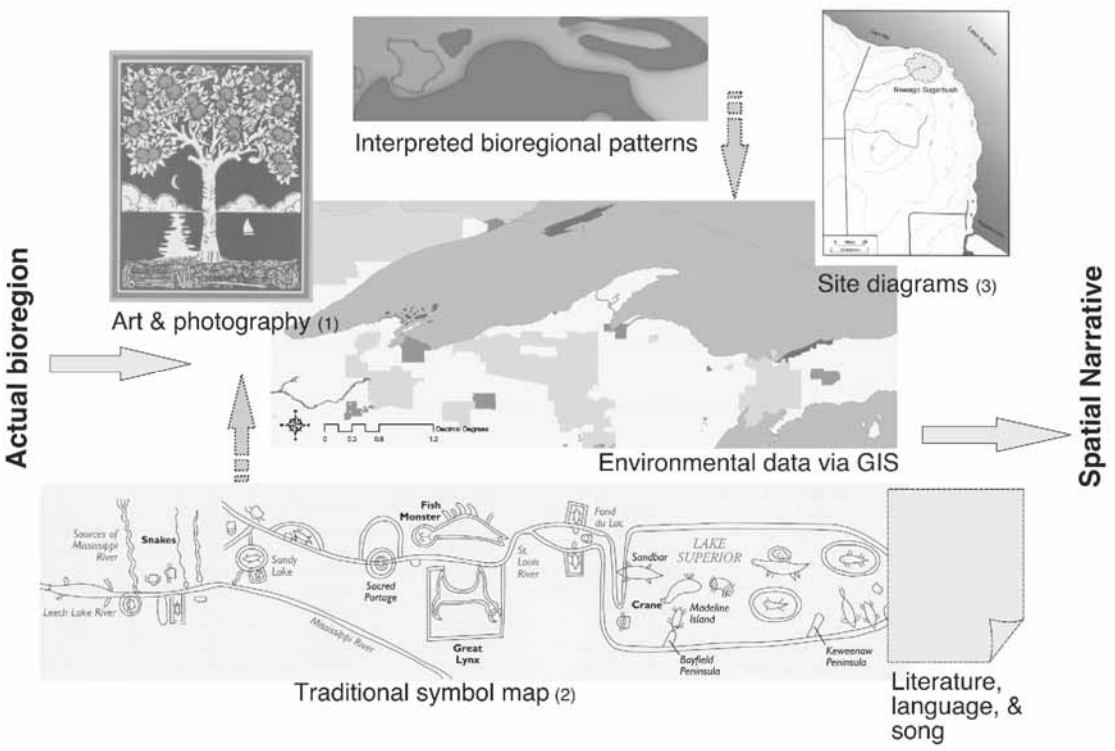

Figure 5. Conceptual framework for linking bioregional patterns to spatial narratives. In contrast to the vertically layered GIS model, the spatial narrative is conceived as a horizontal, sometimes overlapping layering of maps, figures, photos, diagrams and artwork to form a sequence of landscape meaning and patterning, somewhat like a storyline. The sequence is dynamic and not necessarily chronological. (1)Bayfield Apple Fest poster 2003, Bayfield, WI; (2)Ojibwe traditional migration chart, (Wisconsin's past and present. Wisconsin Cartographers' Guild 1998, p. 10). Reprinted by permission of The University of Wisconsin Press; (3)Site diagram of Newago maple sugar bush, drawn by M. Thomas, reprinted with permission. Other elements drawn or created by author

bioregional information system program: “a comprehensive and ecosystem-level geographic information system (GIS) consisting of biophysical, social, economic, and cultural databases” (http://www.ecotrust.org). Moreover, Eco-trust developed an example of a conceptual *Pattern Map* through their Conservation Economy project (http://www.conservationeconomy.net). This Pattern Map, in a conceptual way, brings together many of the elements to be included in a spatial narrative.

Like the Pattern Map, the approach of the spatial narrative, is not as much technological as it is conceptual, and is less about analysis than synthesis. But unlike the Conservation Economy Pattern Map, the spatial narrative is geographically explicit. The material may be spread out across a large table, or assembled in a computer system. We may not be able to *measure* components of our spatial narrative, such as change in patchiness, as is common with landscape ecology metrics, or *predict* interior habitat area, as in conservation-biology models. But we will be able to link and inductively synthesize the patterns, as they are translated to spatial sequences and positioned with environmental and land-use data already in a GIS framework.

If the goal of building spatial narratives in landscape-conservation projects is to incorporate meanings and experiences of place, whose sense of place shall we use? Most likely our approach will be to seek, as much as possible, those meanings common to many; a *shared sense of place*. Typically conservationists, planners or outside consultants will play the role of ‘neutral facilitator’, in a participatory environment to build the connected sequences interactively, and thus come to a collective understanding. It is a ‘transdisciplinary’ approach in that it combines interdisciplinarity with participation (Tress, Tress and Fry 2003; Tress, Tress and Fry 2005). Other times, though, it may be appropriate to build a spatial narrative from a distance, as an individual or team of scholars, by using a breadth of sources that convey cultural information about places and human–land interactions through time. This integrated approach, multi- or interdisciplinary, may fit for educational and outreach documentation, for example. Whether the approach is more participatory or scholarly will depend on the intended application and audience.

Participants and implications

Inclusion of spatial narratives in large, complex landscape studies and conservation projects will provide rich, place-specific knowledge of culture–land dynamics. The spatial narrative can especially support community-based conservation projects where building partnerships and trust is very important. Translation of qualitative information to spatial form will also be useful in cases where immediate plans are not needed as much as is documentation of cultural–environmental relationships for education and outreach programmes. For example, an exhibit, display or awareness/nature centre may be developed to illustrate sustainable land-use practices to school groups, tourists and publics. In this case, direct, extended access to the local people or place by the scholar(s) or audience is limited, but the compilation and synthesis of spatial material and visual culture can tell an important story for public awareness of conservation issues.

Seeking and visualizing bioregional patterns to form spatial narratives provides a framework for synthesizing fuzzy layers of landscape information from across the community with environmental data and mapping. Having a tool to array a mix of cultural and biophysical data will expose new levels of discussion and landscape understanding, and ultimately sustainability. This paper contributes to the

development of integrative tools, which are necessary for operationalizing integrative research and design.

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