5. Landscape and Environment

Natural science was for much of its history predominantly characterised by a reductionist paradigm, being focused on description and analysis of the natural world. Indeed some of this description and analysis was carried out overtly at the landscape scale as scientific knowledge and understanding was extended through periods of exploration and discovery. However, increasing concentration on the analysis of process narrowed the view, leading to the proliferation of sub-disciplines and to specialisation. In the second half of the twentieth century this narrow specialisation was called into question and the need for the integration of scientific knowledge and the synthesis of understanding was recognised.

5.1. Systems thinking and systems modelling

The emergence of a holistic philosophy nurtured the birth of the environmental movement both in science and in the popular imagination. Views of the Earth from Space, the economist Kenneth Boulding's (1966) reference to the finite "spaceship Earth" and James Lovelock's (1979, 2000) concept of "Gaia" all captured the moment. From the mid 1960s to the present science build a profound understanding of the complexity of the natural world based on increasingly sophisticated conceptual and mathematical models of how it was organised and integrated and above all how it worked or functioned (White et. al. 1984)

In *The Dialectical Biologist* (1985), Richard Levins and Richard Lewontin sketch a dialectical approach to biology. They see "dialectics" more as a set of questions to ask about biological research, a weapon against dogmatism, than as a set of pre-determined answers. They focus on the (dialectical) relationship between the "whole" (or totality) and the "parts." "Part makes whole, and whole makes part". That is, a biological system of some kind consists of a collection of heterogeneous parts. All of these contribute to the character of the whole, as in reductionist thinking. On the other hand, the whole has an existence independent of the parts and feeds back to affect and determine the nature of the parts. Indeed, Iain White, Derek Mottershead and John Harrison expressed similar views in 1984.

It is indeed the case that the representation of environment through the representation of landscape engages directly with such emergent properties of natural systems. Like systems models landscape paintings are models of landscape and environment and as such are characterised by simplification, generalisation, idealisation, and abstraction. These are all the properties of homomorphic (similar) models as opposed to isomorphic (exact) representations. Nonetheless, such models subsume the depth of understanding that detail both brings and obscures. Similarly, it can be argued that landscape (environmental) art has (emergent) properties that go beyond the elements that make up the work; again, the whole is greater than the sum of its parts.

> "In short, our mental picture is a montage of images at once comprehensive in the panorama it commands and incisive in the perspective it produces. Just as the fragments of pigment in a painting resonating individually, but responding and relating to each other, are held together by the weft and warp of the supporting canvas, so our images of environment are underpinned and supported by a framework of systems and a fabric of scientific law and principle. Breadth of understanding becomes possible without superficiality, and detailed knowledge without the isolation of specialisation. As a way of looking at our world and as a framework for thought the systems approach is richly rewarding, but it is also undeniably an attitude of mind - some would say a philosophy." (White et al 1992)

However, somewhat belatedly in the natural sciences it was realised that some of the work on understanding environmental systems as generic models ubiquitous in their application was failing to build in the spatial or landscape dimension and the geographical variation it implied.

5.2. Environmental models at the landscape scale

In the last two decades research has re-examined the structures and operation of environmental systems at the landscape scale. There are two elements to the structure and function of landscape. First, there are the two horizontal dimensions of distribution: how natural phenomena and natural processes occur across the Earth's surface. Secondly, a third vertical dimension that concerns the organisation and working of processes across the interface between the rocks of the crust and the atmosphere above. [1] Strictly we should add a fourth dimension for environmental systems are dynamic systems, they change through time. Some change is inherent, simply the reflection of the operation of processes maintaining steady states, some is directional, evolutionary or developmental change associated with various manifestations of growth inherent in the system. Yet another category of change is precipitated in someway by changes outwith the system that is they are externally induced changes leading to major perturbations in the operation of environmental systems. Such is the case with current models of climate change and global warming.

5.3 Environmental systems and art

[1] Each landscape has a two dimensional spatial pattern determined by and reflecting patterns in:

- the underlying geology,
- the distribution patterns of plants and animals and of the communities of which they are a part
- the ecology of landscape or landscape ecology
- the soils developed at the surface
- the climate, microclimate and weather in the lower atmosphere.

The character of a landscape also reflects the stratification vertically both beneath the tangible surface and above it:

- the stratigraphy of the rocks,
- the weathering mantle,
- the soil profile,
- the vegetation stratification,
- the cloud layers and atmospheric stratification

In the disciplines of ***geology*** and particularly in ***geomorphology***[2] the description and representation of the Earth's surface is termed ***morphology*** and ***morphometry***. Both, but particularly the former have generated a wealth of visual imagery, drawings, paintings, diagrams and thematic maps. The same is true of ***soil science*** and ***ecology***. In both these disciplines, in addition to conventional distribution maps, the spatial dimension is represented strongly in the visualisation of notions such as the ***soilscape*** the ***toposequence*** *(catena)* emphasising linear and aerial relationships in space. In the relatively new sub-discipline of ***landscape ecology*** (Forman and Godron 1986) the landscape is divided into ecological *patches* of various types and *corridors* both set in a *matrix* and in ***meta-population biology*** (Hanski and Gilpin 1997) where the theory of population dynamics is reconfigured to apply to local breeding populations that have spatial and temporal reality in the landscape. The visualisation of these concepts, clearly intended as informative illustrations, nonetheless, should command more interest from the art world than they do currently. They provide a rich source for the making of images and works that engage more profoundly with environment than some current *straw in the hair, tree hugging* environmentalist *EcoArt* (as distinct from land and environmental art see Section 6.2).

There are however some contemporary artists who can legitimately claim to be environmental artists, though the appellation and definitions of the term are confused and confusing. Indeed, the terms environmental and land art are often taken to be synonymous. Artists whose work can be termed land art are considered later in Section 6., but not all such work resolves the issues between landscape and environment.

Section 5. **Landscape and Environment: Conclusions**

The main conclusion is that although some forms of land art (environmental art) do address the notion of the environmental systems as integrated, complex, functioning, open thermodynamic systems with emergent properties, or at least the contemporary relationships between those systems and society, the majority of works, particularly painting have yet to satisfactorily embrace the philosophical implications of complexity and the creative opportunities inherent in the science.

On a more mundane level the use of imagery from the environmental sciences (with the possible exception of biology (see Marius Kwint's work)) in the spirit of non-art as art, presents a myriad of opportunities for creativity.

[2] Geomorphology is the study of the processes acting at the surface of the Earth, and of landforms that result. In the United Kingdom it is traditionally part of the curriculum of academic physical geography, but in the USA it is a sub-discipline of geology