

STEPS TO A DESIRABLE FUTURE

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INTRODUCTION

In natural landscapes maximum vegetation growth and a thick raw humus layer lead to biological control (closure) of the water cycle, and reciprocal closures of matter cycles and energy dissipation to local sites (Ripl and Gumbricht, 1996). This creates an efficient, moist and cool landscape with stable conditions, beneficial for high biodiversity and large life-support capacity (cf. Odum, 1993). From a landscape perspective efficiency can be defined as the ratio between cyclic (ecological) processes and outflow losses (erosion) of e.g. essential nutrients. In urban regions structural randomisation (e.g. sealing of green surfaces), combined with a large input of unstructured energy causes high fluctuations in temperature and wetness, associated with large irreversible erosion losses. The natural moist and cool landscape has turned hot and bleeding. Figure 1 shows the town of Olofström in SE Sweden as interpreted from a Landsat TM scene (obtained July 12th, 1994, a date preceded by hot and dry weather). The green forest patches in the town clearly have a higher vegetation density (b), associated with cooler (c), and wetter (d) micro-climate. Larger forest patches and core areas are more cool and moist (cf. Gumbricht *et al.*, 1996a). Open land takes an intermediate position, and the lake is the coolest and wettest object.

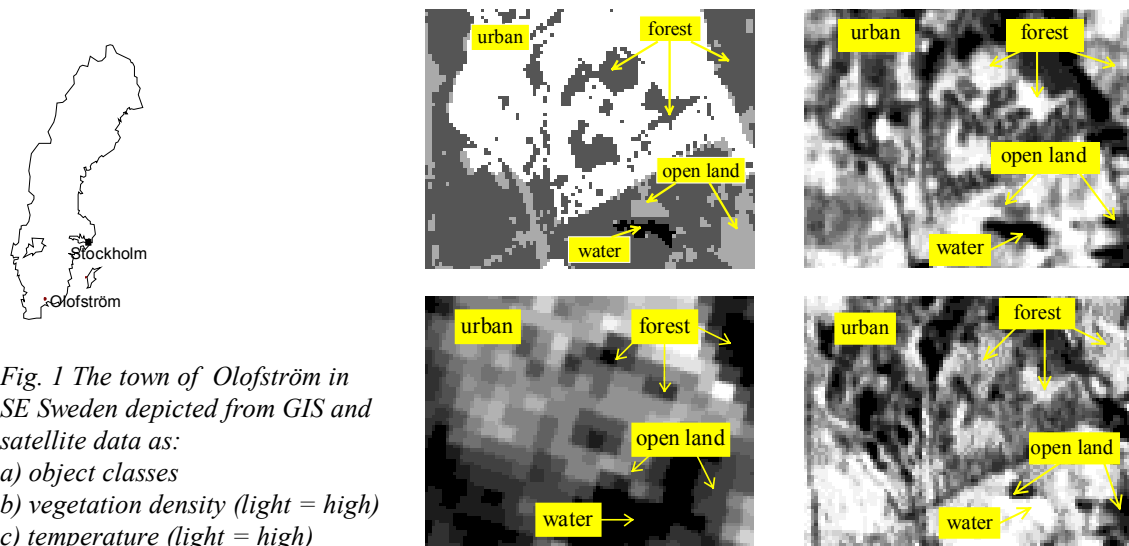


Fig. 1 The town of Olofström in SE Sweden depicted from GIS and satellite data as:
a) object classes
b) vegetation density (light = high)
c) temperature (light = high)
d) wetness (light = high)

The importance of non-linear dynamics of complex systems and of discontinuous properties pervades the basic sciences underlying environmental problems. The landscape forms an integrated part nested to other scales. In the highly non-linear biosphere system (human) deterioration at one scale can trigger chaotic behaviour and flip-flop changes at other scales, exemplified by desertification and floods and droughts. A new land use planning strategy for sustainable housing and living in the spirit of the Brundtland commission (WCED, 1987) and Agenda 21 is needed (cf. Merret, 1995). This article reviews ideas of naturally adopted living, and tries to put present trends in perspective to the holistic concept outlined above.

LIVING WITH NATURE - A HISTORICAL REVIEW

Historically the dominating idea of Nature is that of a great chain of being (Lovejoy, 1936). In Ancient Greece the (divine) "other-worldliness" of the chain was emphasised, by e.g. Plato's thought of ethereal and eternal good ideas. To prevent hubris and Nemesis (the Goddess of revenge) to further degrade the organic world (*mundus senescens*) Plato (in *The Republic*) suggested a hierarchical society ruled by philosophers. He also introduced the idea of the human body (microcosmos) being reflected in macrocosmos. Nature (or mother Earth - GAIA) was seen as benign and rational, and human logic (refined in philosophical minds) prepared to interpret the true ontology. Thus the rational world was used to define morality, a thought emphasised by stoicism and prevailing in Western thought until Romanticism. With Christianity the idea of a good was transformed to an almighty God, still emphasising divine dominance over human fate. This holds the key to the contradicting Christian view of man both as a steward (set by God to preserve the creation) and ruler (being higher than all other creatures) over Nature (cf. White, 1967). Once paradise lost, cosmic degradation continues as e.g. expressed by Goodman in *The fall of Man, or the corruption on Nature* (1616). With the scientific revolution "this-worldliness" of the great chain came in the foreground. Observing population growth, increasing economic injustice and inspired by Plato, T. More wrote his famous essay *Utopia* (1516), of an alternative (today we would say communistic) society. In More's Utopia no property was private, civics was patriarchal, and seeking Nature's secrets for the benefit and use of life was encouraged (this was further emphasised by F. Bacon, who also outlined a utopian society - *New Atlantis*, posthumously published in 1627).

The scientific (Newtonian) picture that emerged during the 16th and 17th centuries was a linear cause-effect concept that was translated from physics to both natural and social sciences. This paved the way for simplified but (then) powerful paradigms in *inter alia* the social (e.g. J. Locke), economical (e.g. A. Smith) and political (e.g. J. Bentham, E. Burke) sciences. Inspired by such ideals (especially Locke's conviction that individual development depended on the social environment) R. Owen (an English industrialist and philosopher) founded the co-operative New Lanark in Scotland in 1799 and the more communistic New Harmony in USA 1825. While the former was rather successful, the latter failed after a few years. Owen regarded natural resources as unlimited (cf. Frängsmyr, 1980), and went in to polemics with T. Malthus who published his *Essay on the principle of population* in 1799 (in his own name in 1803). Malthus claimed that natural resources were limited and could only grow linearly (by human inventions), but that population growth was exponential. He thus foresaw society's outgrowth of its natural resource base. This view was contradicted by D. Ricardo, who developed a theory for

relative scarceness of natural resources (in *Principles of political economy and taxation*, 1813), i.e. competition and inventions would always solve the scarcity problem.

The idea of Nature as a great chain culminated in the beginning of the 18th century, when Leibnitz claimed our world to be the best of worlds. And also history was incorporated in the deterministic world model, a development crowned by Marx. More important though, is Kant's romantic idea of man as a moral agent, decoupling moral obligations from Nature's being. Romanticism led to a large intellectual transformation; from conformity and stability to individuality and differentiated and subjective apprehension. With Darwin (who got his last clues for *The origin of species* when reading Malthus Essay) the great chain of being finally collapsed. New utopias based on Newtonian science and Darwinian evolution was instead formed by Laissez-faire liberalists (e.g. H. Spencer) on one hand and social utopists in Owen's foot steps on the other (most notably E. Bellamy - *Looking Backward 2000-1887*). One who criticised Bellamy was W. Morris, a socialist and artist (who described his own utopia in *News from Nowhere*, 1890). His ideal was a pastoral idyll, grounded on personal engagement stretching even to environmental issues. He was an inspiration for socialists, anarchists, environmentalists, and also for the functionalistic school of architecture.

With the introduction of railroads, new ideas for commuting, and improved environmental housing outside the cities were introduced by e.g. J.S. Buckingham in London. His ideal city - Victoria, was never constructed, but partly realised by T. Salt who built Saltaire (outside Bradford) on his own cost as a patronage. The city was divided into zones, as well in the way of building as in the social structure. E. Howard's book *Garden Cities of Tomorrow* (published under this title in 1902) was also inspired by the social utopists and e.g. Krapotkin, and became a turning point in city planning. Howard (in a long European tradition) wanted to combine the positive sides of both the city and the country by introducing neighbourhood units in suburbs (or satellite towns). The Garden-City should be self-sufficient and the land be collectively owned (EjvegErd et al, 1992). In Sweden the idea of garden cities got a strong foot hold, some examples from Stockholm are Gröndal built 1898, Örby built the same year and Långbro Villastad from 1899, all placed south of Stockholm.

During the 20th century there has been a tendency to strive back towards the more organic ideal of Ancient Greece, for instance by the functionalists, including the German Bauhaus school and Le Corbusier (cf. Droste, 1991). They mostly used the microcosmos analogue with societal functions to arrange urban forms and functions in a rational way (actually Leonardo da Vinci had done this already in the 15th century when drawing a city on the request of the Duke of Mainland). Nature was reduced to a materialistic resource supplier. In Sweden L. Mumford's *The culture of cities* published in Swedish 1942 became much more influential in Sweden than in his native USA Le Corbusier's and Mumford's ideas strongly influenced Swedish city planning during the so called million homes program (c. 1940-1970).

PRESENT SWEDISH TRENDS

Starting in the 1950's (culminating in the 1970's with protests against tree clearing for the Stockholm subway) Swedes started to take a larger interest in environmental issues and urban planning. A "green wave" movement rapidly evolved (cf. Wessling, 1983). Their original roots were earlier counterpoints in Western history, notably Romanticism and the writings of J.J. Rousseau. The green wave sought simple and holistic life styles, e.g. in the spirit of Thoreau's *Forest life a Walden*. Another, even earlier movement were the Anthroposophs, who already started biodynamic agriculture in Sweden in the 1930s, also emphasising spiritual and holistic aspects.

However, the present trend in "ecological living" is not connected to those schools. Their ideal concentrate on healthy building materials, local water and waste systems, local energy supply and small scale gardening with belonging compost (cf. Eronn, 1991; Malbert, 1993; Berg, 1993; Kullinger and Strömberg, 1993). The first generation of ecological villages started to arise in Sweden during the 1970's. They were located to sites with favourable soil and moisture conditions for building and construction purposes, as well as with beneficial micro climate. The second generation ecological villages, now being planned for, aims at finding local supply for primarily food, but also for energy and water (Günther, 1993). A major scope is to minimise the need for transportation. A futuristic concept is to put a pattern of communicating ecological villages in the landscape. A pattern of villages composing a rural centre (or diffuse urban centre), also being able to support social services, job places etc. A third generation of ecological villages will hence aim at functioning in a holistic, beneficial mutualism with the surrounding rural and natural environment.

The present ecological villages resemble the town-country magnet emphasised by E. Howard, but with neighbourhood units of a smaller scale. That this has been so popular (and successful) in Sweden relies on the good opportunities for electronic communication, and a tradition of country life among both intellectuals, and upper and lower classes (cf. Wessling, 1983). The nostalgia for self ruling communities (with a long Swedish history) is emphasised by the fact that all but one of the villages are co-operative or tenant-owned (Ejvegård 1991, Malbert 1993). Whereas the Garden cities idealised forms derived from renaissance, present ecological villages are more inclined to use Romanticist ideals. The planning ideal of both the ecological villages, and of other landscapes has also been much influenced by McHarg - *Design with Nature* (1967). This book suggested analyses of suitability based on overlay of different thematic maps. It is an important fore runner to the use of information technology in urban and rural planning.

Living in ecological villages is expensive, and a luxury on a global scale (cf. Galtung, 1976). And several of the villages seem to have ended with separations of urea and faeces, combined with a worm based composting system. Such a development (accelerated by ongoing implementation of local Agenda 21s) is now taking place in larger scale all over Sweden. It seems that the ecological villages are more seeking the "town-country magnet", and relying on support by society (or market imperfections - cf. Coase, 1962). The aim of the present ecological villages is thus more directed towards improved social living, and local democracy.

INFORMATION TECHNOLOGY FOR LOCATING ECOLOGICAL VILLAGES

For natural resources decision GIS can be a powerful tool base for evaluation of choice alternatives based on spatially related criteria (Gumbricht et al., 1996b). As part on a MSc course (cf. Gumbricht, 1996) students from several different countries used GIS and embedded multi criteria evaluation (MCE) for identifying suitable sites for ecological villages in the Stockholm area (Fig. 2). Two kinds of criteria were used: Boolean constraints (excluded/included areas) and continuous factors. Factors were combined into a decision rule giving a suitability index ($S = \sum(w_i * x_i)$), where w_i is the weight of the factor ($\sum w_i = 1$) and x_i the criterion score of factor i . Among several standard procedures, weights were derived based on a pair-wise evaluation of importance between individual factors. Factors used for decision included: distances to i) nature areas (recreation), ii) farmland (food production and organic waste disposal), iii) aquifers (drinking water supply), iv) urban areas and communication (services and jobs), and v) wetlands (for ecological wastewater treatment). Areas to be excluded included: i) juridical closed (e.g. beaches), ii) unfavourable micro climate (northern slopes), iii) radon-gas risk, iv) technically unsuitable (e.g. due to geology or present land use). These lists more or less include the general criteria used for selecting and defining ecological living regarding spatial context (cf. Malbert, 1993). The students were asked to cut or extend the criteria depending on their preferences. All criteria must be organised in a pre-defined digital form (for details see Gumbricht, 1996). Each group had to come up with five sites within the study area (25 x 25 km), of which each should be able to host 50 to 100 families (Fig. 2).

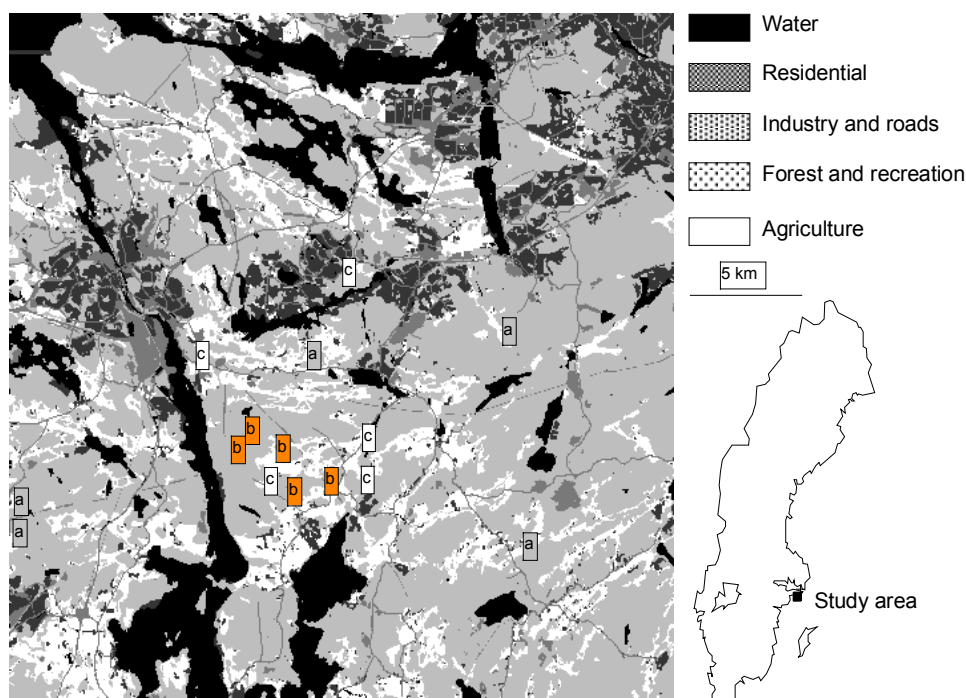


Figure 2 Suitable sites identified for ecological villages in the South Stockholm suburb area by three different groups of students (see text). Group b tried to create a diffuse urban centre.

The students themselves had expected that the different project groups should have selected approximately the same sites. As it turned out, they ended up with very different localisations. They had notably all had different opinions on the relative importance of recycling and locally closed food and waste cycles versus the importance of closeness to service and job centres. This points at the large importance of knowledge base, experience and personal preferences when seeking a life in closer harmony with Nature. It also emphasises the present lack of consensus in defining ecologically adopted living.

DISCUSSION

Throughout Western history each society has had proponents for naturally adopted living. As the understanding and interpretation of Nature changed, so did the ideals for housing and living. Three major dual thought figures have been uttermost important. First the idea of Nature as a great chain of being, giving rise to the duality of man as both a ruler and steward. Second the town - country duality, which have pervaded ideas of living and housing throughout Western history (cf. Williams, 1973). The idea of a degrading world (*mundus senescens*), where human (microcosmos) moral and Nature (macrocosmos) reciprocally decay, was dominating until the industrial revolution and the enlightenment. Knowledge about Nature led to deterioration (as expressed in the myths of paradise and Prometheus theft and bringing of fire to mankind). With the scientific revolution, notably Bacon, its counterpoint, the idea of progress, became the mainstream. Science became the new religion. This made possible large scale exploration of natural resources, of which another prerequisite was Kant's formulation of a categorical imperative. Degradation has since been the counterpoint, however at times it has been strong, notably during Romanticism and the writings of J.J. Rousseau, when seeking primitivism was idealised. A more recent advocate for degradation is the philosopher G. H. von Wright (e.g. 1978), who uses Nemesis as a metaphor for the revenge of Nature that he foresees.

Utopian ideas of living and planning is a combination of the counterpoints man as a steward, a degrading world and living on the country side (cf. Frängsmyr, 1980). Whereas the opposite standpoints of human dominance and development have led Western society at least since the enlightenment. Another important idea is that of the world as a deterministic machine, where the counterpoint is that of an evolving system with an open end. Prigogine and Stengers (1984) thought that the emerging acceptance of the latter could bring a new alliance between social and natural science (also advocated by many others - e.g. Thofelt, 1986). This is not the direction presently taken, neither at universities (Macilwain, 1996), nor in planning and management (cf. Merret, 1995).

The present trend of naturally adopted living (in Sweden) is focusing on the development paradigm, combined with ecology (a term coined in the 1920s). The change from e.g. Howard's garden city is more in scale. Present information and communication systems have made possible functional small scale integration, whereas former utopian societies were based on (spatial) functional separation. However, alternative schools exist, most notably the anthroposophic living and their biodynamic cultivating, and the remnants of the green movement. The latter is formed also on spiritual grounds, whereas ecological living is based on a reductionistic cause-effect paradigm with Newtonian roots. The primitivistic green wave during the sixties were seeking simple lives, instead today's eco-villages are inhabited by the upper middle class. This is paralleled with a switch from

Malthusian scarceness (as also expressed in *Limits to growth* published by the Club of Rome 1972) to Ricardian scarceness (as expressed in the *Brundtland commission* report and *Agenda 21*). It can be speculated that this direction of change satisfies both the development thesis and its antithesis of degradation into a synthesis, ending the history of duality in views on naturally adopted living (cf. Fukuyama, 1990).

CONCLUSION

As shown in the historical examples, all epochs have had their own ideals regarding naturally adopted living. With the great chain of being, Nature was seen as benign, and utopian ideals were based on a human stewardship adapted to Nature (cf. Wiman, 1990). With the revolutions in science and industry, accompanied by a break in the ontological value of Nature (Kant), a new linear and deterministic view emerged. The benign view still dominates what I have called the degradation counterpoint, and the linear view the mainstream development paradigm (cf. Wiman, 1991). However, science has convincingly shown that Nature is non-linear (cf. Prigogine and Stengers). Geophysics is a new science emphasising the cybernetics of Earth, based on the GAIA hypothesis by Lovelock (e.g. 1988). This urgently calls for changes in policy, management and planning.

A utopian ideal based on present knowledge should consider a holistic and integrative approach based on first principles. Recognising water as the main organising agent of Nature's hierarchical life-support systems, Gumbrecht et al (1996) suggested a modular concept for sustainable redevelopment of urban life. Such a strategy should emphasise urban form and both natural and human communication patterns (e.g. Lamm and Göring, 1992; Breheny, 1992). By intelligent management energy dissipation in nested and communicating green structures can be exceeded beyond their natural capacities. This system should be based on a taxation of time and space (Malthusian) limited natural processes, and the use of self-organising (Ricardian) market forces. In theory this should lead to a tax system where space and time limitations of natural processes should be reflected in costs of housing, living and transport. This is in rather strong contrast to present ecological villages, and, for instance, EU policy (where e.g. agricultural and road-construction subsidies leads the other way). A first step would be to identify and define synoptic and transparent indicators of sustainability applicable for urban and rural planning and management.

DISCLAIMER

This article is the result of a long personal interest in the history of Western ideas, especially concerning man's relation to Nature. I have no training or professional experience in those fields, and the quoted literature is arbitrarily chosen. Probably there are myriad of other texts, and other interpretations to be made.

REFERENCES

- Berg, P.G., (Ed), 1993. *Biologi och bosättning. Naturanpassning i samhällsbyggandet. Natur och kultur/Institutet för framtidsstudier.* (In Swedish).
- Breheny, M. (ed), 1992. *Sustainable development and urban form. European research in regional science.* Pion, London.

- Coase, R. 1960. The problem of social cost. *J. of Law and Economics*. Oct.
- Droste, M., (1991), *Bauhaus 1919-1933*. Benedikt Taschen Verlag GmbH. Köln.
- Ejveg(Erd, P., Forsberg, A., Högström, S., Jivžn, G., Klang, A.-M., NorlŽn, C., Nyqvist, K., Wallner, S. (1992); *Dagmaskens dilemma - ideer för en mer ekologisk stad*. Chalmers tekniska högskola, Göteborg. (In Swedish).
- Eronn, R., 1991. *Ecological living in Sweden*. The Swedish Institute, Stockholm.
- Frängsmyr, T., 1980. *Framsteg eller förfall*. Kontenta (In Swedish).
- Fukuyama, F., 1992. *The end of history and the last man*. Free press, New York.
- Galtung, J. *Alternative life styles in rich countries*. *Development Dialogue*, 1: 83-96.
- Gumbrecht, T., 1996. *Application of GIS in training for environmental management*. *Journal of Environmental management*, 46: 17-30.
- Gumbrecht, T Högelin, A and Renman, G (1996a) *Urban green mosaic and sustainable water processes*. *Proc. Water saving strategies in urban renewal* (EAUE, Feb 1-3, Vienna), in press.
- Gumbrecht, T., McCarthy, J. and Mahlander, C. (1996) *Digital interpretation and management of land cover - a case study of Cyprus*. *Ecol. Eng.*, in press.
- Günther, F., 1993. *Systemekologi och samhällsbyggande*. In Berg, P.G., (Ed), 1993. *Biologi och bosättning. Naturanpassning i samhällsbyggandet*. Natur och kultur/Institutet för framtidsstudier. pp 113-154. (In Swedish).
- Kullinger, B. and Strömberg, U.-B. (Eds), 1992. *Planera för en bärkraftig utveckling*. Bygghökningsrådet, Stockholm. (In Swedish).
- Lamm, J.O. and Görling, A. 1992. *Environment, energy and housing. A location model*. Swedish Council for Building Research, BFR. D1.
- Lovejoy, 1936. *The great chain of being*. Harvard University Press.
- Lovelock, J., 1988. *The ages of GAIA*. Oxford University Press.
- Macilwain, C. 1996. *Science societ course ais under threat at Stanford*, *Nature*, 381: 183.
- Malbert, B., (Ed), 1993. *Ekologiska utgångspunkter för planering och byggande*. Bygghökningsrådet, Stockholm. (In Swedish).
- Merret, S. 1995. *Planning in the age of sustainability*. *Scandinavian Housing and Planning research*, 12:5-16.
- Odum, E.P., 1993. *Ecology and our endangered life-support system*. 2nd ed. Sinauer, Sunderland, Massachusetts.
- Prigogine I. and Stengers, I. 1984. *Order out of chaos*. Bantam Books.
- Ripl, W and Gumbrecht, T. (1996). *Integrating landscape structure and clean water production*. Presented at Stockholm Water Symposium 1995, submitted to *Ambio*.
- Thofelt, L., 1996. *Ecotechnics - the fusing of theory and practice*. In Thofelt and Englund (Eds), *Ecotechnics for a sustainable society*. Mid Sweden University, pp. 1-9.
- WCED (World Commission on Environment and Development), 1987. *Our common future*.
- Wessling, U., 1983, *Leva nära naturen - Om innebörden av det underförstådda i gröna vågens budskap*. In Hjort, A. (Ed), *Svenska livsstilar - om naturen som resurs och symbol*. Kontenta, Liber Förlag. Stockholm, pp 18-53.
- White, L., 1967. *The historical roots of our ecological crisis*. *Science*, 155: 1203-1207.
- Williams, R. 1973. *The country and the city*. St Albans, 1975.
- Wiman, B., 1991. *The world of perceptions versus the world of data: notes towards safe-failing the energy equation*. In K. Takeuchi and M. Yoshina (Eds), *The global environment*. Springer, Berlin, pp. 171-206.

Wiman, I., 1990. Expecting the unexpected - some ancient roots to current perceptions of Nature. *Ambio*, 19: 62-69.

Wright, G.H., von, 1978. Humanismen som livsåskådning. (In Swedish).