

Forsaking Nature? Contesting ‘Biodiversity’ Through Competing Discourses of Sustainability

Helen Kopnina¹

Abstract

The Convention on Biodiversity has developed the concept of ‘ecosystem services’ and ‘natural resources’ in order to describe ways in which humans benefit from healthy ecosystems. Biodiversity conceived through the economic approach was recognized to be of great social and economic value to both present and future population. According to its critics, the economic capture approach might be inadequate in addressing rapid biodiversity loss, since many non-human species do not have an economic value and there may thus be limited grounds for prohibiting or even restricting their destruction. This article aims to examine the concept of biodiversity through competing discourses of sustainability and to discuss the implications for education for sustainable development (ESD).

Keywords: biodiversity, conservation, ecocentrism, education for sustainable development (ESD), environmental ethics, sustainable development

Introduction

The Convention on Biodiversity (1992), a key outcome of the United Nations Conference on Environment and Development, included equity statements regarding the use of the benefits of biodiversity. The concept of ‘ecosystem services’ has been developed in order to describe ways in which humans benefit from healthy ecosystems. Biodiversity was recognized to be of considerable social and economic value to both present and future human populations (Braat & De Groot, 2012).

The Club of Rome, a global think tank founded in 1968 to address a variety of international political issues, set out to answer the question: what would happen if the world's population and industry continued to grow rapidly? Could growth continue indefinitely or would we start to hit limits at some point? The Limits to Growth publication (Meadows et al, 1972) postulated that biodiversity protection required drastic measures, including the curbing of economic growth and fostering ‘steady state economy’ and curbing human population.

Graham Turner (2010) published a paper called "A Comparison of ‘The Limits to Growth’ with Thirty Years of Reality”, providing empirical evidence for the contention that the values predicted by the Limits to Growth model and actual data from the turn of the century are very close. Other researchers such as Hall and Day (2009) supported the dire predictions, arguing that the problems predicted by the limits to growth model had not gone away and would only

¹ is a Researcher/Lecturer at The Hague University of Applied Sciences. Email: h.kopnina@hhs.nl

take the world population by surprise if they were ignored. Hall and Day have re-examined some of the data that led to the discrediting of the Limits to Growth theory and have shown that both resource use and costs have only risen, and are no longer mitigated by market forces. Despite human technical ingenuity, the '30 years of historical data compares favorably with key features... [of the Limits to Growth] 'standard run' scenario, which results in the collapse of the global system midway through the 21st Century' (Turner, 2010).

In the newly published book by Anders Wijkman and Johan Rockström, *Bankrupting Nature: Denying Our Planetary Boundaries* (2012), the authors demonstrate that humans, in general, are in overt denial about the magnitude of the global environmental challenges and resource constraints facing the world. Despite growing scientific consensus on major environmental threats as well as resource depletion, societies are largely continuing with business as usual, at best attempting to tinker at the margins of the problems.

Currently, the urgent calls of the Limits to Growth advocates seem overshadowed by the optimism of the 'sustainable development' discourse. The Limits to Growth message proved to be unpalatable to political leaders (Eckersley 2004). In addressing the question as to why political and corporate elites, as well as the general public, seem unwilling to acknowledge the fact that humanity is 'living far beyond its means', Wijkman and Rockström (2012:4) provide a number of explanations, such as lack of adequate education, unwillingness to change habits, powerful business interests which strongly defend business as usual models and the like. In combination with other well-known factors which are not mentioned, such as the tragedy of the commons, and theories of human nature in relation to the environment (Ehrlich, 2000; Kopnina, 2013), such reluctance to accept the pessimistic scenarios is understandable. Rejecting neo-Malthusian pessimism, sustainable development supporters prefer to speak not of absolute limits to growth but of limitations imposed by the present state of technology and social organization on environmental resources (Brundtland Report 1987).

This optimism is grounded in a belief in human ingenuity, solving problems by technological advancement as proponents of ecological modernization theory would argue. Ecological modernization theory (e.g. Mol and Sonnenfeld, 2000) states that enlightened self-interest, economy, and ecology can be favorably combined and that productive use of natural resources can be a source of future growth and development.

Coupled with this optimism is the persistent belief that environmental problems are caused by poverty and that economic growth, prosperity and equitable division of resources are going to solve the problem. This optimism is supported by the twin theories of The Environmental Kuznets Curve (EKC) hypothesis and the post-material values theory. The Environmental Kuznets curve (EKC) hypothesis postulates that during early industrialization, economies use material resources more intensively until a threshold is reached, after which structural changes in the economy lead to progressively less-intensive materials use (Grossman and Krueger, 1991). It is believed that high-income levels and economic growth lead to environmental improvement (Stern, 2004).

The post-materialist values theory states that while wealthier societies can afford to care about the environment, the developing countries or poor people need to worry about meeting their basic needs (Inglehart, 1971, 1977). Furthermore, this hypothesis contends that prosperity would create environmental awareness and care for the environment through technological advances. This article aims to dispute this belief based on two sets of issues. One set of issues concerns criticism of the premise of sustainable development based in EKC and post-materialist value theory; another set of issues concerns the very value of 'nature' or 'environment' such sustainable development discourse propagates. 'Environment' is represented as 'natural capital' used by humans and the intrinsic value of non-human species is rarely recognized. We shall explore each of these issues in turn.

Paradoxes of Sustainable Development

In regards to the Kuznets curve, critics have noted that overwhelming empirical evidence from developed industrial countries demonstrates that the material saturation level in prosperous societies is far from sustainable. It is questionable whether the objective of balancing social, economic and environmental triad is achievable, and whether human equality and prosperity, as well as population growth, can be achieved with the present rate of natural degradation (Rees, 1992; Giddens, 2009). Critiques of top-down development projects have noted that foreign aid, structural adjustment programs and programs to promote development may have caused more harm than good in exacerbating global inequalities and have largely failed in addressing ecological crises (e.g. Goldsmith, 1996; Easterly, 2006; Bodley, 2008; Oliver-Smith, 2010).

The very notion of the triple bottom line ignores the ecological need for the biosphere for which economic development is not imperative since it only contributes to human development. Rather, we should use a different set of imperatives, namely ecological and moral imperatives that would alleviate human suffering and provide basic materials for all humankind (Stevenson 2006: 280–281).

More generally, the two prime terms 'sustainability' and 'development' have somewhat contradictory meanings. 'Sustainability' implies continuity and balance, while 'development' implies dynamism and change. Thus, environmentalists are drawn to the 'sustainability' angle, while governments and businesses place the focus on 'development', usually meaning GDP (Gross Domestic Product) growth (Giddens, 2009) by this term. Expanding the 'economic pie' to include the most dispossessed, will necessarily include even more natural resources being consumed since the poor are much more numerous than the rich (Spring, 2004).

Critics argue that ecological modernization does nothing to alter the impulses within the capitalist economic mode of production that inevitably lead to environmental degradation (Foster, 2002). In doing so, ecological modernization theory tends to ignore the five facets that Dunlap (2008) and his colleagues developed to measure popular support for the New Ecological Paradigm: (a) the limits to growth, (b) non-anthropocentrism, (c) fragility of nature's balance, (d) untenability of exemptionalism, and (e) ecological crisis. According to Foster (2012), ecological modernization theory is systematically defined by its weak adherence to or complete rejection of all five of these facets, and in

particular, by its new exemptionalism. While proponents of human ingenuity celebrate the human capacity for invention and innovation, critics question whether technological fixes can lead to sustainable practices, particularly if powerful elites such as corporate leaders are still allowed to follow the business-as-usual trajectory (York and Rosa, 2003).

In relation to post-material value theory, ecological sociologists have argued that there is evidence that environmental concern is an exception to the post-materialist thesis (Dunlap and York, 2008). Environmental concerns have been shown to be a global phenomenon exemplified by the proliferation of environmental organizations in developing countries and surveys on citizen concern for the environment (Brechin and Kempton, 1994). Some studies show that national wealth is 'negatively rather than positively related to citizens' environmental awareness and concern' (Dunlap and Mertig, 1997: 24). Put simply, there is no empirical evidence that richer societies are necessarily more 'environmentalist' or more able to deal with environmental problems than poor ones and that technological solutions are limited in solving ecological challenges.

Related to this concern, is the concern for whether any modern industrial society is willing to resolve environmental problems that are not directly related to human welfare.

Biodiversity protection is not necessarily contingent with social and economic interests, such as deriving medicines from wild plants and may be inadequate in addressing biodiversity loss since not all species are 'required' or 'necessary' for the survival of human species. Besides, the growing human population and consumption demands are pressuring non-human species into increasingly instrumental and subservient categories of resources, rather than recognizing their intrinsic value (Cafaro and Crist, 2012).

What is the "environment"?

Much of international political rhetoric supported by an organization like The United Nations and financed by institutions such as the World Bank (2012), conceives environmental sustainability as promoting human, social and economic sustainability, whereas natural (environmental) sustainability is particularly viewed as protecting natural capital for human use. In the World Bank's statement on environment and biodiversity, 'biological resources' are perceived as providing the raw materials for livelihoods, sustenance, medicines, trade, tourism, and industry:

Genetic diversity provides the basis for new breeding programs, improved crops, enhanced agricultural production, and food security. Forests, grasslands, freshwater, and marine and other natural ecosystems provide a range of services, often not recognized in national economic accounts but vital to human welfare (The World Bank, 2012).

'Environment' is thus represented as 'natural capital' used by humans and no intrinsic value of non-human species is recognized. Framing 'environment', 'nature', 'wilderness', or 'biodiversity' as a 'common good' and putting a price on 'ecosystem services' or 'natural capital' became increasingly prominent in international political debates since the nineteen-eighties (e.g. Golley, 1993; Costanza et al, 1997; De Groot, 2002). Isbell and colleagues

(2011) argue that plant biodiversity needs to be preserved in order to benefit complex human systems.

Recently, some authors have argued that market-based valuation techniques are inadequate as they do not seem to capture the expanse, nuances, and intricacies of many of the ecosystem services as well as ecological identity and emotional attachment to nature, the value of which is not readily understood by economists (Kumar and Kumar, 2008). Critics have noted that green GDP requires measurement of the benefits arising from public goods provided by nature for which there are no market indicators of value (Boyd, 2007). In the case of deep sea ecosystem services, there is also a substitution between different kinds of value: 'as our knowledge of deep-sea environments increases, there may be a reduction in value related to wonder or awe for the unknown, and an increase in value associated with marveling at the intricacies of the natural world and our ability to decipher its secrets' (Armstrong et al, 2012:10). Another example of non-monetary valuation published in Ecosystem Services is that of cultural ecosystem services provided by landscapes (Tengberg et al, 2012).

In its focus on integrating social and economic interests with those of environmental protection, sustainable development discourse represents a radical departure from the limits-to-growth concerns as in shifting the focus on solving environmental problems, towards social equity issues (Kopnina 2012a). Sustainable development discourse seems to embrace anthropocentrism, which entails human moral superiority vis-à-vis other species. It reserves moral consideration exclusively to human beings, judging our acts towards nature on the basis of how they affect us, not on how they affect other beings (Eckersley, 2004). In contrast to the earlier efforts of environmental educators to promote conservation and address anthropogenic causes of environmental degradation, ESD reveals an anthropocentric bias that obscures the aims of EE outlined in The Belgrade Charter (Kopnina, 2012b).

The perspective of the Nature Conservancy (TNC) chief scientist Kareiva represents a challenge to the traditional approach of conservation, and in some ways devalues efforts that seek to protect large functioning ecosystems (http://thebreakthrough.org/blog/2012/04/peter_kareivas_breakthrough.shtml). In a similar vein, Emma Marris, author of *Rambunctious Garden*, have argued that humans have such a significant influence upon the planet that we should or must "manage" it as if it were a giant garden (Marris, 2011). Humans have changed the landscapes they inhabit since prehistory, and climate change means even the remotest places now bear the fingerprints of humanity. Coupled with this realization is optimism that urges us to look forward and create the "rambunctious garden," a hybrid of wild nature and human management (Marris, 2011). Rather than decrying imaginary wilderness, the argument goes, imaginary Edens, designer or novel ecosystems and Pleistocene parks can be celebrated by all. Implicit in this position is optimistic narratives which bring home the idea that we must give up our romantic notions of pristine wilderness and replace them with the concept of a global, half-wild rambunctious garden planet, tended by us. In a similar vein, Conway and Fresco (2013) argue for 'sustainable Intensification', advocating a new paradigm for African agriculture and praising genetically modified

crops and other forms of intense agriculture which ignores animal welfare and other environmental ethics concerns. In her recent lecture at one of the prestigious Amsterdam high schools, Louise Fresco, an honorary Professor of Sustainable Development at the University of Amsterdam, has related to the students' parents that there is definite hope in providing the 'planet' with enough food, that population growth is not a problem, and that agriculture can be further intensified to provide higher yields (Fresco 2013).

In opposition to this view, publications by the Foundation for Deep Ecology (FDE) are quite revealing. The Foundation has published large-format books on various environmental issues including CAFO (confined animal farming operations), Fatal Harvest, Clearcut, Plundering Appalachia, and other titles. FDE defends the traditional approaches to conservation - at least makes the case that protecting large landscapes is the most effective and secure way to sustain ecological function and reduce biodiversity losses. Concerns with depletion of resources, equity in the distribution of resources, as well as human health and welfare exclude consideration of an ecocentric perspective and reduce the 'environment' to that which only serves social and economic interests of human beings (Spring, 2004; Kopnina 2012d). This point concurs with Heidegger's notion of nature as 'standing reserve'. The critics of resources' approach have pointed out that 'intensification of sustainability' is going to mean abandoning any ethical scruples in relation to non-humans in order to 'feed the plant' (of humans only). The values attributed to nature are instrumental in character, in the sense that the natural environment is only useful in so far as it provides resources that can be used to satisfy human wants. For example, while ethical assumptions underlying sustainable development condemn practices like child labor, gender, class, ethnic and racial discrimination, the daily mechanized slaughter of farm animals for human consumption or medical experimentation is rarely disputed (Shepard, 1993). While combating social problems is acknowledged in all sustainable development objectives, speciesism (discrimination against other species) tends to be under-valued.

This scholarship disputes the general concept that there is no such thing as wildlands; that humans have no choice but to become global ecosystem managers; and that the only value of nature is through human use of it. FDE authors challenge this worldview and the epistemology that generates such viewpoints and critique the ideas that greater development and higher human population will lead to better environmental outcomes and the basic anthropocentric viewpoint that ignores human impacts on the rest of life. They examine the larger issue that we are facing from many "conservationists" who are ready to give up on biodiversity protection, wilderness, wildness and so forth to focus on "working landscapes" or human-directed lands (e.g. Cafaro and Crist, 2012).

However, we need to note that utilitarian approaches and (implicit) abuse by mainstream economic activities and institutions cannot be easily dismissed as they also offer alternative ecological possibilities. Researchers have shown that given present socio-economic conditions, putting a price on nature may be the only way to guarantee its preservation (Armstrong et al, 2012; Tengberg et al, 2012; Farley, 2012). Yet, we also need to stress that ideological and ethical treatment of nature in pure anthropocentric terms does present a

significant moral issue which testifies to something even more sinister than anthropocentrism. As Eileen Crist (2012: 149) has aptly put it:

While the anthropocentric worldview can be held accountable for the historical trajectory into the present ecological catastrophe, the magnitude of Life's crisis today, in conjunction with the deafening silence enveloping it, render the idea of "anthropocentrism" too feeble and academic for the critical-analytic task of opposing the human domination of the natural world. Undergirding the tyranny of this domination is something more deadly than anthropocentrism, or a highly virulent strain of it: the open or tacit stance of human supremacy. The foundational pillar of human supremacy is the belief that human beings are the superior life form of the planet and the Earth's entitled owners. ...The assumption embedded in "resources" is that the natural world always already is graspable in terms of its disposability to human ends: conceptually, actionably, open-endedly, and in perpetuity. The pervasive use of the concept reflects its entrenchment; even those who regret human unrestraint feel compelled to talk about resources as a counterfeit referent for things, living beings, and natural conditions on Earth.

But how are these alternative forms of valuation of nature translated into education for sustainable development (ESD)?

Education for Sustainable Development (ESD)

ESD programs are supposed to focus on the 'triple bottom line'; that is, finding a balance between social/economic/environmental (SEE) aspects of sustainable development (Stevenson 2006). Jickling (2009) warns that ESD risks becoming instrumental in indoctrinating students about the idea of 'progress' formulated by agencies that claim to know what development (in the broadest sense of the word) is. Literature identifying donors of ESD programs suggests that they are mostly governments and corporate elites (Crossley and Watson, 2003; Jickling and Wals, 2008) or powerful NGO's (Blum, 2009). ESD is 'inspired' by international initiatives such as the UNESCO (2005), as well as government ministries concerned with 'development' (Black, 2010), and 'commercial partners' involved in development enterprises through their trade operations (Lewis and Kanji, 2009). According to its critics, the mainstream discourse on sustainable development as well as support for ESD programs originates from the 'big players' such as the World Bank, the IMF, and governments of the neo-liberal consumerist societies (e.g. Mosse, 2010). These organizations were criticized for promoting the oxymoronic goal of maintaining economic growth, re-distribution of wealth and keeping the health of the ecosystem intact (Rees, 1992; Mander and Goldsmith, 1996). In the article challenging the practitioners of ESD, Jickling (2005:252) inquires whether education for sustainable development really has the capacity to challenge the status quo and if it would not contribute more to sustaining present global inequities, given its corporate and political sponsorship?

Many observers have noted that the idea of 'progress', 'modernity' and 'development' is relative and that the enterprise of development actually creates social inequalities and

imbalance between humans and environment (Lewis, 2005; Giddens, 2009). In fact, formal (Western) education may be complacent in creating 'monocultures of the mind' (Shiva, 1993) in which the new 'holy grail' of the dominant political elites, the consumerist culture, is perpetuated (Blaser et al, 2004), and culturally specific ways of relating to each other as well as to plants and animals is undermined (Black, 2010; Efrid, 2011; Baines and Zarger, 2012; Kopnina, 2012c). A related concern is that mainstream discourse on sustainable development and ESD tends to ignore the deep ecology perspective (Naess, 1973) and exhibit anthropocentric bias (Kopnina, 2012a) arguably absent from traditional societies' learning practices (Anderson, 2012; McElroy, 2013). In the case of ESD in Africa, Lotz-Sisitka (2005) acknowledges that mainstream sustainable development discourse espouses:

anthropocentric view of the environment, in which environment is viewed as 'goods and services' within a market-oriented framing of the environment as a commodity or resource for human consumption. African societies (and other societies) attribute other values to the environment, not only economic value (p. 1).

A notable exception is a special issue of *The Journal of Education for Sustainable Development* the Earth Charter issue (Volume 4, Number 2, 2010), which included articles referencing non-anthropocentric views of biodiversity (e.g. Sarabhai, 2010). In this special issue, Kim (2010: 307) discusses the ESD program inspired by the Earth Charter principles of Florida Gulf Coast University:

Here, humanities education becomes eco-education through exploring the relationships of humans not only to their internal worlds but also to their external worlds. In the course, students and instructors explore traditional definitions of ethics and sustainability, which sets the stage for engaging with the Earth Charter and thinking beyond anthropocentric views. The study of literary words through the lens of the Earth Charter allows students the opportunity to broaden their listening to include the forgotten voices of the natural world and of our elders.

Why is anthropocentrism 'bad' for biodiversity?

An anthropocentric view of nature is not likely to lead to decisions that benefit the preservation of biodiversity. Some scholars have argued that 'all' biodiversity is needed in order to address human needs for clean water, clean air, and breakdown of waste since complex ecological systems are self-managing (Isbell et al, 2011). Additionally, others argue that the preservation of 'some' biodiversity would be sufficient to satisfy human needs. For example, Bas Haring, Dutch philosopher, and professor in the Public Understanding of Science at the University of Leiden argues that only some select species are needed for human survival and welfare and that most of these species are domesticated and 'adopted' for human needs. In his recent publication *Plastic Panda*, Haring (2011) argues that the public should not be influenced by environmentalists into feeling guilty about the extinction of certain species, which are functionally useless for humanity. In an interview with the journal for

Dutch professionals, *Intermediair*, Haring argued that species such as pandas, while 'beautiful', do not have any direct value to humanity, as cultivated or domestic species have (Haring in Rijnvis, 2012). Haring further contends that the proponents of preservation of all biodiversity seem to be laboring under the false pretense that everything in nature is interconnected, while from a human utility point of view, a lot of species are simply redundant. In fact, humans can make plastic imitations that are as beautiful as the 'originals' and concentrate their efforts on species that are truly interlinked in terms of their value for humans (such as farm animals and crops as well as pets) (Haring in Rijnvis, 2012).

This view has been criticized by some as extreme on two grounds. The first criticism is ethical and ecocentric - Haring's argument denies intrinsic value to other species - something that might have caused the current environmental crisis in the first place (Drenthen et al, 2009; Drenthen and Keulartz, 2011). The second argument is more 'naturalistic' and can be traced back to recent publications in *Nature* (e.g. Rockström et al, 2009; Isbell et al, 2011) or *Ecological Economics* (e.g. de Groot, 2009; Boyd, 2007) which highlight high species interdependency and the importance of their preservation. This argument is illustrated with examples of a particular type of insect fertilizing a particular kind of plant that could be crucial for the pharmaceutical industry. While the latter argument is more anthropocentric, the accent on biodiversity preservation remains.

However, Haring's argument that has sparked a lot of controversy in the Netherlands in recent months, does represent a paradigm that the author of this article fears the most: that an anthropocentric view of nature will lead to abandoning of biodiversity conservation. By extension, the author is apprehensive that ESD stimulates students to abandon the ecocentric paradigm and forsake 'nature' which has no functional value to humans.

Conclusions

According to the economic valuation of nature, conventional economists pursue efficiency and the maximization of monetary value, achieved by integrating ecosystem services into the market framework. Ecological economists, however, pursue the less rigorously defined goal of achieving the highest possible quality of life compatible with the conservation of resilient, healthy ecosystems, achieved by adopting economic institutions to the physical characteristics of ecosystem services. Proponents of economic valuation of nature – both in monetary and non-monetary terms - assert that the concept of ecosystem services is a valuable tool for economic analysis, and should not be discarded because of disagreements with particular economists' assumptions regarding sustainability, justice, and efficiency (Farley, 2012:40). Translated into the framework of sustainable development, with its implicit moral objective of fair sharing of economic (and thus natural) wealth, a number of issues need to be raised. Some authors have pointed out oxymoronic aims of sustainable development discourse promoting both social and economic benefits, as well as, environmental protection.

Economic valuation of nature then often takes precedence over other types of value. This preference for monetary valuation is often reflected in education for sustainable development

(ESD). With the exception of the Earth Charter initiative, where ESD emphasizes ecological values and ethics, few other publications on EE and ESD address the anthropocentric bias. The question remains: will the anthropocentric view of nature lead to abandoning biodiversity conservation? Empirical evidence of rapidly disappearing biodiversity seems to suggest that explicit anthropocentric views, pure or mixed with neo-classical economic short term market exploitation, have led to abandoning biodiversity conservation, other than conservation of species used by humans for consumption, recreation, medical experimentation, tourism, or pet-keeping. While debates on the aims of sustainable development are not new, earnest recognition of the value of conservation education, with its emphasis on ecological values rather than economic benefits, may lead to true integration of human interests with those of the entire ecosphere of which all humans – in ‘developed’ or ‘developing’ countries – are apart.

References

- Anderson, E. N. 2012. ‘Tales Best Told out of School: Traditional Life-Skills Education Meets Modern Science Education’. In *Anthropology of Environmental Education*, Ed. H. Kopnina, New York: Nova Science Publishers. Pp. 17-29.
- Armstrong, C. D., Foley, N. S., Tinch, R. van den Hove, S. 2012. Services from the deep: Steps towards valuation of deep-sea goods and services. *Ecosystem Services*, 2: 3-12.
- Baines, K. and Zarger, R. K. 2012. Circles of Value: integrating Maya environmental knowledge into Belizean schools. In *Anthropology of Environmental Education*, Ed. H. Kopnina, New York: Nova Science Publishers. Pp. 30-42.
- Black, C. 2010. Schooling the World: The White Man’s Last Burden’. Documentary film. Lost People Films. www.schoolingtheworld.org.
- Blaser, M., Feit, H. A. and McRae, G, eds. 2004. *In the Way of Development: Indigenous Peoples, Life Projects and Globalization*. London: Zed Books and Ottawa: International Development Research Centre.
- Blum, N. 2009. Teaching science or cultivating values? Conservation NGOs and environmental education in Costa Rica. *Environmental Education Research*, 15(6):715-729.
- Bodley, J. H. 2008. *Victims of Progress*. Mountain View, CA: Mayfield.

Boyd, J. 2007. Non-market benefits of nature: What should be counted in green GDP? *Ecological Economics*, 61 (4): 716-723.

Braat, L. C. and de Groot, R. 2012. The ecosystem services agenda: Bridging the worlds of natural science and economics, conservation and development, and public and private policy, *Ecosystem Services*. 1(1): 4–15.

Conway, G. & Fresco, L.O. 2013. Sustainable Intensification. A New Paradigm for African Agriculture. A Montpellier Panel Report.

Costanza, R., d'Arge, R. De Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R. V. Paruelo, J., Raskin, R. G., Sutton, P., Van Den Belt, M. 1997. The value of the world's ecosystem services and natural capital. *Nature*, 387 (6630): 253-26.

Crist, E. 2012. Abundant Earth and Population. *In* Life on the Brink: Environmentalists Confront Overpopulation. Philip Cafaro and Eileen Crist, eds. Pp. 141-153. Athens, GA: University of Georgia Press.

Crist, E. and P. Cafaro. 2012. Human Population Growth as If The Rest of Life Mattered. *In* P. Cafaro and E. Crist (Eds). *Life on the Brink: Environmentalists Confront Overpopulation*. Athens: University of Georgia Press. (p. 3-15).

Crossley, M. and Watson, K. 2003. *Comparative and International Research in Education: Globalisation, Context, and Difference*. London: Routledge Falmer.

De Groot, R. 2002. A typology for the classification, description, and valuation of ecosystem functions, goods, and services. *Ecological Economics*, 41 (3): 393-408.

Drenthen, M. Keulartz, J. & Proctor, J. (eds) 2009. *New Visions of Nature: Complexity and Authenticity*, Dordrecht: Springer.

Drenthen, M. And Keulartz, J. 2011. Filosofen ruziën over belang biodiversiteit. [Philosophers disagree about the importance of biodiversity]. <http://runieuws.nl/2011/11/15/filosofen-ruzin-over-belang-biodiversiteit/> Accessed March 2012.

Dunlap, R. E. 2008. The New Environmental Paradigm Scale: From Marginality to Worldwide Use. *The Journal of Environmental Education* 40 (1): 3-18.

Dunlap, R. and Mertig, A. 1997. Global environmental concern: an anomaly for postmaterialism. *Social Science Quarterly* 78: 24–29.

Dunlap, R. E. and York, R. 2008. 'The globalization of environmental concern and the limits of the Postmaterialist values explanation: Evidence from Four Multinational Surveys'. *The Sociological Quarterly* 49:529–563.

Easterly, W. 2006. *The White Man's Burden: Why the West's Efforts to Aid the Rest Have Done So Much Ill and So Little Good*. The Penguin Group, Inc: New York.

Earth Charter (The) 2011. ESD indicators project
<http://www.earthcharterinaction.org/content/pages/ESD%20indicators%20project>

Eckersley, R. 2004. *The Green State. Rethinking Democracy and Sovereignty*. MIT Press: London.

Efird, R. 2011. Learning the Land Beneath Our Feet: An anthropological perspective on place-based education in China. In Kopnina, H., and Shoreman-Ouimet, E. (Eds.) *Environmental Anthropology Today*. New York and Oxford: Routledge.

Ehrlich, P. 2000 *Human Natures. Genes, Cultures, and the Human Prospect*. Washington, DC: Island Press.

Foster, J.B. 2002. Ecology Against Capitalism, New York, *Monthly Review Press*.

Farley, J. 2012. Ecosystem Services: The Economics Debate, *Ecosystem Services*. 1 (1): 40–49.

Foster, J.B. 2012. The Planetary Rift and the New Human Exemptionalism: A Political-Economic Critique of Ecological Modernization Theory. *Organization and Environment*. On-line: DOI: 10.1177/1086026612459964

Fresco, L. 2013. Lecture 'Food and sustainability'. Lecture at Vossius gymnasium, Amsterdam. March 11. <http://www.vossius.nl/nieuws/vossius-lezing-vol>

Giddens, A. 2009. *Global Politics and Climate Change*. Oxford: Polity Press.

Goldsmith, J. 1996. The Winners and the Losers. In *The Case Against the Global Economy: And For a Return to the Local*. J. Mander and E. Goldsmith, eds. San Francisco: Sierra Club Books.

Golley, 1993. *A History of the Ecosystem Concept in Ecology*. Yale University Press, New Haven.

Grossman, G. M., & Krueger, A. B. 1991. Environmental impacts of a North American Free Trade Agreement. National Bureau of Economic Research Working Paper 3914, NBER, Cambridge MA.

Hall, C. & Day, J. 2009. Revisiting the Limits to Growth After Peak Oil. *American Scientist*, 97: 230 -238.

Haring, B. 2011. *Plastic Pandas*. The Netherlands: Nijgh & Van Ditmar.

Inglehart, R. 1971. 'The Silent Revolution in Post-Industrial Societies'. In: *American Political Science Review*, 65: 991-1017.

Inglehart, R. 1977. *The Silent Revolution: Changing Values and Political Styles Among Western Publics*. Princeton: Princeton University Press.

Isbell, F., Calcagno, V., Hector, A., Connolly, J., Harpole, W.S., Reich, P.B., Scherer-Lorenzen, M., Schmid, B., Tilman, D., van Ruijven, J., Weigelt, A., Wilsey, B.J., Zavaleta, E.S. & Loreau, M. 2011. High plant diversity is needed to maintain ecosystem services. *Nature* 477:199-202

Jickling, B. 2005. Sustainable Development in a Globalizing World: a few cautions. *Policy Futures in Education*, 3 (3):251-259.

Jickling, B. 2009. Environmental education research: to what ends? *Environmental Education Research*, 15(2): 209 — 216.

Jickling, B. and Wals, A. E. J. 2008. Globalization and environmental education: looking beyond sustainable development' In *Journal of Curriculum Studies* 40(1): 1-21.

Kim, R. E. 2010. The Principle of Sustainability: Transforming Law and Governance. *Journal of Education for Sustainable Development* 4(2): 307-312

Kopnina, H. 2012a 'Education for Sustainable Development (ESD): The turn away from 'environment' in environmental education?' *Environmental Education Research*. 18 (5): 699-717 <http://dx.doi.org/10.1080/13504622.2012.658028>

Kopnina, H. 2012b 'Revisiting Education for Sustainable Development (ESD): examining anthropocentric bias through the transition of environmental education to ESD'. *Sustainable Development*. <http://onlinelibrary.wiley.com/doi/10.1002/sd.529/abstract>

Kopnina, H. 2012c. *Anthropology of Environmental Education*. Nova Science Publishers, Inc. New York.

Kopnina, H. 2012d. 'The Lorax Complex: Deep ecology, Ecocentrism and Exclusion'. *Journal of Integrative Environmental Sciences*. 9(4):235-254.

Kopnina, H. 2013. 'The grand old theory of Human Nature and environmental problems.' *Journal of Ecological Anthropology*. In press

Kumar, M. and Kumar, P. 2008. Valuation of the ecosystem services: A psycho-cultural perspective. *Ecological Economics* 64(4): 808-819.

Lewis, D. 2005. *Anthropology and development: the uneasy relationship*. In: Carrier, James G. (ed.) *A handbook of economic anthropology*. Edward Elgar, Cheltenham, UK, pp. 472-486. <http://eprints.lse.ac.uk/253/>

Lewis, D. & Kanji, N. 2009. *Non-Governmental Organisations and Development*. London: Routledge.

Lotz-Sisitka, H. 2004. *Positioning Southern African Environmental Education in a Changing Context*. Howick: Share-Net & Southern African Development Community-Regional Environmental Education Programme.

Mander, J. and Goldsmith, E. eds. 1996. *The Case Against the Global Economy: And For a Return to the Local*. San Francisco: Sierra Club Books.

Marris, E. 2011. *Rambunctious Garden: Saving Nature in a Post-Wild World*. London, New York: Bloomsbury Publishing.

Meadows, D. H., Meadows, D. L., Randers, J. and Behrens III. W. W. 1972. *The Limits to Growth*. New York: Universe Books.

McElroy, A. 2013. Sedna's Children: Inuit Elders' Perceptions of Climate Change and Food Security. In *Future Trends in Environmental Anthropology*. Eds. H. Kopnina and E. Shoreman-Ouimet, New York and Oxford: Routledge. Pp. 145-172.

Mol, A.P.J. and Sonnenfeld, D.A. 2000. *Ecological Modernisation Around the World: Perspectives and Critical Debates*, London and Portland: Routledge.

Mosse, D. 2010. *A Relational Approach to Durable Poverty, Inequality, and Power.* *Journal of Development Studies*, 46 (7): 1156-1178.

Naess, A. 1973. The shallow and the deep: long-range ecology movement. A summary, *Inquiry*, 16:95–99.

Oliver-Smith, A. 2010. *Defying Displacement: Grassroots Resistance and the Critique of Development*. Austin: University of Texas Press.

Rees, W. 1992. Understanding Sustainable Development, in B. Hamm, G. Zimmer and S. Kratz (Eds.) *Sustainable Development and the Future of cities*. Proceedings of an international summer seminar, Bauhaus Dessau, 7-14 September 1991, 17-40.

Rijnvis, D. 2012. 'De helft van alle plant- en diersoorten kan weg' ['The half of all plant and animal species can disappear'] Interview with Bas Haring. *Intermediair*, 8, 24 February, 32-33.

Rockström, J., W. Steffen, K. Noone, Å. Persson., F. S. Chapin, III, E. F. Lambin, T. M. Lenton, M. Scheffer, C. Folke, H. J. Schellnhuber, B. Nykvist, C. A. de Wit, T. Hughes, S. van der Leeuw, H. Rodhe, S. Sörlin, P. K. Snyder, R. Costanza, U. Svedin, M. Falkenmark, L.

Karlberg, R. W. Corell, V. J. Fabry, J. Hansen, B. Walker, D. Liverman, K. Richardson, P. Crutzen & J. A. Foley. 2009. A Safe operating space for humanity. *Nature* 461, 472-475.

Sarabhai, K. V. 2010. An Ethical Framework for a Sustainable World. *Journal of Education for Sustainable Development* 4(2): 155–156.

Shepard, P. 1993. On animal friends. In S. R. Kellert and E. O. Wilson (eds.) *The Biophilia Hypothesis*, 275-300. Washington: Island Press.

Shiva, V. 1993. *Monocultures of the Mind: Biodiversity, Biotechnology and Agriculture*, Zed Press, New Delhi.

Spring, J. 2004. How educational ideologies are shaping global society: intergovernmental organizations, NGO's, and the decline of the state. Mahwah, NJ, Laurence Erlbaum Associates.

Stern, D. I. 2004. The Rise and Fall of the Environmental Kuznets Curve. *World Development*, 32(8): 1419–1439.

Stevenson, R. 2006. Tensions and transitions in policy discourse: Recontextualising a decontextualised EE/ESD debate. *Environmental Education Research*, 12(3-4): 277-290.

Tengberg, A., Fredholm, S. Eliasson, I. Knez, I. Saltzman, K. Wetterberg, O. 2012. Cultural ecosystem services provided by landscapes: Assessment of heritage values and identity. *Ecosystem Services* 2: 14-26.

Turner, G. 2010. A Comparison of the Limits of Growth with Thirty Years of Reality. CSIRO Working Paper Series. Available at: <http://www.csiro.au/files/files/plje.pdf>

UNESCO 2005. United Nations Decade of Education for Sustainable Development (2005–2014) *Framework for the international implementation scheme*. 32 C/INF.9: Available online at: <http://unesdoc.unesco.org/images/0013/001311/131163e.pdf> (accessed May 2011).

Wijkman, Andreas and Johan Rockström. 2012. *Bankrupting Nature: Denying Our Planetary Boundaries*. New York: Routledge.

The World Bank 2012 <http://go.worldbank.org/08H25N3QY0>

York, R., and Rosa E.A. 2003, "Key challenges to ecological modernization theory", *Organization and Environment*, 16(3), pp. 273–288.

