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The Post-Modern Scientific Revolution – from Parts to Wholes

Paradigm Shift:

- Last 20 – 30 years emergence of a 'complexity science'.
- From parts to wholes
- From reductionist and mechanistic to more holistic and organismic
- From mono- and multi-disciplinary to inter- and transdisciplinary

"[Paradigm?] turned from a belief in the indisputable and certainty of the scientific truth towards the recognition of the limits of scientific knowledge, to the recognition of human wisdom, [and] the need for a contextual view of reality."

General Systems Theory and Hierarchy Theory

GST – transdisciplinary approach to science/perspective of the world needed
Gestalt Systems – a system is always 'more' than the sum of its parts
Hierarchy Theory – holons function as both a part and a whole system

Systems should not/cannot be broken down for investigation. Thus, cartesian, reductionist science must be rejected and a contextual approach is needed though the inclusion of the epistemology (the understanding of knowledge) in desciption/investigation of natural phenomena.

Rene Descartes (Cartesian Paradigm)

The understanding and nature of realisation of certainty are achieved first by separation from the natural world, and then by its precise measurement.

Modern reductionist science

– mechanistic models with only data that fits the model considered
– only what can be measured, counted and quantified through analytical procedures has any scientific meaning

BUT

"not everything that can be counted can be counted, counts, but there are many things that cannot be counted, which count" – Egler.

"Cartesian paradigm has led not only to the belief in the objectivity of scientific knowledge, but also to its certainty…we will never be able to reach a full understanding to explain myriad of all subtle interconnections of natural phenomena."

Therefore we have to learn to deal with uncertainties and fuzziness.

Total Human Ecosystems (THE)

THE have been suggested as an additional integration level above natural ecosystems:

- we cannot disregard close links between natural and social systems
- natural ecosystems are NOT the highest organisational level of ecological hierarchy
- humans are animals/organisms too and must be considered so – not currently [e.g. no inclusion of humans in any food chain studies].

Humans and their cultural, social and economic dimensions must be incorporated as part of a global ecological hierarchy – the Total Human Ecosystem. This should be regarded as the highest co-evolutionary ecological entity on Earth with landscapes as its concrete 3D Gestalt systems forming the spatial and functional matrix for all organisms – including humans – and their populations, communities and ecosystems.

Self-Organisation and Co-Evolution

The mechanistic, one-way causality paradigm of Darwinian evolution should be replaced by co-operative, two-way adaptation of species in a co-evolving Earth. Thus, earth should be understood as a single interactive system in which each species (including humans) adapts to and affects others in a constant process of community co-evolution. If one element is affected, all other will be affected directly or indirectly to greater or lesser extents.

Thus, with these feedbacks, landscapes become Gestalt systems in a qualitative-structural way that cannot be comprehended by taking them apart and analysing each component individually. Landscapes should be treated as a special case of 'mixed natural and cultural interaction systems'. This is especially true for heterogeneous, human-modified, -managed

and –used cultural landscapes where co-evolution has created closely interwoven, natural and cultural patterns and processes. This co-evolution means that defining a boundary between social and natural systems in socio-economic models of landscape processes is completely arbitrary and artificial.

Further, because the THE landscape is a unique self-organising Gestalt system with intrinsic [natural] self-transcendent openness, considering such a multidimensional system in any way less than whole – considering simply 'lower' geological or biophysical, or aesthetic or socio-economic dimensions – is pointless. Thus, landscape research dealing exclusively within biology or geography loses sight of the whole self-organising Gestalt system.

[*Transcendent*: existing apart from, not subject to the limitations of, the material universe.]

Naveh coins the term 'Total Landscape Ecodiversity' as a transdisciplinary parameter, broader then 'biodiversity' that accounts for biological and geophysical diversity as wel as cultural diversity. This, he says, is needed for tangible expression of the new orders of landscape richness. These new orders are thought to be hidden behind regular, explicit order and occur because "everything is enfolded into everything". This philosophy/theory was developed by Bohm (1980).

Biosphere and Technosphere Landscapes and the Disorganised 'Total Landscape' of the Industrial Society

Throughout human history, the THE expanded according to the rate of growth of human populations, their consumption and technological power. During this evolutionary process, and since the industrial fossil fuel revolution, a crucial bifurcation [separation/fork into two] has divided these THE landscapes and their ecotopes, and most recently into intermediate, agro-industrial ecotopes.

Non-human Influenced Natural Bio-ecotopes (natural landscape)

- Closed, self-organizing systems with energy entirely from the sun
- Spontaneously evolve and reproduce in a coherent way maintaining their structural integrity in a process of continuous self-renewal and autopioesis (self-creation)

Human-Influenced Bio-ecotopes (modified and converted landscapes, traditional agriculture and pastorialism)

- open, dissipative structures
- driven by negative feedback of environment and internal fluctuations
- autopioetic, life-creating processes that create/pump-out entropy (disorder) but improve internal efficiency
- create order from fluctuation and chaos

Urban-Industrial Techno-ecotopes (urban landscapes?)

- human-made throughput systems
- driven by fossil fuels and nuclear energy
- entirely lack self-organization and regenerative capacities of those above
- high outputs of entropy, waste and pollution
- far reaching detrimental impacts

High-input agro-industrial ecotopes (high-intensity agriculture landscapes)

- have recently replaced almost all low-input cultivated agro-ecotopes
- closer to technosphere landscapes than biosphere
- still dependent upon high-grade solar energy but subsidised to great extent by low-grade fossil energy
- natural control mechanisms replaced almost entirely by heavy chemical inputs and throughputs
- "These landscape have lost not only their ecological but also their economic sustainability."

These ecotopes are spatially interlaced across the landscape forming a disorganised mosiac of the industrial 'Total landscape' which cannot function together in the ecosystem as a coherent, sustainable whole of our Total Human Ecosystem.

To a Sustainable Future

- Destabilising feedback loops must be counteracted by culturally regulative, controlling, stabilising loops in all natural and human dimensions

- A post-modern symbiosis between human society and nature should lead to the structural and functional integration of bio- and technosphere ecotopes into a coherent sustainable ecosphere.
- The original symbiotic natural feedback loops should not and cannot be restored. Instead, new cultural, information-rich cross-catalytic and synergistic feedback loops, linking natural, ecological, socio-cultural and economic processes should be created
- **Landscape ecology,** in collaboration with other mission-driven transdisciplinary environmental sciences could fill an important role in the integration of human society and nature and help create healthy, productive and attractive landscapes for the emerging information society.

"Holistic landscape ecology should be based on a transdisciplinary systems view of the world as an autopioetic, self-organising and self-regulating, irreducible Gestalt system."

Reference

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