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capitals**

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**Sustainable Development and Nature: the substitution of
capitals.**

Michael Redclift¹ and Graham Woodgate²

The concept of 'sustainable development' was coined in the 1980s to meet contradictions in policy and practice, and to 'square the circle' of resource conservation and economic growth. It was one of several similar concepts, which facilitated the management of divergent policy objectives, in this case environmental protection and economic development¹. However, we seek to argue in this paper that in practice 'sustainable development' has been advocated primarily as a means of subordinating nature to economic growth. To meet both environmental and development objectives means responding to dual vulnerabilities - exposure to external risk, occurring in nature and in structural conditions within and between societies (markets, prices, tenure etc.). Sustainable development as a concept has sought to address both kinds of vulnerabilities. In this paper we argue that one way of viewing the relationship of sustainable development to nature is through exploring the extent to which human-made and

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natural capital are substitutable and expose us to different risks and uncertainties. This is a question which has long interested political economists and, more recently, ecological economists and other social scientists. Our point of departure, however, is to distinguish sociologically between different 'natures', which reflect different levels of human/natural capital substitution and degrees of hybridity. This approach to sustainable development - through investigating the co-existence of human made and natural capital - provides the theoretical framework of this paper, and is used to explain the vicissitudes of much of the 'sustainable development' debate.

In taking this approach we run the risk of reification which comes with using 'natural capital' as a category, since capital is a social relation, and the essential process is one in which elements of the natural world are transformed, socially and materially, into commodities and services within the social relations of capital. At the same time we take the view that the material transformations we are discussing cannot be contained within strict boundaries of time and space. In addition they will also have unintended consequences that are difficult to anticipate. So the forms of nature to which we refer are not to be read diachronically, as sequential historical forms, or as characterising different

geographies. Rather, they are conceptual categories, and it is in this spirit that we have undertaken our analysis.

The first part of the paper sketches out the conceptual distinctions in the relationship between human-induced 'sustainable development' and nature. Later we move to explore some ways in which this analysis can be taken forward, and used to illuminate very different iterations of what 'sustainable development' has come to represent, particularly as part of a toolkit for public policy.

This paper differs from other attempts to chart the conceptual territory of 'nature' which examine the way in which it co-evolves with social forms (Demeritt 1998, Freudenburg, Frickel and Grambling 1995, Norgaard 1988, Carolan 2005). Our objective is not to ask, as these authors do, "how might nature be co-evolving in accordance with broader sociocultural processes (such as capitalism, globalization etc.?)" (Carolan 2005, 395). That is, to "understand what nature is", first and foremost, and to take the discussion forward by making analytical distinctions between the social and the biophysical, "while leaving conceptual space for interaction" (Carolan 2005, 395).

The objective of this paper is rather different. It is to examine distinctions between the 'social' and nature as material *and* social territory; to envisage processes through which the very materiality of nature affects the social and vice versa. Specifically, in this paper we examine the process of substitution through which human-made capital (an important element of the 'social' in the above literature) has come to replace biophysical nature, by means of technological development, urbanisation and global political and economic relations. We argue, however, that ultimately this is a two-way process, since what we term Fourth Nature sees nature re-inserted in an engineered 'social' form, primarily through the new genetics.

We begin by distinguishing between the concepts of different 'natures', drawing on the approach to 'critical natural capital' first employed by mainstream environmental economists such as Pearce (1991) which we refer to as 'First Nature'. The concept of 'First Nature' describes a nature little influenced by human activity, often described in terms of 'wildness', and differentiated from social formationsⁱⁱ. The locations of First Nature relate to what ecologists call 'biodiversity hotspots' - complex assemblages of species and habitats that are vulnerable to extinction or significant

degradation. In these locations there is human activity, of course, and structural processes are at work in the economy, but it is their indirect consequences which have most bearing on the environment. The areas and resources most at risk, and which characterise First Nature, include primary forests, coral reefs and the deep oceans. In these cases very little human-made capital has been substituted for natural capital. Nevertheless, these resources are subject to different forms of degradation and risks to the stability of ecological systems are increasingly common.

What we term Second Nature, marks an important difference. In his dialogue, *The Nature of the Gods*, Cicero wrote: 'By our labour ... variety and plenty of food are provided Out of the caverns of the earth we dig iron.... We cut down trees, and use every kind of wild and cultivated timber.... We sow the seed, and plant the trees. We fertilize the earth ... We stop, direct, and turn the rivers: in short, by our hands we endeavour ... to make, as it were, a *second nature*' (Cicero, 1877, Book II, LX, emphasis added). Second Nature is conceptually distinct from wild, First Nature: natural capital substitution is higher and human populations are larger and exposed to greater external physical risks. With agricultural production we find permanent, sedentary habitation, economic development is more 'advanced', and human populations live in a more sophisticated co-

existence with nature, increasingly subject to environmental constraints and security vulnerabilities. Livelihoods are materially influenced by structural processes, directly (rather than indirectly) attributable to human transformation, and increasingly linked to globalisation. As the substitution of natural capital by human-made capital intensifies, the natural resource base is depleted and the built environment expands (roads, physical infrastructure, and transport links) at the cost of the ecosystem, and its capacity for renewal and equilibrium. In the discussion of society and the environment Second Nature becomes a site of hybridity which, as we have already argued, might be located at different times and places.

Our next conceptual category, Third Nature, occurs where externalities resulting from very high levels of substitution produce serious environmental problems that were not anticipated. In these cases environmental 'externalities' pose problems for capital and economic growth. They are the result of very high levels of natural capital substitution: urban infrastructures, sterile living spaces, vertically-integrated, intensive agro-industrial production, processing and distribution of homogenised foods and consumption of highly pre-packaged natures and cultures, at a distance, through the new electronic media. In these cases the economists' 'externalities' challenge the stability of the economic system

itself, and have to be addressed with urgency. Here, technological changes contribute to shifts in the very conditions of existence, notably through long term processes that prove transformational for the natural environment, particularly climate change. The natural resource 'crisis' assumes enormous importance and policies are designed to manage the contradictions of this development - we shift from managing the environment to produce agricultural and mineral commodities to the 'management' of environmental externalities. Vulnerabilities here are both to physical processes and to those processes attributable to anthropogenic (human) risk, but in some cases the two are compounded.

The kinds of challenges thrown up by modern urban environments typify Third Nature, since preserving 'nature' (conservation) is not the only or even the principal object of concern. In Third Nature, we also encounter a perceived need to limit and manage the effects of high levels of consumption of goods and services on our (anthropocentric) 'quality of life', and human wellbeing. The effects of economic activity on the natural environment are subject to more state regulation, in which the choice is not between 'markets' and the 'state', but rather the mode of regulation which is employed to influence, stimulate or modify markets. In this transition levels of

substitution are so advanced that environmental externalities serve to prompt both political movements in 'defence' of nature and a raft of policy interventions designed to 'hold back' or mediate the full effects of economic growth.

Finally, we can discern a further category. We are beginning to delineate what might be termed a Fourth Nature, opened up by the new genetics. Here nature is fully internalised by design, through a fully developed and embodied 'production of nature' (Smith 2007). This is about the genetic inheritance of nature, and the extent to which it can be manipulated by our growing understanding of genomics. In the case of Fourth Nature human vulnerabilities are no longer external to nature, as part of the lived experience of human societies but part of the way nature is constituted. We become vulnerable to the as yet unknown consequences of creating and releasing genetically modified organisms, and consuming foods derived from them. At the same time, these biotechnologies are 'sold' to us as a panacea for hunger and malnutrition and as the solution to the problems of scarcity and pollution resulting from the prior substitutions of Second and Third Natures. Indeed, the substitution of nature by capital is so advanced in Fourth Nature, that biological nature is reconstituted as a new avenue of capital accumulation (Smith 2007).

This brings us to consider the ways in which this ongoing but differentiated process of substitution is linked to the core ideas in 'sustainable development', and its evolving narrative and discursive effects. The intellectual roots of sustainable development, as a discourse for the social sciences and policy, lie in the interlinked economic, social and ecological crises and contradictions of capitalism, yet they have taken on a post-Enlightenment character that is very much at odds with the narrative of modernity. The social sciences, however, have only paid attention to the processes through which nature is substituted in an oblique form. The 'balance' at any given time between human-made and natural capital has really only interested a minority of environmental and ecological economists. The concerns of most social sciences have taken this process of gradual substitution as a 'given'. The hermeneutic social sciences have focused on the social construction of 'environmental problems' and addressed quite distinct concerns such as: the limitations and dangers of science, the costs of accelerated personal consumption, depletion of the resources that have fuelled economic and social 'progress', and the threats which industrialisation has posed to 'nature' and the environmental services that underpin human wellbeing.

The emergence and development of the environmental social sciences has clearly been influenced by the concerns and campaigns of modern environmentalism. For example, while the radical environmentalists of the 1970s contended that an ecologically sound society could only be achieved through a fundamental restructuring of the modern social order, their demands for social change and the curtailment of accelerating substitution had very limited impact on the institutions of modern society. Despite the establishment of dedicated environment departments and ministries and the enactment of environmental legislation, the key institutions of modernity that supported the evolving substitution of natural by human-made capital continued to pursue narrowly defined agendas for economic growth. According to Mol (1997), the limited efficacy of those early sustainability measures is reflected in the dominant social theories of the time, which sought to explain continuing environmental degradation and failing environmental reform under 'regimes of substitution' which we have characterised as Second and Third Nature. They can equally be seen as facilitating new regimes of accumulation, whose mode of regulation depends on incorporating environmental objectives within institutions whose main purpose remains economic growth under capitalism.

The discussion of the substitution of 'natural' by human-made capital has, in some respects, occupied a central place in the

development of policy, especially European policy. The policy rhetoric around 'sustainable development' has been fostered at the heart of discussions around European integration, even if the practice has often been at odds with the rhetoric. This experience also helps us to structure our discussion of sustainable development and nature.

In particular we want to distinguish two strands of practice which are increasingly global, although they rest on more or less specific European experience of 'sustainable development'. The first strand concerns the apparent attempt to green both industry and the consumer, to reduce environmental externalities at source and build a 'green economy'. This political programme - frequently referred to as 'ecological modernisation' - has developed largely (but not exclusively) from a base in European wide integration policy and become lodged in the very fabric of the European Union. It seeks to reduce the throughput of materials and energy in the production of goods and services, and in their distribution and consumption, while allowing producers to remain economically competitive within global markets. This has been a consuming interest, even a defining one, of the European Union and is of increasing importance at the global level because of trade policy. Understanding and critiquing this

process has been the core business of 'ecological modernisation' as a social theory of 'environmental reform' (Mol 1997), and represents a move away from the prior concern with nature conservation and ecological degradation.

While asserting the centrality of the 'ecological modernisation' project, we would also draw attention to a second strand of policy, which is more obviously 'regulatory', and which preceded most market-based approaches (Sullivan and Gouldson 2012). This is the role of regulatory mechanisms in shaping productive forces, and therefore the ecological systems with which they interact. At the same time regulatory practices can be seen as a way in which institutions under capitalism reconfigure themselves, to respond to the unanticipated effects of markets, on similar lines to those suggested by Regulation Theory in the 1970s (Aglietta 1976, Boyer 1990). From this perspective the way in which the state intervenes in environmental policy suggests a crisis in the mode of regulation of capital, and its exposure to new forms of risk (Bourdieu 2005, Beck 1992, Jessop and Ngai-Ling Sun 2006).

Finally, the discussion of sustainable development today is increasingly concerned with mapping and critiquing post-carbon

futures in the context of anthropogenic climate change. As such we suggest that it draws on the rich tradition of utopian imaginaries, as well as the 'lived experience' of groups of people, as a guide to the creation of whole, alternative societies (Kumar 1987, 1991). Such approaches would facilitate a larger role for sustainable development thinking within the intellectual and material worlds which are developing around alternatives to long-term carbon dependence.

Third Nature: Ecological Modernisation

The 1980s and 1990s saw a progressive increase in policies associated loosely with neoliberalism: specifically, the withdrawal of the state from many of its traditional roles and the creation of new markets for goods and services traditionally supplied by the non-market sector. At the same time, and not surprisingly, environmental policy incorporated much of the neoliberal agenda (even while environmental groups often expressed vocal opposition to it). The notion of ecological modernisation came to refer to efforts to reduce the throughput of materials and energy *per unit of* output of goods and services. The policy objective was to seek, in effect, more technological efficiency while not constraining economic growth. The environmental measures which paralleled

economic deregulation and the development of new markets took several forms:

First, attempts were made to internalise what economists identified as environmental 'externalities' in products and services: that is the usually unintended consequences of economic activities that bore heavily on the environment but which remained un- or at least under-valued in the market: the vulnerabilities experienced in Second and Third Nature. In the context of emerging debates around the notion of 'sustainable development', within Europe especially, this process came to be referred to as 'ecological modernisation'. This was viewed as a competitive strategy by the European Union, seeking to give member states a competitive advantage over the United States and any newly developing rivals in Asia. The approach sought to use the tax system to reduce energy and material throughput and create a 'win/win' scenario, promoting efficient technology and reducing environmental damage. It was envisaged that in the future trade arrangements would also take account of 'embodied carbon', and the first nations to acknowledge this would prove to be the trade 'winners'. Some of the more imaginative policies of the European Union sought to facilitate this in the 1990s.

Second, the development of carbon markets, both within industries and, more importantly, between countries was an

important new development, which in some senses acted to formalise and at the same time disembed and globalise the process of substitution. These new markets represented a challenge for entrepreneurship, new opportunities for investors, and required very little government action. Carbon markets were thus popular among devotees of free-market economics and neo-liberal environmentalism (Simms 2005). Unlike the earlier interventions that relied on the tax system, carbon markets not only avoided the double burden on industry implied by the need to invest in clean technology and pay green taxes, they also created a new source of value and the potential for profit. It is worth adding, perhaps, that a decade ago few paused to consider what might happen when production contracts and the price of carbon, like that of other traded commodities which are oversupplied, drops significantly.

The conversion of governments to a more or less uncritical view of markets was even more evident in the international efforts to 'protect' biodiversity. The biodiversity regime, expressed in the Convention on Biological Diversity (1992) and the Cartagena Protocol on Biosafety (2000), demonstrated a shift from a focus on the loss of *species* diversity, and thus the loss of complex ecosystems to a focus on the preservation of *genetic* diversity, where the principal gains were in the pharmaceutical industries and agriculture (Paterson 2008).

The almost imperceptible shift was from *nature conservation* to *nature as commodity* and the way was paved for the more radical substitution that we have characterised as Fourth Nature. The main opposition to the neo-liberal 'nature as commodity' discourse came from groups - principally Non-Governmental Organisations - which argued that marginalised people had *rights* in nature which governments and the pharmaceutical industry ignored. However the industry lobby won much of the political and ideological struggle, insisting that *ex situ* conservation in gene banks should be treated as equivalent to *in situ* conservation in ecosystems. In effect the pharmaceutical companies improved their access to plant genetic diversity, under new international regimes of trade and intellectual property.

The third element in the redesign of environmental policy was the creation of the 'consumer-citizen', the idea that individuals could best express their preferences for goods and services through their own (and their household's) personal consumption. Parallel with the development of cleaner technology, more efficient production, and carbon markets came the concern with sustainable consumption and the greening of lifestyles: suggesting that the vulnerabilities associate with Third Nature could be addressed through personal consumption decisions. Partially as a result of their insufficient understanding of the link between social structures and

consumer habits, and the awkward politics of wealth redistribution, governments came to favour consumer encouragement to live more sustainably and to reduce household 'footprints'. This implied the design of new 'lighter' consumer goods, evocations to act in more environmentally-responsible ways, and an accent on 'lifestyle' and the consumer, at the expense of livelihoods and citizenship.

Among the most important analyses of the European programme of ecological modernisation are those of European environmental sociologists, the most important of whom are Arthur Mol (1997,2010) and Gert Spaargaren (Spaargaren and Mol 1992) whose approach has built upon and developed earlier work, notably that of Huber (1982) and Jänicke (1986). Together with others, these scholars have established and developed the social theory of ecological modernisation, which Mol suggests should be 'seen as the social scientific interpretation of environmental reform processes and practices at multiple scales' (2010: 63).

Mainstream scholars of European ecological modernisation view policy innovation and changing production practices and consumption habits as evidence of the ecological restructuring of modern society and the delinking of economic growth from environmental degradation. The most optimistic positions consider these changes as marking significant progress towards

a rejuvenated, if scarcely recognisable, type of materials 'light' capitalism (Lovins *et al.*, 2000). At the same time, Huber (2000) has cautioned that industry's efforts to increase productive 'efficiency', even when combined with a shift in consumer behaviour away from excess and towards 'sufficiency', is unlikely to address adequately our current environmental and human predicament. While he identifies good reasons for adopting and pursuing both these courses of action, he also suggests that a third discourse is required, that of 'consistency'. For Huber, consistency points towards an industrial metabolism that is consciously consistent with nature's metabolism, and will require fundamental technological innovation, rather than simple, incremental efficiency gains. From the perspective of those most critical of market-based environmental valuation, however, ecological modernization might, with hindsight, be better understood as a 'managed senescence' of the eco-illogical fossil carbon economy developed under industrial capitalism (Woodgate 2010, Smith 2007, Bellamy-Foster 2010).

The neoliberal trajectory which characterised the 1980s and 1990s was viewed by many as a liberating model. It removed 'government' as the engine of economic momentum, and opened up activities to the market, or introduced 'shadow' markets which encouraged firms and individuals to behave as if markets operated, in the process not merely shifting economic

activities to the private sector but implementing a new logic for the public sector (a sector that, despite neo-liberal rhetoric, continued to grow in most developed countries). The new policies also deregulated financial flows, facilitating the free movement of finance and reducing the burden on capital through lowering barriers to growth such as corporate taxes. The model also removed many of the politically negotiated rights that organised labour had gained in the developed world, and reconfigured the frontiers of the 'welfare state'. Among the existing capitalist economies, only those of the European Union sought to combine this market-based model with measures in favour of labour, consumers and environmental protection, producing a hybridization of neoliberal thinking and traditional welfare support.

Rethinking the role of the state and the consumer in economic growth held importance for the environment, too. The new policy emphasis, especially within the European Union, was on moving from the management of capitalist growth along more environmentally sustainable lines, towards enabling private actors to pursue their interests while *simultaneously* promoting sustainability. Policy increasingly sought to structure incentives for environmentally beneficial behaviour, believing that the 'agency' of the individual, if it existed at all, consisted of a kind of 'consumer-agency', rather than the battery of roles that constituted 'citizenship'. This

wider view of the multifarious roles performed by the 'citizen' had been pioneered by social democratic (and some Christian Democrat) governments. However, as Redclift (2010) has argued, the new model envisaged the individual as reducible to their 'consumer self', and this applied as much to the way environmental externalities were treated, as to the loosening up of credit, and (in the case of some economies) the burden of equity-based housing.

These changes came at a cost, of course. The movement of neoclassical economics into more mainstream environmental policy left several concerns at the margin of policy and politics. The challenges of reducing material throughput and reducing carbon emissions converted environmental policy into a technical question, effectively side-lining the agency of social movements and their pursuit of alternative social and cultural objectives. Unlike the position in the first half of the twentieth century, for the discursive politics of the decades after 1980 the term 'utopia' was treated pejoratively, as irrelevant and out of phase with the realities of the 'enabling market'. The apparent need to reassure publics that the impending environmental dystopias were not inevitable seems to have led policymakers to emphasise individual contributions over collective political action.

The underlying assumptions of the dominant model transposed the supposed 'barriers' to market freedom and choice in the formal economy, to the new terrain of environmental and sustainability policy. Policy interventions assumed that similar barriers, this time 'social' rather than economic, existed to people acting more sustainably in everyday life (Redclift and Hinton 2008). It was suggested that these obstacles were constituted by habit, poor education, a lack of information and cumbersome state bureaucracy, and could be rectified by policy. The solution was to introduce more choice of products and services, new 'greener' technologies, and market opportunities which could maximise utility while placing more responsibility on the individual. The individual consumer could regard herself as 'greener' through encouragement or, in the current political argot, 'nudging': that is, being leant-upon by government to behave more appropriately. This solution rendered the individual as a consumer, rather than a fully reflexive citizen and her environment solely in terms of products and services, rather than social and ecological processes or structures.

At the same time science was viewed as part of the solution, rather than the 'problem' confronting societies threatened by climate change. The decisions were only obliquely political, while technical solutions held the promise of removing politics from environmental policy entirely. As demonstrated

in the Stern Report, we were embarking on what has been termed a 'post-political' future (Swyngedouw 2009): one in which consensus science came to exercise normative authority, and political judgements about the way resources and rights to them were distributed could be left to (supposedly) independent rational discussion.

Contradictions of the sustainable development model: carbon dependence

At a more 'macro' level the development of carbon markets, both within industries and, more importantly, between countries, represent a mature version of the 'market solution' model. On the one hand global warming was characterised as the 'greatest market failure ever' (Stern, 2007) and the development of carbon markets was welcomed by many sectors of industry: indeed they were heralded as a 'challenge for entrepreneurship', providing new 'market opportunities' (Lovins, Hawken and Hunter Lovins 2000). At the same time, as we have seen, they required very little government action, and were consistent with the largely deregulatory model being widely pursued.

Carbon markets were thus popular among devotees of free-market economics and those who recognised the urgency of environmental action but bemoaned the shifts in behaviour that

this might imply. As one 'progressive' think tank in the UK put it, they provide "the political opportunity to highlight, secure and celebrate wealth creation. The benefits from the low-carbon transition are waiting to be grasped" (Policy Network 2008, 23). Notwithstanding the endorsement of carbon markets by large sections of political opinion, they also raised other questions which were anathema to more radical Green opinion, raising the possibility, following Oscar Wilde's famous dictum, of "knowing the price of everything and the value of nothing".

The existence of carbon markets contributed to the new middle-ground consensus that has come to characterise business-friendly environmental policy during the first decade of the twenty-first century. Organisations such as the Carbon Trust advertised heavily in publications like 'The Economist', where individual entrepreneurs were singled out for compliments and given a platform to communicate their endorsement of carbon trading (The Economist, *March 20, 2010*).

The clear benefits of encouraging industry to enter the new carbon markets only represented one part of the equation however. The downsides of carbon trading were perhaps less 'tangible' but equally compelling. Once the financial recession became apparent the benefits of carbon *markets* began to recede.ⁱⁱⁱ By late 2009 the 'cap-and-trade' model was

beginning to lose ground in precisely those economic systems which had earlier favoured it. Under President Obama in the United States, electricity utilities looked likely to use 'cap and trade' but transport emissions were more likely to be taxed and industrial emissions regulated. The 'new tools' of the market are less in evidence today than they were at the end of the 20th century. By the same token the appeal of the 'old' policy instruments of taxation and regulation has become more apparent since the onset of the current financial crisis when governments, especially in the United States and Europe, have needed to raise income, particularly for much needed investments in energy, especially renewables. As *The Economist* put it: 'as market-based approaches lose relevance, climate action ... may come to lean more heavily on the command-and-control techniques they were intended to replace' (*The Economist* March 20, 2010).

The shift towards more conventional policy tools, especially regulation, might also have political consequences, as the environmental movement in all its complexity assumes the lobbying role that has been largely a specialism of business interests since the ascent of ecological modernisation.

Challenges of the Third Nature: globalisation and environmental social movements

The modern environmental movement has its roots in 1960s counter-culture. Together with the women's movement and the anti-nuclear movement, the environmental movement became a focus of study for an emerging, although somewhat disparate, sociological paradigm. Rather than the 'old' class-based movements such as the trades unions, these 'new social movements' (Offe, 1985) were characterised by post-materialist ideals, novel organisational forms and new collective identities. Throughout the 1970s and much of the 80s, environmentalism was largely focused on the underlying causes of environmental crises and neo-Marxist scholars sought to identify them in the structural dynamics of industrial capitalism. Other studies, however, began to focus on the ways in which environmental social movements (from communal living experiments, through direct action protests, to political lobbying and raising public awareness), were actually contributing to the reform of the modern institutional regime (Frankel 1987).

By the 1990s, a shift could be discerned in the ideology and strategy of environmental social movements, many of which moved from being critical commentators positioned on the periphery of important decision-making institutions to critical participants in the process of environmental reform (Mol, 1997). As we have noted, ecological modernisation has been a key interest of the European project, almost since its

inception. Starting in 1972 with a declaration of European Heads of Government to establish common environmental policy for the Community and the subsequent adoption of environmental action plans, a European Environment Agency and directives covering environmental impact assessments, eco-audits, eco-labelling, and most recently the EU ETS carbon trading scheme, a pro-environmental stance has come to be associated with many of the core institutions of the Union. As Marks and McAdam (1996: 269) point out: the Commission has been 'consistently progressive on environmental issues', often opposing the positions of member states; the European Court of Justice in Luxembourg has come to be viewed as 'pro-environment in its interpretation of the law'; and the European Parliament, with a significant number of Green MEPs, has 'evidenced a strong environmental consciousness', all of which have provided a political opportunity structure highly favourable to the environmental movement.

As European integration proceeded and member states ceded authority to Brussels, national environmental movements shifted the focus of their activities, with early examples including Friends of the Earth, the WWF, and Green Peace, all of which had established a strong lobbying presence in Brussels by the mid-1990s. In association with seven other major European environmental NGOs and networks these frontrunner organisations have gone on to establish 'Green

10', which represents more than 20 million EU citizen members of the constituent organisations. Green 10's stated objective is to 'work *with* the EU law-making institutions - the European Commission, the European Parliament and the Council of Ministers - to ensure that the environment is placed at the heart of policymaking' (www.green10.org).

As globalisation gathered pace through the 1990s, aided by the commercial development of the Internet, environmental movements also extended their reach, becoming more internationally organised in terms of both membership and the targets of their activities and taking advantage of the new possibilities afforded by electronic information and communication technologies to develop their organising and claims-making performances. Kousis's (2010) analysis of social mobilisation surrounding concerns over the possible negative impacts of bio- and nano-technology (elements of what we have termed Fourth Nature) highlights this shift toward more international and global configurations. She also notes the increasing dominance of professional social movement entrepreneurs and links with public authorities in large scale social movements such as Greenpeace and Friends of the Earth. The expanding scale, professionalization and articulation with government agencies appears to come at a price however: elements of local and regional claims-making that cannot be

co-opted into international activism are often left behind and politically marginalised.

In the globally interconnected world of the 21st century, environmental sociologists (cf Spaargaren, Mol and Buttel, 2006) have turned to ideas of complex networks, flows and assemblages and the work of European scholars such as Castells, Urry and Sassen to understand processes of environmental reform. Sassen (2006) has suggested that global environmental networks form constructive elements of the global assemblage, as the global environmental movement creates a new form of authority within the global network society. An environmental sociology of networks and flows conceptualises and articulates the environment, and processes of environmental degradation and reform in the 'space of flows' as well as the 'space of place': local acts of environmental resistance and protection are joined by articulation of the environment in international trade, certification standards, and global epistemic communities such as those that have developed around vulnerabilities associated with Third Nature - particularly global climate change (Mol, 2010, Redclift 2008).

Climate change is perhaps the most pressing environmental issue of the 21st century and one which has led the environmental movement into a novel position (Yearley, 2010).

For much of the 1970s and 80s environmentalists cast science as the perpetrator of environmental crimes, deeply implicated in industrial societies' exploitation and degradation of the natural world. The science of global climate change, however, has manifested several unprecedented and fascinating features. An innovative form of organization has been created in order to foster the production of more authoritative information and to identify appropriate policy responses - the Intergovernmental Panel on Climate Change (IPCC). The Panel is multidisciplinary with its thousands of unpaid members drawn from the social as well as natural sciences, while its periodic assessment reports are subject to review by representatives of more than 120 national governments, with summaries for policy makers being subject to approval by all participating nations. Although the apparent authority of the IPCC's forecasts has been criticised on a number of grounds by vested interests, in contrast to their past challenges to scientific authority, environmental NGOs and campaigners have found themselves defending the objectivity of scientists' published findings and denouncing the IPCC's critics. (Yearly 2010, *passim*)

There is another important contribution of environmental social movements: the notion of 'ecological debt'. Established on the principle of 'environmental justice', 'ecological debt' is the debt accumulated by the countries of the North towards

the countries of the South through the export of natural resources at prices that take no account of the environmental damage caused by their extraction and processing and the free occupation of environmental space through the dumping of production wastes. There is no room in this paper to explore the concept in detail, but we can note that ecological debt is an aggregate measure that brings together: carbon debt, biopiracy, waste export, and environmental liabilities. The concept acts as a counterbalance to the external debt of less industrialized countries, which continues to exert economic pressure towards further exploitation and degradation of the environments in the South and the social deprivation of the 'bottom billion'.

The Colombian environmental lawyer José María Borrero popularised the term within Latin America through the publication of his book *La Deuda Ecológica* in 1994. The idea has since been employed by numerous environmental movements in the South and became the *raison d'être* for the establishment of the 'Southern People's Ecological Debt Creditors Alliance', which has forged strong links with supporters in Europe. At the Second European Social Forum in Paris in 2003, a coalition of NGOs, including Friends of the Earth International, proposed the formation of the 'European Network for the

Recognition of the Ecological Debt', which has since been joined by more than 100 environmental movement organisations.

Although the first academics to pay attention to the concept were not European the idea quickly established itself within European environmental circles. The Catalan political ecologist Joan Martinez Alier, made ecological debt a central theme in his book, *The Environmentalism of the Poor: a study of ecological conflicts and valuation* and with publication of the first edition of Andrew Simms' (2005) book '*Ecological Debt: Global warming and the Wealth of Nations*', the concept became firmly cemented in the environmental social science lexicon, contributing to the further development of principles of environmental justice.

Third Nature: Sustainable Consumption and regulation under economic austerity.

These developments in the economy and in public policy raise some awkward questions for our understanding of sustainable development and the policy discourses which have characterised the field. In this paper we have drawn on the substantial literature that suggests there is still considerable confusion over the most effective way of achieving more sustainable development, and several of the assumptions about consumer

behaviour - such as the role of an 'information deficit' about the environmental costs of products and services, and the targeting of personal responsibility for policy solutions as being sufficient to lead to voluntary behaviour change. Remarkably, these assumptions are largely untested and circumstantial. Whilst policymakers and pundits alike tend to measure progress towards sustainable development in terms of the numbers of purchases of particular 'green' or 'ethical' commodities, where success is framed in terms of market share, an alternative discourse suggests that sustainable development involves frugality, thrift and a kind of voluntary austerity. If this is indeed the case, then a focus on economic growth - low carbon or otherwise - may still be unsustainable.

Policies which suggest that sustainable development can be achieved through making consumption more sustainable are difficult to square with the fiscal austerity that has characterised many of the 'advanced' economies since 2008. Even prior to the banking crisis of 2008/9 the level of indebtedness had increased, in both private households and in the public domain. In a society in which increased equity in housing seemed assured, and borrowing was easy, individuals were prepared to buy property to rent and re-mortgage their homes with apparent alacrity. The rise in disposable income,

for most consumers, was also driven by increasing female participation in the labour force, facilitating wider social participation for the majority (but not all) of the population (Goodman and Redclift 1991). This model of rising consumption had also been associated with longer working hours, as Richard Titmuss had argued much earlier, to explain the apparent rise of the 'Affluent Society' in the late 1950s (Titmuss 1962).

The 'sustainable development' which societies strove for in the boom years before the financial crisis of 2008 is in marked contrast with what followed. On one interpretation the economic crisis since 2008 is a result of a failure in the 'regulationist' policies with which the national state, in much of Europe and the United States, managed demand. An approach from Regulation Theory helps to explain the ability of capitalism to stabilise itself in the 1970s and 1980s, but might also help explain the illusion of 'stability' during the long boom of the last decade (Aglietta 1976, Boyer 1990, Jessop and Ngai-Ling Sum 2006). The model of growth at the dawn of the twenty-first century was one of enhanced personal consumption on the basis of negotiated debt not financial stability. It leads us to question models of sustainable development which rest on enhanced consumption of new products and services, and might suggest we look instead towards 'sufficiency', including the experiences during World War II and its aftermath, for historical lessons in how to maintain

economic activity while using resources more sparingly (Redclift and Hinton 2008, Urry 2003) and pursuing the goal of making our getting and spending activities consistent with the capacity of nature to produce and renew the environmental goods, services and conditions that underpin human well-being. We concur with Huber (2000) in arguing that even when combined with efficiency in production, sufficiency as a principle for guiding consumer behaviour is insufficient to turn the tide of twenty-first century mass consumption. What is required is a conscious attempt to bring our social/industrial metabolism back into line with nature's metabolism, a closer approximation to the models in nature which provided the impetus for Second Nature, such as the sustainable farming systems adopted by societies aware of their impact on theirs and others' environments.

Conclusion

In this paper we have argued that different forms of risk and environmental insecurity correspond to different degrees of substitution of nature by human-made capital, delineating a continuum from the First Nature of relatively 'wild' or 'wilderness' areas, through the Second Nature of agricultural landscapes that Cicero conceptualised more than 2,000 years

ago, to large scale urban settlements in industrial and post-industrial landscapes. Finally we suggested a Fourth Nature in which 'nature' has been engineered in the laboratory and reinserted within the biological cum social human individual. Sustainable development can, then, be seen as a comprehensive term which obscures different societal responses. These responses range from oppositional social movements, in both the developed and less developed countries, to the incorporation of latent criticism into new 'environmental' policy, the process which Mol and Spaargaren refer to as 'environmental reform'.

We have suggested above that the growing concern to measure and value environmental externalities, goods and services, most evident in carbon markets and new low-carbon technologies, has been prompted by an enhanced awareness of biodiversity loss, resource depletion, ecosystem collapse and climate change, which we have characterised as Third Nature. These new forms of policy intervention, and their accompanying technologies, which were discussed under the rubric 'Ecological Modernisation', involve forms of political compliance or co-optation. Nature takes on social authority, as the 'environment', while governments seek behavioural changes, and new forms of consumption. A recursive loop thus

transforms the unintended consequences of consumption into new forms of consumption itself: green goods, commodities and even banks. Valuing nature under threat, and identifying the need for dematerialisation, leads to new material goods and processes. At the same time there are unforeseen consequences: on the one hand the global financial crisis, in both public and private debt, has given way to austerity policies far removed from the affluence (in the North) which gave sustainable development much of its appeal. At the same time other social processes can be observed: in which social movements such as the 'Occupy' movement mount opposition to the effects of capital's depredations by invoking the idea that global sustainability is being sacrificed on the altar of market dogma.

Finally, it is worth making a tentative link between these on-going changes, often inchoate from the point of view of the consumer/citizen, who may simply view them as part of everyday life, and the new forms of utopianism that have grown from global environmental conflicts. There is a process of disenfranchisement of large groups of people, in both North and South, faced by alienation from nature, and the means ('labour/work') with which it is transformed. Increasingly social 'marginality' or 'exclusion' is not simply ascribed by

societies, but challenged by those disaffected by the 'post-political' consensus. The 'utopian' response has re-emerged just as 'sustainable development' has turned into a thinly disguised mantra for economic growth, and this growth has proved, in turn, something of a chimera.

The recognition of what we have lost in the course of economic 'growth', notably the equilibrium mechanisms which had enabled nature to be resilient in the face of risks and shocks, have led to a shift from individualistic and anthropocentric to more collective, bio- and eco-centric positions. There is a reassertion of nature's primacy at a time when living standards are under threat from government austerity and low economic growth. Might sustainable development, as a concept, be subject to renewal, then, in the hands of different political forces and forms of political expression? Is 'sustainable development' being reinvented to accommodate the new exigencies of financial crises and an ecological Armageddon?

ⁱ Other, similar concepts are 'zero' or 'no' growth, steady state economy, and 'ecological modernisation'.

ⁱⁱ Note that Carolan, in his critique of Bhaskar's critical realist approach to nature, and his call to "bring nature back in", uses the term 'nature' in quite a different way from the one we are proposing (Carolan 2008). He distinguishes between 'Nature'(Upper Case) in referring to the physical laws of nature; 'nature' meaning the meeting of both biophysical and social phenomena, and "nature" (inverted commas) to refer to discursive constructions alone. In this paper what we refer to as First, Second, Third and Fourth Natures all correspond to Carolan's 'nature', with no attempt made to distinguish 'purely' discursive constructions of the term. Our definitions are prompted, rather, by the

evolving tradition in environmental economics, which highlighted the role of capital substitution of nature (Pearce 1991).

ⁱⁱⁱ There have been several reports suggesting that the European Union's Emissions Trading Scheme (ETS) will do little to encourage investment to reduce emissions during the economic recession. On the present course emissions trading is likely to produce only a 3 per cent reduction in emissions within the EU by 2020. Two effects will be observed. First, the cap on emissions will exceed projected EU emissions providing no economic incentive to move to clean technology and infrastructure before 2012. Second, because the EU allows unused permits and offsets under phase three (2013-2020) any claimed economic incentive during this later period will be reduced also. (See 'Recession plus ETS = fewer carbon emissions in the EU', National Audit Office Report, March 2009).

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