

## EDITORIAL

# Natural capital in education and economics: predicaments and potential

### Introduction

The 57 varieties of ‘literacy’ include the ecological, scientific and emotional. Dig a little deeper and the combinations available may suggest that literacy is little more than the emperor’s new clothes, a qualifier being used to dress up priorities and perspectives which no longer succeed in commanding attention. But such a view imperils a keener insight: despite the neologisms the variety speaks of an array of abilities across an assortment of domains whose qualities resemble reading and writing, and hence, literacy. Or put another way, the 57 are essentially metaphorical. Push this further and a number of questions become possible though not all are desirable. For example, asking whether environmental educators are, say, ‘economically illiterate’ may appear facetious (is it congenital or inveterate?) but then some might retort that continuing to accentuate the negative or eliminate the positive is as well when confronted with the Keynesian truth that economics ‘is dangerous for good or evil’.

Such opening remarks are deliberately playful but they are part of an attempt to articulate something much more serious in this Special Issue about the use and role of metaphor and its import for environmental learning. In this case, it is exploring understandings from economics of natural capital as metaphor. At question is the deep (yet often unspoken) reliance of education on economy and vice versa in addressing matters of sustainability. Yet whether it be the discursive, strategic or pragmatic dimensions of such a reliance (for example, the grammar and lexicon of Capital), we might also note that while this dependence has acquired the status of a given in some circles, it is met with disdain by others, as well as by ambivalence and even perhaps by indifference or ignorance. Few respond or engage with cheer. Nonetheless, assuming the co-evolution of economy and environment has become commonplace in virtually all talk of sustainable development, and this is a topic grasping at the central territory of much that is commonly labelled as ‘environmental education’, and hence perhaps, underlining the prescience of the undertakings in this edition of *Environmental Education Research*.

With supposed collusion regarding substantive matters then—as if the content and focus on sustainable development in environmental education, or attempts to elide the two together, required no further querying (cf. Scott & Gough, 2003, p. xiv, pp. 2–4 & pp. 37–46)—we might ask why is this reliance of education on economy (still) treated with suspicion?

Perhaps it reflects distaste amongst many environmental educators for (all?) things economic: the privileging of *Homo economicus* and related assumptions in governing so much that passes as policy-making at all levels,<sup>1</sup> or when this becomes clouded by concerns about the dehumanising and disenchanting effects of economics in the guise of managerialism, technification and efficiency drives?<sup>2</sup> Or perhaps it is concern that those arguing for this mutual and evolving reliance simply aggrandise a theoretical prejudice as hard-headed thinking about the ‘real world’?<sup>3</sup> Then again, maybe it is voicing the belief that this reliance is really an untruth, an emotionally satisfying fiction, even a political convenience, to bring the unruly strains of environmental education—variously accounted for as anti-globalisation, anti-industrialisation, etc.—into the realm of ‘common-sense’ (read: economistic) discourse.<sup>4</sup> As such, its colonising tendencies might well be resisted. Clearly, if reduced to absurdity, attempts to corral educators and learners into camps depending on whether one views ‘Economics as bad/good for the planet’ is not just simplistic but simple-minded. But misgivings do exist (or rather, persist), and they appear well founded. Take the archetype of when such a dualistic, reductive outlook mediates the substance and boundaries of popular and academic debate (stultifying though this is). Within such a (given?) framework, those attempting to transform the basic assumptions and preoccupations of economics (and environmental educators for that matter) face a momentous task which few have the resource or inclination to engage.<sup>5</sup>

Yet we might also begin to wonder whether we are actually stuck between a rock and a hard place. Based on this Special Issue, one gets the impression that such observations and responses are misdirected or may even be misplaced. Errors of composition—in this case, conflating medium and message regarding the discourse and perspicacity of economics—are distinct possibilities in the preceding arguments (and endnotes). One could argue their primary effect is to trace the contours of concern about the limits and effects of capitalism but they do little to offer viable alternatives to this particular grammar (or envelope—another metaphor) for thinking about the terrains of production and exchange<sup>6</sup> when faced with the challenge of sustainability. In this sense capitalism remains the Master-Signifier—it (continually) presents the horizons of meaning in which many of us dwell.<sup>7</sup> Indeed, although the reticence to engage education and economy with sustainability in mind is directly addressed by the contributors of these articles, it is done so more as if the need were to loosen the corners of our frameworks, rather than to smash or replace them.

The authors set about this task by bringing together a range of perspectives from economics, public policy and education on one particular area of the aforementioned reliance: the role of ‘natural capital’ in framing mainstream sustainability discourse.

This specific focus, and correspondingly each article, emerged from a collaborative research project, ‘Natural Capital: Metaphor, Learning and Human Behaviour’, led by members of the Institute for Environment, Philosophy and Public Policy at Lancaster University (Robin Grove-White and John Foster) and the Centre for Research in Education and the Environment at the University of Bath (William Scott and Stephen Gough). Taken together, the contributions investigate the origins, impacts and critiques of a variety of concepts and models working with(in) the logic of the natural capital metaphor in economics and education. A distinctive feature of this discussion is the prominence given to the role of metaphors and metaphorical thinking in both areas, and the transactions and disruptions that take place therein when confronting sustainable development. The project summary sets out the rationale for this work (Foster, 2003):

Sustainable development requires that human demand on the Earth’s ecosystemic capacities remain constant over time. The idea that natural resources and systems can be treated as a form of capital underpinning human production of goods and services offers a way of operationalising this requirement, since sustainable development must require a certain minimum level of such capital to be maintained. Much recent work in ecological economics has focussed on identifying natural capital stock, measuring its value and comparing these measures meaningfully over time.

But to think of natural systems as capital is to think metaphorically, extending a form of discourse from one area of experience where it works straightforwardly to one where its application is exploratory, illuminating but also, perhaps, problematic. Metaphorical thinking is a centrally characteristic feature of social and individual learning, and the value of the natural capital concept as an analytical framework for economic policy is closely tied to the ways in which it can be used heuristically, to make ongoing sense of our experience as citizens, consumers or policy-makers. If we are to use environmental–economic framings effectively in shifting human behaviour towards sustainability, it is therefore crucial to think about them in terms of how they can serve as learning tools, and how individual and social learning with such models are related.

The purpose of this introductory essay then is to set out the architecture and activities of the Natural Capital project,<sup>8</sup> and briefly summarise the eight articles in this Special Issue as discrete outcomes of the research. As will become clear, much instructive and insightful work has taken place, although whether this dispels ambivalence or represents progress—loosening some and tightening other frameworks perhaps—is ultimately for readers to decide. Given the circumstances of the project and the nature of the tasks required though, my impression is that taken together the papers succeed in attempting to be more efficacious than some alternative strategies might be: rejecting economic frameworks altogether; seeking to replace them directly with something new, unfamiliar or untested arising from a dialogue with ‘education’; or indeed, shoe-horning in some preformed response as if answers were already known and there was nothing to learn or gain from such a dialogue. Perhaps, *pace* Wittgenstein, what we are witnessing here is the creating, climbing and discarding of ladders to extend current horizons, defeat others or engage new vistas. However, such a positive interpretation doesn’t stop this editor and participant in the project entertaining doubts about the research and its outcomes when taking wider landscapes and memories of

the field into account; in short, there remains the possibility that with every Trojan horse, an Achilles heel isn't too far behind...

### **The Natural Capital project**

More than any time in history mankind faces a crossroads. One path leads to despair and utter hopelessness, the other to total extinction. Let us pray that we have the wisdom to choose correctly. (Woody Allen)

The Natural Capital project was funded by the UK's Economic and Social Research Council (ESRC) within one of seven strands of its New Opportunities Programme (2002–2004), in this case, on Environment and Human Behaviour.<sup>9</sup> The strands are part of the ESRC's mechanisms for synthesising existing research, and/or engaging in preliminary activities to set the agenda for future research investment. In contributing towards these goals, the Natural Capital project sought insights into the (stalled?) momentum of the environmental agenda in the UK, and the potential of new kinds of institutional and social intelligence to inform and shape that momentum—in this instance, that afforded by recent work on concepts and models of natural capital in economics and education (see Grove-White, 2005). Put another way, this particular 'new opportunity' was essentially about engaging researchers in generating possibilities and seeking alternatives; literally 'pathfinding' when faced with what is both present and absent in Woody Allen's dichotomous quip.

Paul Ekins, the environmental economist coordinating the Environment and Human Behaviour programme, illustrates the context for the programme and consequently that for the project and the papers herein through the following extract from his introduction to the programme (2002):

It is crucial for the sound development of environmental policy that it is based on a good understanding of why people behave towards the environment as they do and how these behaviours might change. Both human behaviour and environmental change are formidably complex areas, and their combination compounds the complexity. Interdisciplinary research from a variety of theoretical perspectives is called for, covering a broad range of environmental issues. The core objectives of this programme are to seek insights, and avenues for further research, into the following questions:

1. Why do people behave as they do towards the natural environment?
2. How do or will people seek to adapt their behaviour in response to environmental change, especially rapid environmental change?
3. What public policy approaches might persuade people to change their behaviour, either to mitigate the extent of negative environmental change, or to adapt to it in ways that do not exacerbate it, and to change their behaviour in ways that are least costly for society as a whole?

Later on, he notes:

The definition of capital as accumulated wealth in the form of investments, factories and equipment is a familiar one. Human capital has had increasing attention over the last 30 years. However, 'natural capital', which comprises the resources we use—both

non-renewable and renewable has received far less attention. Although these resources are often considered in terms of material inputs, their most important value lies in the services they provide. These resources include living systems that help provide a healthy environment: clean air and water, climatic stability and waste processing.

Historically, economic development has faced a number of limiting factors that have prevented growth, such as access to labour, financial capital and technology. For the first time however, limits to increased prosperity are not likely to be due to a lack of manufactured capital, but a lack of natural capital to provide essential services. Among other topics in this area, research is needed on the valuation of natural capital; on the relationship between natural capital and quality of life; and on growth models based on natural capital.

While the project articles demonstrate the wealth of interests in, and challenges to, the meaning(s) of natural capital in the dual contexts of theorising and practising education and economics, clearly the articles that follow can only address particular aspects of the objectives of the wider Environment and Human Behaviour programme, and we should note, when faced with the breadth of expectations set out by Ekins, that they do not pretend to tackle them all, or fully. Despite these caveats, their themes and questions are much more than simply of academic interest, or as it were, to service a need for greater ‘economic literacy’ in this particular research community, valuable though this may be. In fact, they speak to a wide range of inquiries in environmental education research, for neophytes and cognoscenti alike, such as:

- investigations and deliberations about the scope, substance, and parameters of environmental learning, be that ‘formal’, ‘informal’, ‘lifelong’...;
- blank spots and blind spots (past and present) regarding environmental educators’ conceptions of agency, society and economy, and to various cultural, pedagogical or environmental overlays redolent of a series of tensions between rigidities and resilience in this grouping of conceptions; for example, how environmental educators position ‘orthodox’ (the neo-classical mainstream...) and ‘heterodox’ economic knowledges (social, neo-institutional, evolutionary, feminist, etc.) in their discourses; and
- core environmental ideas, such as *environmental capacity* and *intergenerational stewardship*, including their significance to the framing of what is taught and learnt (and why, when, where and how) in light of conventional and emerging understandings of public policy, human behaviour, and models and processes of environmental, pedagogical and cultural change.

Each of these points may also serve to signal that environmental learning is no less derivative of other subjects than other human science disciplines, particularly in drawing on (borrowing? cherry-picking?) terms and notions from diverse areas of social, economic, ecological or cultural theory or experience. Nor is there a guarantee that they will be contested or debated, or adequately (re)defined or conceptualised as they become part of the recipient research community’s vocabulary. But before we get too diverted by this aside to the genealogies, practices and futures of a discipline, what exactly were the themes and questions of the Natural Capital project, and how were they addressed?

### **Activities and themes**

Taking the questions in reverse order, over a 12-month period the aforementioned project team pursued a linked sequence of research topics (see below) via a series of seminars, workshops and online discussions. Each of the four two-day seminars sought to bring insights to bear on the use of the natural capital concept as both an analytical tool and an exploratory metaphor, by principally drawing on work seeking to understand processes of individual and social learning. Academics and research students (largely from economics, education, philosophy and sociology), and a range of people in policy development and implementation (from government, agencies, non-governmental organisations and corporations) were invited to contribute to this extended and structured dialogue. Usually between 8 and 20 participants were in attendance, with many going to two or more seminars, alongside the project team. At each event, four or five pre-prepared, pre-circulated papers were discussed, often with vigour and into the late hours. Key points were collated and circulated to inform the later stages as they emerged from the seminars, accompanying workshops, or interstitial online discussion.<sup>10</sup>

The four seminars focused on the following topics:

#### *14–15 April 2003 (Lancaster)*

Where did the concept of natural capital come from? How essential is it to the idea of sustainability? In what senses is it importantly metaphorical? How has it structured debates in environmental and ecological economics and how has it figured in the policy and planning world?

#### *19–20 June 2003 (Bath)*

How has education for sustainability used natural capital concepts such as environmental capacity and stewardship? How might it recognise and make best learning use of the metaphorical status of this idea-nexus? What light could such a learning agenda throw on the economics issues, and vice versa?

#### *18–19 September 2003 (Lancaster)*

How could we develop social and institutional learning around natural capital and similar concepts? What are the implications for institutions and the political process of the metaphorical character of these concepts, for instance of the different ways in which suggestions of capital ‘ownership’ are to be taken? What are the implications for changing human behaviour around environmental sustainability issues?

#### *20–21 November 2003 (Bath)*

Where do we go from here? What new prospects for economics, education, social intelligence and future research are opened up by this approach?

Two further themes emerged from the first seminar, which will be familiar to readers of previous special issues of the journal,<sup>11</sup> and which were returned to in subsequent seminars (particularly the second, which focused on environmental learning and the learning society), namely:

1. the ‘value-action gap’ (*EER*, 2002, Vol. 8, No. 3) between expressed environmental concern and actual pro-environmental behaviour, and
2. a possible new metaphorical concept of natural capital value, based on the recent corporate strategic concept of ‘real options’.

These topics were discussed in detail in two draft working papers emerging from the project, one directed at environmental economics, and the other at educational policy and practitioner communities. In a revised form, as a Policy Brief, the research represented in these working papers forms part of the key project outputs and ‘deliverables’ of the Environment and Human Behaviour programme, and is intended to inform further research, policy-making and scholarship in this area (see Note 9 for information on these and other outputs). Finalised versions of the working papers are included in this edition alongside six other reworked papers from the seminars. The next section of this Introduction provides an overview to the collection, before introducing each article in turn.

### *‘Framing’ the articles*

While considerably varied in their focus and purpose, the articles share a common ground in a range of ways, three of which I will highlight here in relation to their points of departure. These starting points are interrelated, and concern: (1) conceptual frameworks for the project, (2) the role of metaphor in shaping understandings and actions, and (3) the importance of the process and substance of environmental learning to that which constitutes our lives, educational institutions and wider society, in addressing sustainability.

Firstly, the philosophical underpinnings of the project articulate the view that ideas like ‘natural capital’, ‘environmental capacity’ and ‘intergenerational stewardship’ are all metaphorical—as John Foster remarks (2005a), they take concepts from certain contexts and press them into service to explore others. While this is potentially generative, it is not wholly unproblematic, either in theory or practice. Metaphors may subtly condition our reading and thinking and assist in eliciting a positive or negative response from us to a particular viewpoint or argument. Indeed, the rhetoric accompanying a metaphor may be essentially eristic in purpose, striving for victory in argument at the expense of truth, while the metaphor itself can only ever offer a limited (and limiting) set of directions within a particular cultural trajectory and historico-linguistic framework, however universal it may appear. (Consider the cultural, biological and historical baggage and situatedness of terms like ‘the greenhouse effect’ or rainforests as ‘the lungs of the planet’, two prominent examples of *Greenspeak*.<sup>12</sup>)

Further, as Foster observes, while such exploration is necessarily dynamic—concentrating on diverse implications in different fields—the prompting of new

perspectives and values as understandings are advanced may be disruptive and change may be resisted. To illustrate, Foster (2003) argues that in the wake of a project such as this are a series of public policy-related questions, which it might also be argued have wider and more immediate purchase in their role as a litmus test for orientating and evaluating the achievements and shortcomings of a project such as this: Can our mainstream institutions really handle this kind of open-ended thinking? Can they use such ideas creatively as exploratory learning tools? Are bureaucracies bound to be uncomfortable with metaphor? What difference to the use of the natural capital idea-nexus in economics, policy and educational contexts would be made by seeing it as genuinely metaphorical and open-ended? How would this affect our ideas of environmental learning and of the prospects for a learning society? What are the implications for institutional change?

Secondly, in this project metaphors are generally understood as concerning deeper issues about the structures and bases for both strategic and everyday cognition and action regarding ‘people–environment’ interactions rather than being solely about the figurative or symbolic (Foster, 2005a). In *Metaphors we live by*, for instance, Lakoff and Johnson (1980, p. 5) argued that ‘the essence of metaphor is understanding and experiencing one kind of thing in terms of another’. This recognises their communicative power but there is more to metaphors, for example, their performative power and symbolic efficiency. Thus the authors go on to claim that (p.158):

In all aspects of life...we define our reality in terms of metaphors and then proceed to act on the basis of the metaphors. We draw inferences, set goals, make commitments, and execute plans, all on the basis of how we in part structure our experience, consciously and unconsciously, by means of metaphor.

In fact, we might note that a key strand to the work of those advocating a critical ecological literacy (which will be exemplified here through reference to the work of Chet Bowers) is to continue this line of reasoning by critiquing ecologically destructive ‘root metaphors’. Bowers (1997) observes such metaphors in the cultural values and deep patterns of thinking of industrial and post-industrial cultures, as in those taken-for-granted and obdurate views that foreground the individual as the basic social unit, an anthropocentric view of the world, and/or a view of change and growth as inherently progressive.<sup>13</sup> Etymologically speaking, ‘metaphor’ can be traced to the notion of that which bears a transfer. ‘Amphora’, a vessel used to store precious oils and spices and to carry them from one place to another, shares a similar root. In the work of Bowers, both container and content are rejected through recognition of how the processes of storage or transferral serve to reinforce unsustainable root metaphors. (For Bowers, this is evident in that which becomes embedded in the languages, cultures, and institutions of education as, for example, high and low status knowledge.) Thus, Bowers expects educators (to be able) to name, reflect on and revive alternative cultural patterns that would replace predominantly modernist metaphors with those rooted in ecological sustainability. Such practices would be based on models of cultural development that have been and remain present in ecologically centered cultures, including: (1) meta-narratives that

represent human beings as interdependent with all life; (2) a view of progress that conserves the authority of those past cultural values, beliefs, and practices that contribute to sustainable relationships with the environment; and (3) ‘forms of community where patterns of civic responsibility and reciprocity ensure that economic production and exchange do not become the dominant force in everyday life’ (Bowers, 1997, p. 5).

The point of this detour is not to suggest that this work on metaphors is not without its challenges or ironies, which Bowers acknowledges, as do the articles in this Special Issue. Nor is it to record that Bowers makes this case without explicitly mentioning natural capital in either a metaphorical or literalist sense. Rather, to elaborate my third point, it is to note that that which is paramount in both the work of Bowers and the Natural Capital project is recognition that whether dormant, exhausted or active in our personal or shared life-worlds and associated life-projects, metaphors are used to attempt to embody and define the intangible and abstract, as well as unavoidably constrain those perceptions and actions which make sense within the logic and limits of that particular metaphor.

Another way of putting this is to observe that metaphors have descriptive and prescriptive functions as they displace, dislocate and transform frameworks of meaning. Their utility—which Gough (2005) relates to the forcefulness of their explanatory, exploratory and motivational powers—refers to how vivid, suggestive, compact, resonant, emphatic and expressive they are in capturing the essential nature of an idea, experience or phenomena. Given that metaphors literally are about ‘making sense’ of a more complex reality, we are always in danger of being seduced/socialised/enculturated into forgetting that they are actually (only) metaphors, particularly in witnessing the release of their ‘complex semantic energies’, or in ‘turning a logical falsity into a truth telling signification’, as Foster put it during the first seminar. To reiterate, even as they may disrupt and critique current understandings and practices, because metaphors like ‘the greenhouse effect’ signify one object in terms of another subject, they specify and constrain our ways of thinking about the original referent. This influences the sense and importance we attach to the original, the way it might fit with other phenomena, and the actions we take as a result of this fresh way of seeing the world. Like Bowers, part of the work of the Natural Capital project has been to generate awareness of one’s own metaphors for worthwhile environmental learning and environmental behaviour—individually, culturally, historically—so as to recognise how these limit or liberate. Moreover, as the articles well demonstrate, if we were to reframe Quine’s thesis (van Fraassen, 1980) on the underdetermination of theory by evidence or observation, a metaphor can be regarded as always-already underdetermined by the meaning(s) intended or available. Thus, while metaphorical juxtapositions can displace and reinvigorate meanings, as well as generate novel opportunities and new possibilities, looseness and slippage (linguistically, culturally, historically...) can also undermine their sustainability and value. Thus, testing and troubling metaphors in environmental education like natural capital (amongst others) is about embracing processes of deconstruction and reconstruction, as we shall see.

*Contributions from the Natural Capital project*

So to the articles themselves. There are eight in this Special Issue, presented here in chronological order, to illustrate something of the sequencing and development of the research project.

The first article, ‘Uncertainty, environmental policy and social learning’, is from the first seminar, in which Robin Grove-White (Lancaster University) draws on his close engagement with the field to set out a context for viewing developments in and around environmental policy over the past two decades in the UK, through which he links political and institutional problems over sustainable development to the changing role and authority of science in contemporary society, and to the new kind of emphasis on social learning to be found in subsequent papers (Grove-White, 2005).

Next, also from the first seminar, John Foster (Lancaster University) sketches the fundamental characteristics of metaphorical language which enable it to subserve, not only the shaping of particular discourses, but also crucial aspects of our powers of enquiry and understanding. In ‘Making sense of stewardship: metaphorical thinking and the environment’, Foster (2005a) argues that without metaphorical creativity we cannot make adequate sense of the more complex and open-ended aspects of our experience, such as how we cultivate the conditions for getting to grips with what ‘could *be* a sustainable human future’ (p. 36) (emphasis in the original). This is illustrated in the way in which the closely related key environmental metaphors of ‘stewardship’ and ‘natural capital’ are deployed, including the more specific ‘real option’ sub-version of the latter idea explored in other papers, for example, in the ways in which nature ‘is capital and it isn’t’—and how the friction between the two provides space for and impetus to learning. A key argument is that the depth, power and force of these metaphors only holds our attention under certain psychological and social conditions, of which a condition of making metaphorical thinking operational and socially productive is the development of a genuine learning society, wherein the relevant frameworks would include (p. 35 original emphasis):

as far as formal systems go, at least:

- Schooling that encourages children to recognise and develop their conceptual and linguistic creativity in all its forms (that is, takes the humanities, especially art and literature, with real seriousness).
- Schooling and tertiary education that, in respect of environment and sustainability issues in general, brings these modes of sense-making to bear in as explicit and focused a way as it does science.
- Formal educational and lifelong learning arrangements that, specifically in relation to natural capital and other central sustainability concepts, study and explore them in the historical, conceptual and imaginative round as well as in their scientific dimensions.

Informally, they require at least:

- Institutions (policy-making and executive) that build in reflexivity—not just recalibrating targets in the light of experience, but continuously revising the interpretive frameworks which give meaning to these targets. (We might call these *intelligent* institutions, but not just in terms of information-processing facilities—they would be institutions that could both hear the past and make imaginative leaps into the future.)

- Processes of policy consideration, formation and validation that are radically dialogical, to meet not just the democratic but the epistemic, and still more glaringly the imaginative and emotional deficits in the current armoury of social decision-making.

The third article is from Maria Åkerman (University of Tampere) and is the final one from the first seminar. Her paper, 'What does 'natural capital' do?—the role of metaphor in economic understanding of the environment', is already published in the journal *Environmental Values*, but is reproduced here for good reason. Åkerman's doctoral work on ecological discourse in economics forms the foundation for her review of the uses of the natural capital concept in ecological economics publications (1988–2000). The article goes on to examine the power/knowledge implications of these uses, and in particular, how they affect the rules according to which claims concerning sustainable development can be made, and which solutions to environmental problems are afforded or challenged with this metaphor. In so doing, Åkerman (2005) discusses the strategic, discursive and legitimatising roles of the metaphor in the constitution of objects of environmental knowledge, in particular, shifting conceptions of nature in these publications from passive to more active views, and the power of natural capital in informing other disciplines, like political economy, that is, the metaphor may signal the integration rather than the breaking of disciplinary and conceptual boundaries amongst scientists, policy-makers, environmentalists and economists. Examples in the article familiar to many environmental educators are its incorporation into calculative practices and environmental governance strategies using indicators like the 'ecological footprint'. For Åkerman, if the footprint is viewed as a symbol of 'financial assets', knowledge is produced and environmental management occurs differently than if natural capital is used to invoke 'nature' (for example, monetary versus biophysical calculative practices). In her conclusion she observes two problems with the spread of the concept of natural capital in this literature (p. 49):

Insofar as the calculation tools are used as a central tool to create knowledge, these practices force people to express their relation to the environment in specific, universal monetary or biophysical terms in order to be heard. Therefore, instead of stimulating approaches which would give a new insight into the evolving everyday practices through which humans are connected with their natural environment, the concept of natural capital seemed to marginalise these discourses and strengthen the ahistorical and non-contextual view of environmental problems.

Moving on to the second seminar, two papers find their way into this issue, one by Derek Bell (University of Newcastle), the other by John Blewitt (University of Exeter). Bell (2005), in 'Environmental learning, metaphors and natural capital', continues the discussion on metaphors and their value in environmental learning by proposing five analytically distinct 'moments' in the process of environmental sense-making and demonstrates how they link with both conceptual and metaphorical frameworks for developing and evaluating models of environmental learning. The moments are 'conceptualising, knowing about, knowing how to respond, responding and acting'. Each moment may be an independent locus of learning, where environmental learning can be thought of as 'improving our capacity for environmental sense-making and action'. As Kim Walker, the reviewer for the

papers in this Special Issue notes, Bell illustrates his model by arguing for the linking of learning in the first (conceptualising) and third moments (knowing how to respond) to the acquisition of new conceptual metaphors through which we can see the environment and our relationship to it. In such circumstances, Gough's work (2002) can be regarded as focusing on the skills needed to make good decisions about the future based on knowledge of the benefits that the environment can provide, while Foster's work (2005a) raises questions as to how to make decisions under conditions of uncertainty. Thus, the set of moments may be used to identify the limits to which frameworks can be put in environmental learning, whether based on conceptual innovations like 'real options' metaphors or the more familiar 'information deficit' models that often populate the assumptions and practices of environmental learning, that is, when acquiring knowledge becomes overly dominant. The set is also *apropos* another metaphor. When we view frameworks as 'pictures' in a 'gallery', we are not compelled to visit or view one picture only (Bell, 2005, p. 66, original emphasis):

The lesson we need to learn is that developing our capacity for environmental sense-making and action is not a matter of finding *the* right conceptual framework. Instead, we make most progress—we learn most—when we work cooperatively to deliberate and discuss new and existing conceptual and metaphorical frameworks and the relationships among them.

Blewitt's (2005) article is entitled 'Education for Sustainable Development, natural capital and sustainability: *Learning to Last*', and continues this theme of contesting claims to absolute knowledge about ways of achieving sustainability through evaluating the status of natural capital in 'toolkit' approaches to learning. His article combines two elements. First, reflections on his experience as an evaluation consultant for the UK Government's Learning and Skills Development Agency and as a member of its *Learning to Last* Steering Group; and second, an analysis of the technologies of new public management structures, the drivers of instrumental rationality and the dominant governmentality, in relation to concepts and metaphors employed in the UK's lifelong learning sector as reproduced in the sector-wide document, *Learning to Last*. The paper builds a similar argument to Foster: that real learning in sustainability can only be achieved if there is a broader understanding of the natural capital metaphor. Thus, while toolkits provide measurable targets they limit the possibility of the emergence of 'transformative, creative, conceptual and deep learning' as they are often aligned to conventional learning approaches, which are mainly successful in promoting weak versions of sustainability. His conclusions (p. 80) get to the heart of the debate thus far by raising questions as to the (in)ability and apprehensions 'of people and of government to make sense of the world in terms that articulate with the ethics and conceptual framework of sustainable development'; that is, how heuristic, valuable and ultimately, useable, are our metaphors in fashioning 'an understanding of a sustainable future and practices designed to realise it'?

The sixth article is from the second half of the seminar series, a contribution from Adrian Winnett (University of Bath), on 'Natural capital: hard economics, soft metaphor?'. Along with the final two contributions, this article originated in the

third seminar. It is illustrative of the debates that took place in Lancaster at that time and elucidates ‘capital’ more than ‘natural’. Winnett (2005), like Åkerman, is interested in the economist’s perspective on natural capital, particularly conceptions and misconceptions of weak and strong sustainability, and whether societies can be holders of various sorts of capital assets, but chooses to trace the relationship between theory, empirics/metrics and method without resorting to a discourse analysis of recent events. Instead, taking a longer view, he discusses the ‘Cambridge controversies’ of the 1930s on the relationship between the aggregate value of capital stock and the rate of return to that stock within models with numerous capital goods, alongside reviewing the aftermath of these debates through to the 1960s and beyond. This period, of course, includes not only the emergence of a distinctive environmental economics in academia and policy-making, but also, as Winnett observes, the (sometimes unwitting) return to these earlier debates in some studies of the impacts of innovation and investment on productivity growth in modern information and communication technology. Towards the end of the article, after discussing multi-capital models (physical, human, natural and social) and the notions of sustainability, substitutability and resilience and their problems in such models, Winnett draws on recent analyses of technical innovation as a possible solution to the problems of sustainability, and identifies a conflict between narrow path-dependent solutions, and more open, learning-based approaches. The latter are exemplified by building on and broadening the environmental economist’s concept of a quasi-option—an alternative ‘option’, so to speak, rather than necessarily pursuing the real options approach outlined by Gough, Foster and colleagues elsewhere in this collection.

Which neatly leads us to our final two contributions, the revised working papers primarily emerging from research associated with the third and fourth seminars. Both articles make much of natural capital and real options as metaphors with potential to inform our understandings of learning and human behaviour, with the proviso that they continue to be contested. First, in ‘Rethinking the natural capital metaphor: implications for education and learning’, Stephen Gough (University of Bath) considers how natural capital as a metaphor informs wider thinking from the perspective of an orthodox, discounted cash flow approach to the valuation of capital. The paper revisits Ekins (2002) and the notion of a critical natural capital in relation to the argument for strong sustainability, and introduces an alternative approach to the valuation of capital, namely real options, exploring its metaphorical implications for learning and human behaviour. Put very simply, real options values the option of sustaining a natural resource as opposed to using it. The focus is then positively on the potential of the resource. Gough (2005) argues this proves to be radically different from those approaches produced by the current orthodox mindset, and is consistent with innovative contemporary thinking on both education and learning, and sustainable development, regarding the contingencies and connectivities of decision-making engaging with ‘freedom’s possibilities’ (p. 103), that is, uncertainty is not to be regarded as always a bad thing in calculative or decision-making practices, and we are wise to use learning in the pursuit of better ‘environmental-social intelligence’

through developing an options-sensitive mindset. In order to develop this, Gough sets out possible principles for the design of learning interventions using a real options metaphor for ‘real instantiations’ of natural capital, drawing on the threefold typology of approaches to learning developed by Scott and Gough (2003). These are accompanied by a number of worked examples, both actual and prospective, in order to provide preliminary indications of the potential of this approach. Type 3 is clearly the preferred learning model as it involves open-endedness, negotiation and juxtapositioning of competing learning theories (depending on the need and circumstances of the learning situation). In his concluding reflections Gough claims that with real options, ‘this alternative conceptualisation has the effect of creating an intrinsic role for learning’ (p. 113) in the face of living with uncertainty, rather than pretending that uncertainty is something we can, and should, eliminate.

Finally, in a second contribution, ‘Options, sustainability policy and the spontaneous order’, John Foster (2005b) examines the implications for sustainability policy of environmental uncertainty and indeterminacy, and relates the associated problems with a conventional understanding of sustainable development to Hayek’s critique of collective planning. Foster suggests that the appropriate recourse is not, however, a Hayekian endorsement of the free market, but an extension of his key idea of spontaneous order to characterise the learning society. His argument is illustrated by a practical application: the analysis of natural capital explored in this Special Issue is shown to be directly relevant to the improvement of the UK’s headline sustainability indicators package.

The prospect outlined by Foster and colleagues then is rather than policy, planning and decision-making simply attempting to ‘break nature’ (in Marx’s surprisingly redolent phrase)—for example, with our reductionistic talents we break nature down into ever smaller parts in the three-fold attempt to: learn how they work, use and control them—we (now) have good reason and opportunity to reaffirm both the connectedness of the natural and the dependence of forms of capital on each other, including (re)learning possibilities for the engineering of environmental collapse and resilience through deliberat(iv)e human intervention.

### **Concluding comments**

In conclusion, I offer three further observations that return the discussion of the contributions to some of my earlier comments about the features of this collection. First, if as it were the papers are viewed with a capitalist lens, any contribution to the realm of ideas will rest on the ability of this collection to create wealth (surplus value?) by moving intellectual assets from lower-value to higher-value uses: in this case, the unequivocal intention is to demonstrate how one might exploit the natural capital metaphor for heuristic and analytical purposes in education as well as economics. The sign that we have learned such a language is that we no longer need to focus on its rules: not only do we speak it spontaneously, but actively focusing on the rules would prevent us from speaking it fluently. Again, whether the processes to which this refers are successful or necessary, is assumed to be for the readership (market?) to decide:

(is the valuation satisfactory, is the price worth paying, do I want to buy [into] [and use] this?...). However, as with real-world markets, a note of caution must be sounded regarding the absence of a level playing field between economics, environment and education, and more critically, in using the ‘Master[-Signifier]’s tools’ in this way, as in whether new types of subject, object and relation can exist in the horizons of life under capitalism, amidst the dynamics of this particular, albeit dominant, set of socio-symbolic, economic and political spaces and realities shaped by particular ideologies of Capital.

Second, in deliberately seeking to explore and forge links between research, policy and practice, the articles engage in boundary-blurring both within and beyond the journal’s focus in research activity. This, of course, has been by design as well as default; to some eyes, it will no doubt make the ‘product’ more attractive, to others, less so. Questioning the (ir)relevance of economic theory for environmental education is right and proper, particularly when the bulk of environmental learning has been detached from ‘mainstream’ economics and vice versa, or, perhaps because of the perception that economics overrides education more often than not (and indeed, not the other way round). Thus, in making available the deliberations and outcomes of the Natural Capital project to the journal’s audience, *Environmental Education Research* invites responses on the part of readers—for example, what to do with the terms of reference of this debate, as in those operationalised in the programme objectives? Critique or extend these articles as responses to them in this unique project, or link them to wider initiatives or trends—mindful of the dynamics represented herein, namely, that definitions and understanding change, theories are reconstructed, and fields may become more specialised from within or more distracted from without, and so on.

And third, what of the Achilles heel referred to earlier on? Maybe it is that recognising a reliance on metaphors is intrinsically risky for policy-making, particularly if metaphorical thinking, retreating and U-turns are not part of the repertoire of economists or educators (Gough, 2005). Or perhaps it is that while the gist of the papers critically expounds rather than extols the concepts of economics, this is not necessarily the case when compared with the realities of economics. As mentioned earlier, the Symbolic order of capitalism remains very much in place; horizons are extended, not radically changed or traversed. Martin (1996, p. 43), for example, in criticising the kinds of environmental learning advocated in the International Union for Conservation of Nature’s (1980) *World conservation strategy* argued it implied prescriptive sets of values relating to the environment, rather than opening up debate on the ‘attitudes and values that underpin and motivate the main socio-economic model and its resultant impact on the environment’. With more recent events in mind, like the end of the Cold War, others have noted how few seem to care to conceive of alternative forms of production to capitalism, although most people are gravely preoccupied with the potentially apocalyptic exploitation of nature itself. Žižek (1999, p. 55), for example, argues, it ‘seems easier to imagine “the end of the world” than a far more modest change in the mode of production, as if liberal capitalism is the “real” that will somehow survive even under conditions of global ecological catastrophe’.

Yet the bind identified here on how we interpret and engage with our world may in fact be self-imposed, like uncritically going along with Allen's dichotomy. Pierced by longings pulling in opposite directions for ecological rectitude and economic sophistication, yet being wholly committed to neither, may seem an apposite summing up of the state of affairs we might find ourselves ending up with here. More challenging is that there may be more truth in seeing this project as a matter of harnessing this hermeneutical friction to transform the objects of study: the performative power of natural capital is sought, even possessed, through the continuing critical examination of the narratives and spaces of economy, ecology and education within which so many of us now live, live by, and live for.<sup>14</sup>

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## Notes

1. For example, 'the contrast with economics is an instructive one, largely because of what it says about how policy messages are *consumed*...The ideological power of economics is such that it may not actually matter whether or not there is an academic economist whispering in the minister's ear; the minister can hear the whispers anyway' (Peck, 2000, p. 256; emphasis in original, cited in Henry *et al.*, 2001, p. 200).
2. As in Note 1, a similar expression of concern about the apparent rise in the stock and influence of economics can be found in a citation in Henry *et al.* (2001, p. 200): 'Economists have become the new priesthood. The entire world has succumbed to their powers: only other economists can understand or challenge their views' (Flintoff, 1999, p. 37).
3. Again, Henry *et al.* (2001, p. 203) illustrate this point: 'Economics' role is visible not only in the social sciences but also in the media and in numerous branches of government and other institutions responsible for policy work. The abstract models of economists, their formulation and refinement, occupy relatively privileged positions as sources of policy. Although notorious for sidestepping questions of power, subjectivity, and agency, neoclassical models have proven extremely powerfully politically.'
4. A final example from Henry *et al.* (2001, pp. 203–204): 'The "science" of economics abstracts a highly rarified vision of how the world operates...In turn, however, these abstractions are reimposed as the world is rendered more like them through policy...this abstraction and reimposition in the form of policy is a deeply political process with profound social consequences, but is disguised as the technocratic, scientific, and "neutral" practice of economics.'
5. Although, some might argue, in addressing the deep problems within economic paradigms (regarding the horizons of commodification, the thrust towards permanent self-enhancing productivity, the 'culturalisation' of the market economy within the cultural logic of late capitalism...), what might be more challenging than taking on mainstream economists on their own terms and showing that they are inconsistent or wrongheaded, for example, regarding the ecological consequences of different forms of capitalism and/or its alternatives? (See also the concluding comments.)
6. For example, 'this capitalist dynamics is propelled by its own inner obstacle or antagonism—the ultimate limit of capitalism (of self-propelling capitalist productivity) is Capital itself, that is, the incessant development and revolutionizing of capitalism's own material conditions, the mad dance of its unconditional spiral of productivity, is ultimately nothing but a desperate forward flight to escape its own debilitating inherent contradiction' (Žižek, 2000, p. 17).

7. As Winnett observes in this issue, multi-capital inventories may (falsely) assume the substitutability of forms of capital represented in the 'four capitals' model adopted by the World Bank (physical, human, natural and social) as national sustainability indicators (see also Chapter 4 of the World Bank's report *The quality of growth* (2000), entitled 'Sustaining natural capital', and for a contrasting view, the 'natural capitalism' promoted by Amory Lovins and colleagues as recognising limits to substitution and levels of capital (2000).
8. For further information about the project, please visit the web site [www.lancs.ac.uk/fss/projects/ieppp/naturalcapital](http://www.lancs.ac.uk/fss/projects/ieppp/naturalcapital) (accessed 10 April 2003).
9. See [www.esrc.ac.uk](http://www.esrc.ac.uk) and [www.psi.org.uk/ehb/](http://www.psi.org.uk/ehb/) for further details. (Accessed 10 April 2003).
10. See Note 9.
11. See *Environmental Education Research*, Vol. 8, No. 3, Kollmus & Agyeman (2002), on the first point, and Vol. 8, No. 1, Gough (2002), on the second.
12. See *Greenspeak: a study of environmental discourse* by Harré *et al.* (1999).
13. David Gruenewald has been most helpful in sparking these observations of the similarities and differences between the Natural Capital project and Bowers's work. See also Peters (2003) and Bowers (2003), as brief exemplifications of this form of critique, albeit with alternative approaches and differing conclusions regarding the role of postmodernisation and the value(s) of postmodernity.
14. As part of a new initiative by the publishers, the text of this special edition (with the addition of a new introductory chapter) is being published as a Routledge book in mid 2005. The title will be 'Learning, natural capital and Sustainable Development: Metaphor, Learning and Human Behaviour', and its ISBN: 0415 36020X. It is edited by John Foster and Stephen Gough.

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