GLOGOV.org

A Tale of Two Crises

What the Global Financial Crisis Means for the Global Environmental Crisis

Kyla Tienhaara

Global Governance Working Paper

No 37–September 2009

The Global Governance Project is a joint research programme of eleven European research institutions. It seeks to advance understanding of the new actors, institutions and mechanisms of global governance, especially in the field of sustainable development.

Co-ordinator	Vrije Universiteit Amsterdam, Department of Environmental Policy Analysis, IVM
Partners	Bremen University Freie Universität Berlin, Environmental Policy Research Centre Fridtjof Nansen Institute Oslo London School of Economics and Political Science Lund University Oldenburg University Potsdam Institute for Climate Impact Research Sciences Po Bordeaux Vrije Universiteit Brussel, Institute for European Studies Wageningen University, Environmental Policy Group
Endorsed by	International Human Dimensions Programme on Global Environmental Change (IHDP)

Abstract

Humanity is currently faced with two crises on a global scale, one financial and one environmental. While ostensibly distinct, these crises are in fact entangled with one another. Unsustainable consumption, at the heart of the environmental crisis, is driven to a large extent by unsustainable debt, which creates financial instability. If these underlying issues are tackled, and investment is directed into environmental initiatives through a 'green new deal', then the ultimate outcome of the financial crisis could be the mitigation of the environmental crisis. If, conversely, economic hardship is used as a justification for delaying action on critical environmental issues and economic *growth* remains at the centre of government policy, then the ultimate outcome of the financial crisis could be the deepening of the environmental crisis. The relationship between the two crises, therefore, provides both opportunities and threats to achieving long-term economic and ecological sustainability.

Citation

This paper can be cited as: Tienhaara, K. 2009. *A Tale of Two Crises: What the Global Financial Crisis Means for the Global Environmental Crisis*. Global Governance Working Paper No 37. Amsterdam et al.: The Global Governance Project. Available at www.glogov.org.

Contact: Kyla.Tienhaara@anu.edu.au

Managing Series Editor

Ayşem Mert, Department of Environmental Policy Analysis, Institute for Environmental Studies, Vrije Universiteit Amsterdam, and Global Governance Project. Contact: aysem.mert@ivm.vu.nl.

Foreword

This working paper was written as part of the Global Governance Project, a joint research programme of eleven European research institutions that seeks to advance understanding of the new actors, institutions and mechanisms of global governance. While we address the phenomenon of global governance in general, most of our research projects focus on global environmental change and governance for sustainable development. The Project is co-ordinated by the Department of Environmental Policy Analysis of the Institute for Environmental Studies at the Vrije Universiteit Amsterdam and includes associate faculty members and research fellows from eleven European institutions: Science Po Bordeaux, Bremen University, Freie Universität Berlin (Environmental Policy Research Centre), The Fridtjof Nansen Institute Oslo, London School of Economics and Political Science, Lund University, Oldenburg University, Potsdam Institute for Climate Impact Research, Vrije Universiteit Amsterdam, Vrije Universiteit Brussel (Institute for European Studies) and Wageningen University (Environmental Policy Group).

Analytically, we define global governance by three criteria, which also shape the research groups within the Project. First, we see global governance as characterised by the increasing participation of actors other than states, ranging from private actors such as multinational corporations and (networks of) scientists and environmentalists to public non-state actors such as intergovernmental organisations ('multiactor governance'). These new actors of global governance are the focus of our research group MANUS–Managers of Global Change.

Second, we see global governance as marked by new mechanisms of organisation such as public-private and private-private rule-making and implementation partnerships, alongside the traditional system of legal treaties negotiated by states. This is the focus of our research group MECGLO–New Mechanisms of Global Governance.

Third, we see global governance as characterised by different layers and clusters of rule-making and rule-implementation, both vertically between supranational, international, national and subnational layers of authority ('multilevel governance') and horizontally between different parallel rule-making systems. This stands at the centre of our research group MOSAIC–'Multiple Options, Solutions and Approaches: Institutional Interplay and Conflict'.

Comments on this working paper, as well as on the other activities of the Global Governance Project, are highly welcome. We believe that understanding global governance is only feasible through joint effort of colleagues from various backgrounds and from all regions of the world. We look forward to your response.

Frank Biermann

Director, Global Governance Project
Department of Environmental Policy Analysis, IVM, Vrije Universiteit Amsterdam

Philipp Pattberg

Research Co-ordinator, Global Governance Project
Department of Environmental Policy Analysis, IVM, Vrije Universiteit Amsterdam

Acknowledgement

I would like to thank John Braithwaite, Ken Coghill, Christian Downie, Neil Gunningham, Fiona Haines, Christine Nam Pobke and two anonymous reviewers for their insightful comments on earlier versions of this Working Paper. I am also indebted to all of the participants of the RegNet Colloquium, held on 16 June 2009 at the Australian National University - where I presented this paper - for their feedback. Finally, I would like to thank Aysem Mert for her excellent editorial work.

Contents

1 Introduction

What has become known as the global financial crisis began as the US subprime mortgage crisis in August 2007. The initial crisis appeared relatively contained, affecting only countries that were exposed to the subprime market. However, in the last quarter of 2008 the crisis became full-blown, epitomized most strikingly by the collapse of Lehman Brothers (a major US investment bank) and the bailout of American International Group (AIG), the largest US insurance company. On the heels of these events came similar collapses and rescues of financial institutions in other advanced economies. As the knock on effects of the credit crunch sunk in, emerging economies also began to suffer. What started as a crisis in one sector in one country eventually became "the world's first truly *global* financial crisis" (Omarova 2009: 157, emphasis added).

Most advanced economies are now suffering deep recessions. Global trade in manufactured goods has fallen sharply as a result, with repercussions for East Asian economies in particular. At the same time, plummeting commodity prices have severely affected countries in Africa, Latin America and the Middle East. The International Monetary Fund (IMF) issued an economic forecast in April that projected a 1.3 percent decline in global economic output in 2009 (IMF 2009: 9). In May, the International Labour Organization (ILO) reported that 14 million people lost their jobs in 2008 and that global unemployment was likely to increase even more dramatically in 2009 (ILO 2009: v). There is overwhelming agreement that the world is currently undergoing the most severe economic contraction since The Great Depression.

At the same time that the world is experiencing the worst financial crisis in a generation, it is faced with the worst environmental crisis of *any* generation. Over the course of 2008, research findings from a number of studies were released which indicated that climate change is occurring much more rapidly than previously anticipated. In particular, the arctic sea ice was shown to be disappearing at a far greater rate than scientists had predicted (UNEP 2009b: 22). While the public, the media and politicians have been understandably preoccupied with the disastrous implications of climate change, trends in other areas are equally alarming. In late 2008, the World Wildlife Fund (WWF) released its Living Planet Report which showed that biodiversity has declined by 30 percent over the last 35 years (WWF 2008: 2). In the last few decades of the twentieth century approximately 20 percent of the world's coral reefs and 35 percent of mangrove forests were lost (MEA 2005: 2). In a business as usual scenario, the world's fisheries are projected to decline by more than 90 per cent by 2050 (WWF 2008: 22). And if present trends continue, 1.8 billion people will be living in countries or regions with absolute water scarcity by 2025, and two thirds of the world population could be subject to water stress (UNEP 2007: 116).

These startling figures are only a few of the many that could be catalogued here, but perhaps the most effective way of conveying the gravity of the current situation is through a more cumulative assessment. According to recent calculations the world's total 'ecological footprint', human demands on natural resources and waste sinks currently exceed the Earth's capacity by at least 30 percent. It is anticipated that if current trends continue, and no ecological 'tipping points' are reached in the mean time, this

overshoot will reach 100 percent in the 2030s (meaning we would need two planet Earths to sustain our population and consumption levels) (WWF 2008: 22).

The global financial crisis and the global environmental crisis differ in many respects, most notably in the severity of their respective consequences for humanity, but they also have some striking commonalities. Risk and uncertainty seem to be pervasive in both ecological and economic systems (Haines 2009) and in both cases the crises disproportionately affect the poor even though they are largely caused by the rich (UNEP 2009a: 5). The goal of this paper is to examine some of the root causes of the two crises and explore whether there is any potential to tackle them simultaneously. In doing so, it focuses on broad issues of debt, consumption and economic growth as well as the 'green' aspects of fiscal stimulus packages released by governments in 2008 and early 2009. The paper does not aim to discuss or provide any recommendations for stricter regulation of the financial sector. It should also be noted that while some references are made to developing countries, the overall focus of the paper is on advanced economies and its arguments should be viewed in this light. It goes without saying that further economic growth means something quite different in a society that has already achieved a high level of per capita income than it does in one in which the majority of the population lives on less than $2 a day.

The remainder of the paper is divided into two main sections followed by some conclusions and recommendations. The first section examines the relationship between the causes of the two crises and explores the *opportunity* that the financial crisis presents for responding to the environmental crisis. The second section takes a more critical look at plans to devise a 'green recovery' from the financial crisis and also explores some of the potential stumbling blocks to environmental progress that may result from the onset of a global recession. This section also addresses a fundamental problem that has been consistently avoided by most proponents of a green recovery although it has been recognized as a core, albeit controversial, environmental concern for nearly forty years: the limits to growth. The paper concludes with somewhat of a compromise between the optimism and pessimism of the two main sections. It is argued that regulation and green investment can certainly help to mitigate the impacts of the global environmental crisis. Nevertheless, if the aim is not simply to lessen the severity of the crisis, but to actually resolve it, then it is necessary for a new metric of (economic) well-being to be devised; perpetual growth is neither sustainable nor desirable.

2 It Was the Best of Times

It is a well-worn saying that every crisis is also an opportunity. It appears that for many, this cliché has resonance in the current economic (and ecological) climate. For example, economist Nicholas Stern believes the financial crisis presents an opportunity for reaching agreement on a post-Kyoto regime in Copenhagen in December 2009.[1] With even greater ebullience the United Nations Environment Programme

[1] "Financial crisis an opportunity to move on climate change" *East Asia Forum*, 27 October 2008.

(UNEP) has described the financial crisis as a "unique historical opportunity" and has asserted that "[w]e must not miss this chance to fundamentally shift the trajectory of human civilization" (UNEP 2009a: 4).

The optimism about the opportunity presented by the financial crisis is derived from two main streams of thought. The first stream is focused on the underlying causes of the two crises and how they are connected. As a UNEP (2009a: 3) report notes: "Although the causes of these crises vary, at a fundamental level, they share a common feature: the gross misallocation of capital". Here the optimist assumes that if the underlying causes of one crisis (the financial one) are recognized and addressed there will automatically be knock on effects for the other crisis (the environmental one). The second stream is focused on one particular response to the financial crisis: the use of fiscal stimulus. Here the optimist sees an unprecedented opportunity to direct funds that would otherwise be unavailable towards crucial environmental initiatives. This section more fully explores these two streams of thought about the opportunity presented by the financial crisis.

Underlying Causes: Unsustainable Debt and Unsustainable Consumption

One of the major results of deregulation of the financial sector was the creation of a credit boom. In recent times easy credit has fuelled consumption as well as debt creation. As Foster and Magdoff (2009: 28) point out, household incomes have been stagnant or declining for decades, and yet consumption has continued to climb. In 2007 consumption made up 70 percent of US gross domestic product (GDP) (Green New Deal Group 2009: 11). Consumption, in turn, is a key driver for environmental degradation (Dauvergne 2005 and 2008; Jackson 2009). In other words, easy credit encourages and enables individuals not only to live beyond their own means, but also beyond the means of the global environment.

Consider, by way of illustration, the case of the housing market. As is well known, the US housing market played an important role in the eruption of the financial crisis, which has been described extensively elsewhere (Bernake 2009; Foster and Magdoff 2009; Gokhale 2009; IMF 2009). For the purposes of this paper, it is sufficient to provide only a few key details. First, policymakers in the United States during the Clinton administration weakened regulations governing mortgage loan eligibility in order to promote home ownership amongst first-time, lower income and minority buyers (Gokhale 2009: 3). Second, in the same period the US began receiving a large inflow of foreign savings. This created a surplus of available funds that drove financial institutions to more aggressively compete for borrowers. Eventually lenders moved into the risky area of subprime mortgages (Bernanke 2009). Loans were increasingly provided with "little or no money down, zero closing costs, and/or sparse documentation of borrowers' ability to pay" (Gokhale 2009: 3-4). To reduce investor exposure to risk these loans were carved up and repackaged as complex securities. Third, demand for houses, and therefore housing prices, soared. Demand was driven to a large extent by lenders and developers who convinced unsophisticated buyers that they could afford mortgages that were actually beyond their means (Schnoor 2008: 8615). It was also fed by the "boom euphoria" that led many to believe that the value of their home would continue to rise indefinitely (Foster and Magdoff 2009: 96). Of course prices did not rise indefinitely, instead the housing bubble burst in 2006. As the values of houses began to decline refinancing became more difficult causing delinquencies and defaults to

soar and subprime mortgage backed securities to lose most of their value. This precipitated the collapse of several major financial institutions and a general reduction of the availability of credit.

While subprime lending is by and large an American phenomenon, high mortgage debt is not. In the majority of advanced economies mortgages make up a significant percentage of household debt. For example, as of May 2009, residents of Canada owed $1.3 trillion (CDN), $900 million of which was mortgage debt. While there are a number of factors that contribute to the high level of mortgage debt, a major one is the desire amongst buyers for larger and larger homes. In most developed countries the trend over recent decades has been for houses to get bigger, even as the number of people making up the average household declines. In Canada, for example, 38 percent of families lived in a dwelling with at least seven rooms in 1997. By 2005, that proportion had risen to 41 percent.[2] In the US the average size of new homes more than doubled between 1950 and 2005, and as in Canada this was as family size shrunk (Wilson and Boehland 2005: 278). Wilson and Boehland suggest that "the notion that bigger is better has been a leading driver of the real estate industry" (Wilson and Boehland 2005: 280).

But is bigger better? From an ecological standpoint, the answer is an unqualified "no". In addition to the fact that larger homes take up more land (leaving less for 'nature'), there is a clear relationship between house size and resource and energy consumption in both the construction and operation (i.e. when people are living in it) phases. According to UNEP (2009a: 6), buildings, in general, are responsible for 30-40 percent of all energy use, greenhouse gas emissions and waste generation. In a larger home there is greater surface area over which heat loss (or unwanted heat gain) can occur. Additionally, air ducts and hot water pipes have to traverse greater distances, which can greatly increase heat losses (Wilson and Boehland 2005: 280). Moreover, most construction of new detached (large) homes in major metropolitan areas takes place in the suburbs. Thus, when considering the footprint of a large home, one should factor in the ecological consequences of its occupants having to commute long distances to their place of employment. Finally, there is an important connection between house size and other avenues of conspicuous consumption. Generally speaking, the more space that is available, the more 'stuff' that will be purchased to fill that space. That 'stuff' requires the input of natural resources and energy and leads to waste generation. This issue is also connected to debt and subprime mortgages in particular. During the subprime era many homeowners took advantage of low interest rates to refinance their mortgages and withdraw cash value from their homes, often in order to purchase furnishings and electronic goods. As Foster and Magdoff note, this type of mortgage borrowing is "a way to maintain or increase consumption levels despite stagnant wages for most workers" (Foster and Magdoff 2009: 97).

Have institutions and individuals learned from the subprime fiasco and subsequent financial crisis that the debt-consumption cycle is unsustainable (both economically and ecologically)? If they have then this would arguably decrease environmental stresses. In recent months savings rates have risen and consumption has fallen. For example, in the US, the personal savings rate reached 5.7 percent in April 2009, the

[2] See the Statistics Canada website: http://www41.statcan.ca/2007/40000/ceb40000_000_e.htm

highest it has been since February 1995.[3] However, it is questionable whether this trend will be sustained in the long term, particularly given the importance of consumption in maintaining economic growth, which will be discussed further below.

A Collective Response: A Green New Deal

In the early to mid 1930s President Franklin D. Roosevelt, seeking to pull the US economy out of The Great Depression, introduced a series of economic programs which are collectively referred to as The New Deal. The New Deal focused heavily on fiscal stimulus in order to help the economy escape what John Maynard Keynes called the 'paradox of thrift'. In this paradox, savings made by one sector of the economy lead to a reduction of income in another sector of the economy which eventually comes back to undermine the income of the original savers provoking them to spend even less and save more, creating a self-reinforcing cycle of economic contraction (Cooper 2008: 119). Keynes argued that in order to reverse this cycle the government would have to inject money into the economy.

In the wake of the current financial crisis there have been a number of different government initiatives aimed at preventing a serious recession and speeding up economic recovery. While bailouts of specific industries, most importantly banks and automotive producers, captured the headlines in the early days of the crisis, the focus has now turned to broader Keynesian fiscal stimulus packages.

What is interesting from an environmental perspective is that there have been numerous proposals for a *green* new deal from non-governmental organizations (NGOs), international organizations such as UNEP, and popular figures such as former US Vice-President Al Gore and economist/author Joseph Stiglitz. At first glance, the benefits of coupling environmental protection with economic recovery appear axiomatic. As UN Secretary General Ban Ki-moon and Al Gore wrote in an article in the *Financial Times*, "continuing to pour trillions of dollars into carbon-based infrastructure and fossil-fuel subsidies would be like investing in subprime real estate all over again".[4]

The purported 'win-win' opportunities in a green-focused recovery are numerous. First, sectors such as renewable energy are more labour intensive than traditional fossil fuel industries (CAP and PERI 2008: 11; HSBC 2009: 11). As Jones (2009:9) remarks:

> Solar panels do not install themselves. Wind turbines don't manufacture themselves. Buildings do not weatherize and retrofit themselves. Urban trees, green roofs and community gardens do not plant themselves. All these activities require human labour. Recognizing this simple fact helps to undermine the myth that ecological restoration must always be at odds with economic performance.

Thus, investment that creates 'green collar jobs' can tackle the problems of unemployment and greenhouse gas emissions simultaneously. Second, as UNEP (2009a:4) has

[3] "Consumer Spending Dips; Savings Rate Surges", *Associated Press*, 1 June 2009

[4] "Green growth is essential to any stimulus" *Financial Times*, 16 Feb 2009.

pointed out, many green sectors have better returns on capital than traditional or 'brown' sectors. Therefore, even if one ignores all of the other benefits of investing in these sectors, the decision remains sound at the most rudimentary level. Third, investment in certain green sectors (e.g. building retrofitting, wind and solar power generation) will bring about considerable economic savings to individuals and businesses through lower fuel bills and reduced health costs (less air pollution) (Peterson Institute for International Economics and World Resources Institute 2009: 1). Similarly, measures to improve public transport can reduce congestion in cities, with benefits for the environment and the economy. Fourth, reducing the world's reliance on scarce resources through a transition to a low-carbon economy would help to prevent future economic downturns. Although the price of oil has declined significantly since the onset of the financial crisis, this trend will inevitably reverse, with serious repercussions for the global economy. Edenhoffer and Stern suggest that if action is not taken to reduce reliance on fossil fuels "the next economic crisis is pre-programmed" (Edenhoffer and Stern 2009: 6). Finally, because it is well accepted that the cost of taking action to deal with issues such as climate change are much lower now than they will be in the future, a green new deal implemented immediately would make environmental goals both more achievable and more affordable in the long-term, thus contributing to future economic health (Peterson Institute for International Economics and World Resources Institute 2009: 2).

All of the exhortations about a green recovery appear to have been heard by governments. As of April 2009, government funded recovery packages were in the order of $3 trillion and most contained at least some claims of 'greenness'. When the G20 met in London to discuss the financial crisis they agreed to pump an additional $1.1 trillion into the global economy. In the statement issued from that meeting it was suggested that this spending would "accelerate the transition to a *green* economy" (G20 2009).

Some observers appear to be convinced that the call for a green new deal has been answered. Jeffrey Sachs, well-known economist and Director of Columbia University's Earth Institute, has argued that "[o]ne of President Barack Obama's historic contributions will be a grand act of policy jujitsu – turning the crushing economic crisis into the launch of a new age of sustainable development".[5] Sachs has applauded Obama for focusing on what he calls "two core truths of sustainable development" namely "that technological overhaul lies at the core of the challenge, and that such an overhaul requires a public-private partnership for success". He concludes exultantly that "[t]aking shape…is nothing less than a new 21st-century model of capitalism itself".

3 It Was the Worst of Times

[5] "Rewriting the Rulebook for 21st –Century Capitalism" *The Guardian*, 28 January 2009.

Not all observers share Sachs' optimism about the prospects for real progress on environmental issues to be born out of the aftermath of the financial crisis, let alone for a new model of capitalism to emerge. There are four main reasons for pessimism in this regard. First, claims about the 'greenness' of various recovery plans have been critically examined to a very limited extent. The analysis that has been done shows a very mixed picture. More often than not, 'green' spending is likely to be offset by more traditional investments in 'brown' sectors. Second, there are several adverse outcomes that can be expected in an economic downturn, such as an increased propensity for politicians to use economic hardship as an excuse to avoid or delay action on environmental issues. Third, and most critically, there has been insufficient attention (from politicians, international organizations and NGOs) to the underlying causes of the economic and environmental crises outlined above (debt and consumption) and this is unlikely to change. The principal response to the economic crisis has been to find ways to return individual economies and the global economy to a path of *growth*. As will be explained further below, this means that, ultimately, any recovery (no matter how 'green' on paper) will be at odds with long-term environmental sustainability. Finally, at the core of the optimistic outlook is a belief in technological solutions to environmental problems. This belief is based on the assumption that gains in efficiency can outstrip continual increases in the *scale* of economic activity, an assumption that experience has shown to be false in most instances.

Green Recovery or Greenwash?

There have been several analyses which have 'graded' the various stimulus packages that were introduced in late 2008 and early 2009. For example, the Global Research Department of HSBC put out a report in February 2009 that looked at more than 20 economic recovery plans and assessed what percentage of spending was being devoted to "investment themes" in the HSBC Climate Change Index (e.g. energy efficiency, renewables, etc.). This report found that China and the US were leading the way in green stimulus and that overall about 15 percent of stimulus worldwide (tabled before February) was aimed at "investments consistent with stabilising and then cutting global emissions of greenhouse gases" HSBC 2009: 1). It is notable that this figure falls far short of what most commentators suggest is necessary for a transition to a low-carbon economy. For example, a report from the London School of Economics has suggested a 'ball-park' figure of US$400 billion (20 percent of stimulus) globally on 'green' measures over the next year or so (Bowen et al 2009: 3). However, the HSBC team believes that what had been tabled up until early 2009 was just "the first installment" of green stimulus and that further efforts were likely to emerge in which governments would use "low-carbon growth as a key lever for economic recovery" (HSBC 2009: 1).

The majority of 'report card' publications, like the one produced by HSBC, have judged stimulus packages solely on the basis of how much investment has been put into so-called green sectors. As an E3G/World Wildlife Fund (WWF) commissioned report notes, "[t]his is useful but not adequate" (E3G/WWF 2009: 3). First, there is the problem that a dollar spent on wind energy has a much different impact on emissions reduction than a dollar spent on energy-efficient cars. According to the E3G/WWF report, the majority of stimulus money is being funneled into rail, transportation, grid expansion and improved building efficiency. Renewable energy projects have not received as

much attention as was expected or hoped for by environmental groups. Additionally, it is worth noting that environmental issues other than climate change have by and large been ignored in the majority of stimulus packages.

Second, there is the even larger problem that non-environmental (or 'brown') spending in stimulus packages could completely negate any benefits from the 'green' portion. If 30 percent of a stimulus package goes to improving energy efficiency in buildings but 70 percent goes to large infrastructure projects such as coal-fired power stations, is it really possible to call it 'green' stimulus? Or is this instead another example of 'greenwash'? In the US, for example, $27 billion of stimulus money has been earmarked for the construction of roads. Another example is China's plan, which has been lauded for its high proportion of green programs; here stimulus money has been used to boost car sales, which has helped China overtake the US as the world's biggest automobile market.[6] There has also been a surge of spending on energy-intensive cement and steel infrastructure projects.[7]

A related issue concerns stimulus measures aimed directly at boosting consumer spending through tax rebates and other forms of household-directed measures. For example, in early 2009 the Australian government introduced a plan to give 8.7 million residents who earned $100,000 or less in the 2007/8 year a bonus payment of up to $900 in the hope that they would re-inject that money in the economy through high street spending. Such efforts to promote conspicuous consumption are clearly a move in the opposite direction from a green economy. As Jackson (2009: 90) argues, governments need to get their messages straight:

> Urging people to *Act on CO2*, to insulate their homes, turn down their thermostat, put on a jumper, drive a little less, walk a little more, holiday at home, buy locally produced goods (and so on) will either go unheard or be rejected as manipulation for as long as all the messages about high street consumption point in the opposite direction.

In sum, the level of green stimulus is not high enough, it is skewed towards a small subset of 'green' sectors, it has the potential to be offset by brown spending, and overall governments are not sending a clear message about what is needed for a transition to a sustainable economy. In the words of Ben Stewart, a spokesman for Greenpeace, "a once in a lifetime opportunity… is being fumbled".[8]

Obstacles to Environmental Progress

A missed opportunity is certainly something to be lamented. But are there also other consequences of the global financial crisis that could potentially put the planet in a situation that is *worse* than the status quo? It is perhaps too early to tell; however, there are reasons for apprehension.

[6] "How China is Battling the Economic Crisis", *San Francisco Sentinel*, 23 May 2009

[7] "China's Emissions a Wild Card as G-20 Weighs Global Stimulus", *The New York Times*, 12 March 2009

[8] "Stimulus plans threaten green gains" Financial Times 3 March 2009

Although there have been many efforts to combat the notion that economic development and environmental protection are fundamentally at odds with one another, this is still a widely held view. As one UNEP (2009a: 5) report notes, "[t]his view is exacerbated at times of economic difficulty". With jobs on the line, the argument that protecting the environment is an *unaffordable luxury* becomes more politically acceptable. Popular magazines such as *The Economist* still run by-lines that read "Saving the planet and creating jobs may be incompatible".[9]

Thus far, politicians, such as British Prime Minister Gordon Brown have argued against a trend in this direction, suggesting that "rather than [the recession] pushing the environment into a lower order of priority, the environment is part of the solution".[10] However, Australian Prime Minister Kevin Rudd has acknowledged that the global recession has made it harder to get his emission trading scheme passed through parliament.[11] At a Senate Hearing Meeting on the scheme, National Party Senator Ron Boswell accused the country's leading climate scientists of living in "a Pollyanna world", arguing that deep cuts in greenhouse gas emissions was simply not practical given the financial crisis.[12]

Stern has identified two further problems that could emerge as a result of a recession: first, because "people can only concentrate on a limited number of things at the same time" they may redirect concern for the environment to the economy; and second, people will be sensitive to cost increases (e.g. from environmental taxes).[13] Others have hypothesized that as a result of the recession individuals and corporations will be less likely to pay a premium for 'environmentally friendly' goods and will also donate less to non-profit organizations (including environmental NGOs).[14]

Public opinion polls on environmental issues in 2008 and 2009 are inconclusive on these points. A survey by the Mobium Group revealed that the number of Australians concerned about the impacts of climate change dropped by almost 20 percent between 2007 and 2009.[15] The Group's Research Director noted: "While the fall in environmental concerns cannot be directly attributed to the economic downturn, naturally people do become more concerned about their personal circumstances when times are tough".[16] On the other hand, a global survey conducted by HSBC indicated that climate change remains a key issue; more than 40 percent of people surveyed ranked it higher than the global economy on their list of current concerns (HSBC 2008). However, while climate change may remain at the top of priority lists, other environmental

[9] "The grass is always greener: Saving the planet and creating jobs may be incompatible", *The Economist*, 2 April 2009

[10] "Tough Lap for the Marathon Man", *The Observer*, 4 January 2009

[11] "Global Financial Crisis to Slow Climate Progress: Rudd", *The Australian*, 27 March 2009

[12] "Climate Scientists Living in Pollyanna World: Senator", *Sydney Morning Herald*, 16 April 2009

[13] "Financial Crisis Could Promote Clean Energy, *The Guardian*, 7 October 2008

[14] "Global Financial Crisis Endangers Conservation Gains", *National Geographic News*, 8 October 2008

[15] "Environment Suffers as Global Financial Crisis Concerns Hit Home", *Mobium Group Press Release*, 12 March 2009

[16] *Ibid.*

concerns may more easily fall by the wayside. At a meeting of the International Union for the Conservation of Nature (IUCN) in Barcelona in October 2008 there was serious concern amongst participants that a recession would push conservation to the very bottom of priority lists for years to come.[17]

Finally, in addition to the issues of public opinion and government priorities, there is the undeniable fact that financing is currently much more difficult to obtain than it has been in recent history. This inevitably affects companies in the green sector as well. A Deutsche Bank (2009: 26) report notes: "Just as banks have been reluctant to lend to each other, they are also less likely to lend to renewable energy projects". According to a report published by the World Economic Forum (WEF 2009: 23):

> The global financial crisis of 2008, and the recession that is following in its wake, represents a serious threat to the clean energy sector. Short-term energy and carbon prices have fallen, making clean energy less competitive in immediate financial terms. At the same time risk has been re-priced, and finance is much harder to come by.

As mentioned above, there has not been a substantial focus on renewable energy in the fiscal stimulus packages tabled by early 2009. Consequently, cutbacks in public and private-sector investment in wind farms, solar and wave power, which were already occurring in 2008, may continue.[18]

Addicted to Growth

There are, at present, many unknowns which make it difficult to predict the long term environmental implications of the financial crisis. Analysts differ on what percentage of stimulus will really be green and to what degree it will be offset by brown spending. It is also too early to tell whether the recession will provoke a retreat from popular and political support for environmental protection. However, there is one area where politicians and the vast majority of economists and even environmental NGOs appear to be in agreement: the aim of any efforts at recovery, whether green or brown, is to restore economic *growth*. Tacking on the words 'low-carbon', 'sustainable' or 'green' does not fundamentally alter this growth imperative.

One should not be surprised with the focus on growth. As Hamilton (2004: 1) argues in *Growth Fetish*, "[n]othing more preoccupies the modern political process than economic growth". This preoccupation stems from the fact that the modern capitalist system is structurally reliant on economic growth; with ever-increasing productivity, growth is considered essential to maintain full employment (Jackson 2009: 5). As a consequence, questioning the primacy of the growth imperative "remains an economic heresy, punishable by excommunication from the company of the professional commentariat" (Green New Deal Group 2008: 32).

The global economy is currently almost five times the size that it was half a century ago and if growth returns to pre-crisis rates it will be an astonishing eighty times

[17] "Global Financial Crisis Endangers Conservation Gains", *National Geographic News*, 8 October 2008

[18] "Green New Deal Makes Sense but Unlikely", *Reuters*, 17 Nov 2008

that size by 2100. Given these facts and the continuing push for economic growth, it seems pertinent to briefly examine the relationship that growth has with environmental degradation.

Here there is a long history of divergent views. The most famous of early reports on the issue was the Club of Rome commissioned study entitled *The Limits to Growth*. Using a computer model, a team from MIT predicted future trends in population, food production, industrial production, pollution and consumption of non-renewable resources. It is a gross understatement to say that the findings of the group were controversial. According to Turner (2008: 397), there have been "sustained false statements that attempt to discredit [*The Limits to Growth*]". In particular, he argues that it is frequently claimed that the authors predicted resource depletion rates that would lead to complete collapse of the world system by the close of the 20th century. Such claims make it easy to label Meadows *et al* as doomsayers and their predictions as false. In actual fact, the group estimated that planetary limits would be exceeded at some point in the 21st century, which is consistent with present day ecological footprint calculations.

At the opposite end of the spectrum is the so-called Environmental Kuznets Curve (EKC), first proposed by economists Grossman and Krueger (1993; 1995). According to this theory, there is an inverted-U relationship between pollution and economic growth. The typical explanation for the occurrence of the EKC is that in early stages of development people are occupied with basic concerns such as employment and income; environmental protection is therefore not a priority. However, as per capita income rises, people come to value the environment more and therefore demand stricter regulation, and companies may also voluntarily improve performance through investment in cleaner technologies when they have the resources to do so. It is postulated that, as a result of these factors, at a certain level of per capita income, the amount of pollution begins to stabilize and eventually tapers off, theoretically falling to pre-industrial levels in wealthy societies.

Given the concordance that this theory has with neoliberal ideas of economic progress, it is perhaps unsurprising that the EKC has been enthusiastically embraced by many authors both in and outside of economics (see, e.g., Lomborg 2001). As recently as April 2009, *New York Times* columnist John Tierney, in an article entitled "Use Energy, Get Rich and Save the Planet", relied on the EKC to make the claim that:

> No recession or depression will make a lasting change in consumers' passions to use energy, make money and buy new technology — and that, believe it or not, is good news, because... [t]he richer everyone gets, the greener the planet will be in the long run.[19]

However, Stern (2004: 1419) has argued that "EKC results have a very flimsy statistical foundation" and that policies based on these results will be misguided. Other scholars have pointed out additional problems including: the focus of most studies on a limited number of pollutants (e.g. sulfur oxides, particulate matter) that have visible effects on the local environment; the failure of the theory to hold for pollutants arising from con-

[19] "Use Energy, Get Rich and Save the Planet", *The New York Times*, 20 April 2009

sumption (e.g. carbon dioxide and municipal solid waste) which commonly rise rather than fall with per capita income; and the failure of EKC researchers to take account of trade an investment patterns that shift polluting activities to less developed countries (Rothman 1998; Cole 2004; Nahman and Antrobus 2005a; 2005b).

Although the proponents of green stimulus packages do not seem to be supporting a position as extreme as that put forward by the most ardent EKC advocates (i.e. 'grow first, clean up later') they also don't appear to acknowledge that pursuing perpetual economic growth on a finite planet is a recipe for disaster. Indeed any commentary on this fundamental issue is sparse, at least in the mainstream media. A notable exception is an op-ed piece that appeared in the *New York Times* in March 2009, penned by columnist and author Thomas L. Friedman.[20] He asked:

> What if the crisis of 2008 represents something much more fundamental than a deep recession? What if it's telling us that *the whole growth model* we created over the last 50 years *is simply unsustainable* economically and ecologically and that 2008 was when we hit the wall - when Mother Nature and the market both said: "No more."

Surely this is the question that should be on everyone's mind. Unfortunately, rather than delving deeper into the heart of the matter, Friedman quickly reverts to optimism about stimulus packages leading to "*growth* in smarter, more efficient, more responsible ways".

Will Technology Save Us?

At the heart of the EKC and indeed of any defense of the sustainability of perpetual growth is the notion that technological developments can solve any environmental problem or resource limitation that humanity is confronted with. This belief in technological progress is also abundantly evident in discussions about a green recovery from the financial crisis. As an HSBC (2009: 6) report suggests:

> There is growing acceptance that the next wave of productivity and innovation could well come from smart technologies that enable a growing world economy to thrive in the context of deepening carbon as well as other natural resource constraints, most notably water.

These hypothetical 'smart technologies' are based on the notion of 'decoupling'. That is, innovation that allows growth to continue with declining material throughput. However, as Jackson (2009: 8) points out, most commentators fail to distinguish between 'relative' and 'absolute' decoupling. With relative decoupling, resource use and environmental impact decline relative to GDP. If GDP rises, so too do these impacts, just not as quickly. Absolute decoupling would require that impacts decline with rising GDP.

A focus on relative decoupling ignores the undeniable fact that technological innovation and improvements in efficiency are continuously outstripped by increases in the scale of economic activity (Dauvergne 2008: 214; Foster 2003: 23). In fact, because efficiency brings down the costs of goods over time it can actually have the perverse effect of increasing production and consumption (Rees 1998). For example, while the efficiency of automobiles increases quite substantially on a regular basis, so too does

[20] "The Inflection Is Near?", *The New York Times,* 7 March 2009, emphasis added

the number of people who own a car and the amount that they drive. Thus, overall, greenhouse gas emissions from automobiles continue to rise rather than fall (Foster 2003: 95).

There are also other arguments against a complete preoccupation with technological solutions. One obvious one is that technologies developed to resolve one problem often end up creating myriad new, often unanticipated, problems. In recent years, there has been a resurgence of interest in nuclear power as a 'climate friendly' alternative to conventional fossil fuels. An OECD document on 'green growth' additionally suggests that nano- and bio-technologies can 'contribute to improved environmental performance' (OECD 2009). And proposals to 'geoengineer' the climate (for example, by injecting sulphur particles into the atmosphere to mimic volcanic activity) are popping up with increasing frequency. All of these types of technology-focused 'fixes' are highly controversial, risky and bring with them the potential for serious environmental *harm*.

An overemphasis on technology also tends to displace solutions to problems that are simple, yet effective, and reinforces the belief that changes in lifestyle (or in ways of doing business) are not necessary in order to reduce humanity's impact on the planet. Discussions about 'green homes' are a prime example. While much is made of technological solutions that range from switching to energy efficient light bulbs to installing solar panels on roofs, it is rarely suggested that individuals and families should consider buying/building *smaller* homes.

Finally, in the context of this paper it is also worth noting that improvements in technology can also have a perverse effect on employment. Increased efficiency means that more output can be produced not only for any given input of natural resources, but also any given input of labour (Jackson 2009: 7). As a result, unemployment will rise unless economic activity continually grows.

4 Conclusions

While Keynes was preoccupied with the paradox of thrift, some commentators have suggested that in light of recent events perhaps there should be more attention given to the paradox of *gluttony* put forth by Hyman Minsky (Cooper 2008: 119). The paradox of gluttony occurs when "higher borrowing produces higher profits, thereby ratifying the decision to borrow and spend more" leading to a self-reinforcing cycle of economic expansion through debt creation (Cooper 2008: 119). This cycle has serious consequences, not only for the global economy, but also for the global environment.

Escaping from the paradox of gluttony will require a different strategy than that developed to respond to the paradox of thrift. Fiscal stimulus packages such as those put forward in 2009 do not come close to addressing the underlying causes of the financial or environmental crises. What they are likely to accomplish (at least in the short term) is what they were intended to accomplish; a return to the path of economic growth. Economic *development*, full employment and general human well-being should not be considered at odds with environmental protection. However, the same cannot be said for indefinite economic growth; this concept must be untangled from

our understanding of the notions of progress and prosperity if we are to have any chance of solving the global environmental crisis.

Jackson (2009: 10) argues that no comprehensive proposal for a "macroeconomics for sustainability" has been put forth in the wake of the global financial crisis. It is probably more accurate to say that many such proposals exist; they have been put forth by ecological economists for the last three decades or more. However, non-growth models remain sidelined in the discussions on the financial crisis occurring at the national and global levels, which are dominated by politicians, businessmen, academics and journalists that fail to even consider questioning the assumptions that underlie mainstream economic theories. Perhaps what we actually need at the moment is not more economic models or more opinions from economists, but less. Instead, it may be time to consider having a more serious and engaged discussion (at all levels of governance) about the fundamental values that should form *the basis* of our economic models. One important outcome of the global financial crisis is that it has opened up a space (however small) for a dialogue on these issues to take place.

A possible way to begin this conversation is for governments to consider collectively abandoning their almost religious devotion to GDP as a measure of national well-being. Alternative indices already exist. For example, the Genuine Progress Indicator (GPI) and the Index of Sustainable Economic Welfare (ISEW) take into account economic "costs" such as pollution as well as "benefits" such as household and volunteer work that are neglected in GDP calculations (Lawn 2003). Although a switch in metrics may seem like a cosmetic measure, it could substantially assist in reframing Western society's notion of progress.

Although a fundamental change in the way we think about the economy is required to ensure a truly green recovery, in the mean time there is every reason to believe that regulation can have an important effect in *mitigating* environmental harm. In a recent study Özler and Obach (2009) found that the level of regulation in a state had a significant impact on its per capita ecological footprint. Given this, perhaps the most significant outcome of the financial crisis (from an environmental perspective) is that, as Schnoor (2008: 8615) puts it, "'regulate' is no longer a dirty word". While there are numerous areas where increased/improved regulation would be valuable, it is worth briefly highlighting three specific policy options that directly relate to the issues discussed in this paper: reducing the working week; reforming tax policy; and issuing green bonds.

Work-time policies can reduce consumption (by reducing disposable income) without jeopardizing the goal of full employment (Jackson 2009: 10). Furthermore, a shorter work week frees up time to allow individuals to participate in activities that contribute more to well-being than material consumption. Numerous studies have indicated that once a certain level of satisfaction of basic needs is met, there is very little connection between personal well-being and one's level of consumption.[21] Experts suggest that factors such as quality of family life, friendships, and opportunities to learn and engage in pastimes are far better indicators of personal satisfaction and happiness

[21] Oliver James, a psychologist, has further suggested that material consumption can actually be detrimental to mental health. See James 2007.

(Green New Deal Group 2008: 32). While it could be argued that a shorter work week will simply provide people more time to shop, with less disposable income it is likely that individuals will eventually have to make a shift away from such material pursuits.

As for taxation, it is evident that the large sums of money that are currently being pumped into the global economy are adding significantly to the debt-burden of advanced economies. This public sector debt will eventually have to be repaid. One of the obvious options for reducing debt will be increased taxation. Higher taxes can help to redress the balance between "private affluence and public squalor", reducing material consumption while improving well-being (Galbraith 1958). There is also an opportunity to target tax policy to achieve environmental goals. UNEP (2009a: 11) has argued that the global financial crisis:

> provides an opportunity for broad, neutral and equitable tax reform, such that the tax burden is shifted away from economic 'goods' such as jobs, income, fuel efficient vehicles and other activities providing environmental and social benefits, to economic 'bads' such as carbon, pollution and dirty and inefficient vehicles...

As noted above, in the immediate aftermath of the financial meltdown the focus was not on increasing or reforming taxes but rather on pumping stimulus money into tax rebates or bonuses. Instead of trying to spur on high street spending at a time when many individuals would actually prefer to increase their savings, governments could instead introduce 'green bonds' that would allow individuals to invest in environmental initiatives (Sustainable Development Commission 2009: 34).

Although these suggestions all appear to be focused at the national level, in the modern era it is increasingly difficult for governments to implement such policies unilaterally. Concerns about 'industrial flight' and attendant job losses resulting from increased regulation remain high and attempts to impose environmentally-based taxes may run afoul of international trade and investment rules. As a consequence, action is also required at the global level. The current hierarchy of strong legally binding economic agreements (e.g. bilateral investment treaties, regional and global agreements) and weak ineffectual multilateral environmental agreements reinforces the notion that economic growth is to be achieved at the expense of all other goals, and will therefore need to be reformed. Furthermore, global efforts will need to be made (e.g. debt cancellation, increased aid, regulation of multinational corporations) to ensure that the national policies in developed countries, such as those proposed above, do not result in the further exploitation of developing countries. It is not difficult to imagine that declining incomes in developed countries (e.g. through reduced working weeks) could put pressure on producers in developing countries to export even cheaper goods, resulting in poorer conditions for workers as well as no or minimal decline in overall consumption. It can not be overemphasized that the aim of the proposed policies is not to increase the leisure time of the rich at the expense of the poor.

References

Bernanke, Ben (2009) Four Questions about the Financial Crisis, Speech by Federal Reserve Chairman at the Morehouse College, Atlanta, Georgia, April 14, 2009.

Bowen, Alex, Fankhauser, Sam, Stern, Nicholas and Dimitri Zenghelis (2009) An Outline of the Case for a 'Green' Stimulus, Policy Brief, Grantham Research Institute on Climate Change and Environment and Centre for Climate Change Economics and Policy, London.

Center for American Progress (CAP) and Political Economy Research Institute (PERI) (2008) Green Recovery: A Program to Create Good Jobs and Start Building a Low-Carbon Economy, Washington, D.C.

Cole, Matthew A. (2004) "Trade, the Pollution Haven Hypothesis and the Environmental Kuznets Curve: Examining the Linkages," *Ecological Economics* 48: 71–81.

Cooper, George (2008) *The Origin of Financial Crises: Central Banks, Credit Bubbles and the Efficient Market Fallacy*. Petersfield, Hampshire: Harriman House.

Dasgupta, Susmita, Benoit Laplante, Hua Wang and David Wheeler (2002) "Confronting the Environmental Kuznets Curve," *Journal of Economic Perspectives* 16: 147–168.

Dauvergne, Peter (2005) "Dying of Consumption: Accidents or Sacrifices of Global Morality?" *Global Environmental Politics* 5(3): 35-47

Dauvergne, Peter (2008) *The Shadows of Consumption*. Cambridge, MA: MIT Press.

Deutsche Bank (2008) Investing in Climate Change 2009: Necessity and Opportunity in Turbulent Times, New York.

E3G and WWF (2009) Economic/Climate Recovery Scorecards: How Climate Friendly are the Economic Recovery Packages? London.

Edenhoffer, Ottmar and Lord Nicholas Stern (2009) Towards a Global Green Recovery: Recommendations for Immediate G20 Action, Report Submitted to the G20 London Summit, Potsdam Institute for Climate Impact Research and Grantham Research Institute on Climate Change and the Environment at the London School of Economics.

Foster, John Bellamy (2003) *Ecology Against Capitalism*. New York: Monthly Review Press.

Foster, John Bellamy and Fred Magdoff (2009) *The Great Financial Crisis: Causes and Consequences*. New York: Monthly Review Press.

G20 (2009) The Global Plan for Recovery and Reform, Communiqué from the London Summit.

Galbraith, John Kenneth (1958), *The Affluent Society*. London: Hamish Hamilton.

Green New Deal Group (2008) A Green New Deal: Joined-up Policies to Solve the Triple Crunch of the Credit Crisis, Climate Change and High Oil Prices, London.

Grossman, Gene M. and Alan B. Krueger (1993) "Environmental Impacts of a North American Free Trade Agreement." In *The US-Mexico Free Trade Agreement*, edited by P.M. Garber. Cambridge, MA: MIT Press.

Grossman, Gene M. and Alan B. Krueger (1995) "Economic Growth and the Environment," *Quarterly Journal of Economics* 110: 353–377.

Gokhale, Jagadeesh (2009) "Financial Crisis and Public Policy," *Policy Analysis* 634, Cato Institute, Washington, D.C.

Haines, Fiona (2009) "Exploring the Parameters of Systemic Risk through the Climate Crisis and Financial Meltdown," unpublished manuscript.

Hamilton, Clive (2004) *Growth Fetish*. London: Pluto Press.

HSBC (2008) Climate Confidence Monitor 2008, London.

HSBC (2009) A Climate for Recovery: The Colour of Stimulus Goes Green, London.

ILO (2009) The Financial and Economic Crisis: A Decent Work Response, Geneva.

IMF (2009) World Economic Outlook: Crisis and Recovery, Washington D.C.

Jackson, Tim (2009) Prosperity Without Growth?: The Transition to a Sustainable Economy, Sustainable Development Commission, London.

James, Oliver (2007) *Affluenza*. Boston MA: Vermillion Press.

Jenkins, Rhys (2002) "Introduction." In *Environmental Regulation in the New Global Economy: The Impact on Industry and Competitiveness*, edited by R. Jenkins. Cheltenham: Edward Elgar.

Jones, Van (2009) "Green Collar Jobs," *Our Planet*, February 2009: 8-9.

Lawn, Philip A. (2003) "A Theoretical Foundation to Support the Index of Sustainable Economic Welfare (ISEW), Genuine Progress Indicator (GPI), and Other Related Indexes," *Ecological Economics* 44: 105-118.

Lomborg, Bjørn (2001) *The Skeptical Environmentalist*. Cambridge University Press.

Meadows, Donella, Jorgen Randers, Dennis Meadows and William H. Behrens (1974) *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind* (2nd edition). New York: Universe Books.

Millennium Ecosystem Assessment (MEA) (2005) *Ecosystems and Human Well-Being: Synthesis*. Washington, D.C.: Island Press.

Nahman, Anton and Geoff Antrobus (2005a) "The Environmental Kuznets Curve: A Literature Survey," *South African Journal of Economics* 73: 105–120.

Nahman, Anton and Geoff Antrobus (2005b) "Trade and the Environmental Kuznets Curve: Is Southern Africa a Pollution Haven?" *South African Journal of Economics* 73: 803–814.

OECD (2009) Green Growth: Overcoming the Crisis and Beyond, Paris.

Omarova, Saule T. (2009) "The New Crisis for the New Century: Some Observations on the 'Big-Picture' Lessons of the Global Financial Crisis of 2008," *North Carolina Banking Institute* 13: 157-165.

Özler, S. Ilgü and Brian K. Obach (2009) "Capitalism, State Economic Policy and Ecological Footprint: An International Comparative Analysis," *Global Environmental Politics* 9(1): 79-108.

Peterson Institute for International Economics and World Resources Institute (2009) A Green Global Recovery? Assessing US Economic Stimulus and the Prospects for International Coordination, PIIE Policy Brief No. PB09-3, Washington D.C.

Rees, William (1998) "Reducing the Ecological Footprint of Consumption." In *The Business of Consumption: Environmental Ethics and the Global Economy*, edited by L. Westra and P. Werhane. New York: Rowman & Littlefield.

Rothman, Dale S. (1998) "Environmental Kuznets Curves - Real Progress or Passing the Buck? A Case for Consumption-Based Approaches," *Ecological Economics* 25: 177–194.

Schnoor, Jerald (2008) "Global Financial and Environmental Crises," *Environmental Science & Technology* 42: 8615.

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

Sustainable Development Commission (UK) (2009) A Sustainable New Deal: A Stimulus Package for Economic, Social and Ecological Recovery, London.

Turner, Graham M. (2008) "A Comparison of *The Limits to Growth* with 30 Years of Reality," *Global Environmental Change* 18: 397-411.

UNEP (2007) Global Environment Outlook (GEO) 4: Environment for Development, Nairobi.

UNEP (2009a) Global Green New Deal, Policy Brief, Nairobi.

UNEP (2009b) UNEP Year Book 2009: New Science and Developments in Our Changing Environment, Nairobi.

Wilson, Alex and Jessica Boehland (2005) "Small is Beautiful: U.S. House Size, Resource Use, and the Environment," *Journal of Industrial Ecology* 9: 277-287.

WEF (2009) Green Investing: Towards and Clean Energy Infrastructure, Geneva.

WWF (2008) Living Planet Report, Gland, Switzerland.