RESPONDING TO CLIMATE CRISIS: MODERNISATION, LIMITS, SOCIALISM

James Goodman

Debates about how to address the causes of climate change often focus on the need to transition to renewable technologies. In part this reflects the degree to which climate change is presented, in the first instance, as a scientific issue. It is, after all, the balance of scientific probability, as defined by the Intergovernmental Panel on Climate Change (IPCC), which has established the need to reduce Greenhouse Gas (GHG) emissions. From 1988, when it was set up, the IPCC very successfully marshaled the authority of climate experts to establish an international consensus on the reality of human-generated climate change. That authority carries over into debates about how to address climate change, creating another near-consensus that technological change, and in particular renewable energy, offers the required solution. In this respect, both the problem, climate change, and the solution, renewable technology, are abstracted from the social contexts in which they arise.

This article first explores the resulting political stagnation in debates about how to address climate change, drawing on local and international examples. Second it seeks to invigorate those debates by drawing on the social theory of environmental change. It focuses on three perspectives - eco-modernisation, eco-limits and eco-socialism, and discusses them in terms of what they prescribe for climate crisis. The article ends by outlining some themes for sustained engagement between ecology and socialism on the question climate crisis.

Political Silences

Not surprisingly, dominant policy debates on climate change resolutely avoid the question of social and ecological sufficiency, as against

technical efficiency. Economic growth is the unquestioned fact of political life, as is our cherished faith in the capacity of technology. Some examples may help establish this claim. One is the 'Greenhouse Development Rights' model, designed by the US NGO 'Eco-Equity' to address the distributional issues of climate policy. The model reconciles historic responsibility for emissions, uneven capacity to mitigate emissions and to adapt to impacts, with a global commitment to a minimum income of at least $6000 per capita (EcoEquity 2007). All this is achieved by a transfer of about one per cent of global output (estimated at US$56Trl in 2005) from rich countries to enable the reduction of GHG emissions in the rest of the world. At the 2009 Copenhagen UNFCCC some approximation of this model became the official policy of the G77, the 'majority world' group of 132 low-income countries (UNFCCC 2008). Whilst a laudable attempt at reconciling the imperative to reduce GHG emissions with the requirements of global distributional justice, the model assumes technology can deliver: that a certain quotient of wealth transfer will deliver a measurable reduction in GHG emissions. The 2008 edition of the report acknowledged as much, stating in a footnote that, for renewables, 'cost estimates are all over the place' (EcoEquity, 2008: 109).

A second example is closer to home. In March 2009 more than 500 climate activists met in Canberra at the first Climate Summit to discuss ways forward for the Australian climate movement. The Summit displayed much the same tendencies for technological optimism, as expressed in its headline demand of 100% renewable energy by 2020. Prior to the Summit local climate action groups submitted a long list of policy proposals for consideration as official movement policy. The final list of policies covered climate targets, funding mechanisms for renewable energy, a 'phase-down' for fossil fuels, 'revolutionising energy efficiency', 'repowering' transport, 'just transitions' for carbon-intensive communities, and measures to reduce emissions from land use. Nowhere in the list of eighty policy proposals approved by the Summit was there mention of economic growth or consumerism as a driver of emissions, and as something to be addressed. Throughout, the unspoken assumption was that technology can enable growth 'as usual'. The only mention of finite resources was in a clause asserting the need for 'ecologically sustainable population levels' in Australia. The clause was strongly opposed at the Summit but remained in the policy mix. This should not necessarily come as any surprise as population remains an

easy scapegoat. Ecological restrictions on population growth constrain peoples rights to reproduce and to migrate, letting polluters off the hook. In the context of Australia's record-breaking per-capita emissions, demands to restrict migration or promote birth control, at home or overseas, misrecognise the problem but persist because they displace responsibility.

The silence on sufficiency underpins NGO models: in early 2010, with the launch of 'Transition Decade', an initiative of a wide range of climate action groups in Australia argued for 'structural transition' that encompasses 'concentrated investment and development in renewable energy systems, the elimination of harmful waste, the efficient use of resources and ecological conservation and restoration' (Transition Decade 2010). Later in 2010, the 'sustainable energy plan' for 'Zero Carbon Australia' took the projected forty per cent rise in electricity demand 2008-2020 as a given, arguing this could be more-than accommodated by a fifty per cent increase efficiency measures that would come with a shift to 100% renewables (Zero Carbon Australia 2010). Post-2010 growth was to be decoupled from energy, through 'ever-improving efficiency measures' to maintain an indefinite cap on total electricity consumption (Zero Carbon Australia, 2010: 15).

The related 'green jobs' debate brings home the full implications of embracing technology as the answer to climate change, and serves as a cautionary tale of falling into its ideological lockstep. In 2009 activists in NSW decided to hold a Climate Camp at the Helensburgh coal mine, which was slated for expansion. Debate about the choice of site raged over whether it was a mistake to target a mine that produces coking coal to feed steel plants, mostly for export. Initially, the organizers saw this as an opportunity to extend NSW coal campaigning into the Southern coalfields, and also to show how coal burning for industry was as much a part of the problem as burning coal for power. At local meetings in the run-up to the Camp, it was argued that these mining jobs should be seen as 'green jobs': where else would Australia get its wind turbines if not from a steel plant; and what delivers the power for making steel? Some key players quietly declined to support the Climate Camp, and Camp publicity shied-away from the coking coal issue, instead focusing on the symbolism of Helensburgh as Australia's oldest operating coal mine (Climate Camp 2009).

In the event the Camp succeeded in extending the coal campaign, and in highlighting and questioning the massive expansion in mining proposed for the region, but in the process it also posed the question of what is a 'green job'? Not surprisingly, advocates of mining expansion in the Illawarra have stepped-up their rhetoric on the issue. In March 2009 the 'outline brief' for Green Jobs Illawarra, 'Power to the People Building Sustainable Jobs in the Illawarra', made no mention of the global warming impacts of steel manufacturing or coal mining (Donaldson et al 2009). In August 2009 the group hosted the architects of Australia's NGO red-green alliance, the ACF's Don Henry and the ACTU's Sharan Burrows. The two had published 'Green Gold Rush', which advocated expanded industries, including 'mineral wealth', on the back of environmental technologies. At the Wollongong meeting Burrows turned this into an argument for mining, asserting that 'Coal and steel… have a place in green industry' (ACTU and ACF 2008; Cox 2009).

By the end of 2009 the position had been further finessed into an argument not just for maintaining coal mining, but for mining expansion. The Green Jobs Illawarra Report to the State Government, released in November that year, argued that coking coal was the key element of 'green industry infrastructure'. A diagram in the Report titled 'From Coking Mines to Renewable Energy Turbines: A Production Process in the Green Economy', gave 'South Coast Mines: Coking Coal Extraction' a pivotal position, as the first stage in a flow chart leading to renewable energy. The Report concluded succinctly with this argument for the expansion of coal mining in the region:

> 'All of the renewable energy technologies that will power the future rely on steel. Steel manufacturing relies on coking (metallurgical) coal. Australia is the world's largest producer of coking coal with 53 per cent of the export market… The Illawarra's Southern coalfield is the only source of premium quality hard coking coal in NSW. The choice for policy makers is to exploit this advantage, service the domestic market and open up export opportunities, or, instead, rely on imports' (Green Jobs Illawarra, 2009: 43).

The NSW State Government welcomed the Report, demonstrating how quickly the demands for renewable energy can translate into demands for the expansion of industry, including coal mining.

These silences on growth matter. Failure to question the growth economy means we fail to question the primary drivers of climate change. It has to be recognized that in a capitalist growth economy technological efficiency will more likely fuel consumption and profit, not emissions reduction. The aim of this article is to help break these silences and highlight the limits of technology as a panacea for climate change. This is not a new problem. In 2004, for instance, the Clean Energy Futures Group noted: 'It has been almost impossible to get onto the public agenda the possibility that renewable sources can't save us and that solutions to global problems cannot be achieved unless we abandon some of the basic commitments of our society, notably to high living standards and limitless economic growth' (Saddler, Diesendorf and Denniss, 2004: 1). If nothing else, this suggests an urgent need to return to first principles, and to revisit the social roles of technology, in the nature-society nexus.

Nature-Society And Climate Change

Debates about climate crisis reflect assumptions about the relationship between nature and society. As identified by David Harvey, approaches to nature-society relations fall into three broad categories: those that see society dominating nature; those that see natural limits as dominating society; and those that seek to free nature-society relations both from natural limits and from social domination (Harvey, 1996: 149). As outlined in Table 1, these constitute three distinct approaches to addressing the climate crisis. These three are not associated with particular movements or specific intellectual currents, nor are they mutually exclusive. Rather, they are analytical categories, constructed here simply to clarify the debate; and there is considerable overlap and debate between them.

The first approach centres on ecological modernisation, and assumes the possibility of continuing to dominate nature and produce limitless growth, what Hornborg dubs 'conucopia' (Hornborg 2001). Here, as with welfarism, capitalist modernity develops the technologies to save itself from its own side-effects. Under climate change, as noted, this model posits a total decoupling of growth from emissions, through limitless efficiency gains. The second approach centres on ecological limits and as such, reverses the nature-society nexus, putting nature in control. The

limits serve to contain capitalism, by imposing models of de-growth, or maintaining a steady state, centred on closed-loop production. The third approach, ecological socialism, along with versions of socialist ecofeminism, offers the possibility, or dream, of freedom from domination, 'whether of society or nature', re-embedding economy in both society and ecology (Harvey 1996: 149). The focus of this approach is on de-commodification and the promotion of a regenerative model for social development, centred for instance on modes of commons governance.

Table 1: Addressing Climate Change: Three Models

Model	Problem	Solution	Vehicles	Policy
Ecological modernisation	Inefficiencies, north and south	Northern-led decoupling	Technology markets growth	Renewables eco-pricing Green state
Ecological limits	Modernity vs eco-limits, mainly north	Scale down in north, contain capitalism	Southern models for de-growth	Closing loops, non-extractive steady state
Ecological socialism/socialist ecofeminism	Capitalist exchange value, instrumental labour	Ecological use-value, freely associated labour	Regenerative growth to enhance ecology	Commons governance for eco-social needs

The three approaches produce different models of the relationship between technology and climate, and underpin much of the debate on climate policy. In what follows, each is addressed in turn, leading to conclusions aiming to identify social forces and possibilities for engagement beyond the current malaise.

(a) Carbon intensity and eco-modernisation

Ecological modernisers argue growth can be decoupled from ecological degradation and can serve ecology, saving itself from itself through technology and other forms of social innovation. Accordingly, for ecological modernisers, the world's 'ecological front-runners' are the high-income high-growth industrialized countries (Mol 2000b). In these contexts, re-geared technology, re-grounded markets and eco-sensitive political institutions are assumed to create a cross-societal shift to

renewables, eco-pricing, and to 'green' states, movements and cultures (Blowers 1997).

The ecological modernisation approach dominates the international climate debate, to the extent of monopolising governmental positions, and as we have seen, it has a powerful hold over the political imagination of the climate movement. Coined by Joseph Huber and Arthur Mol, eco-modernisation usually assumes that growth patterns can be maintained provided they are regeared to ecological frameworks (Mol 2000b). In some versions, the goal is a form of 'natural capitalism', a new 'industrial revolution', where ecological values are internalised into the inner workings of capital accumulation, such that one becomes indistinguishable from the other (Hawken, Lovins and Lovins, 1999). This model of 'weak' ecological modernisation is nicely evoked in Suzuki's call for 'making money like a bee: doing business without doing harm' (Suzuki and Dressel 2002).

Dominant models of neoliberal climate policy closely approximate to this position, with markets and profit harnessed to technological transition. The Stern Review on the economics of climate change is perhaps the clearest recent manifestation of the model at work (Stern 2007). Defining climate change as an externality of production, the review assumed that the most effective approach is simply to internalize it. By giving greenhouse gas emissions a monetary value, the market creates incentives for the development and take-up of renewable technology, decoupling growth from emissions. This notion that economic forces can be re-channeled to address climate change is nicely illustrated in the now dominant approach to the climate-trade nexus, where trade policy geared to stimulating economic growth is justified in terms of its capacity to stimulate trade in 'environmental goods and services' (Goodman and Wolfenden 2008). As the powerhouse of economic growth, trade becomes the guarantor of ecological modernisation, especially where it promotes growth in relatively efficient Northern contexts.

Critics of these approaches often embrace a variety of 'stronger' approaches to ecological modernisation. The move from weakness to strength may be constructed along a continuum from less to more interventionist approaches. Emissions trading may be rejected, and a more interventionist market approach may be favoured, such as a carbon tax. Alternatively, the reliance on market incentives may be rejected in favour of more direct public investment and regulation. Relying on

subsidized private players to deliver may be seen as unreliable, hence more thorough-going forms of nationalization and expropriation may be favoured, approximating to a war economy. Finally, there may be proposals for a wholesale shift away from private property, to state or community-planned transitions to a post-capitalist ecological modernity. What all these approaches share is a faith in technology, and in the capacity of economic growth to deliver it.

Additionally, the continuum may move from adaptive to more transformative technologies. Various geo-engineering proposals would be positioned at the weaker end of the eco-modernisation scale, as attempts to enable continued emissions; likewise for Carbon Capture and Storage (CCS) as an end-of-pipe technology designed to enable extraction-as-usual; and for nuclear power, as another form of higher risk extractive technology. Other efforts at offsetting fossil fuel emissions through the expansion of carbon sinks may also be positioned in this way. Stronger forms of ecological modernisation may then entail renewable technologies that address the origin of emissions, rather than treating the symptoms. Hence, insofar as the 2009 Australian Climate Summit rejected CCS and nuclear technologies, and was critical of offsets, while embracing direct public intervention for renewables, it was positioned closer to this 'stronger' end of eco-modernisation. As noted, though, such approaches remain grounded in the assumption that technological change and other innovations can raise efficiency, and assume limitless prosperity and growth.

Of particular interest at the 'stronger' end of the scale are the arguments for 'reflexive modernisation' as advocated by Ulrich Beck (see Dryzek, 1997: 148). Beck contends high-income societies have passed into a 'second modernity' forced to address the 'side-effects', especially the ecological side-effects, of 'first modernity'. Beck is sharply critical of the 'metaphysical' belief in the capacity of modernity to solve its own problems, in the 'optimism of control' very much in evidence with weak ecological modernisation, that, as reflected in geo-engineering, CCS and nuclear energy, simply displaces current risks into exponentially higher-risk interventions. Yet the required 'second modernity' also subsumes and transforms ecologies: human society continues to dominate nature in risk society through reflexivity, just as much as it does under industrial society. Despite clear differences, reflexive modernisation retains ecological modernisation's belief in modernity's adaptive capacity.

Similar themes emerge from socialist forms of ecological modernisation, which argue that productive forces liberated from capitalist relations of production can be deployed for socio-ecological values rather than for private gain. This assumption that productive forces and associated technologies are neutral is not uncommon amongst ecological socialists (see Smith 1984: 31). A version, for instance, surfaces in Callinicos' 2003 *Anti-Capitalist Manifesto,* where he looks to large-scale public investment in renewables and transport to address climate change, within a globally-planned equitable mitigation strategy (Callinicos, 2003: 137). And in a recent ecological socialist account devoted to addressing climate change, Neale argues simply that capitalism possesses the technological capacity and the resources to mitigate greenhouse gas emissions, but lacks the motivation (Neale 2008).

Across these approaches, as Mol has argued, the shared assumption is that what is needed to address climate crisis is an alternative modernity (Mol 2000a). Whether the alternative simply corrects a 'structural design fault', as Mol puts it, or engineers a wholesale reconstruction as promoted by Beck, or indeed supersedes the profit motive as favoured by Neale, the ultimate prescription for climate crisis is essentially the same. Ecological modernisation re-masters nature by re-managing it, whether through technocratic control, ecological reflexivity or socialist intervention.

(b) Decarbonisation and ecological limits

What may be termed the ecological limits approach offers a dramatically contrasting account, effectively a mirror-image of eco-modernisation. From this approach the growth society is seen as producing material products, entities with a specific ecological impact. Nature is understood to have its own eco-systemic laws, and within the bounds of these laws, for instance in relation to regenerative capacity, global nature is configured as a fixed stock of material. The production of goods requires a specific quotient of material and energy, directly sourced from the biosphere. Once nature's regenerative capacity is factored-in, production proceeds at direct cost to ecologies: one wins while the other loses, and the society-nature relationship is irreducibly zero sum (see Hornborg 2001).

Rather than asking how economic expansion can transform nature, the approach asserts ecological limits, asking how society can live within them. Likewise, rather than devising alternative modernities to more efficiently reshape ecologies, ecological limits require us to ask how ecologies should shape societies. The assumption of limitless growth is rejected, as is the assumption of progress through productive expansion. In this respect the ecological limits perspective forms part of a much larger post-developmentalist critique of dominant political ideology.

The concept of ecological limits was popularised in the late 1960s principally in terms of resource exhaustion, an issue directly addressed in 1972 by the Club of Rome Report 'Limits to Growth', which proposed responding to ecological crisis with precaution and conservation. The concept was then later deployed through Schumacher's notion of 'natural capital', a metaphor for earth's stock of natural wealth that is consumed at humanity's peril (Schumacher 1973). Lovelock's Gaia hypothesis of 1972 refigured the limits model to accommodate regenerative capacity, viewing the planet as a living thing, which humanity can either render sick or healthy. As a living entity, Lovelock argued, the earth has certain needs: as long as humans place their needs above planetary needs the earth will suffer (Lovelock 1972). More recently Lovelock identified climate change as the clearest manifestation of this nexus: our 'way of life encroaches upon the domain of the living earth…. now it is changing, according to its own internal rules, to a state where we are no longer welcome' (Lovelock, 2006: 7).

The recognition of ecological limits obliges us, at the very least, to reduce growth: given that the production of whatever kind is understood to have ecological impacts, the imperative is to scale-down consumption. The approach is neatly encapsulated in the ecological footprint approach, where the ecological impact of consumption is translated into a spatial metaphor, to deliver the required regenerative capacity. In 1998 for instance, the World Wildlife Fund used its 'Living Planet Index' to suggest that the world first exceeded its regenerative capacity in 1975, and that by 1997 'consumption pressure' was thirty per cent greater than the available space (WWF 1998). The challenge to live within limits is defined as the world's key development challenge, and that challenge is located in the over-consuming countries of the rich North.

There is, not surprisingly, a great deal of interaction between ecological modernization and ecological limits. Ecological modernizers argue

ecological limits can be superseded, and some advocates of ecological limits ultimately revert to ecological modernisation. Lovelock, for instance embraces nuclear fission as a potential circuit-breaker under climate change. Some combine technology and consumption with population. The Erhlichs, for instance, presented human impacts as a function of technology, population and affluence, reducing sustainability to a three-part formula. The model re-engaged Malthus, with population abstracted from society as an independent variable. In 1991, though, in the context of global warming, they rejected blind faith in technology, arguing for an end to population growth and a shift from affluence to quality of life, to reduce 'the scale of the whole human enterprise', thus refining the model into a two-part formula (Erhlich and Erhlich, 1991: 12). In his magisterial account of societies facing ecological limits, Diamond was more optimistic. He similarly argued that ecological impact is simply 'a product of two factors: population, multiplied times impact per person' (Diamond, 2005: 524). Collapse is precipitated by over-population and over-consumption of resources, caused by short-termism and non-ecocentric value systems. Diamond, though, argued technocracy within limits could win out, provided contemporary societies created effective ecological forward-planning.

Others reject both technocratic and population-centred approaches, and instead focus on post-consumerism. In this version the growth economy is identified as the principal culprit, and superseding it the key challenge. For Herman Daly the goal has to be a steady-state society, that he argues is possible under capitalism (Daly 1977; 1996). Schumacher similarly posited a new localized capitalism, grounded in a wholesale social reorganization, a literal scaling-down (Schumaker 1973). More recently, but in a similar vein, Wolfgang Sachs frames ecological limits in terms of a rejection of efficiency in favour of sufficiency, using Herman Daly's image of an over-loaded ship: 'even if the cargo on a boat is distributed efficiently, the boat will inevitably sink under too much weight' (Sachs 1993:16). Logically, Sachs argues, sufficiency must set the boundaries for efficiency, otherwise we exceed ecological limits. Pointing out that the ecological benefits of increased efficiency are invariably cancelled-out by increased growth, Sachs stresses the necessity for growth restraints, adding 'what really matters is the overall physical scale of the economy with respect to nature' (Sachs 1993:16).

Contemporary climate change policy directly mirrors Sachs' scenario. The focus on reducing the 'carbon intensity' of growth, through

efficiency measures, assumes carbon intensity can fall at a faster rate
than growth. This is a high-risk venture. Using IPCC and World Bank
figures from 2008, Li finds that 'under no plausible circumstances could
the objective of climate stabilization be compatible with the endless
expansion of the global capitalist economy' (Li, 2008: 3). The reasoning
is simple. IPCC reports reveal that to keep the global temperature rise
below two Degrees Centigrade, emissions must stabilize to 445ppm
between 2010 and 2050. Under the IPCC's most optimistic scenario of a
yearly reduction in emissions intensity of 2 per cent, Li shows that the
world economy would have to contract by 0.7 per cent per annum to
bring total emissions down to the required level. Between 2010 and 2050
this amounts to a total contraction of the world economy of at least 24
percent (0.7 per cent per annum over forty years).

Even if such realities were recognized, could they be agreed? As amply
demonstrated by the recent Copenhagen events, we do not live in a
planned world economy, but one where countries compete for leverage.
More powerful, as Li notes, is the Jevons Paradox (named after the
nineteenth century British economist), which insists that rising efficiency
simply enables faster economic growth (also see Bellamy-Foster 2002).
The Paradox has found wide currency with the publication of Jackson's
'Prosperity without Growth', based on a 2009 Report to the UK
Sustainable Development Commission, which restates the central thesis
of Herman Daly's 'steady state' model, namely that living within limits
requires a post-growth society, albeit through efficiencies under
capitalism (Jackson 2010). The crucial question for the climate, then, is
what type of society can generate wholesale emissions reductions on the
basis of low or negative rates of growth? Li argues that only a post-
capitalist society offers such a possibility. Others, as noted, point to the
possibilities of steady-state capitalist economy. Still others point to post-
developmentalist and post-patriarchal options, which draw on already-
existing conservation knowledges and practices, rather than pin hopes on
future innovation. Here we move beyond an emphasis on limits, to
approaches, discussed in the next section, that seek to transform social
relations with nature in a post-capitalist, post-patriarchal context.

In general, the limits approach subsumes society in nature. This
addresses ecological crisis, but may simply romanticize autarchy,
misrecognising necessity as conservation (Pieterse 1998). The assertion
of limits may be driven by disenchantment with scientism in high-
income contexts, generating a conservationist ethic, of holding natural

landscapes 'in trust'. More powerfully, though, it may also be linked to a Southern revolt against post-colonial developmental states, to nurture living environments against developmentalist projects. In both there may be a populist logic, amenable to reaction, but also open to possibilities for 'radical democracy' (Ziai 2007).

(c) Social transformation and eco-socialism / socialist ecofeminism

Accounts of the field of political ecology often confine themselves to discussing two dominant approaches – ecological modernisation or 'sustainability' approaches, and ecological limits, or 'radical' green approaches (Dryzek 1997). As David Harvey notes, there is a third perspective, reflected in eco-socialist and socialist eco-feminist approaches that simultaneously seek to liberate society from social domination and from domination by ecology.

For ecological socialists and socialist ecofeminists capitalism exploits both natural resources and labour power. As O'Connor argues, capitalism is founded on two contradictions, between capital and labour and between capital and nature (O'Connor 1998). This is reflected in the commodity form, which is 'both a social (people-people) and a metabolic (people-nature) relation' (Burkett and Bellamy-Foster, 2006: 152). Importantly, ecological impacts are not then conceptualized as an externality of surplus accumulation, but as its essence: hence capital cannot accumulate without creating ecological crisis (Bellamy-Foster, 2002: 88). From this perspective, climate change is seen not simply a side-effect of capitalist development, but as part of the systemic exploitation of nature at the centre of capitalist development. Under capitalism, society and nature are in direct structural conflict: the resulting 'metabolic rift' can only be healed with the passing of capitalist accumulation.

This ecological socialism recognizes the logic of capitalism's ecological limits, as well as its social limits. Social limits are, of course, socially determined, with wage rates for instance, set by the socially-necessary minimum standard required to reproduce labour power. In contrast, ecological limits are defined by the demands of capitalism in confrontation with nature, and escalate with the intensifying efforts at technological innovation. Reflecting this difference, as O'Connor notes, while class conflict under the 'first contradiction' can be sidestepped or

displaced, the ecological crisis of the 'second contradiction' cannot be so easily avoided. The result is that now, with global climate change, ecological limits pose an incommensurable challenge to the very existence of capitalism. Eco-socialists therefore recognize that ecological relations have their own autonomy, and cannot be reduced to social relations through 'simplistic rhetoric about the "humanisation of nature"' (Harvey, 1996: 194). To put it another way, the forces of production under capitalism are not innocent of productivism – they cannot simply be re-tooled for a post-capitalist sustainable future.

Clearly, though, ecological limits depend upon how ecological degradation occurs (Redclift 1994). With the latest period of globalised marketisation, ecological crisis is subsuming all other social conflicts, translating anti-capitalism into a 'struggle for survival' (Van der Pijl, 1998: 47). Where once ecological exhaustion was displaced from one locality to the next, it now has nowhere to run, and is manifest as quite literally a global crisis (Bellamy-Foster 2002). The advent of this global contradiction between capital and nature, writ large in the form of climate crisis, creates profound possibilities. In 'The Enemy of Nature', for instance Kovel declares that with climate change 'the moment for the global realization of ecosocialism has arrived'. Just as in the early Twentieth Century humanity was faced with a choice between socialism and barbarism, so today, he argues, we are confronted with the choice between ecosocialism and ecocatastrophe (Kovel, 2007: 258-62).

But what, specifically, is proposed as the transformative alternative? Marx pointed to a communist society where the metabolic rift between society and nature, created by capitalism, is healed. In a passage that has often been quoted, Marx pointed to 'the consummate oneness of nature and man – the true resurrection of nature – the naturalisation of man and the humanism of nature both brought to fulfillment' (Salleh, 1997: 166). An eco-socialist system of production for need rather than for profit would thus by definition be ecocentric. The key is in the character of 'use value' under eco-socialism. How can use values be redefined in ways that do not dominate nature? As noted, some socialist modernisers have assumed that capitalist technologies, once freed from capitalist control, can be deployed to meet social needs. But if freely-associated labour is to produce 'fruitful use value' (or usefruct), these use values must be ecologically embedded. This requirement is not satisfied by capitalist technology. In other words, real non-capitalist social needs are by necessity defined with ecologies, not against them. Thus eco-socialists

can only embrace technologies and the use values they produce if these 'foster ecosystemic integrity' (Kovel, 2007: 268-272).

In terms of practical transitions, eco-socialism points to 'the commons', particularly the local commons, as the foundation for ecocentric values and living environments (see Goldman 1998). Here, in non-commodified or de-commodified contexts, people create new ways of living within nature, freed from exchange value. Bennholdt-Thomsen and Mies, for instance, align their post-capitalist ecofeminism with a 'subsistence perspective', where peoples live autonomously of commodification, within living ecologies, outside of the 'regime of wage labour' (Bennholdt-Thomsen and Mies, 1999: 177). These invisible forms of metabolic labour prop-up the visible instrumental forms of productivist labour, performed in the main by men (see Bennholdt-Thomsen and Mies' 'Iceberg model of capitalist patriarchal economics', 1999: 30; Mies 1986). In these contexts ecologies may be defined as a commons to be nurtured, rather than as a resource to be exploited. The key to understanding the resulting transformation is in the contrast between regenerative or 'metabolic' labour and instrumental labour. Where instrumental labour exploits and exhausts ecologies until we breach ecosystemic limits, regenerative labour enhances ecologies: it 'synergises the satisfaction of human needs with enhanced metabolic flows in nature' (Salleh, 2009: 295). As such, in a post-capitalist and post-patriarchal society centred on regenerative labour, rather than on instrumental labour, there are no ecological limits. To put it another way, regenerative labour under eco-socialism defeats scarcity by redefining social need.

Indeed, where eco-modernisers find their inspiration amongst high-income 'front-runners', many ecofeminist advocates point to examples from the Global South. Here, it is argued low-consuming ecologically-sufficient communities can sustain forms of labour that nurture and nourish nature rather than dominate it (Escobar 1995; 2007). Examples have been documented and found to offer eco-sufficient modes of living, especially as experienced by women (Rocheleau et al 1996; Salleh 2009). These ecological reproducers are grounded in reduced use, embracing small-scale subsistence technologies (such as small-scale farming, see for instance Shiva 1989; 2009). The search, here, is for a time when humanity acknowledges its embeddedness in nature, to a time when, 'Man's domination over nature – the principle that has guided Northern society since the Renaissance – is replaced by the recognition that

humans are part of nature, that nature has its own subjectivity' (Mies and Shiva, 1993: 319).

The move is to a kind of healing: insofar as capitalism creates a rift between society and nature, between 'human capital' and 'natural capital' perhaps, eco-socialism and variants of ecofeminism aim to heal that rift, so that nature and society become mutually self-reproducing. In material terms, humanity lives within nature, whether or not the social system expresses that reality. Proximity to that reality is deeply uneven, stratified by developmentalism and neo-colonialism, and by gender. The resulting questions for mobilization are paramount (and are addressed elsewhere in this Special Issue, especially by Pearce and by Long, Roberts and Dehm).

In general terms, rather than assuming a choice between technology and sufficiency, eco-socialists and many ecofeminists argue that relations between them can be transformed. Such transformation can overcome both the drive to exploit labour and to exploit nature, in a double move to embrace non-commodified 'metabolic' relations. What this may mean in practice, though, is difficult to spell out. The first and most important point is that eco-socialists insist a low-growth economy under capitalism means injustice – 'more austerity – and even more upward redistribution of wealth and power' (Mueller and Passakis, 2009: 60); autarchy also relegates ecological priorities as 'industry can and does more nakedly resist and erode environmental protection regulation (Grundmann 1991: 219). As such, an eco-socialist response to climate change embraces planning and commons management: it must be a 'collectively managed, just process of de-growth' (Mueller and Passakis, 2009: 59). Herein lies the centrality of 'really existing' metabolic labour – performed for instance by unwaged household or subsistence workers – as it is from these contexts that some of the analogies and options for eco-socialist climate policy may emerge.

Conclusion: Engaging Socialism and Ecology

As argued here, the climate challenge is not simply a quantitative challenge for technocrats, of securing required emissions reductions through a quantum of investment in this or that technology. Climate change poses profound qualitative questions, for all of us to address, of charting possibilities for freedom from domination for both society and

nature. The three broad approaches discussed here – ecological modernisation, ecological limits and ecological socialism – are in constant dialogue, but answer this challenge in different ways. It is centrally important to appreciate the limits and possibilities they entail.

The logic of continuing and intensifying climate crisis is already pushing us to reconsider settled positions. We have seen how various 'weak' approaches to ecological modernisation have unraveled. Emissions trading, international offsetting and carbon sequestration, for instance, that formed the foundation of Australia's proposed Carbon Pollution Reduction Scheme, are already discredited. Debate has shifted to more direct mechanisms, such as a carbon tax and direct subsidy or regulation, moving the debate closer to modes of 'strong' ecological modernisation. Now, it is certainly time for the shibboleth of economic growth to be put on the table, and for a broader questioning of the technological optimism that characterizes so much of what passes for policy debate on climate change.

Over time, as we press up against the limits of 'strong' ecological modernisation, we may expect debates between ecological limits and ecological socialism to move to centre-stage. In anticipation of this, formulations for an eco-socialist and ecofemimist future, and how we can get there, are likely to become centrally important. In recognition that anything like a program must come from mobilisation around the concerns we are living with day-to-day, rather than from an abstract blueprint, we could do worse to ask how ecology and socialism can deepen their engagement. A preliminary conceptual frame, drawing on Harvey, may offer us five themes - alienation, hierarchy, technology, difference and space-time relations – as key contact-points or 'rubbing' points between the two conceptual blocs, to generate deepened dialogue (see Harvey, 1996: 197). The five themes, applied to the climate debate, are highly suggestive of an open-ended means of operationalising ecologism with socialism.

To address alienation there must clearly be a process of re-embedding society in ecology. Under capitalism ecologies are commodified and society is alienated from nature, as a resource to be exploited. Instead, with the assertion of eco-social commons, we may create the institutions to collectively regenerate ecologies, and reanimate our relationship within it, overcoming alienation. For climate this may mean creating non-market collective frameworks for reducing emissions, notably

through collective ownership and regulation (see Goodman and Rosewarne in this special issue). How can these institutions be constructed, and how would they operate in practice, to address the crisis?

Second, we may ask how the required social relations of transformation will be generated? With the centrality of class power under capitalism, this forces us to think about class forces. Is there a leading class within capitalist production to offer strategic leverage, a class of immaterial workers, perhaps? Or, given the unevenness of the crisis, should we favour cross-class alliances, centred on localities, national states, or macro-regions, perhaps as reflected in the Bolivarian axis? Or should our focus be on 'metabolic' workers as a potential 'meta-industrial class' offering pathways beyond the climate crisis (Salleh 2004; 2010)?

Then there is the question of how to redefine use value in the context of eco-systemic crisis. How can technology be redefined to enact metabolic relations with nature? Freely-associated labour within a socialist society by definition seeks to meet collective needs. Ecological socialism requires that under climate crisis the collective priority must be first and foremost to ensure the restoration of a stable climate. To realize this requires the mobilisation of collective intellectual and creative capacity and resources. How may we imagine the process of achieving this? And how can the process of getting there be articulated and pursued?

Fourth, any agenda to address climate crisis must be capable of both mediating particular priorities and charting a universal strategy. Given the asymmetries of climate crisis there can be no possibility of imposing a 'global climate commons' that does not accommodate vast differences in responsibility, impacts and capacity. The crisis, as a product of capitalism, rewards those who exploit nature while others suffer the consequences. Yet at the same time, the global character of the crisis, as requiring a genuinely reciprocal response at a universal level, cannot be downplayed. The climate crisis, as eco-systemic crisis, has universal significance and the prospects for a global climate movement rest on the possibility of a universalizing consciousness. Clearly, the particularities of climate injustice are the foundation-stone of a universalizing movement, for a movement founded on 'militant particularism', to use Harvey's term. But how to balance these dimensions?

Fifth, and finally, there is the related temporal issue, of how to establish frameworks that reconcile the temporal scope of climate change with its

spatial logic. There is a need to address historical, present-day, and anticipated future dimensions of unevenness: biospheres are nested in temporal frames, and our capacity to act is shaped by our place in climate time. How, for instance, can we address the disjuncture between inter-generational responsibilities? The knowledge we now have of the likely future impacts of our present-day activities creates new dimensions of culpability and responsibility. Justice for present and future generations may require urgent action now, regardless of historical legacies and responsibilities. How can these dimensions be reconciled?

There is some evidence that such engagements between socialism and ecologism are underway. The politics of regenerative models, against dominant modes of consumerism, was for instance conveyed in a statement from the eight-country 'Bolivarian Alternative for the Americas' at the Copenhagen UNFCCC, where it identified 'a structural problem of two forms of life — one way of living is the way of over-consumption and waste, the way of luxury, of egoism and individualism: capitalism. The other way is *vivir bien* – living well – food enough for all and living in harmony with others and our Mother Earth, in solidarity and complementarily' (ALBA 2009).

Questions of unevenness and the required climate justice were also foregrounded in 'Peoples' World Conference on Climate Change and Mother Earth's Rights', hosted by Bolivia's President in 2010. The conference offered a convergence point for ecologism and socialism in the backwash from Copenhagen, and as a prefigurative moment, anticipated some of the strategic questions of mobilization. Indeed, one may go so far as to liken the event, and its potential symbolic power, to the Zapatistas' 'First Intercontinental Encounter Against Neoliberalism', held in Chiapas in 1996, that initiated Peoples Global Action and began the ten-year-long cycle of mobilizations for justice globalism.

References

ACTU and ACF (2008) *Green Gold Rush: How ambitious environmental policy can make Australia a leader n the global race for Green Jobs.* Melbourne: ACTU and ACF.

ALBA (2009) Press conference: Hugo Chavez and Eco Morales, 18 December, Bolivarian Alternative for the Americas. UNFCCC: Copenhagen.

Beck, U. (1995) *Ecological politics in an age of risk.* Cambridge: Polity Press.

Bellamy-Foster, J. (2002) *Ecology against capitalism.* New York: Monthly Review Press.

Bennholdt-Thomsen, V. and Mies, M. (1999) *The subsistence perspective: beyond the globalised economy.* London: Zed.

Blowers, A. (1997) 'Environmental policy: ecological modernisation or risk society?.' *Urban Studies,* 34(5-6): 845-871.

Burkett, P. and Foster, J. (2006) 'Metabolism, energy, and entropy in Marx's critique of political economy.' *Theory and Society,* 53: 109-156.

Callinicos, A. (2003) *An anti-capitalist manifesto.* Cambridge: Polity Press.

Climate Camp (2009) 'Climate Camp at Australia's Oldest Coal Mine: Actions Speak Louder than Words', Invitation, 12 June 2009. Sydney: Climate Camp.

Cox, B. (2009) 'Illawarra can lead green jobs revolution: union', *Illawarra Mercury,* 5 August.

Daly, H. (1977) *Steady-state economics.* San Francisco: WH Freeman.

Daly, H. (1996) *Beyond Growth: the Economics of Sustainable Development.* Boston: Beacon Press.

Diamond, J. (2005) *Collapse: how societies choose to fail or survive.* Melbourne: Penguin.

Donaldson, M. et al (2009) *Power to the People: Building Sustainable Jobs in the Illawarra, A Report for the South Coast Labour Council.* Wollongong: Wollongong University.

Dryzek, J. (1997) *The politics of the earth: environmental discourses.* Oxford: Oxford University Press.

Ecoequity (2007) *The right to development in a climate constrained world: the Greenhouse development Rights Framework.* San Francisco: Ecoequity.

Ehrlich. P. and Ehrlich, A. (1991) *Healing the planet: strategies for resolving the environmental crisis.* Stanford: Surrey Beatty and Sons.

Escobar, A. (1995) *Encountering Development: The Making and Unmaking of the Third World.* New Jersey: Princeton University Press.

Escobar, A. (2007) 'Post-development' as a concept and social practice' in A. Ziai (ed.) *Exploring post-development: theory and practice, problems and perspectives.* London: Routledge.

Goldman, M. (ed.) (1998) *Privatising Nature, Political Struggles for the Global Commons.* London: Pluto.

Goodman, J. and Wolfenden, A. (2008) *Trade and Climate Change.* Manila: Asia Pacific Research Network.

Green Jobs Illawarra (2009) *Action Plan: A Report to the Honourable Nathan Rees Premier of NSW from the Green Jobs Illawarra Project Steering Committee.* Wollongong: Green Jobs Illawarra.

Grundmann, R. (1991) *Marxism and ecology.* Oxford: Clarendon.

Harvey, D. (1996) *Justice, Nature and the Politics of Difference.* Oxford: Blackwell.

Hawken, P., Lovins, A., Lovins, L. (1999) *Natural capitalism: creating the next industrial revolution.* Boston: Little, Brown and Company.

Hornborg, A. (2001) *The power of the machine: global inequalities of economy, technology and environment.* Oxford: AltaMira Press.

Jackson, T. (2010) *Prosperity without growth: economics for a finite planet.* Earthscan: London.

Kovel, J. (2007) *The enemy of nature: the end of capitalism or the end of the world.* London: Zed.

Li, M. (2008) 'Climate Change, Limits to Growth, and the Imperative for Socialism.' *Monthly Review,* 60(3): 51-67.

Lovelock, J. (2006) *The Revenge of Gaia: Why the Earth Is Fighting Back - and How We Can Still Save Humanity.* Santa Barbara: Allen Lane.

Lovelock, J. 1972) *Gaia: A New Look at Life on Earth.* Oxford: Oxford University Press.

Mies, M. (1986) *Patriarchy and Accumulation on a World Scale.* London: Zed Books.

Mies, M. and Shiva, V. (1993) 'The need for a new vision: the subsistence perspective' in M. Mies and V. Shiva (eds) *Ecofeminism.* London: Zed.

Mol, A. (2000a) 'Globalization and the environment: between apocalypse blindness and ecological modernisation' in G. Spergaren, A. Mol, F. Buttel (eds) *Environment and global modernity.* London: Sage.

Mol, A. (2000b) 'Ecological modernisation around the world: an introduction.' *Environmental Politics,* 9(1): 3-14.

Mueller and Passakis (2009) 'Green capitalism and the climate: it's economic growth stupid!' in U. Brand et al (eds) *Contours of Climate Justice, Critical Currents no. 6.* Uppsala: Dag Hammarskjold Foundation.

Neale, J. (2008) *Stop global warming: change the world.* London: Bookmarks.

Pieterse, J. (1998) 'My Paradigm or Yours? Alternative development, post-development, reflexive development.' *Development and Change,* 29(2): 343-373.

Redclift, M. (1994) 'Development and the environment: managing the contradictions?' in L. Sklair (ed) *Capitalism and Development.* London: Routledge.

Sachs, W. (1993) 'Global ecology and the shadow of "development"' in W. Sachs (ed) *Global ecology: a new arena of political conflict.* London: Zed.

Saddler, *H.*, *Diesendorf, M.* and Denniss, R. (2004) *A Clean Energy Future for Australia.* Sydney: Clean Energy Future Group.

Salleh, A. (1997) *Ecofeminism as politics: nature, Marx and the postmodern.* London: Zed.

Salleh, A. (2004) 'Global alternatives and ther meta-industrial class' in R. Albritton et al (eds) *New Socialisms: Futures beyond globalization.* New York: Routledge.

Salleh, A. (ed.) (2009) *Eco-Sufficiency and Global Justice: women write political ecology.* London: Pluto Press.

Salleh, A. (2010) 'Schumacher, E. (1973) *Small is beautiful: a study of economics as if people mattered.* London: Vintage.

Shiva, V. (1989) *Staying Alive: Women, Ecology and Development* London: Zed Books.

Shiva, V. (2009) *Soil not oil: Climate Change, Peak Oil and Food Insecurity.* London: Zed Books..

Smith, N. (1984) *Uneven Development.* Oxford: Blackwell.

Stern, N, (2007) *Stern review on the economics of climate change.* Cambridge: Cambridge University Press.

Suzuki, D. and Dressel, H. (2002) *Good news for a change: hope for a troubled planet.* Toronto: Stoddart.

Transition Decade (2010) Strategy and announcement. Melbourne: Transition Decade.

World Wildlife Fund (1998) *Living Planet Report.* Gland: WWF.

Zero Carbon Australia (2010) *Stationary Energy Plan.* Melbourne: ZCA.

Ziai, A. (2007) 'The ambivalence of post-development: between reactionary populism and radical democracy' in A. Ziai (ed.) *Exploring post-development: theory and practice, problems and perspectives.* London: Routledge.