Cosmos and History: The Journal of Natural and Social Philosophy, vol. 18, no. 1, 2022

THE EARTH HAS BECOME THE GARDEN OF MANKIND

Markus Lindholm

ABSTRACT: The environmental crisis challenges our faith in humanity. Building on deep ecology and recent insights in evolutionary psychology, this article elaborates evolutionary peculiarities of our species, in order to develop foothold for new perspectives on the relation between man and earth. Premodern cultures managed to interact with their environments by establishing bio-cultural interfaces, thereby maintaining sustainable resource use. Homo sapiens has not generally been 'a plague of the earth', but rather a species that enhanced local biodiversity. In addition to genetical information, humans share a reservoir of cultural meaning. This reservoir has been coined 'the noosphere' and probably make up the last stage in a series of major evolutionary transitions since the Precambrian. Through the noosphere, the earth has become the garden of mankind. Such perspectives may open for re-establishing faith in man and in his ability to develop flowering relations to his environment.

KEYWORDS: Environmental education; Homo sapiens; evolution; waste; noosphere; Anthropocene.

INTRODUCTION

Humans live on hope. A life without hope is not an option. Can scientific knowledge evoke hope, despite alarming climate crisis and environmental deterioration? The answer will depend on the concepts applied to frame the man-earth-relation. Traditionally, this relation has been viewed as rather straight forward: *Homo sapiens* is a mammal species, and our conception emphasizes the features we share with them. Unintendedly, this contributed to a deflation of human peculiarities, which frequently lead to a rather pessimistic view (Scranton, 2016; Money, 2019). Many scientists would subscribe to claims like those of David Attenborough ("*Humans are a plague of the earth*") or Umberto Echo, who claimed that "*the rest is just sex, copulation, the perpetuation of the vile species*". "*Humans are the cancer of the Earth*" t-shirts can even be purchased on the web. Based on deep ecology and recent insights in evolutionary biology, this study questions the legitimacy of such a pessimistic conception of the man-earth relation. The article departures from the paradoxical fact that humans not only destroy the environment. They are biophilious, as well. Use of flowers for ornaments, or animals as pets, are known from cultures across the world. People make nesting boxes for birds, plant trees, and dig flowerbeds, too. Biophilic behavior is universally human, known from Babylonia and ancient China to today's suburban balconies. These two opposite faces of *Homo sapiens* call for a deeper exploration of human peculiarities, in order to establish a better evolutionary concept of man and environment, which even may renew hope and belief in the value of environmental education.

THE PROBLEM

Homo sapiens is certainly a mammal. And still, it comprises peculiarities. Mammals are limited by the resources of their ecological niche. If disease and predation is absent, populations increase as long as resources are available. But competition increases as they approach the sustainability of their ecological niche. Now, features which favor survival and reproduction give certain genotypes superiority, and new adaptations spread and change the entire population. This is what Charles Darwin called natural selection. Mammals, and other organisms alike, are optimal outcomes of adaptive matches addressing species specific ecological niches. Darwin made the mechanism explicitly dependent on the absence of cultural checks, however: "*as more individuals are produced than can possibly survive, there must in every case be a struggle for existence (…); for in this case there can be no artificial increase of food, and no prudential restraint from marriage*." (Darwin, 1859, chapter 3, *my underline.*). For a species which artificially produces food and regulates reproduction, the outcome is less predictable.

Five years after 1859, Alfred Russell Wallace published the first article specifically exploring the evolutionary problems posed by *Homo sapiens* (Wallace, 1864). Like Darwin, he was puzzled by the possibility that culture could overrun the selection mechanism. Humans are sympathetic and share feelings, memories, worries and plans for common action. They collaborate intimately, but flexibly:

"*the swift hunt, the less active fish, or gather fruits; food is to some extent exchanged or divided. The action of natural selection is therefore checked*" (pp. clxii). Through language and symbolic signs, *Homo sapiens* achieve a new dimension of cognitive and cultural autonomy. Instead of adapting to specific ecological niches, humans adapt to a culturally constructed cognitive niche, by means of symbolic language and local traditions (Whiten & Erdal 2012). "*The core of our zoological distinctiveness lies in a capacity for 'conceptually abstracting from a situation a model of what manipulations are necessary to achieve proximate goals that correlate with fitness*" (Tooby & DeVore 1987, p. 209). According to Steven Pinker (2010), the cultural-cognitive niche may solve the riddle elaborated by Wallace, because the cultural factors modulate and override the ecological niche: "*The Inuit's colonization of high latitudes may have been facilitated by adaptive changes in body shape and skin pigmentation, but it depended much more on parkas, kayaks, mukluks, igloos, and harpoons. This underscores that the cognitive niche differs from many examples of niches discussed in biology in being defined not as a particular envelope of environmental variables (…), but rather the opportunity that any environment provides for exploitation via internal modeling of its causal contingencies*" (p. 8995).

The cognitive-cultural niche made humans largely independent on their environments and explains their astonishing ability to settle across wide climatic and geographical gradients. This flexibility is possible because humans rather adapt to their cultural-cognitive niche than to the physical environment. *Homo sapiens* is this planet's global species (Fuentes, 2017).

Cultural mediated independence from physical habitats, however, also invokes the risk to overexploit natural resources. In general, natural selection prevents species from niche destruction. Temporal overpopulation is not uncommon. But sooner or later natural selection kicks in, and through enhanced competition and increased mortality, population size is pushed down to the carrying capacity again, possibly with new adaptations. If evolvability is insufficient to meet the resource deficiency, the population goes extinct. In such cases, the species has become so inflexible, that it can no longer produce the departures from the traditional norm that might permit a major switch in resource utilization or an answer to the challenge of a competitor or pathogen. Humans, on the contrary, respond to resource limitation by shifts in cultural habits, hence allowing further population growth. By insisting on the view of *Homo sapiens* as nothing but a mammal, the human capacity for environmental destruction remains mysterious. Solving the environmental crisis is only possible through solving the human riddle.

Homo sapiens share, as all species do, a reservoir of common genetic information. But they share a common reservoir of symbolic information, as well: a reservoir of shared meaning, in terms of knowledge, myths, traditions and local habits. Human cultures, from the Pyramid of Cheops and the Great Wall of China to the Eiffel Tower and the Apollo program, are not primarily testaments of rationality and intelligence, but rather of shared symbolic signs, expressing intentions, opinions, thoughts and plans. Signs and language enable humans to share contents of meaning independent of the physical context. There is a nearly complete lack of indications that other species recognize that their fellow creatures constitute minds like their own. Humans are aware of their own consciousness, and accordingly aware of others. This self-awareness opens for flexible, situated collaboration and altruistic behavior. As claimed by Robin Dunbar in his 'social brain hypothesis': humans think through other minds (Dunbar 1998; Henrich 2016). Humans are cognitive adapted for collaborative activities involving shared goals and socially coordinated action plans and common intensions, and regulate their behavior accordingly: *"Interactions of this type require not only an understanding of the goals, intentions, and perceptions of other persons, but also, in addition, a motivation to share these things in interaction with others*" (Tomasello et al., 2005, p. 676).

A corresponding kind of self-regulation has historically characterized common resource use (Jackson et al., 2000; Shiraev & Levy, 2017). Jared Diamond's book *Collapse* (2005) evoked much attention, with its reports on community collapse due to overexploitation of resources. But the number of unambiguous cases of such collapse are in fact few (the Viking colony on Greenland, the Easter Island, Minoan Crete), and have been factually disputed, as well (McAnany & Yoffee, 2010; Bregman, 2020). Most premodern communities managed to establish sustainable solutions to local resource use (Ostrom 1990). The Sami of the Arctic share limited grazing areas for reindeers, with agreements encompassing benefits and responsibilities in order to maintain common pastures (Barlindhaug, 2013; Marin & Bjørklund, 2015). Shared use of summer pasture, arable and meadows, has a long history across Eurasia, where resources have been regulated by common rules defining numbers of grazers, duration and associated duties, as well. The system of transhumance and setring of Northern

Europe and the Swiss Alps partly roots back in the Iron age (Moe et al., 1988). Common laws included duties associated with maintenance and care of outfields, such as bush and rock removal, hunting of predators, and sowing of new grass following landslides. In Sahel, pastoralists have maintained the common use of meadows for cattle, which also included rules for shared use of the scattered acacia trees, and their protein-rich fruits (Stave et al., 2007).

Through such agreements, sustainable use of common resources have been successfully maintained over centuries, without resource deterioration. A 'tragedy of the commons' is an exception rather than the rule (Ostrom, 1990; Araral, 2014).

THE CULTURAL LANDSCAPE

Through such local modes of common self-regulation, new kinds of ecosystems emerged, now known as cultural landscapes (Taylor, 2012). In Europe these landscapes consisted of mosaics of pasture, arable land, and settlements, mixed up with ditches, mires, ponds, rocky hills and tree groves. Lacking modern technology, the reworking of the environment was shallow, with minor impact on bedrock and waterways. The result was a heterogenization of landscape features which substantially increased local biodiversity (Suchantke, 1993; Vos & Meekes, 1999). Large parts of eastern Asia are dominated by cultural landscapes, now partly populated by species that solely occur in these environments (gingko, rock dove). Other regions have been extensively cultivated by means of terraced wetlands for rice, taro, and other crops, in close interaction with aquatic and semiaquatic flora and fauna elements (Bhattacharya, 2014). Large areas of the semi-arid Irano-Anatolian region was altered into open oak-grassland cultural landscapes already during early Holocene (Asouti & Kabukcu, 2014). In the high Andes, pre-Colombian cultural landscapes dominated large areas, and substantial parts of the Amazon rain forests are old cultural landscapes, as well (Heckenberger et al., 2007; Solomon et al., 2007), as confirmed by the widespread occurrence of manmade black soil (*terra preta*). The Maya culture, which persisted through millennia, rested on an intriguing system of agriculture and forestry, making up complex cultural landscapes from wetlands to alpine zones (Beach et al., 2019). African woodlands are partly afforested cultural landscapes, as well (Fairhead & Leach, 1996), and aborigines of Australia controlled bush fires to promote certain grasses and edible plants along their trails, altering game densities and reshaping vegetation patterns (Silock, 2018). Even presently, loss of diversity is shown to be lower in areas managed by traditional cultures (IPBES report, 2019).

The term 'ecological footprint' gained new meaning as premodern cultures created a broad range of man-made soil types, *anthrosols*. Enriched by manure, charcoal, ashes, and compost, anthrosols still dominate substantial areas of the Eastern and Western Palearctic and tropical Nearctic, partly reaching back to early Holocene (Gong et al., 1999; Lehmann et al., 2003). The soil in which we presently put our ecological footprints, are by large created by our own ancestors.

These man-landscape interfaces enhanced local biodiversity and habitat heterogeneity. Half of the flowering plants of northern Europe are introduced from southern latitudes by man or gained increased distribution due to human culture – among them many herbs now ubiquitous, such as dandelion, nettle, ground elder, and coltsfoot. The emergence of a diverse flowering vegetation in turn, boosted the insect fauna. Bumble bee diversity of Britain is intimately associated with cultural landscapes (Carvell et al., 2007), and caterpillars of numerous common butterflies depend on herbs and flowering plants of the cultural landscape. Even the tortoiseshell or the peacock, now common in alpine environments seemingly unaffected by humans, are leftovers from premodern cultural landscapes, where grazing livestock delivered the manure crucial for nettles, which is the only plant their larvae feed on. The abundance and diversity of dung beetles, several of which presently red-listed, is likewise an effect of livestock grazing in outfield (Hanski & Cambefort, 1991). The enhanced diversity of insects favored a corresponding increase in bird diversity (Pedersen & Krøgli, 2017).

While humans transformed the environment into cultural landscapes, so did environments condense into cultural myths, narratives and archetypes. Mountains, cliffs, powerful predators, or charismatic birds populated the cognitive-cultural niche as archetypic myths, expressing notable human habits of relevance (Nazarea, 1999; Taylor & Lennon, 2011; Taylor, 2012). Human culture reorganized the environments, and these reciprocally reorganized human cultures. Crops, game, fish and landscape became personified cultural corner flags, warning, instructing and mediating rules for human behavior and resource use. Maize, along this bio-cultural transition zone, was not only a food item for the Maya culture, but also a cultural corner flag, encompassing "*mythological* *origins, ethnic identification and very existence of the Mesoamerican people*" (Staller, 2010, p.59). The regulatory function of resource limitation, which constitutes the core factor for adaptation by means of natural selection, is in *Homo sapiens* transformed into a bio-cultural framework, where local cultures were reshaped in accordance with the environment, and local nature was reshaped in accordance to the cultural habits. Heckenberger et al. (2007) claim that we need a concept of biodiversity that includes how humans locally enhanced biodiversity and habitat heterogeneity, and how the environment reciprocally influenced human culture. They suggest the concept of 'bio-cultural diversity', defined as "the way certain cultural and biological patterns are mutually constituted". The temporal concept would be bio-historical diversity, "*to describe how this process unfolds over the long term*" (p. 205).

The bio-cultural diversity perspective, however, also reveals how premodern concepts differed from the present modern. Premodern cultures did not maintain a firm distinction between mind and body (Abram 1997). Hills, volcano, stars and animals did not symbolize spirituals or gods – they *were* gods, with strong and sometimes unpredictable wills. The Matsés people of the Amazon calls the rainforest *Titá*. But *Titá* is more than an ecosystem. It has soul and comprises powerful spiritual undertones, and the word may also mean 'mother'. The rainforest is at the same time a forest and a personality. *Titá* expresses variable moods and contact with her is achievable by means of hallucinogens. The rainforest does not symbolize a spirit – it *is* a spirit: "*The Matsés talk about Titá as if it was a human. Titá could be happy and satisfied, and if so, the Matsés were alike. But Titá could sometimes be angry and sad, too, and in such cases, they were humble and aimed at appeasing her.*" (Krogh, 2006, p. 91; *own transl.*). When a game is felled, the act must be lamented to *Titá*, and another game cannot be felled before the animal spirit has been thanked and the bio-cultural relation reconciled, which is partly conceived through dreams. For the Matsés, deforestation is not a loss of 'resources', but just as much a loss of meaning (Jokic, 2015). To understand the concept of *Titá* presupposes that one overcomes the separation between physical object and its meaning. Arne Næss (1995) is transgressing the same distinction between object and meaning, when he claims that the mountain Hallingskarvet may be pleased by his presence (p.9).

WASTE

In Europe, the bio-cultural interfaces began to break up during the Renaissance, before fully collapsing after the industrial revolution. To discuss the causes in full is beyond the scope of this article, but the bio-cultural interface eroded gradually, while the Cartesian object-meaning-distinction gained dominance. Minds and bodies are principal different realms, Descartes claims in the last chapter of his *Meditations*. Reality hence comprises two profound aspects, the reality of the thinking mind, and the realty of matter. Solely human minds comprise thinking and conceive meaning. Things and objects, on the other hand, are mechanical bodies, and "*it is not necessary to conceive of this machine as having any vegetative or sensitive soul or other principle of movement and life*" (Descartes, *in* Cottingham et al., 1984, I:108).

The object-meaning distinction allowed nature to be conceived as assemblages of neutral, dumb 'things'. Now, *Títá* could be chopped. It was 'just a forest'. The word 'just' succinctly sums up the modern mind, which transforms environments into 'resources', or even 'ecosystem services', which may be utilized or converted to cash. Cities and urban areas grew, requiring the subsistence farming principles to develop into rational and effective methods. Harvests turned into crops and commodities. By improving healthcare and nutrition, population growth rates accelerated[1].

The phenomenon of waste is indicative for this cognitive shift. Waste is indeed well known from premodern cultures, too. Most of it, however, was organic leftovers and feces, which broke down and recycled into soil, atmosphere and hydrosphere (Strasser, 1999). But the more 'object' and 'meaning' separated, the more things and objects could be classified as waste: packaging, metals, scrap, clothing, asphalt, concrete blocks and vast numbers of synthetic materials, hydrocarbon polymers and plastics. "*Waste is not simply a product of material and intellectual progress but is in fact foundational to the practices of modernization*" (Cooper, 2010). In addition to visual waste, an ever-expanding application for chemicals generated accelerating venues of pollutants, that accumulate along

[1] Needless to say, premodern communities hardly intentionally aimed to be ecological fashioned, nor were they especially humane. Child mortality, famine and superstition (only to mention a few) prevent any idealization. Nonetheless, they managed to maintain largely sustainable bio-cultural practices for resource use.

biogeochemical cycles in atmosphere, soil, sediments, and food webs. Inventive scientific processes, moreover, enabled purification of substances so far unseen on earth, like Aluminum, Titan, Fluor and Silica, which neither break down nor oxidize through weathering – substances that will remain largely unaltered over geological time spans. Calculations reveal that the total mass of human products (houses, roads, metal, plastics etc.) presently exceeds the natural biomass of the planet (Elhacham et al., 2020). During the interwar period, physicists even created completely new elements, which lack any geo-ecological home range on our planet. They will remain waste in any foreseeable future – substances that the ecosystems look alienated at and are unable to integrate.

The extraordinary proliferation of waste acts as tangible proof for the new cognitive ability of humans to separate objects from meaning. The simple word 'just,' sums up the core problem of the environmental crisis.

THE ENVIRONMENT AND THE EARTH

The environmental crisis poses the global challenge of the 21. century. To solve it, however, will take more than to circumscribe *Homo sapiens* as a mammal among so many. An integral part of the problem, however, is the paradoxical fact that *Homo sapiens* not only destroy ecosystems. Our ancestors managed to establish sustainable bio-cultural solutions to the limited resources. Moreover, humans also recognize the damage they cause and take measures. Environmental responsibility is as puzzling as environmental destruction. Humans across the globe act against the burning of rainforests, raise campaigns for rhinos, and quit meat to reduce carbon emissions. People not only destroy. They dig flowerbeds, too. The bison is back on the American prairie thanks to quite ordinary locals who saved the very last calves and started to breed. Reintroduction of the European beaver was possible due to a handful farmers, who saved some of the last cubs, from where it could be successfully re-introduced across Europe (Halley & Rosell, 2003) – as are the large mammal predators (Chapron et al., 2014), and rare raptors too, after being close to extinction due to toxic pollutants and illegal hunt (Newton, 1988). By getting involved in caretaking for distant species and environments, humans express their personal responsibility for the earth.

Such behavior is otherwise unseen among mammals. It would be far beyond the ecological niches which shaped them. They remain adapted to specific slices of the environment. To adapt means to address a specific ecological niche. To say that the moose is adapted to the boreal forest is to say that it acknowledges it bodily and mentally through its adaptations. But for the same reason, the moose cannot conceive the meaning 'earth'. To be a species is to acknowledge a specific ecological niche and to adapt physiologically, anatomically and behaviorally to it. The flip of the coin, however, is that features to which a species possesses no adaptations, remain physiologically and mentally absent. A frog in a well cannot imagine the ocean, and a moose cannot conceive a desert.

Humans who take responsibility for the global environment, implicitly declare: The *whole* earth is potentially my home. Simultaneously, however, this means that nothing on earth is foreign wilderness. The conception of a pristine nature separated from humans is in fact a recent urban construct. The historical biogeography of humans gives proof of these sentiments. From the Ellesmere Island to the tributaries of the Amazon, from the Gobi Desert to the European beech forests, *Homo sapiens* established homelands. Environmental pollutants, as they now are present from deep sea sediments to the stratosphere, manifest that all parts of the planet have become our home. They are something humans may take responsibility for, in one way or another. To define an environment as 'wilderness', is to reject our responsibility. Ultimately, it is to reject humanity. The moose may content say: "I care about the boreal forest. It means everything to me. But the high Alps, the Mediterranean oak forests or the acacias of the Serengeti – they don't concern me, I don't have room for them in my mind or through my bodily adaptations".

To assign oneself as responsible for the earth is to define oneself as the sovereign of the planet, whether we like it or not. To acknowledge responsibility is to move beyond the capacity of any other being. To classify *Homo sapiens* as solely a mammal among so many, is to deny responsibility for the prosperity of the global ecosystems, thereby undermining our ability to take environmental actions, as well.

THE NOOSPHERE AND THE MAJOR EVOLUTIONARY TRANSITIONS

The human riddle is not about intelligence. It is about '*we*'. '*We*' enables shared intensions and meanings, and creates the cognitive-cultural niche, which each member can adapt to in her or his own genuine way. The result is collaborative hunting, fishing, berry harvesting, cooking, storytelling, godly praise, and the building of camps, shelter, farms, pyramids, and cities. They are all results of shared information and intentions, which go alongside the shared genetic reservoir. Based on this reservoir, agreements are made, dreams are confided, plans are forged. And this enable humans to be altruistic, to feel responsible, and care for the welfare of others. Humans imagine what other creatures feel, what they desire and the intensions they have. The small pronoun 'we' not only relate to conspecifics, but principally to any living entity. Accordingly, humans may be concerned for the future of the entire earth, too – a concern no other species for evolutionary reasons ever had. Human altruism means more than warm feelings for our kin (Wilson, 2015). Humans live and take potentially part in any other existence by means of huge cognitive regimes of intensions, reciprocal understanding and shared meaning.

The French paleontologist Pierre Teilhard de Chardin (1959) considered this pan-human reservoir of shared meaning of such significance that it deserved its own term. In addition to the lithosphere, hydrosphere, atmosphere and biosphere, he identified the *noosphere* (nous = reason, meaning). The Ukrainian geochemist Vladimir Vernadsky (1945) considered the noosphere, despite its invisible nature, to have substantial impact on the other spheres, through houses, constructions, roads and railways, and through farmlands, roads, quarries, and other landscape deforming enterprises. It manifests physically as "*the sphere of the earth system or its subsystems where human activities constitute a significant source of change through the use and subsequent transformation of natural resources, as well as through the deposition of waste and emissions*" (Kuhn & Heckelei, 2010, p. 282). Two generations after de Chardin and Vernadsky, the footprints of the noosphere is recognizable to everyone. Even if all of humanity disappeared, future paleontologists would easily recognize that, during a geological blink of an eye, one species caused profound physically and biogeochemical alterations of the spheres on earth. For this reason, geologists increasingly consider the metabolic impacts of the noosphere as a new geological epoch, the *Anthropocene*.

The noosphere gained an evolutionary dimension through the work of John Maynard-Smith and Eörs Szathmáry, in what they identified as *the major evolutionary transitions* (1995, 1999; Szathmáry, 2015). The history of the biosphere involves a series of transition thresholds, associated with new levels of collaborative 'altruistic' behavior. An early transition occurred in the Precambrian, as one bacteria cell managed to inhabit another, without getting engulfed or digested. The two cells overcame their inherent tendency of selfish behavior, and instead developed a collaborative, symbiotic bond. This collaborative fusion became the advent of large and complex eukaryote cells, characterized by extensive division of cellular functions, with mitochondria for energy metabolism and chloroplasts for effective photosynthesis. This novelty enabled the biosphere to extend into new space, and thereby to alter patterns and dynamics of biogeochemical cycles.

During the early Cambrian period, a new level of collaboration emerged, as some eukaryote cells formed cellular colonies. Again, instead of pursuing genomic selfishness, cells established functional common equilibria, resulting in a novel biological unit: Tissue, which soon assembled into larger collaborative complexes, such as leaves, stem, cones and cambium, or blood vessels, nerves and skin, and enabled the emergence of large and complex organisms. Again, the biosphere went through a transition of 'physiological altruism' into its present mode. During the Cretaceous, certain insects socialized into superorganisms, where each member partly serves as independent organism, but nonetheless are functional units of a larger communal organism – anthills, beehives, or wasp nests.

The noosphere flags a new transition, where the mental isolation, which up to this point had dominated the biosphere, is complemented by the sharing of meaning, conveyed by symbolic signs. We are the last major evolutionary transition (Wilson, 2015). The human community, based on shared meaning, which already puzzled Charles Darwin and Alfred Russel Wallace, inaugurates a web of cognitive interactions, which allow us to alter, reorganize, deteriorate, and even possibly destroy our environment. "*Due to social care (including medicine) and agriculture, the biology of humans has become gradually de-Darwinized*" (Szathmáry, 2015, p. 10110). For the same reason, Joseph Henrich considers *Homo sapiens* as a principally novel existence on the planet: "*humans are at the beginning of a major biological transition, the formation of a new kind of animal. In our species, the extent and sophistication of our technical repertoire – and our ecological dominance – depends on the size and interconnectedness of our collective brains*" (Henrich 2016, p. 318).

We are witnessing a new major transition going on right in front of us, and each of us is part of it. Without understanding the concept of the noosphere and how it relates to the major evolutionary transitions, the environmental crisis will remain inexplicable.

The major evolutionary transition that the reader is part of right now, through conceiving these thoughts of mine, depends on socialization of the minds. The minds, which so far were limited to single organisms, extend into a cognitive community of shared symbolic signs and meaning, independent of the environment. The noosphere involves similar features as the previous transitions, where singular and isolated units managed to overcome their egocentric isolation without engulfing their fellow organisms. The '*we*' invokes a capacity for common action so far unseen in the biosphere: A shared cognitive space independent of the adaptive demands of the ecological niche, and instead adapting to the noosphere, with all its new challenges, fears and possibilities (Gillings et al., 2016).

CONCLUSION

Through this recent cognitive transition, the entire earth is potentially fertile domain of *Homo sapiens*, ready for exploitation and cultivation. And instantly, the whole earth in its natural state is under threat. Nonetheless, our ancestors demonstrate that humans can establish sustainable resource use, thereby even enhancing habitat heterogeneity and biodiversity. They, however, had not undergone the Cartesian mind-body split, that so profoundly affects our present civilization. Instead, the modern mind has strengthened another ability: That of responsibility and recognition of beauty, in the shimmering of the marvelous blue earth as seen from space.

The demands for restoration measures of deteriorated streams, forests and cultural landscapes reflect not the least the modern minds growing responsibility for the earth. The necessity of integrating human dimensions in nature conservation is increasingly acknowledged, emphasizing conservation to be complimented by restoration principles, where local cultural traditions interact with science to develop new sustainable solutions. IUCN programs like The Earth Restoration Project, pointed to the relevance of bio-cultural interfaces for any conservation and restoration measures, by emphasizing the significance of measures as sensitive for human needs (Gritzner et al., 2011; Gann et al., 2019).

What started a century ago in saving buffalos, beavers and birds, has grown to a cultural task of global significance, as numerous large and small restoration initiatives are launched worldwide. The African Great Green Wall and the Kenyan Green Belt Movement have managed to reforest more than 50 million acres of degraded land (Goffner et al., 2019), and studies supports the assumption of a positive effect on regional climate and rainfall (Yu et al., 2017). The Aral Sea collapsed during the last decades of the 20th century, due to unsustainable irrigation and water use. Fisheries, previously comprising 13 % of the Soviet fishery, vanished and evoked regional social erosion. Construction of the Kokaral dam in 2005, however, allowed parts of the sea to recover, with reintroduction of the aquatic flora and fauna from the lake's tributaries, even allowing native fisheries to return (Micklin et al., 2020). As for Sahel, the measures undertaken are seemingly associated with increased rainfall. Similar successfully restoration measures are reported from the Nearctic, for example of the upper Mississippi river catchments, where eutrophication erased backwater ecosystems, which at present regain many of their previous features (Theiling et al., 2015).

Such large-scale restoration measures find their microlevel counterparts in millions of people, who express their biophilous passions on a daily occupational basis. The naïve joy of gardening signals steps towards bridging the gap between object and meaning, by means of biophilous responsibility and aesthetics of deep bio-cultural features, where environment, love for life and wellbeing come together (Sempik et al., 2005; York & Wiseman, 2012). Historically, environments invoked a rich venue of myths and metaphors for cultural development. Gardening is a possible developmental pathway to reconcile the cartesian violation of object and meaning and renew the metaphoric language, which historically framed the bio-cultural interfaces of man and earth (Richards, 2001). The relationship between man and earth comprises more beauty and depth than can be conceived by claims of 'humans as plague of the earth'. Perspectives like these may renew curiosity and hope in environmental education.

It looks quizzical to us from eutrophic lakes, from hillsides demolished by wind farms, from plastic litter along seashores, from the smoke of burning rainforests, and from the climbing CO_2 concentrations of the atmosphere: *Who are you, man?* If we insist to be nothing but a zoological entity among so many, we will neither understand the earth nor ourselves, and challenges of the Anthropocene will remain unsolved.

For better or worse, the earth has become the garden of mankind (Clark, 1989; Steffen et al., 2020). To quote one of the leading authorities of the novel upcoming earth system science: "the time has finally come to extend the gardening to the planetary scale – if only to counteract anthropogenic global despoliation that, ironically, results in part from the measures taken to protect limited-area environments" (Schellnhuber 1998, p. 8). Scott F. Gilbert (2017), similarly, recently claimed that "*land development and economic development lead to something [new]: Earth as managed plantation. (…). It is metamorphosis, bringing us and the land to higher, more developed, stage*" (p. 82). Already pioneers of evolutionary thinking anticipated this perspective. Alfred Russel Wallace, in the aforementioned article, outlined this view, in claiming that man actually is "*able to take away some of that power from nature which, before his appearance, she universally exercised. We can anticipate the time when the earth will produce only cultivated plants and domestic animals; when man's selection shall have supplanted natural selection*" (p. cixviii). That does not mean that all environments should be manicured flowerbeds. But humans across the earth have since ancient times treated their environment like gardens, by means of bio-cultural interactions, where meaning and objects are two sides of the same coin – as they are in any feeling of responsibility and in the aesthetic experience of daily life.

Professor science didactic
Rudolph Steiner University College
Oslo
Markus.Lindholm@steinerhoyskolen.no

REFERENCES

Abram, D. (1997). *The spell of the sensous. Perception and language in a more-than-human world* New York: Vintage Books.

Araral, E. (2014). Ostrom, Hardin and the commons: A critical appreciation and a revisionist view. *Environmental Science and Policy 36*, 11-23.

Asouti, E., & Kabukcu, C. (2014). Holocene semi-arid oak woodlands in the Irano-Anatolian region of Southwest Asia: Natural or anthropogenic? *Quaternary Science Review 90*, 158–182.

Avital, E, & Jablonka, E. (2000). *Animal traditions*. Cambridge: Cambridge University Press.

Barlindhaug, S. (2013). *Cultural sites, traditional knowledge and participatory mapping. Long-term land use in a sámi community in coastal Norway*. Dissertation University of Tromsø/Norway.

Beach, T., Luzzadder-Beach, S., Krause, S., Guderjan, T., et al. (2019). Ancient Maya wetland fields revealed under tropical forest canopy form laser scanning and multiproxy evidence. *PNAS 116*(43), 21469-21477.

Bhattacharya, S. (2014). Forest and biodiversity conservation in ancient Indian culture: A review based on old texts and archaeological evidences. ILSHS https://doi.org/10.18052/www.scipress.com/ILSHS.30.35

Bregman, R. (2020). *Humankind. A hopeful history*. London: Bloomsbury.

Carvell, C., Meek, W.R., Pywell, R.F., Goulson, D., & Nowakowski, M. (2007). Comparing the efficacy of agri-environment schemes to enhance bumble bee abundance and diversity on arable field margins. *Journal of Applied Ecology 44*, 29-40.

Chapron, G., Kaczensky, P., Linnell, J.D.C., von Arx, M. et al. (2014). Recovery of large carnivores in Europe's modern human-dominated landscapes. *Science 346*(6216), 1517.

Clark, W. (1989). Managing planet earth. *Scientific American 261*(3), 46-57.

Cooper, T. (2010). Recycling modernity: Waste and environmental history. *History Compass 8*(1), 1114-1125.

Cottingham, J., Stoothoff, R., Murdoch, D. (1984). *The Philosophical Writings of Descartes*. 2 vols., Cambridge: Cambridge University Press.

Darwin, C. (1859). *On the origin of species by means of natural selection or the preservation of favored races in the struggle for life*. London: Murray.

Diamond, J. (2005). *Collapse. How societies choose to fail or survive*. New York: Penguin books.

Dunbar, R.I.M. (1998). The social brain hypothesis. *Evolutionary Anthropology 6*, 178-190.

Elhacham, E., Ben-Uri, L., Grozovski, J., Bar.On, Y.M., & Milo, R. (2020). Global human-made mass exceeds all living biomass. *Nature 588*, 442-444.

Fairhead, J., & Leach, M. (1996). *Misreading the African Landscape: Society and Ecology in a Forest-Savanna Mosaic*. Cambridge: Cambridge University Press.

Fuentes, A. (2017). Human niche, human behaviour, human nature. *Interface Focus 7*, 20160136. https://dx.doi.org/10.1098/rsfs.2016.0136

Gann, G.D., McDonald, T., Walder, B. et al. (2019) *International principles and standards for the practice of ecological restoration*. Society for Ecological Restoration, Washington, D.C. 20005 U.S.A.

Gilbert, S.F. (2017). Metaphors for a new body politics: Gaia as holobiont. In: Latour, B., Schaffer, S., & Gagliardi, P. (Eds) A book of the body politic. Connecting biology, politics and social theory. Venezia: San Georgio Dialoge (pp. 75-88).

Gillings, M.R., Hilbert, M., & Kemp, D.J. (2016). Information in the biosphere: Biological and digital worlds. *Trends in Ecology & Evolution* https://doi.org/10.1016/j.tree.2015.12.013

Goffner, D., Sinare, H., & Gordon, L.J. (2019). The Great Green Wall of the Sahara and the Sahel Initiative as an opportunity to enhance resilience in Sahelian landscapes and livelihoods. *Regional Environmental Change 19*, 1417-1428.

Gong, Z.T., Zang, G.L., & Luo, G.B. (1999). Diversity of Anthrosols in China. *Pedosphere 9*, 193-204.

Gritzner, J., Milan, G., & Berry, L. (2011). The Earth Restoration Project: An Overview. In: Brunn, S. (ed) *Engineering Earth*. Dordrecht: Springer Verlag (pp. 1343-1352).

Halley, D.J., & Rosell, F. (2003). Population and distribution of European beavers. *Lutra 46*, 91-101.

Hanski, I., & Cambefort, Y. (1991). *Dung beetle ecology*. Princeton: Princeton University Press.

Heckenberger, M.J., Russell, J.C., Toney, J.R., & Schmidt, M.J. (2007). The legacy of cultural landscapes in the Brazilian Amazon: implications for biodiversity. *Philosophical Transactions of the Royal Society B 362*, 197-208.

Henrich, J. (2016). *The secret of our success. How culture is driving evolution, domesticating our species, and making us smarter.* Princeton: Princeton University Press.

IPBES (2019). Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany.

Jackson, T., McKenzie, J., & Hobfoll, S.E. (2000). Communal aspects of self-regulation. In: Boekaerts, M., Pintrich, P.R., & Zeidner, M. (eds.) *Handbook of self-regulation.* San Diego: Academic Press (pp. 275–300).

Jokic, Z. (2015). *The living ancestors. Shamanism, cosmos and cultural change among the Yanomami of the Upper Orinoco.* New York: Berghahn Publ.

Krogh, A.C. (2006). *Med jaguarens kraft. En reise i det ukjente Amazonas.* Oslo: Bazar forlag. Kuhn, A., & Heckelei, T. (2010). Anthroposphere. In: Speth, P., Christoph, M., & Diekkrüger, B. (eds). *Impacts of Global Change on the Hydrological Cycle in West and Northwest Africa.* Berlin: Springer Verlag (pp. 282-341).

Lehmann, J., da Silva, J.P. Jr., Steiner, C., Nehls, T., Zech, W., & Glaser, B. (2003). Nutrient availability and leaching in an archaeological Anthrosol and a Ferralsol of the Central Amazon basin: fertilizer, manure and charcoal amendments. *Plant Soil 249*, 343-357.

McAnany, A., & Yoffee, N. (eds; 2010). *Questioning collapse. Human resilience, ecological* *vulnerability, and the aftermath of empire*. New York: Cambridge University Press.

Marin, A., & Bjørklund, I. (2015). A tragedy of errors? Institutional dynamics and land tenure in Finnmark, Norway. International Journal of the Commons 9, 19-40.

Maynard Smith, J., & Szathmary, E. (1995). *The major transitions in evolution*. Oxford: Oxford University Press.

Maynard Smith, J., & Szathmary, E. (1999). *The origins of life. From the birth of life to the origin of language*. Oxford: Oxford University Press.

Micklin, P., Aladin, N.V., Chida, T., Boroffka, N., Plotnikov, I.S., Krivonogov, S., & White, K. (2020). The Aral Sea: A Story of Devastation and Partial Recovery of a Large Lake. In: Mischke, S. (ed.) *Large Asian Lakes in a Changing World*. Berlin: Springer Verlag/Springer Water. DOI: 10.1007/978-3-030-42254-7_4

Moe, D., Indrelid, S., & Fasteland, A. (1988). The Halne area, Hardangervidda, use of a high mountain area during 5000 years – an interdiciplinary case study. In: Birks H et al. (eds): *The cultural landscape, past, present and future*. Cambridge: Cambridge University Press, (pp. 429-444).

Money, N.P. (2019). *The selfish ape. Human nature and our path to extinction*. Chicago: University of Chicago Press.

Nazarea, V.D. (ed.) (1999). *Ethnoecology: Situated knowledge/located Lives*. Tucson: University of Arizona Press.

Newton, I. (1988). Changes in the status of the peregrine falcon in Europe: an overview. In: Cade, T.J., Enderson, J.H., Thelander, C.G., & White, C.M. (ed.) *Peregrine falcon populations*. The Peregrine Fund Inc, Idaho, (pp 227-234).

Næss, A. (1995). *Det gode lange livs far. Hallingskarvet sett fra Tvergastein*. Oslo: Damm & Søn.

Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. New York: Cambridge University Press.

Pedersen, C., & Krøgli, S.O. (2017). The effect of land type diversity and spatial heterogeneity on farmland birds in Norway. *Ecological Indicators 75*, 155-163.

Pinker, S. (2010). The cognitive niche: Coevolution of intelligence, sociality, and language. *PNAS 107*, 8993-8999.

Richards, R. (2001). A New Aesthetic for Environmental Awareness: Chaos Theory, the Beauty of Nature, and our Broader Humanistic Identity. *Journal of Human Psychology 41*, 59-95.

Schellnhuber, H.J. (1998). Earth System Analysis – The Scope of the Challenge. In: Schellnhuber, H.J. & Wenzel, V. (eds.), *Earth System Analysis: Integrating Science for Sustainability.* Heidelberg: Springer Verlag, (pp. 8-125).

Scranton, R. (2016). *Learning to die in the Anthropocene*. San Francisco: City Light Publ.

Sempik, J., Aldridge, J., & Becker, S. (2005). In touch with the earth. *Mental Health Today*, September, 23-26.

Shiraev, E.B., & Levy, D.A. (2017). *Cross-cultural psychology. Critical thinking and contemporary applications*. New York: Routledge.

Silock, J.L. (2018). Aboriginal translocations: The intentional propagation and dispersal of plants in Aboriginal Australia. *Journal of Ethnobiology* DOI:10.2993/0278-0771-38.3.390

Solomon, D., Lehmann, J., Thies, J., Schäfer, T. et al (2007). Molecular signature and sources of biochemical recalcitrance of organic C in Amazonian Dark Earths. *Geochimica et Cosmochimica Acta 71*, 2285-2298.

Stave, J., Oba, G., Nordal, I., & Stenseth, N.C. (2007). Traditional ecological knowledge of a riverine forest in Turkana, Kenya: Implications for research and management. *Biodiversity & Conservation 16*, 1471-1489.

Staller, J.E. (2010). *Maize Cobs and Cultures: History of Zea mays L.* Berlin: Springer Verlag.

Steffen, W., Richardson, K., Rockström, J., Schellnhuber, H.J., Dube, O.P., Dutreuil, S., Lenton, T.M., & Lubchenco, J. (2020). The emergence and evolution of Earth System Science. *Natures Review Earth & Environment 1*, 54-63.

Strasser, S. (1999). *Waste and want. A social history of trash.* New York: Holt Paperbacks.

Suchantke, A. (1993). *Partnerschaft mit der Natur. Entscheidung für das kommende Jahrtausend.* Stuttgart: Urachhaus.

Szathmáry, E. (2015). Toward major evolutionary transitions theory 2.0. *PNAS 112*, 10104–10111.

Taylor, K. (2012). Landscape and meaning: Context for a global discourse on cultural landscape values. In: Taylor, K., & Lennon, J.L. (eds.) *Managing cultural landscapes.* London: Routledge, Taylor & Francis Group, (pp 21-44).

Taylor, K., & Lennon, J. (2011). Cultural landscapes: a bridge between culture and nature. *International Journal of Heritage Studies 17*, 537–554.

Teilhard de Chardin, P. (1959). *The phenomenon of man.* New York: Harperperennial.

Theiling, C.H., Janvrin, J.A., & Hendrickson, J. (2015). Upper Mississippi River restoration: Implementation, monitoring, and learning since 1986. *Restoration Ecology 23*, 157–166.

Tomasello, M., Carpenter, M., Call, J., Behne, T., & Moll, H. (2005). Understanding and sharing intentions: the origins of cultural cognition. *Behavioral Brain Science 28*, 675–735.

Tooby, J., & DeVore, I. (1987). the reconstruction of hominid behavioral evolution through strategic modelling. In: Tooby, J., DeVore, I. & Kinzey, W.G. (eds). *The evolution of human behavior: Primate models*. New York: Suny Press (pp. 183-227).

Vernadsky, V. (1945). The biosphere and the noosphere. American Scientific 33:1-12.

Vos, W., & Meekes, H. (1999). Trends in European cultural landscape development: perspectives for sustainable future. Landscape and Urban Planning 46, 3-14.

Wallace, A.R. (1864). The origin of Human Races and the Antiquity of Man Deduced from the Theory of 'Natural Selection'. *Journal of the Anthropological Society London 2*, 158-170.

Whiten, A., & Erdal, D. (2012). the human socio-cognitive niche and its evolutionary origins. *Philosophical Transactions of the Royal Society B 367*, 2119-2129.

Wilson, D.S. (2015). *Does altruism exist? Culture, genes, and the welfare of others*. New Haven: Yale University Press.

York, M., & Wiseman, T. (2012). Gardening as an occupation: a critical review. *British Journal of Occupational Theory,* DOI:10.4276/030802212X13286281651072

Yu, Y., Notaro, M., Wang, F., Mao, J., Shi, X., & Wei, Y. (2017). Observed positive vegetation-rainfall feedbacks in the Sahel dominated by a moisture recycling mechanism. *Nature Communications* DOI:10.1038/s41467-017-02021-1