

Determining capitalism's prospects for sustainable development:

A régulationist approach

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Abstract

This paper argues that régulation theory, although generally regarded as having a macroeconomic focus, offers a cogent analytical framework to understand the character of the contemporary environmental challenge, to examine the responses of capitalism to environmental issues and the challenge to accumulation posed by sustainable development. Not only does the paper seek to explain the insights provided by this analytical framework to the environment-economic relation compared to mainstream neoclassical economics, the paper also canvasses the extent of sustainability achievable within the boundaries of capitalism.

Key words: capitalism, economic-environment relation, neoclassical economics, *régulation* theory, sustainability, sustainable development

1 Introduction

Environmental degradation has escalated with the evolution of capitalism. Climate change has become the hallmark of contemporary environmental concern. The concept of sustainability has been re-configured to validate the green credentials of an economic growth agenda. Neoliberalism has reconceptualised the environment as an economic rather than as an ecological problem with markets dominating the policy solutions to environmental problems. Contemporary capitalism is also distinguishable by green consumerism, the development of

* The John Curtin Institute of Public Policy, Curtin University of Technology, Perth, Australia. Not to be cited without the author's permission. This paper has been prepared for the 11th AHE Conference, 9-12 July 2009, Kingston University, London.

'clean' technologies and corporate environmentalism. Yet the "systemic ties between capitalism and environmental degradation remain under-explored" (Lippitt 2005: 158).

Régulation theory, although generally regarded as having a macroeconomic focus but not limited in its application to a particular discipline or topic of study, has been criticised for paying scant attention to environmental issues. This paper argues that *régulation* theory offers a cogent analytical framework to explain the character of the contemporary environmental challenge, the responses of capitalism to environmental issues and the challenge to accumulation posed by sustainable development. In seeking to explain the insights provided by this analytical framework to the environment-economic relation compared to mainstream neoclassical economics, the paper also seeks to progress a *régulationist* approach to the ecological.

The paper is structured as follows. The next section provides an overview of: twentieth century energy, technology and economic changes that provoked substantial and irreversible environmental damage; the actions and responses of neoliberal capitalism to escalating environmental degradation; and, the response of mainstream neoclassical economics to explain this phenomenon as well as the mainstream's innate inability to elucidate the interaction of the capitalist economic system with the environment. A third section sets out the conceptual framework of *régulation* theory, addresses the criticisms levelled against *régulationists* for their 'environment-deficit-syndrome', and, in discussing two particular contributions to break this impasse, posits an analytical method for empirical investigation of the challenge to accumulation posed by sustainable development. A final section presents concluding comments.

2 The problem, the response and mainstream economics

2.1 The ecological legacy of twentieth century capitalism

In environmental history, the twentieth century qualifies as a peculiar century because of the screeching acceleration of so many processes that bring ecological change. Most of these processes are not new: we have cut timber, mined ore, generated wastes, grown crops, and hunted animals for a long time. In modern times we have generally done more of these things than ever before, and since 1945, in most cases, far more. Although there are a few kinds of environmental change that are genuinely new in the twentieth century, such as human-induced thinning of the ozone layer, for the most part the ecological peculiarity of the twentieth century is a matter of *scale and intensity* (McNeill 2001: 4, emphasis added)

The growth of the world's economy throughout the twentieth century, and particularly at the unprecedented rate since the Second World War, has been accompanied by the greatest deployment of energy in human history. In the twentieth century, humans used ten times the energy used in the previous thousand years (*ibid*: 15). Significant changes to the energy regime, technology and economic organisation, most markedly in the latter part of the century, have propelled the scale and intensity of energy use and, as a result, the pace and direction of environmental change.

Transformation of the twentieth century's energy regime - the arrangements to extract, convert, store, transport, use and dissipate waste - occurred through the growing domination of non-renewable fossil fuels. Oil was the fuel of the century being the world's main transport fuel from 1930 and for industry since the late 1950s. Oil, coal and gas now meet more than three quarters of the world's energy needs and are expected to do so for some time to come (International Energy Agency 2008). The extraction, transport, processing and delivery of fossil fuel deposits, unevenly distributed around the world, have led to irreversible environmental impacts spread throughout the world. The widespread occurrence of oil spills, leaks, blowouts, and fires have damaged fisheries, farms, oceans, and marine life. Petrochemicals, derived from oil, have not only proven to be toxic pollutants but have added tonnes and tonnes of durable waste through the creation of plastics. There is also the unequalled land waste and contamination problem arising from coal mining, combustion and slag disposal (Blumberg and Gottlieb 1989; Cohen 2009; Tiwary 2001).

New technologies of the twentieth century added further impetus to energy use and adverse environmental outcomes (Commoner 1972). The humble chainsaw revolutionised logging and pulping and, in the process, cleared tropical forests. Rail transport led to the demolition of forests needed to construct railway-cars and tracks before other materials became widely available. The advent of the car propelled the oil industry's growth to meet fuel needs, its manufacture stimulated metals and rubber production with attendant air, land and water impacts, and its use had significant spatial implications through the construction of roads as well as causing many deaths. Nuclear energy is equally lethal but in the 1950s symbolised 'vigour and modernity' like dam building (McNeil 2001: 312). Its anticipated development has, however, not been realised with a significant loss of public acceptability following the most significant civilian accident in 1986 at Chernobyl compounded by some nuclear wastes being deadly for thousands of years (Greenpeace International 2007; Thomas 2008). Environmental consequences and risks have also been boosted by the new technology

of genetic modification which has impacted on pest control, fertilisers, recycling, sewage modification and animal cloning (Pretty 2001).

The substantial environmental change provoked by the twentieth century spread of fossil fuels and technological changes was compounded by three significant economic changes. The spread of industrialisation escalated resource use and pollution with falls in energy intensity (the ratio of energy use to GDP) eclipsed by the overall expansion of the scale of industry. The production norms of Fordism (Taylorism plus mechanisation) led to productivity and wage gains converting mass production into mass consumption but fomenting monumental changes to family, gender and intergenerational relations which, in turn, sparked ecological changes.

To sustain the new social arrangements, fields, factories, and offices needed more fuels, fertilizers, water, wood, paper, cement, ores – more of almost everything except horses, oats, whalebone, and a handful of other raw materials consigned to the dustbin of history. All these inputs were converted into energy, food, goods, pollution, and garbage (McNeil 2001: 318).

Finally, falling transport costs, information technology, and the growth of global financial markets drove greater economic integration across the world in the final decades of the twentieth century. One repercussion was the commodification of nature (such as elephant ivory, ostrich feathers, beaver fur) which could not rely on supply through reproduction leading to serious threats of species extinction (Reeve 2002). Greater integration into an international trading system also led to the transformation of ecologies to meet world demand. Rainforests and wilderness, across many continents, have been converted to beef cattle ranches, rubber and coffee or cocoa plantations, or to plant crops for illegal trades such as cocaine and other drugs (Laurance 1999). The growth of global financial markets has also seen a surge in 'conditional' lending from international institutions, such as the World Bank and Asian Development Bank, for energy and infrastructure projects in less developed countries with a strong emphasis on political and economic criteria but little concern for ecological considerations (Bacon and Besant-Jones 2001; Thomas, Hall and Corral 2004).

Air and water pollution, deforestation, desertification, soil erosion, biodiversity loss and global warming dominate the ecological legacy from the conjunction of twentieth century capitalism's spread of fossil fuels, technological change, industrialisation, mass production and mass consumption, and globalisation. "Capitalism's pressures for unremitting economic growth hold as permanent hostage the flora and fauna, the air, the soil, and the water of the planet" (Dowd 2004: 2). This is capitalism's relation to nature. Capitalism requires nature as an indefinite resource and condition of production (O'Connor 1998; Peck and Tickell 1994). But

capital 'undervalues' nature and the drive to accumulate causes environmental destruction imposing costs, to maintain or repair these natural conditions of production, which threaten profitability and thus ongoing accumulation. Costs range from soil degradation causing lower land productivity to those incurred from political compromises to overcome community demands for loss of environmental amenity e.g. sewerage ocean discharge impacting on recreational amenity.

O'Connor (1998) deems these costs to form part of the second contradiction of capitalism, the possibility of an economic crisis from the supply-side i.e. from an undermining of the conditions of production.¹ Nature is one of three natural and social conditions necessary for capitalist production, the other two being the built environment and human labourpower (*ibid*). The prospect of an economic crisis caused by the costs of environmental degradation is for discussion elsewhere. More salient for the purposes of this discussion is the response of twentieth century capitalism to its degradation of the environment.

2.2 The response of capitalism: Environmental managerialism

Environmental and ecological concerns started to be heard more loudly from the 1960s (Lippitt 2005; McNeil 2001). Environmental movements sprang up, green parties entered politics, governments established agencies to 'protect the environment' and companies, particularly oil and chemical, sought to establish 'green' credentials. Capitalism put on "an environmentally friendly face" (Dryzek 1994: 177). In the industrialised world, changes became apparent with the cleaning up of industrial waste water, reductions in sulphur dioxide emissions, and the abolition of leaded petrol (McNeil 2001). New ways of regulating mineral extraction, water supply and waste disposal were introduced, marketable property rights over forests, fisheries and water sources were created along with, to name just a few, land use planning, wetlands mitigation banking, emissions permits, fishing catch quotas, green consumerism, 'clean' technologies, environmental audits, environmental management systems, legal liability for oil spills, charges for effluent or emissions, and banning of DDT (Cohen 2009; Gibbs 1996, 2006; Gibbs, Jonas and While 2002; Lippitt 2005; Redclift 1988).

¹ The first contradiction is the tendency for a demand-side crisis given capital's drive to increase profits from greater production with less labour but the corollary occurs of reduced consumption from labour leading to lower profits. This 'two contradictions' framework of capitalism's tendencies to erode its own natural and social conditions of production and overproduction of commodities relative to market has generated considerable debate (For example, see: Burkett 2006; Foster 2002; Lippitt 2005).

These actions taken by neoliberal capitalism are exemplars of the different 'techniques' of environmental managerialism initiated to 'manage' the environment (Redclift 1988). The overwhelming method inherent to these techniques is to focus on the manifest problem with each being treated as if a commodity instead of dealing more holistically with the cause or context of environmental degradation. Furthermore, markets are regarded as the optimal means to solve environmental problems and thus the environment is being envisaged in economic not ecological terms (Drummond and Marsden 1995; O'Connor 1994b; Rees 1992).

A further response by neoliberal capitalism, which accelerated as the new millennium approached, was to shift the arena for discussion and action on environmental problems. The focus moved from problems essentially local in their impact, where the effects are relatively obvious and remedial measures had become established, to those which threaten major disruption to the world environment such as climate change (Gibbs and Healy 1997). This 'scale and impact' shift has been marked by unprecedented efforts at international collaboration accompanied by a growing body of scientific evidence, a marked reconfiguring of the concept of sustainability and the introduction of schemes which facilitate accumulation in the name of greenhouse gas abatement.

Supranational institutions have been created to spearhead the integration of economic and environmental policies, counter advocacy of a 'no-growth' policy and promote economic growth as mandatory for environmental improvement. The establishment of the United Nations (UN) World Commission on Environment and Development, the widespread dissemination of its 1987 publication *Our Common Future* (commonly referred to as the Brundtland Report), its organisation of the 1992 Rio de Janeiro Earth Summit to gain endorsement by 178 governments of a 'global framework', and the subsequent establishment of the UN Commission on Sustainable Development, exemplify this approach. Other significant actions have been the United Nations Framework Convention on Climate Change which led to the 1997 Kyoto Protocol, an international agreement by thirty-seven industrialised countries and the European Union to reduce greenhouse gas emissions, the establishment of the Intergovernmental Panel on Climate Change (IPCC) and the commissioning by the British Government of the 2006 Stern review on the economics of climate change. These latter actions reinforced the hegemony of supranational institutions promoting a global agenda of economic and environmental integration.

Concurrently, there has been a growing body of scientific evidence about the scale, intensity and long-term implications of the ecological degradation caused by capitalism's

voraciousness, particularly in terms of global warming (Hansen 2006). Although still a somewhat contested terrain, the evidence presented in recent UN and IPCC publications along with the Stern Review and the film *An Inconvenient Truth* has meshed with recent political changes resulting in climate change becoming an accepted institution (O'Hara 2009). Climate change has become the hallmark of contemporary environmental concern and particularly that caused by greenhouse gas emissions from capitalism's inexorable use of non-renewable fossil fuels for energy. This has led to the development of markets to trade carbon and renewable energy sources, and their promotion as the most appropriate mechanisms to deal with this environmental challenge. These mechanisms, however, overwhelmingly facilitate capital accumulation under the guise of reducing greenhouse gas emissions (Jones 2009; Lohmann 2006; Matthews and Paterson 2005).

The actions of supranational institutions and market mechanisms ostensibly designed to deal with emissions have been underpinned by the concept of sustainable development being "transformed, stripped of its critical content, and reconfigured" (Carruthers 2001: 93) to match the priorities and policies of neoliberal capitalism. Previously its polar opposite, sustainable development has become virtually synonymous with sustained economic growth.

The notion of a socially-just and ecologically-sustainable society gained currency throughout the 1970s as an alternative model, particularly for less developed countries. The quest for a sustainable alternative was grounded in formulations of grassroots and bottom-up development, low-impact development, and local control over the use of local resources emphasising equity, self-reliance and basic needs. This "comparatively marginalized, genuinely radical idea" (*ibid*: 98) was totally transformed for mainstream adoption by the "conflation of 'sustainability' (the ecological problem) with 'development' (the economic problem) (Paton 2008: 94) and the UN World Commission on Environment and Development played a lead role in its popularisation. Continual economic growth was promoted and accepted as axiomatic to sustainable development which would be achieved by industrialised countries opening up markets, increasing development aid, leaving private enterprise and partnerships to do the rest (von Frantzius 2004).

Thus the environment came to be reconceptualised as an economic not an ecological problem and a 'recast' sustainability was adopted as a commonly accepted policy goal. Sustainability, understood in the sense of the Bruntland report as inter-generational justice which is sufficiently ambiguous to have the widest palatability, is considered to be in

everyone's interest. As James O'Connor (1998: 234) observed "Who in their right mind would be against "sustainability"?" given its practical and moral connotations. But this 'appropriation' of sustainability means the imperatives of capital accumulation determine contemporary environmental priorities. The environmental challenge is viewed through an economic prism with the emphasis on "reducing the environmental impact of each unit of economic activity" (Gibbs and Healy 1997: 195) purely through market measures but which legitimates certain levels of environmental impact (Gibbs 1996). This is incompatible with the notion of sustainable development achieving distributive and inter-generational equity, and all economic activities resulting in the

sustainable use of renewable natural resources, protection of ecosystem features and functions, preservation of biological diversity, a level of harmful emissions remaining below critical (assimilative) thresholds, and avoidance of irreversible damage to the environment and nature (Mulder and van den Bergh 2001: 111)

through policies framed around co-ordination, co-operation and democratic involvement (Gibbs 1996).

2.3 Mainstream economics and the economic-environment interaction

Until the late 1960s, the interaction of the environment and economic activity – ably demonstrated by the escalating ecological degradation caused by capitalism's growth - was by and large ignored by economists. Environmental costs, overwhelmingly perceived in the form of pollution and resource depletion, were virtually 'banished' as externalities from the realm of analysis (Commoner 1972; Daly and Cobb 1989; Lippitt 2005; Victor 1980).²

As environmental concerns became 'louder' in the 1960s, mainstream neoclassical economics responded in a couple of ways. The economics of natural resources, pioneered by Malthus and Jevons in the 19th century, re-emerged through a spate of publications discussing the optimal use of renewable and non-renewable resources, and common property problems. Another strand of analysis to develop was environmental economics which revived the Pigovian idea of using taxes to correct for market failure ('taxing the emitter') and considered different market structures and policy responses. The tradition to become known as ecological

² Two notable exceptions were Pigou, in the 1920s, and three decades later, Kapp. Both were of the view that market failure caused environmental problems and required government intervention. Pigou developed the idea of using taxes and subsidies to correct for market failure. Kapp was notable for his empirical evidence that the social costs of pollution and resource depletion were not 'minor and exceptional' but characteristic of a market economy (Hahnel and Sheeran 2009; Røpke 2004; Vant 2005).

economics also started to emerge with a number of publications focusing on resource exhaustion and pollution imposing limits to growth (Røpke 2004; Vant 2005).

The nascent division between environmental and resource economics became entrenched in mainstream neoclassical economics, throughout the 1970s and 1980s, although both embraced the methodology of welfare economics (allocative efficiency through Pareto optimality).³ Resource economics became “highly mathematically formalized” (Røpke 2004: 302) and two issues preoccupied environmental economics – valuation of the costs and benefits of pollution control and environmental amenity; and the design and choice of policy instruments. Prominent neoclassical economists, such as Solow and Stiglitz, also attacked the notion of resource scarcity limiting long-term economic growth, arguing that the speed of technological change would ensure sufficient replacement of natural resources with man-made capital to sustain growth.

Preoccupation with valuing the costs and benefits of pollution control and environmental amenity has seen cost-benefit analysis increasingly utilised to simulate market (monetary) values for the economic cost of interactions with the environment. The monetary values ascribed to externalities are used as proxies for the appropriate level of environmental charges or taxes to ‘atone’ for environmental damage. Two particular techniques have become commonly used to simulate these values. The first is contingent valuation which estimates the willingness of individuals (producers or consumers) to pay for the right to use, or protect from damage, an environmental amenity or resource. The second technique, and most commonly used to value environmental amenities that affect the price of residential properties, is hedonic pricing which estimates the effects of environmental changes on other markets. Monetary valuation, using these techniques of cost-benefit analysis, has become a cornerstone of environmental economics (Mulder *et al* 2001; Victor 1980).⁴ On the other hand, there has been a shift in the preferred policy instruments advocated by mainstream environmental economics.

³ The core concept of welfare economics (microeconomic theory) is Pareto optimality. Free, competitive markets allocate resources and distribute income most efficiently because they will tend towards a (Pareto) optimal situation which occurs when no change can improve the position of one individual (as judged by herself) without a negative impact on the position of another individual (as judged by that individual).

⁴ The shortcomings and misuse of cost-benefit analysis have been well documented. For example, see: Ackerman 2008; Ackerman and Heinzerling 2004; Rosewarne 1993.

The externalities of resource depletion and pollution had been generally regarded as ‘minor and exceptional’ to be treated by direct government intervention through command-and-control measures such as the imposition of output quotas or standards for inputs, technology or emissions (Mulder *et al* 2001). This attitude changed as environmental concerns gained wider public exposure from the 1960s and 1970s, and as neoliberalism gained political ascendancy.⁵ Although not quite acknowledging that environmental externalities, rather than being the exception, are pervasive, persistent and growing in importance, the dominant preferred policy approach of environmental economics has moved to one of ‘internalising’ the externalities through the imposition of economic incentives (market-based measures). These policy measures are designed to directly impact on the costs and benefits for individuals through charges, taxes, subsidies or tradeable permits. According to the underlying logic, these ‘incentives’ induce behavioural change leading to a more efficient allocation of resources. By treating environmental issues as goods supplied and demanded in a market, a ‘correct price’ of the externality is created by placing an environmental charge on the cause of the externality e.g. the coal-fired electricity generation plant which emits greenhouse gases. If market participants pay the ‘correct price’, externalities will be reduced, not eliminated, to some ‘optimum’ level of pollution control. Thus “the power of the market can be harnessed ... for the achievement of environmental goals” (Tietenberg 1994: 316) which is considered to be far more efficient than direct government intervention.

This shift in preferred policy solutions has meant that, as the debate about growth and resource scarcity has moved towards the issue of long-term sustainability as noted earlier, the mainstream neoclassical economics position requires two conditions for sustained growth. The ‘substitutability’ argument of replacing natural with human-made capital has remained although another condition has been added – all externalities of production need to be internalised i.e. there needs to be ‘correcting’ price signals for the full social costs of resource use, goods and services.

The focus of mainstream environmental economic analysis is relative scarcity, the allocation of scarce resources, and optimal welfare. The interpretation of environmental degradation – in the form of resource depletion and pollution – as an allocation problem

⁵ Neoliberalism rests on a belief in markets, competition, individual responsibility and social conservatism. Virtually all economic and social problems are seen as having a market solution. The market is considered to be the most efficient method to determine the allocation of economic resources. And, as a corollary, the role of the state is to ensure the effective operation of markets not by active intervention but through regulation and promotion of conditions for profitability.

means that the analytical context of environmental problems is externalities and market equilibrium. Attention is strongly directed at determining how to achieve a social optimum in a market economy with externalities by comparing different equilibria. Equilibrium analysis, however, does not explain the transition from one equilibrium state to another, from one growth path to another.

The economy and the environment are treated by neoclassical environmental economics as two unrelated spheres where the extent of interaction is “mainly along defined points such as mines, fishing grounds and so on” (Vatn 2005: 247). Similarly, the use of resources in economic activity is treated distinctly as ‘resource economics’ and not explicitly linked to the pollution (emissions) arising from economic activity which is treated separately as ‘environmental economics’. Moreover, “the internal dynamics of the economy is emphasized much more than ... the interrelationships with the environment” (*ibid*) because “the environment is subordinated to the dynamic of capitalist economic processes (Rosewarne 1993: 65).⁶

Environmental issues are embedded within capitalism. Yet mainstream neoclassical economics, embedded in the policy actions of neoliberal capitalism, does not consider the ways in which the capitalist economic system affects the environment. Instead, the environment is perceived as being just like other goods, as commodities that can be defined and replaced.

3 What does *régulation* theory offer?⁷

Régulation theory is a conceptual framework to explain the processes of capitalist growth, reproduction and crisis. It seeks to explain the long run changes in capitalist economies which characterise distinctive phases or trajectories of economic growth, the dimensions of capitalist

⁶ Söderbaum (1992) suggests that mainstream economics was not developed primarily to deal with environmental problems so alternative paradigms should be considered. The point is not why a paradigm was developed but the usefulness of the conceptual framework to explain the economic-environment reality which he does address in his 2008 book *Understanding sustainability economics*.

⁷ Throughout the literature, *régulation* theory is referred to as a theory, approach, school, program or framework. This occurrence possibly arose because of Jessop’s (1990: 154) scathing criticism about the absence of a “monolithic theoretical system”, its gradual creation by a range of people with theoretical differences (Noël 1987), the habit of *régulationists* to refer to their work as “general notions and a method of work ... [to be turned by future research] into a more complete theory” (Boyer 1991a: 46) and their willingness to search for improvement in objectives, methods and concepts (*ibid*; Boyer and Saillard 2002c).

development and the forms of crisis that can occur (Boyer 1988; Dunford 2000; Esser and Hirsch 1989; Jessop 2001a, 2001b; Kotz 1990; Mazier 1982; Moulaert and Swyngedouw 1989; Noël 1987; Tickell and Peck 1992). Its genesis may have been hastened by the 1970s economic crisis but it is more than a theory of economic crisis (Lipietz 1987a).

The origins of *régulation* theory are attributed to a diverse group of French economists. Boyer, Aglietta and Lipietz are commonly referred to as the Parisian school and although widely acknowledged as producing possibly the most extensive and influential work on *régulation* theory, a number of other schools or ‘variants’ have “developed in parallel with and/or under the influence of the Parisian School” (Jessop 2001c: xxv).⁸ Despite the differences between each, they share a common focus of seeking to explain different periods of capitalism, the reasons for crisis, and the changing economic and extra-economic mechanisms of control needed to sustain or secure successive periods of capitalist development (Jessop 1990, 2001c; Jessop and Sum 2006).

Although generally regarded as a macroeconomic theory, *régulation* theory is not limited in its application to a particular discipline or topic of study (Jessop 1997a, 2001b). It also has been applied to meso-economic analysis focusing upon large sectors of productive activity (e.g. Allaire and Mollard 2002; Chester 2007; Cooke 1992; Kenney, Lobao, Curry and Goe 1989; Moulaert and Swyngedouw 1992). *Régulationists* have, however, been criticised for paying scant attention to environmental issues which Lipietz (2002), the most prominent ecological *régulationist*, acknowledges. His contributions in turn have been criticised for superficially dealing with ecological issues and bias allegedly because of his close ties to the French political party *Les Verts* (Becker and Raza 1999; Jäger and Raza 2001). These criticisms, on both counts, overlook the steady stream of contributions from the ‘radical geographers’ who have sought to shed insights on the economic-environment relation using *régulation* theory (For example, see: Angel 2000; Baurdiel and Wissen 2002; Bridge 2008; Drummond and

⁸ The schools identified by Jessop (2001c) are: two other French schools, one associated with Destanne de Bernis and the University of Grenoble, and the other with the French Communist Party and Paul Boccardo; an Amsterdam group (Overbeek and van der Pijl 1993; van der Pijl 1993); a German group (Esser and Hirsch 1989), Nordic (Mjøset 1987, 1997); and the American social structures of accumulation (SSA) (Bowles and Gintis 1983; Gordon, Edwards and Reich 1982; Kotz 1990, 1994). There are strong similarities between the Parisian school and these ‘schools’ although I would not subsume, as does Jessop, the SSA to be a ‘regulationist school’ given key differences (Coban 2002; Kotz 1990, 1994; O’Hara 2006: 17-18). There is also an identifiable group of radical geographers (Benko and Dunford 1991; Benko and Lipietz 2002; Collinge 1999; Macleod 1997; Peck and Tickell 1992) which Jessop does not regard as a school per se because they use concepts and arguments developed by others and have not developed their own distinctive research program (Jessop and Sum 2006: 28-29).

Marsden 1995; Gibbs 1996, 2006; Gibbs and Healey 1997; Gibbs, Jonas and While 2002; Peck 2000; Peck and Tickell 1992, 1994; Tickell and Peck 1992, 1995).

The substantive nature of the criticisms levelled against the *régulationists* is addressed below. First it is necessary to outline the conceptual framework of *régulation* theory.

3.1 The object of *régulation*

The two core concepts of *régulation* theory - regime of accumulation and mode of *régulation* - are underpinned by a Marxian view of capitalism where the mode of production is structured around two fundamental conflictual, contradictory and unequal social relations: the commodity (monetary) relation and the wage relation (Lipietz 1988a).⁹ The process of accumulation, by which capitalism is reproduced and expanded over time, must ensure the maintenance and reproduction of these fundamental social relations otherwise crises will occur, that is, “*ruptures* in the continuous reproduction of social relations” (Aglietta 1979: 19, original emphasis).

Maintaining and reproducing these social relations requires a political and legal order to ensure, amongst other things, monetary regimes, rules of competition, the discipline of markets, effective financial systems, functioning labour markets, and the maintenance of private property rights (Dunford 2000). Moreover, “the notion of social relations points to the regularity and repetitiveness of certain practices” (Lipietz 1988b: 14-15). This suggests that certain conditions, ‘regularities’, are essential to ensure the existence of these social relations. This does not mean that qualitative and quantitative change, within these social relations, does not occur over time. It does mean that certain core elements - invariant aspects - are sustained over time and their inherent contradictions are contained partially for a time whilst their historical form and precise articulation will continually alter over longer periods ensuring

⁹ Jessop (1990) suggests that the Parisians provided four key concepts – regime of accumulation, mode of growth, mode of *régulation* and mode of development – although he does acknowledge that use of ‘mode of development’ is largely confined to Lipietz’s work and there is little empirical difference between ‘regime of accumulation’ and ‘mode of growth’. The *régulationist* literature does not refer to ‘mode of growth’. Dunford (1990) also suggests that the legacy of the Parisians was four key concepts although he includes ‘industrial paradigm’ and ‘hegemonic structure’ with regime of accumulation and mode of *régulation*. ‘Industrial paradigm’ is an interesting inclusion given that “few use the notion ... [which] plays a much more important role in neo-Schumpeterian models” (Dunford 1990: 306). The other concept put forward by Dunford, ‘hegemonic structure’, is primarily found in the writings of the German *régulationists* (Esser and Hirsch, 1989: 419). The additional concepts put forward by Jessop and Dunford are not generally found throughout the *régulationist* literature.

the dominance of capitalism (Boyer 1988: 70; 1990: 37) This 'invariant reproduction', 'contradiction containment' and 'historical representation' requires a:

set of regularities that ensure the general and relatively coherent progress of capital accumulation, that is, that allow for the resolution or postponement of the distortions and disequilibria to which the process continually give rise (Boyer, 1990: 35-36).

This set of regularities defines a core concept of *régulation* theory, the *regime of accumulation*, and refers to the distinctive regular social and economic patterns that support and sustain accumulation between structural crises, ensuring its stabilization over a long period (Boyer and Saillard 2002b; Lipietz 1986b). Evidence of these regular patterns are found in the pattern of productive organisation within firms which defines the relationship of wage-earners to the means of production; the time horizon for decisions about capital formation within which management principles are developed; the distribution of income between wages, profits and taxes which reproduces and reinforces social classes or groups; the volume and composition of effective demand validating the productive capacity trend; and the relationship between capitalist and non-capitalist modes of production (Boyer 1988, 1990, 1991b; Brenner and Glick 1991; Moulaert and Swyngedouw 1989). Moreover, these five areas of regular social and economic patterns essentially define a particular combination of production and consumption reproduced over the long term despite conflictual tendencies (Jessop 1988, 2001b; Lipietz 1986b, 1987b; Tickell and Peck 1992).

Using this concept, Boyer (1988) and Lipietz (1986a; 1987b) identified three accumulation regimes based on their observation of major growth patterns from the mid-nineteenth century to the 1970s, each pattern showing a long boom and then a period of decline, stagnation and crisis although the causes of the downswing are different in each case. The accumulation regimes identified are: extensive accumulation, intensive accumulation *without* mass consumption and intensive accumulation *with* mass consumption.¹⁰

Since the crisis of the 1970s there has been much debate as to the nature of the current regime of accumulation. Some have suggested that the major capitalist economies are

¹⁰ These three regimes of accumulation are not readily distinguished throughout the literature with many only referring to the possibility of extensive and intensive accumulation per se (Brenner and Glick 1991; de Vroey 1984; Noël 1987; Tickell and Peck 1992). In all these cases, intensive accumulation is used to mean 'intensive accumulation *with* mass consumption' and the period of 'intensive accumulation *without* mass consumption' is commonly referred to as the long transition period between the two world wars. A similar issue arises when one considers the concepts used by Aglietta (1979). His definition of 'extensive accumulation' is equivalent to the Boyer/Lipietz definition of 'intensive accumulation *without* mass consumption' and his definition of 'intensive accumulation' is the same as those mentioned above; that is, analogous to the Boyer/Lipietz definition of 'intensive accumulation *with* mass consumption'.

undergoing a protracted crisis (Clarke 1988; Gordon 1988) while others contend that a new regime of flexible accumulation is already identifiable (Harvey 1989; Schoenberger 1988). A protracted crisis or a new regime of accumulation is not at issue for this paper. The more important point is thus: a regime of accumulation describes a period of relatively stable capitalist development, a period in which patterns of economic and social 'regularities' ensure the reproduction of the fundamental social relations of capitalism, social relations "whose invariant aspects can only be reproduced through continual alterations of their forms and precise articulations" (Boyer 1990: 37). Moreover, these regularities can be explained by analysing an accumulation regime's institutional (or structural) forms which are "any kind of codification of one or several fundamental social relations" (*ibid*). This notion of institutional forms leads to the second core concept of *régulation* theory, the mode of *régulation*.

There exists "a materialization of the regime of accumulation taking the form of norms, habits, laws, regulating networks and so on ... [a] body of interiorized rules and social processes" (Lipietz 1986b: 19) which ensures "the compatibility of behaviors in the framework of a regime of accumulation, in conformity with the state of social relations" (Lipietz 1986a: 16). This 'set of rules and collective behaviours' is called the *mode of régulation* which supports and steers the accumulation regime by reproducing fundamental social relations through a *conjunction* of institutional forms (Boyer 1988, 1990). In other words, the mode of *régulation* governs, guides, supports and secures an accumulation regime by reducing, containing, mediating, and 'regulating' the inherent conflicts of social relations (Aglietta 1979, 1998; Brenner and Glick 1991; Broomhill 2001; Dunford 1990; Jessop 1988, 1990, 1992, 2001a; Lipietz 1987b; Tickell and Peck 1992; 1995).

Institutional forms may work in one of three ways: as laws, rules and regulations; a compromise or negotiated outcome; or a common value system or representations (Boyer 1990; Boyer and Saillard 2002b). Five institutional forms are used in *régulationist* analysis to describe and explain the mode of *régulation* during different regimes of accumulation. These are:

- *monetary and credit relationships* – these relationships define how separate economic units will interact and will be influenced by the development of national and international financial systems;

- *wage-labour nexus* – this characterises the relationship between capital and labour, management and employees and broadly covers all aspects of work organisation and the standard of living of wage-earners;
- *form of competition* – this institutional form focuses on how relations between firms are organised, how units of accumulation relate to each other;
- *position within the international regime* – the nature of trade, investment, monetary and political arrangements that link firms, national economies and the international system; and
- *form of the state* - the institutionalised compromise between capital and labour, forms of state intervention, and economic policy.

The dimensions of these institutional forms are not limited to economic factors encompassing a far wider range including social, political, spatial, cultural, organisational, technological and historical factors. Nor is analysis of these dimensions limited to the quantitative or the qualitative (Boyer 1990: 61).

A hierarchy or dominance of particular institutional forms has been found to characterise different modes of *régulation* in addition to the ongoing metamorphosis of each institutional form (Boyer and Saillard 2002b). The *competitive* mode of *régulation*, prevalent under extensive accumulation from the mid-nineteenth century until World War 1, has been strongly defined by wages negotiated on an individual basis and subject to market fluctuations, tight monetary controls and a non-interventionist state. The *monopolistic* mode of *régulation*, evident during the period of intensive accumulation following the second World War, has been characterised by collective wage negotiations, the strong growth of credit money, oligopolistic forms of competition and different forms of state intervention.¹¹ As for the current regime of accumulation, “the intensification of monetary constraint [sic] and the internationalisation of competition appear to precede and shape transformations in the wage-labour nexus” (Boyer and Saillard 2002b: 39).

The combination of an accumulation regime and a mode of *régulation* defines a *mode of development* (Boyer 1990; Brenner and Glick 1991). The period post World War II, of intensive accumulation with mass consumption accompanied by a monopoly mode of

¹¹ Most of the literature refers to two modes of regulation although Boyer (1988) does distinguish a third mode which applied during the period when the agricultural sector was dominant and capitalist industry was only just beginning to emerge, *régulation à l’ancienne*.

régulation, is commonly referred to throughout the literature as 'Fordism'.¹² Although the debate continues about the constituent parts of the mode of development since the 1970s crisis, 'post-Fordism' has become the nomenclature for the current period.¹³

The mode of *régulation* contains and controls "within tolerable limits ... [but] cannot prevent all disequilibria" (Destanne de Bernis 1988) because the inherent tensions and contradictions of social relations will never totally disappear. Consequently, crises can occur if these disequilibria are not ameliorated in some way. Different types of crises have been identified and although there is no general consensus on the names or categorisation of crisis, there is common agreement that the nature of the mode of *régulation* will not ensure stabilisation for an indefinite period leading to a crisis.¹⁴

The literature shows a diverse treatment of the mode of *régulation*. Some see the concept as synonymous with regime of accumulation (de Vroey 1984; Moulaert and Swyngedouw 1989) which conveniently overlooks the different levels of abstraction embodied in each concept (Boyer 1990; Boyer and Saillard 2002b; Jessop 1990).¹⁵ The radical geographers have proffered an alternative name, the mode of social *régulation* (or MSR), endeavouring to emphasise the mode's critical role in mediating and controlling the conflictual social relations upon which capitalism is based (Drummond and Marsden 1995; Gibbs 2006; Peck and Tickell 1992, 1994; Tickell and Peck 1992, 1995). The vast majority of the *régulationist* literature, however, focuses on the tangible expression during Fordism or post-Fordism of a specific institutional form of the mode of *régulation* or the conjunction of these institutional forms. The latter is less common than the former and the wage-labour nexus has received perhaps the most attention of all institutional forms.¹⁶ This diversity of treatment

¹² Generally speaking, the literature attributes the origin of the term 'Fordism' to the *régulationists*. However, many *régulationists* have acknowledged that the term was first coined and used by Gramsci (Lipietz 1987b).

¹³ Harvey suggests that this post-Fordist era comprises 'flexible accumulation' and "a quiet different system of political and social regulation" (Harvey 1989: 145).

¹⁴ Generally, four broad categories of crisis are distinguishable – those not originating within the mode of *régulation*, minor crises within the mode, a major crisis of the mode of *régulation* or accumulation regime, or a crisis of the mode of production as occurred with feudalism (Boyer 1988, 1990; de Vroey 1984; Dunford 1990; Lipietz 1987b, 1988b; Mazier 1982; Moulaert and Swyngedouw 1989).

¹⁵ Jessop (2001b, 1997b) suggests that 'an accumulation regime' is a macroeconomic concept while 'a mode of regulation' is more a 'meso-level' concept. Boyer refers to 'levels of analysis' distinguished by a decreasing degree of abstraction with mode of production at the most abstract level, accumulation regime at the second level and the mode of regulation at the third level of analysis.

¹⁶ A number of reasons could explain this imbalance in the literature. The mode of *régulation* is a 'slippery concept' (Tickell and Peck 1995) being often poorly defined if at all which becomes problematic for empirical research (Chester 2007: 68-70). Collinge (1999) suggests that there has been a general

does not, however, outweigh the value which its core concepts provide to a theory of capitalist growth, reproduction and crisis and in particular, the analytical framework provided by the mode of *régulation* to explain the dynamics of capitalist development.

In summary, capitalism requires the ongoing reproduction of its fundamental unequal social relations – the commodity (monetary) relation and the wage relation – otherwise crises occur. *Régulationist* analysis has revealed a periodisation of capitalism as new forms of accumulation have evolved creating different combinations of production and consumption norms. Each stage of capitalism has been found to have distinctive regular social and economic patterns which have materialised as a distinct conjunction of the institutional forms comprising the mode of *régulation*. It is this evolving mode – this evolving set of institutional forms both individually and in conjunction – which has ensured the conditions for ongoing capitalist regimes of accumulation over long periods. The mode is not fixed or immutable because its constituent elements constantly change to ensure its ongoing capacity to reproduce and maintain capitalism’s social relations, to “secure the compatibility of social conflicts with the requirements of the accumulation process” (Baurdiel and Wissen 2002: 108-09).

3.2 The economic-environment relation

We noted earlier that environmental degradation has escalated with the evolution of capitalism. We also noted the change in energy regimes over time and the differing attitude to, and treatment of, environmental issues. Can the mode of *régulation* provide insights into the economic-environment relation, the current environmental challenge and the prospects for sustainable development? Why has sustainable development and the natural environment more generally not infiltrated the range of topics which *régulationists* have addressed to date? We will first deal with this latter conundrum, the key to which lies in the very conceptual framework, genesis and evolution of *régulation* theory. It is superficial and simplistic to claim, as does Zuideau (2007), that the lack of attention is because few *régulationists* have been environmentalists.¹⁷

failure to distinguish the different processes of *régulation* and their respective roles as the mode ‘modifies’ in response to a crisis. Another explanation is posited by Harvey (1989: 179) who suggests that the *régulationists* have not provided “any detailed understanding of the mechanisms and logic of transitions” to a new mode of *régulation*.

¹⁷ Zuideau bases his claim on a very literal reading of Lipietz (2002) which, I contend, has suffered on three counts - translation to English, truncation to five pages like the majority of contributions included in this book, and a style of maze-like writing which borders on the allegorical.

First, as we know, *régulationists* explain the processes and dimensions of capitalism, its growth, reproduction and reasons for crisis by analysing the pattern of economic and social regularities which materialise in the conjunction of institutional forms comprising the mode of *régulation*. The inherent conflict arising from the social relations of the mode of production is contained – although not indefinitely - by these institutional forms which, as we have already seen, may work in a number of ways. Thus *régulationist* analysis is critically focused on the evolving nature of these institutional forms which support and secure regimes of accumulation.

Each of the institutional forms may include compromises between socio-economic groups “when none of the forces present manages to dominant the opposing forces sufficiently to enable it to impose its own interests entirely” (Boyer and Sallaird 2002a: 340). One example is the creation of rules, rights and obligations for creditors. Other examples are the adoption of limits for water usage with breach penalties, local development planning rules and charges for waste collection. These compromises impose discipline in relation to an institution through which behaviour is adapted but which subsequently grow into an object of increasing tension. More importantly, the institutionalised compromises of capitalism only exist between human beings in relation to that which “unify or set them in opposition to one another” (Lipietz 2002: 224). Thus *régulationists* reject the notion of institutionalised compromises with nature and consequently, have focused on explaining the institutional forms to understand the ‘constructed context’ of capitalism.

A second reason for a ‘sustainability and environmental’ gap in the body of *régulationist* work is found in the genesis and evolution of the theory. With the advent of the 1970s economic crisis “there was a need to understand why things no longer worked, a need which first required an understanding of what had previously worked, and why” (Lipietz 1988b: 14).

Destanne de Bernis, with University of Grenoble colleagues, derived a “schema for the analysis of crises” (1988: 45) from which emerged a periodisation of capitalist development.¹⁸ Another major impetus to the theory’s development came with Aglietta’s 1976 publication, *Régulation et crises du capitalisme*, which developed consumption and production norms to explain why capitalist economies sometimes function well and why, on other occasions, they

¹⁸ The early use of the term *régulation* is credited by many to Destanne de Bernis (Boyer 1990; Dunford 1990; Robles Jr 1994).

experience crisis.¹⁹ Early studies, adopting and developing Aglietta's concepts, focused on forms of crisis whereas subsequent research looked at specific aspects or characteristics of crisis such as inflation, wage relations, state expenditure, the nature of the state, international trade and finance, the debt crisis, developing countries and the rise of a new international division of labour. *Régulationists* sought the reasons for the crisis of Fordism and framed solutions to overcome those causes which were not found to encompass some rupture in the economic-environment relation (Lipietz 2002). Hence it is understandable that the environment did not feature given the 'primary object' of *régulationist* inquiry.

Since the 1980s, the theory's core concepts have been refined and its application 'empirically extended' to new research areas, to national economies other than France and the US, to analyses at the micro and meso level, and to different spatial scales (Jessop 1997a). This development and extension has led to four observations of particular relevance to this discussion. First, the 'most developed, highest energy consumer countries with the highest carbon emissions' regard environmental protection as an obstacle to growth and development. Second, embryonic forms of ecological *régulation* are evident but instability in the approach to ecological issues will prevail until these forms are more developed and entrenched. Third, the economic-environment relation may act as constraint to growth and development after a crisis. Fourth, development models which promote individual autonomy and social interaction are more environmentally favourable although some *régulationists* advocate pollution-free models over those that minimise or ameliorate its effects (Lipietz 1997; 2002).

These observations, I suggest, signal a number of important aspects. The environmental consequences of an accumulation regime are becoming more evident from *régulationist* analysis, despite the environment not occupying the analytical centre stage. The environment-economic relation is becoming far more explicit to the dynamics of post-Fordist capitalism evidenced by changes within the mode of *régulation*. Given its role vis-à-vis the process of accumulation, changes within the mode indicate some sort of threat or impediment to accumulation to which responses within the mode are seeking to alleviate or eliminate.

Sustainability and the environment may not have been the primary object of early *régulationist* analysis for the reasons outlined. Yet these reasons do not preclude such an analysis. Two particular contributions have proposed ways to break this impasse.

¹⁹ These norms, according to Aglietta, were not fixed and immutable but continually evolving, increasing in complexity over time, showing distinctive features during different periods of capitalism and leading to a crisis when a divergence between them occurred (Barbrook 2001; Boyer 1990; Davis 2001; Jessop 2001b).

Becker and Raza (1999) posit that the *régulationist* conceptual framework requires the addition of a sixth institutional form, the 'ecological constraint', to explain capitalism's economic-environment relation. Nature's reification (commodification), transformation and destruction by human action – driven by the accumulation imperative - has led to such a complexity of ecological *régulation* that, they contend, demands it 'not be subsumed' within any of the mode's five institutional forms. Becker and Raza do not, however, reveal this 'complexity'. Nor do they demonstrate the inadequacy of the mode's institutional forms, or their conjunction, to explain the dynamics of nature's relation to capitalism thus warranting an expansion of the conceptual framework. They do concede that "a systematic analysis of the interaction between the ecological constraint and the other structural forms ... has yet to be developed" (*ibid*: 11).

Endeavouring to provide a basis for "a real regulationist [sic] theory on the environment", Zuindeau (2007: 282) suggests that the economic-environment relation may take three forms - a general form; a general capitalist form; and, a form specific to each phase of capitalism or regime of accumulation. He further proposes three expressions of the 'particular form' of the economic-environment relation in terms of impact on the environment, methods to manage environmental problems and impact of the environment on economic activities. A further typology is proposed for environmental management methods (method of treatment, responsibility, nature of instruments used). It is this latter typology from which Zuindeau seeks to demonstrate, more by anecdote than analysis (he makes 'no claim to an exhaustive empirical investigation'), that different regimes of accumulation display different economic-environment relations which "will be influenced by the content and development of institutional forms" (*ibid*: 287) i.e. the mode of *régulation*. It is this latter point which is probably the most critical of Zuindeau's contribution although he appears oblivious being far more intent on demonstrating 'institutional complementarity' with the economic-environment relation displayed by different accumulation regimes.

His effort to illustrate complementarity is marred on a number of counts.²⁰ First, complementarity is considered solely in terms of the interaction between an individual institutional form and the economic-environment relation. The impact of the conjunction of

²⁰ It should be acknowledged that Zuindeau's contribution makes no claim to be exhaustive. Its discussion, however, is heavily skewed towards his environment methods typology with little reference to 'impact on or from the environment'. His contribution is also marked by a tendency to conflate the two core concepts of *régulation* theory not recognising their different levels of abstraction.

institutional forms comprising the mode of *régulation* is not considered yet we know that it is this very conjunction which legitimates – and reinforces - the ability of the mode to guide, secure and sustain the process of accumulation.

Second, mention is made of complementarity between the economic-environment relation and the three institutional forms of competition, the form of the state and the international position. The wage-labour nexus and the monetary constraint are not mentioned. Does this mean that these institutional forms have no association or interaction with the economic-environment relation? What does this mean given the dominance of the wage-labour nexus during Fordism and the ascendancy of the monetary regime and competition during the post-Fordist regime? Apart from confirming that Zuideau does not consider the conjunction of institutional forms within the mode, this leads us to a third point. *Régulationist* analyses have shown a hierarchy or dominance of particular institutional forms to characterise different modes of *régulation* (Boyer and Saillard 2002b). Zuideau is silent on whether some institutional forms have stronger forms of complementarity than others to the economic-environment relation.

Finally, and most significantly, is the meaning and use of ‘complementarity’. Zuideau clearly uses this term to mean the ‘influence’ exerted on the economic-environment relation “by the content and development of institutional forms” (*op cit*). Complementarity refers to a state of being complementary, an interrelation of reciprocity where one thing depends or supplements the other. To complement often refers to forming a complete or balanced whole, or making up what is lacking in another. Common synonyms include balance, set off, harmonise, match, go together or accompaniment. To complement does not suggest negative notions of detracting, antagonism, impediment, constraint, dilution or dissipation. Zuideau’s choice of the term is deliberate. It is not something lost in translation or clumsy expression given his citation of the work of others including “the concept of complementary institutions is based on multilateral reinforcement mechanisms between institutional arrangements: each one, by its *existence*, *permits or facilitates the existence of the others*” (Amable 2000: 656 Cited by Zuideau 1999: 287, my emphasis). This statement is a direct reference to complementarity between the mode’s institutional forms with which we have no issue (given the established importance of the conjunction of the institutional forms comprising the mode). However, Zuideau’s extension is to suggest “there exists an institutional complementarity between this [sic] particular form of the relation to the environment and the five institutional forms recognised by *régulation* theory” (*ibid*). Two particular dilemmas are posed by this extension.

First, direct references to institutional complementarity between the mode of *régulation* and the economic-environment relation ascribe to this relation the status of an institutional form equivalent to those inherent to the mode. Is it? Is the economic-environment relation a codification, as we saw earlier, of one or more fundamental social relations of capitalism to reduce, contain, mediate, and ‘regulate’ the inherent conflicts of those social relations through laws, rules, regulations, compromises, negotiated outcomes, a common value system or representations? The question of the economic-environment relation being a core social relation of capitalism has generated considerable debate.²¹ The economic-environment relation as an institution is not questioned. It is a well-established feature of economic activity which is strongly exemplified by the environment’s ‘tap and sink’ role given capitalism’s high reliance on extracting natural resources to satisfy a seemingly insatiable energy appetite and the ‘dumping’ of production externalities from smaller scale disamenities (such as excessive noise, traffic congestion and pollution of local waterways) to environmental destruction of much larger proportions (such as global warming, soil erosion, deforestation, desertification, species extinction).

But is the economic-environment relation a codification of a social relation *particular* to capitalism? That is the more contentious issue despite the consensus about this relation discussed earlier. The evolution of capitalism has placed increasing pressures on the environment, neoliberal capitalism has progressively applied forms of commodification as a solution to environmental problems, and the concept of sustainability has been re-configured to validate the holy grail of economic growth. Pre-capitalist forms of the economic-environment relation have also been observed which Zuideau notes. These conclusions clearly signal that:

- the economic-environment relation of capitalism is subject to some form of ongoing metamorphosis as occurs with each of the mode’s institutional forms; and
- there is increasing evidence over time of ecological *régulation*, within the overall mode *régulation*, directed at mediating, controlling, containing and ‘regulating’ environmental issues and primarily initiated by the state.

The historical form and precise articulation of the fundamental social relations of capitalism, we noted earlier, will continually alter as certain core aspects – invariant aspects – are

²¹ For example, see: Bauriedl and Wissen 2002; Becker and Raza 1999; Burkett 2006; Foster 2002; Lipietz 1996; O’Connor 1994a; O’Connor 1998; Lipietz 2000; and the six responses to Lipietz in the June 2000 issue of *Capitalism, Nature, Socialism* along with his rejoinder.

sustained and their inherent contradictions contained for a time. This invariant reproduction, contradiction containment and historical representation requires a set of regularities to ensure the process of accumulation, and the materialisation of that set of regularities we know is the mode of *régulation*. The economic-environmental relation has historical representation. It also has contradiction containment evidenced by the heightened prevalence of ecological *régulation*. But do we have invariant reproduction of this particular relation?

The second dilemma concerns the use of the term 'complementarity' which, by its very meaning, asserts that the existence of the economic-environment relation is not fully realised without reference to the mode and the converse, the existence of the mode of *régulation* is not complete without the economic-environment relation. Both aspects of this point are very contestable. It is my contention that the mode of *régulation* does *not* give existence per se to the economic-environment relation. Rather, it gives *definition to* - not complements - the nature, scope and form of this relation and, as such, explains some of the mode's complexity. How?

We know that the mode of *régulation* guides, steers, supports and secures the regime of accumulation by ensuring reproduction of the conflictual unequal social relations of capitalism and hence, is constantly seeking to avoid a crisis. It does this through the conjunction of five institutional forms, the constituent elements of which we have seen, particularly in the post-Fordist era, include ecological *régulation* – a range of actions and policies primarily initiated by the state to deal with the environmental degradation caused by the accumulation process. These actions and policies are clear indicators of the nature, scope and form of the economic-environment relation. Why?

These actions and policies are directed at removal or alleviation of impediments to ongoing accumulation exemplified by various forms of environmental degradation. They are evidence of the *type and form* of interaction between the economic system and environment: for example, the trading schemes to purportedly reduce greenhouse gas emissions which have reached epidemic proportions due to capitalism's thirst for energy from non-renewable fossil fuels; the environmental impact assessments commonly conducted for new infrastructure projects and used to negotiate compromises for projects to proceed; the fishing quotas imposed to allegedly ensure species survival but also maintain economic activity; the legislation imposing penalties for large scale oil spills (but not preventing or prohibiting); or local land use planning and development regulations which legitimate certain levels of environmental damage from the erection of buildings and vehicle access to national parks and

ocean beaches. Albeit a handful but all these examples characterise, delineate, describe and thus define aspects of the contemporary capitalist economic-environment relation. Consequently, the term 'complementarity' does not adequately depict the form of interaction between the economic-environment relation and the mode of *régulation*.

Despite the weakness in the arguments of Zuindeau, along with those of Becker and Raza, both contributions provide some insightful comments about the nature of the economic-environment relation, namely: the accumulation process not only depends on the exploitation of labour but also nature as 'a tap and sink'; certain accumulation strategies require specific forms of access to specific forms of nature which will require specific forms of ecological *régulation*; the relation between ecological *régulation* and the mode's five institutional forms with vary depending on the regime of accumulation; and capitalism's relationship with nature is governed by the imperative of accumulation.

These conclusions, and the foregoing discussion about the economic-environment relation, foreshadow an analytical method for empirical investigation requiring the identification of four elements:

- (1) the social and historical origins of the economic-environment relation, its collective actors and spatial implications;
- (2) the constituent elements that define the economic-environment relation found within each institutional form of the overall mode of *régulation*, and the relationship between ecological *régulation* and the macro mode;
- (3) the environment's place in the accumulation regime and macroeconomic relationships; and
- (4) the drivers or points which cause transformations of the economic-environment relation and the overall economic system.

This schema is analogous to that adopted for *régulationist* sector-based studies (Chester 2007: 64-70). There is, however, a critical difference. The environment is not subsumed, like a sector, within the economic system and thus, ecological *régulation* does not mirror or replicate the macro mode as does sector *régulation*. Ecological *régulation* nevertheless can only be understood in terms of the overall prevailing *régulation*.

The analytical method posited does not presuppose the nature or form of the economic-environment relation nor if any one institutional form (e.g. the state, competition,

international position) is particularly influential. It does not focus on monetary valuation of environmental effects nor *ad hoc* market-based solutions. The proposed method does focus on the dynamics of capitalism over time to explain the impact on the environment. It will yield a new depth of understanding about the dynamics of the contemporary economic-environment relation, the sources of change and the forms in which change takes place. It is only against this context that the prospects for sustainable development can be determined, critical to which is the underlying definition.

Neoliberalism's blatant appropriation of sustainability to validate the ongoing pursuit of profit was noted earlier vis-à-vis the alternative model of a socially-just and ecologically sustainable society. Sustainable development, although an intuitively rational idea and often conceived as a broadly accepted policy goal, is a concept of polysemic qualities having multiple ambiguous and contradictory meanings reflecting disciplinary biases, different paradigms and ideological disputes (O'Connor 1998; Redclift 1988, 1992a, 1992b). There is, however, one essential aspect which unequivocally divides all meanings into one of two distinctive categories – if the changes required to achieve the desired state of sustainable development are *within* the context of existing institutions and social structures or require the *transformation* of social structures, modes of economic development, ethics and values (Angel 2000).²²

Capitalism's resilience to date - despite its contradictory tendencies to erode its own natural and social conditions of production, and overproduction of commodities relative to market - is due to the mode of *régulation*. The mode can not overcome capitalism's contradictions rather its inherent role is to contain and manage them in a way to prevent an economic crisis. Consequently, sustainable development that requires transformation, not adjustment, of existing structures and institutions challenges the mode of *régulation* and hence, challenges the essence of capitalism, the process of accumulation. The notion that the quest for sustainability requires the overthrow of capitalism is 'somewhat outmoded' (Dickens 1992: 7). Thus the prospects for sustainability are limited to those "within the reflexive progression of capitalism and the conflict and struggles which sustain and renew the dynamism of capitalist accumulation" (Drummond and Marsden 1995: 62). These 'prospects' can only be determined through an in-depth understanding of capitalism's economic-

²² This distinction should not be confused with the neoclassical notion of 'weak' sustainability (indefinite economic growth occurs if total capital stock is maintained even if natural capital declines) and the ecological economists position of 'strong' sustainability (growth is constrained by a non-declining stock of natural capital). Both notions equate sustainable development with sustainable capitalism (Burkett 2005).

environment relation which, it is contended, can be found by using the proposed 4-point *régulationist* method.

4 Conclusion

Environmental problems are not a problem of nature. They are a problem of the structural relations between the economic system and nature. The economic system's interaction with the environment materialises in the extraction of energy and matter as well as the dissemination of residuals from the productive process into the environment. As capitalism has evolved, the speed of economic growth has accelerated and so too has capitalism's dependence on nature as a 'tap and sink' causing widespread ecological degradation. Policies, more *ad hoc* than part of holistic strategies, to purportedly alleviate and retard some forms of environmental destruction have not averted ongoing destruction. If we are to explain the changing nature of the economic-environment relation, an understanding is needed of the dynamics of capitalism over time. Different phases of capitalism will have different impacts on the environment and responses to environmental problems.

Régulation theory provides a conceptual framework to explain the dimensions, dynamics and crises of capitalism. The change over time in capitalist economies is evidenced through analysis of the mode of *régulation* which guides and supports accumulation. The constituent elements of the mode include ecological *régulation* – a range of policies, actions, arrangements and norms to deal with environmental degradation but not impede accumulation and, as such, define the type and form of interaction between the capitalist economic system and the environment relation. A 4-point method is proposed for empirical investigation of the contemporary ecological *régulation* and its relationship to the overall prevailing *régulation*. It is only against this context that it will then be possible to establish the form of sustainability achievable within the boundaries of capitalism.

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