



AAAJ  
24,8

1000

Received 5 January 2010  
Revised 10 February 2010  
26 October 2010  
Accepted 21 July 2011

# Climate change

## Explaining and solving the mismatch between scientific urgency and political inertia

Jonathan Boston and Frieder Lempp  
*School of Government, Victoria University of Wellington,  
Wellington, New Zealand*

### Abstract

**Purpose** – This paper has two main purposes. First, it considers the detrimental effects of four politically-salient asymmetries on the policy choices of liberal democracies when dealing with the problem of human-induced climate change. Second, it outlines and evaluates possible solutions for reducing or countering these asymmetries.

**Design/methodology/approach** – The approach involves an analysis and evaluation of policy options based on a survey of the relevant literature.

**Findings** – The paper highlights the serious mismatch between the magnitude and urgency of the climate change problem and the current political will to overcome or mitigate the problem. Although four categories of potential solutions, and the various mechanisms through which they might operate, are discussed, it is recognized that all the available options have significant drawbacks, not least limited political feasibility and doubtful effectiveness. In short, action within liberal democracies to mitigate climate change is likely to remain seriously constrained by the four asymmetries discussed, thus increasing the risk of dangerous climate change.

**Originality/value** – The paper highlights the complexities, both international and national, of confronting human-induced climate change. In particular, it identifies four systemic reasons, in the form of politically-salient asymmetries, why liberal democracies have struggled to take effective measures to reduce greenhouse gas emissions and provides a systematic assessment of possible solutions to these asymmetries. These include changes to accounting frameworks to ensure that the impact of humanity on the environment and future generations is more transparent.

**Keywords** Climate change policy, Mitigation, Politically-salient asymmetries, Future generations, Environmental accounting, Climate change, Politics, Sciences

**Paper type** Research paper

### Introduction

There is persuasive scientific evidence that the Earth is warming and that human beings are largely responsible. Equally, the evidence suggests that unless global greenhouse gas (GHG) emissions are reduced substantially over the coming decades, there is a significant risk that large-scale and irreversible damage will be inflicted on key bio-physical systems with severe consequences for human wellbeing (see Stern, 2006; IPCC, 2007; Richardson *et al.*, 2009). Yet despite these disturbing projections, and despite international agreements such as the United Nations Framework Convention on Climate Change (UNFCCC) (negotiated in 1992) and the Kyoto Protocol (negotiated

---

The authors are grateful to Valentina Dinica, Jeremy Richardson, Alec Mladenovic, the two anonymous referees and the Guest Editors for their helpful and insightful comments on earlier versions of this paper.



---

in 1997), relatively few countries have adopted stringent measures to curb the growth of their GHG emissions, let alone make large cuts in their emissions.

Under the Kyoto Protocol, Annex 1 Parties (i.e. most developed countries) have “responsibility” targets[1] for the first commitment period (CP1), which runs from the beginning of 2008 to the end of 2012. But the overall reduction in emissions required of Annex 1 Parties are modest (about 5 percent below 1990 levels), and it is by no means certain whether all countries will fulfill their obligations. Moreover, the USA decided not to ratify the Kyoto Protocol and thus has no legal obligation to meet its negotiated responsibility target for CP1 (which entails an emissions reduction of 7 percent relative to 1990). To compound matters, the UNFCCC negotiations in Copenhagen in December 2009 failed to resolve the key divisions within the international community over climate policy, most notably the legal form and architecture of the post-2012 regime (including the future of Kyoto), and how the responsibilities of developed and developing countries ought to be differentiated (including the nature and extent of differentiation within the two blocs). Nor did the Copenhagen Accord determine the parameters of a second commitment period or the scale of the global emissions reductions required in the longer term. As a result, there are now serious doubts over the capacity of the global community to reach agreement by the end of 2012 on a new climate policy regime – whether via amendments to Kyoto (together with supplementary arrangements) or in the form of a new integrated protocol.

In short, the scientific evidence points to the need for urgent measures to reduce global GHG emissions; but the international response thus far has been slow, muted and largely ineffective. To quote Gardiner (2009, p. 143):

Plainly, there is a mismatch between the apparent seriousness of the problem and our collective institutional response.

But what are the reasons for this mismatch? Why has the international response been so hesitant and limited? Why have most developed countries struggled to implement effective measures to reduce their GHG emissions? And are there ways of increasing the likelihood of more vigorous mitigation efforts being adopted?

A fundamental and enduring reason for the lack of political commitment on the part of individual countries to reduce (or even constrain) their GHG emissions lies in the spatial dimension of the problem. In short, both the causes and consequences of climate change are widespread, stretching far beyond the boundaries of individual nation states. Likewise, no state can solve the problem by acting alone: effective mitigation requires collective action by multiple states. The nub of the problem here is that the atmosphere constitutes a “natural global commons” or a “global public good” (Kaul *et al.*, 1999), and is thus subject to free-riding. In the absence of explicit and enforceable property rights, every country has an economic incentive to exploit the atmosphere and use it as a dumping ground for GHGs and other pollutants. After all, there are short-term costs associated with unilateral action to reduce domestic emissions, and any environmental gains are likely to be modest and short-lived unless all emitters contribute to the mitigation effort. To address the problem of climate change, therefore, coordinated and appropriately sequenced action is necessary via multilateral arrangements. But securing agreement on such arrangements is fraught with difficulty. Not merely does the global community lack robust international institutions and strong, active leadership by the major powers, there are numerous policy-related

challenges to be overcome: technical disagreements over stabilization targets and emissions-reduction paths, conflicts over the most effective policy responses, and contrasting views on international burden sharing. Yet if narrow, short-term, economic interests prevail over wider, longer-term environmental considerations, the outcome will be a “tragedy of the commons” (i.e. dangerous climate change).

In addition to the disincentive for each country to contribute to the global cause of reducing emissions – due to the spatial dimension of the problem – the political inertia in recent times (at both national and international levels) can also be largely attributed to certain inherent structural features of the democratic process. In particular, in liberal democracies there are four significant, politically-salient asymmetries that militate against firm domestic action to curb emissions, thereby generating what can be classified as a “demand-side government failure” (Wolf, 1987): the voting asymmetry, the cost-benefit asymmetry, the interest group asymmetry and the accounting asymmetry. Although each of these asymmetries is analytically distinct and of differing political potency, both over time and between jurisdictions, they are at least to some degree interdependent and mutually reinforcing (Boston, 2010). A comprehensive solution therefore requires concerted action to address each asymmetry.

To compound matters, each of the four asymmetries involves major distributional trade-offs (and hence political conflict), and in several cases – notably the voting and cost-benefit asymmetries – there is a highly significant inter-temporal dimension: short-term pain is required for long-term gain (Jacobs, 2008). These distributional and inter-temporal dimensions of the climate change problem reinforce and complicate the spatial dimension, thereby posing huge political challenges and hard policy choices.

Bearing in mind these various dimensions to the problem, this paper has two specific aims. First, it explores the nature of the four asymmetries and their impact on policy efforts in liberal democracies to address climate change. In so doing, it highlights how these asymmetries, which all operate at the national and sub-national levels, intensify the global collective action problem. The focus on democracies, incidentally, is deliberate: without action to mitigate climate change by the major democracies (most of which have relatively high per capita emissions), it will be extremely difficult to persuade most other nations to contribute to the global effort.

Second, the paper explores possible ways of reducing or countering the four asymmetries and thereby mitigating their negative impact on efforts to address climate change. Four different solutions are considered: supra-national, institutional, constraining and rebalancing solutions. Unfortunately, whether individually or collectively, these solutions do not offer a complete remedy. Also, some have limited political feasibility and/or may generate serious negative side-effects. Nevertheless, focusing on how these asymmetries affect the policy process yields important insights and illuminates some of the strategies and options available to policy makers to counter their effects. Moreover, an appreciation of the political dynamics of climate change, including the relevant spatial, temporal, and distributional dimensions and their deep interconnectedness, is important for researchers across a multiplicity of fields, including organizational accounting and management.

### **The concept of a political asymmetry**

Political scientists typically use the concept of a political asymmetry to describe an imbalance or unevenness of political influence between different actors (e.g. Leyden,

---

2005, p. 36). The concept occurs frequently in debates over federalism, the European Union (EU), and political conflict.

In the literature on federalism, for instance, a political asymmetry usually refers to some kind of variation between units on the sub-state level (Agranoff, 1999). These variations may concern the units' interests, size, population, economic resources, or cultural identity. Following Watts (1999), they are referred to as "political asymmetries" if they have not been deliberately created and as "constitutional asymmetries" if they are intentionally written into federal constitutional arrangements.

In the context of the EU, the term "political asymmetry" is increasingly being replaced by the term "varying geometry" and has at least three meanings (Deschouwer, 2005), namely: that the characteristics and competencies of the member states are different; that the interests, character and makeup of the regions of the EU are different; and that the member states are incorporated in different ways into the EU.

In relation to political conflict, the notion of a political asymmetry is seen as a component of so-called asymmetric wars. Eaton (2002, p. 62), for instance, classifies political asymmetries, together with cultural, legal, and moral-ethical asymmetries, as "asymmetries of viewpoint" and argues that they arise from the international variation of political systems. He characterizes a political asymmetry as a "disparity in *accountability* evident in political systems, which influences public support, accountability to legislatures and even the funding of military activity" (Eaton, 2002, p. 62, italics in original).

Here we employ a broad definition of asymmetry. Consistent with its geometric origin, we take an asymmetry to represent a relationship of unevenness, disproportionality or a lack of correspondence among the constituents of a political entity. Accordingly, an asymmetry arises where there are at least two political entities (e.g. states, interests or environmental goods) that differ significantly in at least one politically salient respect (e.g. voting power, degree of dispersion or accountability). Furthermore, the scope of this analysis is restricted to the area of climate change policy.

### **The voting asymmetry**

The voting (or political accountability) asymmetry refers to the fact that in democratic systems, legitimate political power lies with the voting population – i.e. the portion of currently living people who have reached the voting age and are eligible to vote. For obvious reasons, the young and future generations have no vote; nor are they typically represented by other means in contemporary democracies. Accordingly, they cannot exert any direct influence on current policy-making processes or hold voters or decision-makers to account for their actions. In short, they are powerless; they are utterly dependent for their well-being on the goodwill and responsible behavior of the voting members of the present generation.

This might not present a problem if voters (and their elected representatives) were predominantly far-sighted and strongly other-regarding (both over space and time). But the evidence suggests otherwise (Jacobs, 2008). Rather, most voters tend to be preoccupied with short-term issues and relatively local concerns. This is not only because of narrow self-interest, but also because – as highlighted by the burgeoning literature from cognitive psychology and behavioral economics – people are "wired" to think in certain ways and exhibit various psychological biases (Lazarus, 2009). These

include a tendency to underestimate future benefits and overestimate present costs, to overvalue present benefits and undervalue future benefits, to discount gains more than losses, and to discount small outcomes more than large outcomes (Cornforth, 2009). To the extent, therefore, that elected governments are primarily concerned with the satisfaction of voters' interests and respond to their (short-term) electoral preferences, they are likely to suffer from "political myopia" (Congleton, 1992). This means that policies aimed at achieving long-term goals are unlikely to win favor – all the more so when the benefits will be enjoyed almost exclusively (or at least primarily) by future generations. For such reasons, as Thompson (2005, p. 246) argues, democracies are "systematically biased in favour of the present".

Against this, it should be noted that the interests of future generations are protected, albeit modestly, in certain democracies (e.g. via constitutional provisions), but such protection is generally weak and ineffective (see below).

To the extent that democracies systematically undervalue the interests of future generations, how does this impinge on policy efforts to mitigate climate change? Many goals in climate change policy are long-term in nature (i.e. many decades or even centuries). The benefits of such policies are therefore enjoyed primarily by future generations whereas the costs are borne by current generations. There are, of course, some immediate co-benefits from certain mitigation policies (e.g. for foresters and the renewable energy sector, and improved health outcomes from better insulated homes). But these co-benefits are typically less visible and more widely dispersed than the costs (see below).

Overall, then, the voting asymmetry provides a plausible explanation for the reluctance of current decision makers to adopt effective mitigation policies. If future generations had more influence on current political decisions – for instance, if they had a proxy vote – policy makers would have a greater incentive to support more stringent mitigation policies.

The discussion thus far might suggest that if democratic processes necessarily lead to a systematic neglect of certain environmental considerations and values then it would be better to adopt a different kind of political system (e.g. a dictatorship). But there is little evidence to support such a conclusion (Frederiksson *et al.*, 2005; Farzin and Bond, 2006; Bernauer and Koubi, 2009). On the contrary, there is a statistically significant positive correlation between the degree or strength of democracy and the level of environmental quality. Overall, the environment is less well protected in non-democratic countries than in democratic ones, with corruption playing a significant deleterious role. To quote Pellegrini and Gerlagh (2006, p. 333):

[T]here are now several empirical studies on the effects of democracy and corruption on environmental policy commitment and resource conservation. In general, these studies conclude that democracy is a significant positive and corruption a significant negative determinant of environmental protection.

While many of these studies do not explicitly address climate change policy, a case can still be made that the democratic method is the best political system for ensuring environmental quality. Arguably, therefore, the problem lies not with the democratic method *per se*, but rather with the incentive structure within which the democratic process operates. Hence, a key issue is how to adjust the incentive structure to cater better for the interests of future generations.

---

### The cost-benefit asymmetry

The cost-benefit asymmetry describes the fact that the costs and the benefits of policies to mitigate climate change are significantly different with respect to the crucial dimensions of time, certainty, visibility, and tangibility. Policies to mitigate climate change effectively are likely to incur immediate economic costs that have to be paid for by the present generation (Stern, 2006). These costs include the likelihood of slightly lower GDP growth rates, negative social and employment impacts caused by changes in the structure of the economy and production processes, increased prices for energy and transport, and lower production and consumption of certain goods and services. All these costs (even if modest in aggregate terms) are relatively certain, visible, and tangible; they are measurable in terms of GDP[2], government expenditure, and changes in production and consumption patterns.

In contrast, most of the benefits and co-benefits of such policies (i.e. a limitation of the increase in global average temperatures, a lower rise of sea levels and a less significant change in climatic conditions) will occur over the next few centuries and will thus be enjoyed primarily by future generations. Further, the benefits are somewhat uncertain, as we cannot be sure how successful our mitigation efforts will be; they will be relatively invisible (in the sense that most people will not readily perceive the difference between the damage that unmitigated climate change might have inflicted and the damage that is likely to occur, even in the context of stringent mitigation policies, due to the long lags in the climate system); and they will be intangible, as current generations receive few material benefits (aside from some minor co-benefits) from adopting successful mitigation policies.

In situations where the current generation incurs most of the direct costs while later generations enjoy most of the benefits, the “goods” in question can be said to be “back-loaded” and are likely to be under-produced and under-consumed (Gardiner, 2009, pp. 147-8). In other words, there will be “intergenerational buck-passing” (Gardiner, 2009, p. 148). The cost-benefit asymmetry thus reinforces the voting asymmetry and helps explain the gross mismatch between the magnitude of the climate change problem and the lack of political will to address it. Decision makers, after all, have little incentive to introduce policies that impose immediate, relatively certain, visible, and tangible costs on current voters, all the more so if the short-to-medium-term benefits are limited and the longer-term benefits are uncertain, largely invisible and relatively intangible.

The particular pattern of inter-temporal trade-offs associated with policies to mitigate climate change is complicated further by the spatial dimension to the problem. In brief, any country taking unilateral steps to reduce its GHG emissions risks incurring higher short-term economic costs than under a multilateral agreement which imposes binding obligations on all the parties to act in a simultaneous and broadly comparable fashion. Hence, there is an economic incentive to be a follower, rather than a leader, in the process of emission reductions. This incentive structure is buttressed by the voting asymmetry: after all, politicians will have difficulty selling a domestic mitigation package without reciprocal measures by other countries because voters will understandably regard it as unfair. But, as noted earlier, securing a comprehensive multilateral agreement faces formidable hurdles.

Note that much of the debate over the costs and benefits of different climate change policies is centered on the concept of social discounting (i.e. the assumption that the

value of the consumption of goods and services diminishes over time). In particular, there has been much controversy over how to determine the correct discount rate (Broome, 2008; Caney, 2008). Stern (2006), for instance, uses a discount rate of 1.4 percent a year, whereas Nordhaus (1997) discounts by 6 percent. Not surprisingly, their policy recommendations are remarkably different. In short, the greater the rate we discount the future, the weaker the case for action to mitigate climate change.

### **The interest group asymmetry**

The interest group asymmetry is closely related to the cost-benefit asymmetry but focuses on a different aspect of the costs of climate change mitigation. It refers to the fact that many of the costs of mitigation policies tend to be concentrated and fall mainly on easily identifiable and powerful vested interests[3], whereas the potential beneficiaries of mitigation are highly dispersed, both in spatial and temporal terms. In such circumstances, the potential beneficiaries have much less incentive to mobilize politically than those who are likely to bear the costs.

Moreover, the potential beneficiaries and their present-day representatives – such as environmentalists, green parties or environmental non-governmental organizations – face high transaction costs if they want to channel their collective lobbying power. Many such beneficiaries (including the citizens of developing countries) are also poor and/or have limited access to democratic processes. By contrast, those most likely to incur the direct costs of policies to reduce GHG emissions – such as the fossil fuel industry, power companies, multi-national transport corporations, and the agricultural sector – typically possess a highly functional and well-resourced organizational structure which they can readily mobilize to lobby against stringent mitigation policies.

Overall, therefore, it can be expected that influential interests faced with significant costs arising from domestic mitigation policies will exert stronger lobbying power than the potential beneficiaries (or their representatives) of such policies. There is thus a power imbalance between the groups advocating effective mitigation policies and those opposed. As Lohmann (1998, p. 809) puts it:

Political decisions are often biased in favor of special interests at the expense of the general public, and they are frequently inefficient in the sense that losses incurred by the majority exceed the gains enjoyed by the minority.

In recent years, the scale and intensity of lobbying against policies aimed at controlling GHG emissions has been remarkable. As The Center for Public Integrity (2009) has noted:

Employing thousands of lobbyists, millions in political contributions, and widespread fear tactics, entrenched interests worldwide are thwarting the steps that scientists say are needed to stave off a looming environmental calamity [...].

In 2009 in the USA alone there were around “[...] 2,810 climate lobbyists – five lobbyists for every member of congress – a 400 percent jump from six years earlier” (The Center for Public Integrity, 2009). The overwhelming majority of these lobbyists and the available funds have been directed at preventing the US Congress from taking effective measures to reduce GHG emissions and/or to secure special exemptions for carbon-intensive industries.

---

The influence of interest groups on environmental issues, including climate change policy, has been both formally modeled and empirically analyzed. Polk and Schmutzler (2005), for instance, developed a game-theoretic model to investigate the influence of the types of lobbying that firms can engage in on the amount of GHG emissions they are permitted to release. Bernauer and Koubi (2009) provide a comprehensive statistical analysis in which they confirm, amongst other hypotheses, that:

- the greater the strength of interest groups that tend to lose from more stringent air quality policies, the higher the sulfur-dioxide concentrations in the air (a proxy for air pollution); and
- the greater the strength of pro-environment groups, the lower the sulfur-dioxide concentrations.

Apart from the question of how exactly the mechanisms of lobbying work, it is interesting to compare the financial power of people who care about the environment with those who do not. Brand and Boardman (2008) examined the distribution of GHG emissions from personal travel in Britain and concluded that the distribution of emissions amongst the population is highly unequal and that the statistically significant factors for determining a person's emissions are the person's income, economic activity, age, household structure, and car availability. Ravallion *et al.* (2000) tested and confirmed the hypothesis that higher income inequality within countries is associated with lower carbon emissions at given median incomes. Assuming that political power is at least partly influenced by financial power, two contrary effects have been observed. On the one hand, well-off people tend to demand more stringent environmental policies as the demand for the good "environmental quality" rises with increasing income. On the other hand, they tend to press for weak environmental policies because of their specific consumption patterns and their high overall consumption level.

Finally, the interest group asymmetry is exacerbated by the weak regulation of political and campaign finance in many democracies, not least the USA, and is accentuated further by corruption. As Pellegrini and Gerlagh (2006) observe, big polluters can effectively promote their interests through bribery and other illicit practices in addition to exerting legitimate lobbying power on policy makers.

### **The accounting asymmetry**

The accounting asymmetry describes the fact that firms are not required to include the effects of their activities on the environment in their financial statements and governments ignore net changes in natural capital (and other environmental impacts) in their national accounts. Put differently, whereas manufactured (or built) capital and financial capital is valued and accounted for, natural capital and ecosystem services typically are not. Further, the application of standard economic analyses in policy development frequently excludes consideration of natural capital (and/or includes only a limited range of environmental impacts). As a result, much of the damage to various ecosystems that can be attributed to GHG emissions (e.g. damage to coral reefs caused by ocean warming and acidification, and damage to coastal ecosystems due to sea-level rise) is not costed or reported in important national statistics.

This exclusion similarly occurs at the sub-national level: firms are not usually required to include in their financial statements data on the environmental costs and

benefits that occur as a consequence of their production processes and other activities. Indeed, part of the reason why environmental costs and benefits are not accounted for on the macro-level is their omission at the micro-level. To quote the report of the Commission on the Measurement of Economic Performance and Social Progress:

What we measure affects what we do; and if our measurements are flawed, decisions may be distorted. Choices between promoting GDP and protecting the environment may be false choices, once environmental degradation is appropriately included in our measurement of economic performance (Stiglitz *et al.*, 2009, p. 9).

There are various reasons why the environmental damage caused by human-induced climate change and other human activities is not formally accounted for. One reason is the problem of defining, classifying, measuring and valuing ecosystem services; another is the difficulty of measuring the effects of human activity on the quantity and quality of natural capital (e.g. land, forest, water and fishery resources); yet another is the problem of how best to report changes in environmental variables and integrate such data into current accounting systems (Boyd and Banzhaf, 2007; Stiglitz *et al.*, 2009).

The accounting asymmetry accentuates the cost-benefit asymmetry because the environmental costs of GHG emissions are not properly reflected in the national accounts or firms' financial statements. One implication of this is that current GDP measures have significant limitations as indicators of "true" economic performance or social progress.

### **Possible solutions**

The question of whether, and to what extent, these four asymmetries can be overcome, or at least ameliorated, has generated considerable debate in academic and policy circles. Many solutions have been proposed (and, in some cases, tested) (see Beckman, 2008; Raffensberger *et al.*, 2008). Few of these, however, appear to be politically feasible or likely to alter significantly one or more of the four asymmetries. Indeed, partly for these reasons, human-induced climate change is regarded by many as a classic example of a "wicked problem", if not a "super wicked problem" (Lazarus, 2009). Wicked problems are characterized by being difficult, if not impossible, to solve because of their complexity and inherently contradictory nature, and the fact that each proposed solution creates other serious problems. Climate change is viewed as a "super wicked problem" not merely because of its "tremendous spatial and temporal scope" but also because the longer remedial action is delayed the more difficult and costly the challenge becomes (Lazarus, 2009, p. 1160).

However, even if it is conceded that climate change has the attributes of a wicked policy problem, this does not rule out the possibility of partial solutions for one or more of the four asymmetries. Analysis of the relevant literature points to at least four different types of solution:

- (1) *Supra-national solutions*. These are designed to shift decision rights on climate change policies away from nation states to regional or global entities that are subject to different incentive structures, and in particular are shielded to a greater extent than democratically elected governments from the pressures of voters and powerful interest groups which are typically dominated by short-term horizons;

- 
- (2) *Institutional solutions*: these are designed to shift decision rights on climate change policies within the nation state from governments and parliaments to independent bodies, such as expert committees, that are not directly accountable to voters.
  - (3) *Constraining solutions*. These are designed to constrain the decision rights of national governments on climate change policies so that environmental concerns and the interests of future generations are given greater weight than would otherwise be the case.
  - (4) *Rebalancing solutions*. These are designed to give decision makers a greater incentive to protect the environment and the interests of future generations by, for instance, changing the preferences of voters, the distribution of power between relevant interest groups and/or national parliaments, or the quality and availability of information about environmental performance.

We consider below some specific solutions that fall within each of these four categories. It must be emphasized, however, that the solutions examined here are all open to criticism and most are likely to have unintended negative consequences. Moreover, even if it were possible to construct a policy framework that fully addressed all four asymmetries in each of the major democracies (and other large emitters), the climate change problem is still likely to remain a serious and continuing challenge for decision makers. This is because of the long lags in the climate system, the extremely long life-time of certain GHGs in the atmosphere (especially carbon dioxide), and the fact that it will take many decades to decarbonize global energy and transportation systems (e.g. because of the scope and scale of the new technologies and investment required).

#### *Supra-national solutions*

Supra-national solutions are designed to address several of the four asymmetries by shifting decision rights on climate change policies away from nation states to regional or global entities possessing significant executive and/or legal powers. Such solutions are based on the assumption that, when compared to national governments elected via short electoral cycles, supra-national bodies are less constrained in developing and enforcing long-term policies aimed at reducing GHG emissions. This is because such entities are less exposed to the effects of the voting and interest group asymmetries.

Supra-national solutions can be implemented in a variety of different ways. On the one hand, a distinction can be made between regional entities, such as the European Commission, and global entities, such as the various institutions of the United Nations (or potential equivalents). On the other hand, a distinction can be made between bodies with executive power, such as supra-national bodies with a mandate to devise, implement and enforce policies, and bodies with legal power, such as supra-national courts and multilateral agreements. Common to all these solutions, however, is that they transfer power from national governments to supra-national entities or, at least, give national decision makers strong incentives to take more vigorous domestic action to reduce GHG emissions. Clearly, these solutions will only work if national governments are prepared to surrender certain decision rights and comply with the rulings, decisions and policies of the relevant supra-national entity.

A good example of a supra-national entity with significant executive powers is the European Commission, which has been mandated by the 27 EU member states to formulate and implement policies in certain areas. With respect to climate change policy, the EU has endeavored since the mid-1990s to establish a common policy framework across its member states and to “speak with one voice” in the international arena (e.g. in United Nations climate change negotiations). This has included the design and implementation of the world’s first large-scale emissions trading scheme (ETS) as well as the negotiation of national targets and “effort sharing” measures to reduce emissions in those sectors not covered by the ETS (Helm, 2009; Stephenson and Boston, 2010). Additionally, the EU has taken a leadership role in the international negotiations for a new global climate regime to take effect when COP under the Kyoto Protocol ends in 2012, including the advocacy of relatively ambitious emissions reduction targets for 2020 and 2050.

Elevating decision rights (albeit partially) on certain climate change issues to the EU level appears to have ameliorated several of the asymmetries. For instance, the EU’s top-down approach has required member states to take domestic mitigation measures that they might otherwise have refrained from, or at least found more difficult to execute, because of pressure from powerful sectoral lobby groups. Hence, domestic mitigation actions by individual EU states would probably have been less stringent if climate change issues had been handled exclusively at the national level.

Yet the EU has still struggled to build and maintain a consensus across its 27 member states on the need for ambitious GHG emission reductions. Moreover, the fact that the EU, as a bloc, will have no difficulty meeting its COP responsibility target owes less to EU climate change policies than to three other factors: the global financial crisis (2008-2009) and its negative impact on economic activity; the collapse of the Eastern European economies following the end of communism; and the shift away from coal to a greater reliance on gas in certain EU states.

Further, even if the EU approach has merit, replicating it in other parts of the world (e.g. Africa, Latin America, and South-East Asia) would be difficult. This is because the development of a semi-federal Europe (and related policy-making institutions) was the product of unique political, cultural and economic circumstances. Similar historical conditions do not exist outside Europe and would be difficult to replicate. This of course does not eliminate the possibility of certain kinds of bilateral or regional cooperation between countries to address climate change issues, but top-down decision making and enforcement by a regional supra-national entity is not a realistic option.

At the international level, there are a number of entities with responsibilities related to climate change. These include the United Nations Environment Programme, the Secretariat of the UNFCCC, and the Inter-governmental Panel on Climate Change. But such bodies lack substantive executive powers. In principle, it would be possible to establish an international agency with the mandate to develop, promote and enforce policies to mitigate climate change. But currently it is highly improbable that nation states, especially the most powerful ones, would be willing to transfer their decision rights on climate change policies to an executive supra-national body. This is not only because of considerations of national self-interest and sovereignty, but also because of serious qualms over the democratic legitimacy of any such supra-national body and its capacity to execute fair and effective policy measures.

---

A possible alternative approach, as suggested by Low and Gleeson (1998), is to establish a supra-national court for the environment empowered to review legislation enacted by national parliaments to ensure that proper consideration is given to long-term environmental concerns and the interests of future generations. Indeed, as Raffensberger *et al.* (2008) point out, international courts have already referred to the principle of intergenerational rights in their decisions (e.g. the International Court of Justice has done so in at least two cases). Provided that all countries abided by its decisions, an international court for the environment could help ameliorate the effects of the voting and interest group asymmetries by giving greater protection to the interests of future generations and establishing an objective and independent mechanism to decide on long-term environmental matters, including climate change.

Thus far the most widely used supra-national approach for dealing with global environmental problems has been the negotiation and implementation of international agreements to protect the environment and future generations' interests. According to Haas *et al.* (1993, p. 6), there were 140 international environmental treaties adopted between 1921 and 1993. More recent examples include the UNESCO Declaration on the Responsibilities of the Present Generations Toward Future Generations, the Rio Declaration on Environment and Development, the UNFCCC, and the Kyoto Protocol. If such agreements were fully supported by the major powers, and thus effectively monitored and enforced, they could help ameliorate the effects of the voting and interest group asymmetries. But it is unclear whether the global community will reach agreement on an ambitious, fair, transparent and effective climate change regime beyond COP1, and whether the new framework will be adequately supported by all the major emitters.

In principle, each of the supra-national solutions discussed here – whether implemented globally or regionally, and whether implemented individually or in combination – has the potential to strengthen the interests of future generations, improve the protection of the environment and enhance the stability of the climate system. Possibly the best outcome would be a combination of a new (or strengthened) supra-national environmental agency, a new multilateral climate change agreement with legally-binding obligations on all major emitters, and a new (or strengthened) international court. But, as cautioned earlier, successfully implementing such solutions faces formidable hurdles, not least the problem of securing the support of powerful nations, the difficulty of ensuring compliance and the risk of a democratic deficit (and hence a lack of long-term legitimacy).

### *Institutional solutions*

Solutions under this second category are intended to shift decision rights on climate change policies in nation states away from governments and parliaments to independent bodies, such as expert committees, which are not directly accountable to voters. In contrast to supra-national solutions, the power shift would take place entirely within nation states. Contrary to rebalancing solutions (see below), the entity to which the decision rights are delegated must be vested with specific powers. If the entity were given only an advisory role, the solution merely rebalances the preferences of voters or the distribution of power between relevant interest groups.

One example of a policy area in which governments have delegated executive powers to an expert committee is monetary policy. In many countries, key decisions on

monetary policy are taken by the central bank or a special expert committee. In Britain, for instance, the Monetary Policy Committee – a group of nine appointed experts in the field of economics and monetary policy – has the power to set the monthly interest rate of the Bank of England. Neither the Chancellor of the Exchequer nor the Permanent Secretary to the Treasury can vote in the meetings of the committee.

In principle, such an approach could be applied to climate change policy. For instance, a committee of experts from relevant fields (e.g. climate science and economics) could be given the statutory responsibility for determining key policy settings, such as the country's medium-term and long-term GHG emission-reduction targets and the regulatory and other measures necessary to achieve these targets. While such a committee would no doubt receive advice from various quarters, it would be required to act independently of the government. Accordingly, it would not be beholden to voters' short-term interests or powerful pressure groups. The recently established Committee on Climate Change in Britain might constitute a small step in this direction, but at present it has only advisory powers.

Internationally, various ideas have been advanced for new institutional mechanisms to enhance the interests of future generations, including proposals for an ombudsman (commission/council) for future generations (Partridge, 2003; Shoham and Lamay, 2006; Kiss, 1995). The tasks of such institutions could include: reviewing proposed legislation, government policies, or projects to ensure that the needs of future generations are properly considered; initiating administrative actions or launching judicial investigations about the decisions and actions of agencies; stopping illegal activities endangering the environment; monitoring international treaties; proposing new environmental regulations; and enforcing existing regulations.

Many countries already have experience with various kinds of independent environmental bodies. For instance, Hungary has created an Ombudsman for Future Generations, which has, amongst other powers, the right to review and propose legislation, to initiate administrative actions or judicial reviews of agency decisions, and to halt illegal activities endangering the environment. Similarly, Israel and France created (and later disbanded) a Commission for Future Generations and a Council for Future Generations, respectively, which offered advice to parliament on legislation and regulations relevant to the interests of future generations. Both of these institutions, however, had only an advisory role. Accordingly, they must be considered as rebalancing rather than institutional solutions.

The effectiveness of an ombudsman, commission or council with long-term fiduciary-type duties will no doubt depend on its formal mandate, powers and resources, the caliber of the staff, and the willingness to use its delegated authority in the manner intended, notwithstanding powerful political pressures to do otherwise. If the institution has only an advisory role, the potential to ameliorate the effects of the voting and interest group asymmetries will necessarily be very limited. If, however, the institution has significant powers – such as the right to initiate and postpone legislation, the power to regulate, monitor and enforce the behavior of economic agents, and the power to review government decisions – then it could help address several of the asymmetries.

But creating institutions with the powers and resources necessary to make a material difference to climate change policy is likely to be fraught with difficulty, not least because parliaments and governments will be reluctant to relinquish important

---

decision rights. Moreover, if an institution with substantive powers is not fully accountable to either the legislature or the government, its legitimacy is bound to be challenged, all the more so if it is perceived to be acting in a manner contrary to the interests of powerful groups. Aside from this, any such body would be faced with the daunting task of balancing a range of competing interests and determining the most cost-effective and appropriate mitigation strategies. And to the extent that its decisions are subject to judicial review, then in all likelihood climate policy making will be judicialized, with final decisions lying with the courts. In short, as with other situations where important decisions are delegated, there are bound to be significant risks and objections, not least the challenge for the principal (i.e. citizens or parliament) of ensuring that their agent serves their best interests and that agency losses are minimized.

### *Constraining solutions*

Solutions under this category are designed to work by constraining the decision rights of national governments and parliaments in relation to climate change policies so that long-term considerations regarding the climate and future generations' interests are given greater weight than would otherwise be the case. One such mechanism is to include provisions protecting the interests of future generations within a nation's constitution (i.e. assuming that there is a written constitution which is the supreme law). Under this approach, the courts would be able to strike down legislative provisions that are inconsistent with the interests of future generations, thereby forcing governments to enact only those policies that take such considerations properly into account (Hayward, 2005; Wood, 2004). To quote Beckman (2008, p. 612), rights-based solutions assume that "[a] constitutional right to a "decent" environment would protect the interests of future generations from the living majority's disregard for the environment".

Many domestic legal frameworks, such as the constitutions of Bolivia, Japan, and Norway, contain provisions to protect future generations and the environment. According to Bosselmann (2008, p. 126), 56 constitutions explicitly recognize the right to a clean and healthy environment and 97 constitutions contain provisions that make it the duty of the national government to prevent harm to the environment. Norway's constitution, for instance, states that:

[...]every person has a right to an environment that is conducive to health and to a natural environment whose productivity and diversity are maintained. Natural resources should be managed on the basis of comprehensive long-term considerations whereby this right will be safeguarded for future generations as well. In order to safeguard their right in accordance with the foregoing paragraph, citizens are entitled to information on the state of the natural environment and on the effects of any encroachment on nature that is planned or carried out. The authorities of the State shall issue specific provisions for the implementation of these principles (Stortinget, 1814 (as amended 2007), Article 110(b)).

Obviously, environmental rights enshrined in constitutions are only effective if they are enforced by courts. In Norway, the Supreme Court has not once referred to the above-mentioned article, despite the fact that it was introduced in 1992.

In principle, including environmental rights in a country's constitution should have the effect of strengthening the lobbying influence of environmental interest groups and, thereby, potentially ameliorating the interest group asymmetry. Such rights may

also help ameliorate the voting asymmetry by giving greater moral weight to the idea of protecting the interests of future generations. Against this, courts may be reluctant to constrain governments in significant ways on the basis of constitutional provisions of the kind in question, not least because of the problems of ascertaining the precise nature of the interests that are at stake and how any intergenerational clash of interests should be traded-off.

Another possible way of constraining the decision rights of national governments on climate change policies is to strengthen those institutions within the political system which are not directly linked to the election cycle and which, therefore, may be better placed to promote citizens' long-term interests. Tonn and Hogan (2006, p. 117), for instance, highlight the possibility of representing long-term environmental interests via upper houses of parliaments, such as the British House of Lords:

The House of Lords can accept the responsibility for vigorously overseeing that the actions of the House of Commons and the Government protect the future well-being of the heirs of the United Kingdom without any legislative action. This is because the United Kingdom does not have a written constitution and because the House of Lords has the right to set its own agenda and arrange its own processes.

Nevertheless, the capacity of upper houses to serve as guardians of the environment or the interests of future generations is likely to be limited. First, most upper houses are elected rather than appointed and are thus subject to normal electoral pressures. This is evident, for instance, in both Australia and the USA, where their respective Senates have recently delayed the passage of legislation (passed by comfortable majorities in their respective lower houses) designed to mitigate climate change. Second, even where upper houses are non-elected (as in Britain or Canada), their members may be no more inclined than their counterparts in the lower house to support strong measures to address climate change. Third, some upper houses have the power only to delay, rather than reject, government legislation, and in such cases their reservations can thus be overridden by the lower house (albeit not immediately). Fourth, not all democracies have upper houses, and it is doubtful whether there would be majority support for their creation if one of their primary roles is to counter the presentist bias of the existing political institutions. Accordingly, using upper houses as institutional mechanisms to protect the interests of future generations (e.g. by promoting vigorous action to address climate change) is unlikely to be an efficacious or politically tenable strategy.

#### *Rebalancing solutions*

Solutions under this category are designed to operate within the limits of a country's existing democratic political institutions. Hence, they do not diminish or revoke national decision rights on climate change policy; nor do they transfer important decision rights to non-elected bodies or impose new constitutional constraints on elected decision makers. Rather, the aim is to enhance the incentives for policy makers to protect the climate by changing (or rebalancing) the preferences of voters and/or altering the distribution of power between relevant interest groups or within the country's parliament, and/or improving the quality and availability of information about environmental performance. There are many possible ways to pursue this rebalancing.

Within the relevant literature, one commonly discussed method to strengthen the voting power of future generations is to lower a country's voting age, for instance, from

---

18 or 20 to 16 (or even lower) – as is now the case in Austria, Brazil and Cuba (Wattenberg, 2008; Twyford, 2009). A more radical solution, originally suggested by Demeny (1986), is to allow parents to vote on behalf of their children. Both solutions are designed to address the voting asymmetry by shifting the voting power towards future generations. However, both solutions are questionable. First, it is doubtful whether most children are sufficiently mature and politically informed to vote. Indeed, lowering the voting age runs the risk that parents or other agents may unduly influence young peoples' voting behavior. Second, there is no guarantee that parents will vote in the long-term interests of their children. Also, giving people additional votes on the basis of the number of children they have is utterly contrary to the egalitarian ethos underpinning the democratic method.

A different solution, originally suggested by Dobson (1996), is to reserve special parliamentary seats for so-called F-representatives (i.e. representatives of environmental groups and groups that promote the interests of future generations). This approach aims to reduce the voting and interest group asymmetries by ensuring that the interests of future generations and the environment are better represented in key political institutions. But would F-representatives accurately represent future generations' interests? Moreover, reserving parliamentary seats for particular groups raises a host of practical, ethical and political difficulties, and is unlikely to secure popular support.

Another option, proposed by Ekeli (2005), is to reward financially those political parties that promote measures to address long-term environmental issues, such as climate change. This approach aims to increase the influence of such parties in parliament and increase the incentive for decision makers to address climate change. But favoring "green" parties is highly unlikely to find popular acceptance, not least because it contravenes fundamental democratic principles. That said, there is certainly a strong case for ensuring that the rules governing political and campaign finance enable all citizens, irrespective of their income or wealth, to have an equal opportunity for effective political influence (Boston and Mladenovic, 2010). This implies the need for regulations that limit the campaign expenditure both by political parties and "third parties" (i.e. political actors that do not contest elections but seek to influence electoral outcomes). While such rules apply in some democracies (e.g. Britain and Canada), they are absent or inconsistently applied in many others (e.g. New Zealand and the USA).

A more indirect way of influencing decision makers' choices is to improve the quality and availability of data regarding a country's environmental performance. This might include the provision of better and more detailed official information regarding gains and losses of natural capital, changes in environmental quality or the extent to which humanity's consumption of resources exceeds the biological productivity of the Earth's ecosystems (Rees, 1992). Such solutions attempt to address the accounting asymmetry, and to a lesser extent the cost-benefit asymmetry, by making the costs of environmentally damaging activities more transparent – and thus the subject of more intense public scrutiny.

Considerable analytical work has been undertaken over recent years by international agencies (such as the IMF, OECD, UN and the World Bank) and within the accounting profession on how best to improve systems of accounting so that environmental impacts are properly considered. At the national level, many different metrics have been proposed, such as measures of "genuine investment" (which incorporate changes in different types of capital – manufactured, human, natural,

social and the knowledge base), measures of net changes in natural capital and eco-system quality, and various indices of economic growth that endeavor to take into account the environmental impacts of this growth, including “green” GDP measures.

Boyd (2007, p. 717), for instance, describes the purpose of developing a green GDP as follows:

For environmentalists, well-being provided by nature is as important as well-being provided by market consumption. Societies should be able to see how market consumption affects the consumption of public goods like beautiful views, clean air, and clean water. After all, consuming fewer manufactured products now in order to ensure more access to natural goods and services later may be in society’s best interest. Another reason to measure green GDP is [...] to track the provision of nature’s benefits over time, either to hold governments accountable or to compare [...] environmental conditions with those of another country [...] These tasks are impossible to achieve when nature’s contribution to human welfare cannot be measured.

Various countries have experimented with using green accounting measures including China, Norway, France and The Netherlands (Bühns, 2009, p. 159f). But there are difficulties with, and serious objections to, each of the available options (Stiglitz *et al.*, 2009). For instance, in order to develop a green GDP it is necessary to define, classify, and monetarily value all environmental goods and services, and changes in environment quality (Boyd, 2007; Howarth, 2007). China attempted such an exercise several years ago, but the initiative was abandoned after several years, partly because of the disturbing results.

Another option is to use a sustainability index. This provides a multi-dimensional measure for countries’ ability to maintain environmental assets and manage environmental problems (Esty *et al.*, 2005). Under one such approach, an index comprising 76 variables has been developed, with the variables grouped into five dimensions: environmental systems, environmental stresses, human vulnerability, social and institutional capacity, and global stewardship (Siche *et al.*, 2008, p. 630). While such an index makes it possible, at least in principle, to rank countries according to their environmental performance and sustainability, many concerns have been raised about the objectivity, neutrality and utility of measures of this nature (Sutton and Costanza, 2002).

To compound matters, there is little evidence that green accounting measures are being taken seriously by policy makers or the wider community. And to date they have certainly attracted far less attention than standard measures of economic performance, such as GDP. In short, while there is clearly a case for developing new measures of environmental performance and improving accounting methods to ensure that environmental considerations are properly taken into account, it is unlikely that the accounting asymmetry will be significantly ameliorated in the near future. Moreover, given the dominance of current economic and accounting paradigms, it may take generations to change the way societies assess their progress and institutional performance.

### **Conclusion**

There is strong evidence of a significant mismatch between the magnitude of the problem of human-induced climate change and current efforts to address it. Undoubtedly, this mismatch is at least partly due to the spatial dimension of the issue

---

– especially the fact that avoiding dangerous climate change requires concerted global action in a context where there are significant incentives to free ride (or at least wait for others to take the lead). Yet, as argued above, this spatial dimension is intensified and compounded by four politically-salient asymmetries that affect the policy choices of liberal democracies: the voting asymmetry, the cost-benefit asymmetry, the interest group asymmetry and the accounting asymmetry. If ambitious and effective measures to mitigate climate change are to be implemented, some way must be found to ameliorate these four asymmetries or negate their effects.

This paper has outlined and briefly assessed four broad types of solution to these asymmetries, highlighting the different mechanisms through which they operate. While the solutions considered here have the potential to ameliorate one or more of the four asymmetries, all of them are open to objections, few hold much promise of being implemented, and even those which may be political feasible are likely to be of only limited effectiveness. Of the supra-national solutions, the EU provides a positive example of how regional collaboration on climate change mitigation can operate. But, as noted earlier, this approach may be difficult to replicate elsewhere. Further, there is still the possibility that the global community will be able to reach agreement on a new climate change regime, if not by the end of 2012 then at least within a few years of this. But judging by the limited progress of the UNFCCC negotiations in Copenhagen in late 2009 and subsequently, any such agreement is unlikely to impose obligations sufficient to avoid substantial global warming over the coming century.

In due course, if the projections of the mainstream scientific community prove to be correct, then several of the four asymmetries will begin to weaken, thus facilitating more ambitious measures to mitigate climate change. For instance, as the costs of adapting to global warming begin to mount and as the threats of serious damage become more immediate and widespread (e.g. as a result of sea-level rise and storm damage) it is likely that there will be a change in public perceptions regarding the merits of governmental action to reduce emissions. In other words, the structure of the cost-benefit asymmetry will alter somewhat in favor of mitigation. If a relatively high discount rate is applied, however, it may be many decades before a convincing economic case for mitigation can be mounted. By then, of course, it might be too late; irreversible damage to key biophysical systems may be inevitable.

At the same time, both the interest group and voting asymmetries are likely to undergo change as the economic and environmental damage generated by climate change becomes more visible, extensive and costly. Moreover, as the green technology revolution gathers momentum, the interest group asymmetry can be expected to change, with those having a financial stake in clean technologies gathering strength and those with a vested interest in carbon-intensive industries suffering a slow diminution of political influence. At some point, a tipping point will be crossed and these asymmetries will cease to exercise the kind of influence on government policy making that they have had hitherto. What remains uncertain is when this tipping point will occur and how rapidly it will be possible to decarbonize the global economy once it becomes politically possible to take urgent and comprehensive measures. In the meantime, it seems probable that most democratic governments will be constrained by the four asymmetries such that only gradual, *ad hoc* measures to reduce emissions will be electorally feasible. This may be grim news for future generations, but it appears to be the only realistic conclusion.

## Notes

1. Annex 1 Parties are not required under the Kyoto Protocol to reduce their domestic emissions by the specific targets agreed to, but rather to take responsibility for reductions of the agreed magnitude. Parties have the option, if they wish, of achieving these reductions through the purchase of Kyoto-compliant emission allowances on the international market or via the Clean Development Mechanism. For this reason, the Kyoto targets should be thought of as responsibility targets rather than domestic reduction targets.
2. Recent studies indicate that in order to stabilize GHG at 550 parts per million, the average annual world GDP growth between 2012 and 2050 is likely to be reduced by 0.11 percentage points, resulting in world GDP being reduced by about 4 percent in 2050 relative to business-as-usual projections (OECD, 2009, p. 12).
3. Of course, many of these costs, such as higher prices for fossil fuels, will be passed on to consumers, and thus dispersed. Nonetheless, carbon-intensive industries have a strong financial incentive to oppose policies that seek to internalize the negative externalities generated by GHG emissions.

## References

- Agranoff, R. (Ed.) (1999), *Accommodating Diversity: Asymmetry in Federal States*, Nomos, Baden-Baden.
- Beckman, L. (2008), "Do global climate change and the interest of future generations have implications for democracy?", *Environmental Politics*, Vol. 17 No. 4, pp. 610-24.
- Bernauer, T. and Koubi, V. (2009), "Effects of political institutions on air quality", *Ecological Economics*, Vol. 68 No. 5, pp. 1355-65.
- Bosselmann, K. (2008), *The Principle of Sustainability: Transforming Law and Governance*, Ashgate, Aldershot.
- Boston, J. (2010), "Holding humanity to account for the future state of the planet", *Stimulus: The New Zealand Journal of Christian Thought and Practice*, Vol. 18 No. 1, pp. 19-31.
- Boston, J. and Mladenovic, A. (2010), "Political equality and the regulation of election spending by parallel campaigners", *Australian Journal of Political Science*, Vol. 45 No. 4, pp. 623-42.
- Boyd, J. (2007), "Nonmarket benefits of nature: what should be counted in green GDP?", *Ecological Economics*, Vol. 61 No. 4, pp. 716-23.
- Boyd, J. and Banzhaf, S. (2007), "What are ecosystem services? The need for standardized environmental accounting units", *Ecological Economics*, Vol. 63 No. 2, pp. 616-26.
- Brand, C. and Boardman, B. (2008), "Taming of the few – the unequal distribution of greenhouse gas emissions from personal travel in the UK", *Energy Policy*, Vol. 36 No. 1, pp. 224-38.
- Broome, J. (2008), "The ethics of climate change", *The Scientific American*, June, available at: [www.scientificamerican.com/article.cfm?id=the-ethics-of-climate-change](http://www.scientificamerican.com/article.cfm?id=the-ethics-of-climate-change) (accessed 6 August 2009).
- Bührs, T. (2009), *Environmental Integration: Our Common Challenge*, SUNY Press, New York, NY.
- Caney, S. (2008), "Human rights, climate change, and discounting", *Environmental Politics*, Vol. 17 No. 4, pp. 536-55.
- (The) Centre for Public Integrity (2009), "The global climate change lobby: key findings", available at: [www.publicintegrity.org/investigations/global\\_climate\\_change\\_lobby/key-findings](http://www.publicintegrity.org/investigations/global_climate_change_lobby/key-findings) (accessed 9 February 2010).

- 
- Congleton, R.D. (1992), "Political institutions and pollution control", *Review of Economics and Statistics*, Vol. 74 No. 3, pp. 412-21.
- Cornforth, A. (2009), "Behaviour change: insights for environmental policy making from social psychology and behavioural economics", *Policy Quarterly*, Vol. 5 No. 4, pp. 21-8.
- Demery, P.G. (1986), *Population and the Invisible Hand*, Population Council, New York, NY.
- Deschouwer, K. (2005), "Pinball wizards: political parties and democratic representation in the changing institutional architecture of European politics", in Römmele, A., Farrell, D.M. and Ignazi, P. (Eds), *Political Parties and Political Systems: The Concept of Linkage Revisited*, Praeger, Westport, CT.
- Dobson, A. (1996), "Representative democracy and the environment", in Lafferty, W. and Meadowcroft, J. (Eds), *Democracy and the Environment*, Edward Elgar, Cheltenham.
- Eaton, J.G. (2002), "The beauty of asymmetry: an examination of the context and practice of asymmetric and unconventional warfare from a Western/Centrist perspective", *Defence Studies*, Vol. 2 No. 1, pp. 51-82.
- Ekeli, K.S. (2005), "Giving a voice to posterity – deliberative democracy and representation of future people", *Journal of Agricultural and Environmental Ethics*, Vol. 18 No. 5, pp. 429-50.
- Esty, D.C., Levy, M., Srebotnjak, T. and de Sherbinin, A. (2005), *2005 Environmental Sustainability Index: Benchmarking National Environmental Stewardship*, Yale Center for Environmental Law and Policy, New Haven, CT.
- Farzin, Y.H. and Bond, C.A. (2006), "Democracy and environmental quality", *Journal of Development Economics*, Vol. 81 No. 1, pp. 213-35.
- Frederiksson, P.G., Neumayer, E., Damania, R. and Gates, S. (2005), "Environmentalism, democracy, and pollution control", *Journal of Environmental Economics and Management*, Vol. 49 No. 2, pp. 343-65.
- Gardiner, S.M. (2009), "Saved by disaster? Abrupt climate change, political inertia, and the possibility of an intergenerational arms race", *Journal of Social Philosophy*, Vol. 40 No. 2, pp. 140-62.
- Haas, P.M., Keohane, R.O. and Levy, M.A. (1993), *Institutions for the Earth: Sources of Effective International Environmental Protection*, MIT Press, Cambridge, MA.
- Hayward, T. (2005), *Constitutional Environmental Rights*, Oxford University Press, Oxford.
- Helm, D. (2009), "EU climate-change policy", in Helm, D. and Hepburn, C. (Eds), *The Economics and Politics of Climate Change*, Oxford University Press, Oxford.
- Howarth, R.B. (2007), "Towards an operational sustainability criterion", *Ecological Economics*, Vol. 63 No. 4, pp. 656-63.
- Intergovernmental Panel on Climate Change (IPCC) (2007), *Climate Change 2007: Synthesis Report*, Cambridge University Press, Cambridge.
- Jacobs, A. (2008), "The politics of when: redistribution, investment and policy making for the long term", *British Journal of Political Science*, Vol. 38 No. 2, pp. 193-220.
- Kaul, I., Grunberg, I. and Stern, M. (Eds) (1999), *Global Public Goods: International Cooperation in the 21st Century*, Oxford University Press, New York, NY.
- Kiss, A. (1995), "The rights and interests of future generations and the precautionary principle", in Freestone, D. and Hey, E. (Eds), *The Precautionary Principle and International Law: The Challenge of Implementation*, Kluwer, The Hague.
- Lazarus, R. (2009), "Super wicked problems and climate change: restraining the present to liberate the future", *Cornell Law Review*, Vol. 94 No. 5, pp. 1153-234.

- Leyden, D.P. (2005), *Adequacy, Accountability, and the Future of Public Education Funding*, Springer, New York, NY.
- Lohmann, S. (1998), "An information rationale for the power of special interests", *The American Political Science Review*, Vol. 92 No. 4, pp. 809-27.
- Low, N. and Gleeson, B. (1998), *Justice, Society, and Nature: An Exploration of Political Ecology*, Routledge, London.
- Nordhaus, W.D. (1997), "Discounting in economics and climate change: an editorial comment", *Climatic Change*, Vol. 37 No. 2, pp. 315-28.
- Organisation for Economic Co-operation and Development (OECD) (2009), *The Economics of Climate Change Mitigation: Policies and Options for Global Action beyond 2012*, OECD, Paris.
- Partridge, E. (2003), "Future generations", in Jamieson, D. (Ed.), *A Companion to Environmental Philosophy*, Blackwell, Oxford.
- Pellegrini, L. and Gerlagh, R. (2006), "Corruption, democracy, and environmental policy", *The Journal of Environment & Development*, Vol. 15 No. 3, pp. 332-54.
- Polk, A. and Schmutzler, A. (2005), "Lobbying against environmental regulation vs lobbying for loopholes", *European Journal of Political Economy*, Vol. 21 No. 4, pp. 915-31.
- Raffensberger, C., Giannini, T. and Docherty, B. (2008), "Models for protecting the environment for future generations", Science and Environmental Health Network and The International Human Rights Clinic at Harvard Law School, available at: [www.sehn.org/pdf/Models\\_for\\_Protecting\\_the\\_Environment\\_for\\_Future\\_Generations.pdf](http://www.sehn.org/pdf/Models_for_Protecting_the_Environment_for_Future_Generations.pdf) (accessed August 21, 2009).
- Ravallion, M., Heil, M. and Jalan, J. (2000), "Carbon emissions and income inequality", *Oxford Economic Papers*, Vol. 52 No. 4, pp. 651-69.
- Rees, W.E. (1992), "Ecological footprints and appropriated carrying capacity: what urban economics leaves out", *Environment and Urbanization*, Vol. 4, pp. 121-30.
- Richardson, K., Steffen, W., Joachim Schellnhuber, H., Alcamo, J., Barker, T., Kammen, D.M., Leemans, R., Liverman, D., Munasinghe, M., Osman-Elasha, B., Stern, N. and Wæver, O. (2009), *Synthesis Report from – Climate Change: Global Risks, Challenges and Decisions*, University of Copenhagen, Copenhagen.
- Shoham, S. and Lamay, N. (2006), "Commission for Future Generations in the Knesset: lessons learnt", in Tremmel, J. (Ed.), *Handbook of Intergenerational Justice*, Edward Elgar, Cheltenham.
- Siche, J.R., Agostinho, F., Ortega, E. and Romeiro, A. (2008), "Sustainability of nations by indices: comparative study between environmental sustainability index, ecological footprint and the energy performance indices", *Ecological Economics*, Vol. 66 No. 4, pp. 628-37.
- Stephenson, P. and Boston, J. (2010), "Climate change, equity and the relevance of European effort-sharing for global mitigation efforts", *Climate Policy*, Vol. 10 No. 1, pp. 3-16.
- Stern, N. (2006), *The Economics of Climate Change: The Stern Review*, Cambridge University Press, Cambridge.
- Stiglitz, J., Sen, A. and Fitoussi, J. (2009), *Report by the Commission on the Measurement of Economic Performance and Social Progress*, Commission on the Measurement of Economic Performance and Social Progress, Paris.
- Stortinget (Norwegian Parliament) (1814), "Constitution of the Kingdom of Norway", (as amended 2007), available at: [www.stortinget.no/en/In-English/About-the-Storting/The-Constitution/The-Constitution/](http://www.stortinget.no/en/In-English/About-the-Storting/The-Constitution/The-Constitution/) (accessed September 4, 2009).

- Sutton, P. and Costanza, R. (2002), "Global estimates of market and nonmarket values derived from nighttime satellite imagery, landcover, and ecosystem service valuation", *Ecological Economics*, Vol. 41 No. 3, pp. 509-27.
- Thompson, D. (2005), "Democracy in time: popular sovereignty and temporal representation", *Constellations*, Vol. 12 No. 2, pp. 245-61.
- Tonn, B. and Hogan, M. (2006), "The House of Lords: guardians of future generations", *Futures*, Vol. 38, pp. 115-9.
- Twyford, P. (2009), "Give kids the vote, or at least give it to their parents", New Zealand Labour Party, available at: <http://blog.labour.org.nz/index.php/2009/07/05/give-kids-the-vote-or-at-least-give-it-to-their-parents/> (accessed August 30, 2009).
- Wattenberg, M.P. (2008), *Is Voting for Young People?*, Pearson Education, New York, NY.
- Watts, R.L. (1999), *Comparing Federal Systems*, 2nd ed., McGill-Queen's University Press, Montreal.
- Wolf, C. (1987), "Market and non-market failures: comparison and assessment", *Journal of Public Policy*, Vol. 7 No. 1, pp. 43-70.
- Wood, P. (2004), "Intergenerational justice and curtailments on the discretionary powers of governments", *Environmental Ethics*, Vol. 26 No. 4, pp. 411-28.

**Corresponding author**

Jonathan Boston can be contacted at: [jonathan.boston@vuw.ac.nz](mailto:jonathan.boston@vuw.ac.nz)