

Civil Society Report on Climate Change

Produced by the
Civil Society Coalition on Climate Change

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About the Civil Society Coalition on Climate Change

The Civil Society Coalition on Climate Change seeks to educate the public about the science and economics of climate change in an impartial manner. It was established as a response to the many biased and alarmist claims about human-induced climate change, which are being used to justify calls for intervention and regulation.

The Coalition comprises 41 independent civil society organisations who share a commitment to improving public understanding about a range of public policy issues. All are non-profit organizations that are independent of political parties and government.

www.csccl.info

Summary

The science of climate change remains hotly contested, with substantial disagreements over what impact humanity might have on the earth's future climate (e.g. McKittrick, forthcoming; Green and Armstrong, 2007; Lindzen, 2005; Houghton, 2005). Nevertheless, there is considerable pressure on politicians to take action. Unfortunately, the organisation set up to advise governments on what action to take, the Intergovernmental Panel on Climate Change, has shown itself to be heavily biased (Henderson, 2007; Holland, 2007; Peiser, 2007; Tol, 2007; Kasper, This Volume). This report is an attempt to provide an independent assessment of the implications of climate change for humanity and the policy options that might be adopted.

The report has been prepared by a coalition of 41 civil society organisations from around the world. Background papers were prepared by some of the most noted experts in their respective fields. We then summarised the main findings of those experts and came up with our own policy recommendations.

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Background: the climate debate in the 21st century

While global warming very likely is real and may well cause problems, the debate has become distorted by alarmists who claim that unless drastic and urgent action is taken, catastrophic climate change will decimate humanity. They say that global mean temperature must not rise by more than 2 degrees Celsius above the temperature in the mid-19th century. If it does, a vicious cycle of warming might result,

leading to devastating droughts, disease, pestilence, famine, floods and other disasters.

These alarming claims have helped propel global warming from a scientific curiosity to the mother of all environmental scares in a little over 20 years. The threat has been made more visceral through clever marketing on the part of environmentalist groups, as well as journalists who know that bad news sells. Scientists seeking funding for their research – and perhaps also suffering from ideological bias – have been happy conspirators, writing papers and appearing in the media. Meanwhile, many businesses, from corn growers to hedge fund managers, have found it convenient to jump on the bandwagon.

And once the wagon got moving, politicians became generally wary of stepping in the way. This is why we ended up with a treaty that supposedly requires 'industrialised' countries to reduce their emissions of greenhouse gases (GHGs) to 5 per cent below 1990 levels by 2008–2012. This treaty, the Kyoto Protocol, agreed in 1997, was seen as the first step on the road to reducing global emissions of GHGs. In reality, it has barely made a dent in those emissions – in spite of costing many billions of dollars.¹

It is worth bearing in mind at the outset that the claims of 'consensus' and objectivity so often made in respect of this issue smack of hubris for a very good reason. There is even a sense that the cart may have been put before the horse. After all, environmentalists have been arguing for decades that we should reduce our consumption of fossil fuels. During the early 1970s, at the birth of the modern (anti-capitalist) environmental movement and in the context of an apparently cooling atmosphere, the pretext for such reductions was the threat of global cooling – which was supposed to result from aerosols

emitted as a by-product of human use of fossil fuels. The co-author of one of the key papers on global cooling, Stephen Schneider, subsequently became a prominent proponent of global warming (Rasool and Schneider, 1971; Schneider, 1989).

And now, as we approach the substantive implementation period for Kyoto (2008–2012), huge uncertainty exists over what will happen at the end of 2012, when Kyoto expires. The additional scaremongering that we have seen over the past 24 months has largely been generated in an attempt to convince us that a post-2012 agreement with binding targets and timetables for emission reductions is necessary. But is such an agreement really necessary? Or is this just a ruse by powerful vested interests who fear that the lack of a subsequent commitment period will undermine the existing restrictions, from which they are making billions of dollars at our expense?

This report seeks to put the threat of climate change into perspective. More importantly, it seeks to offer policies that would enable all people around the world to live better, happier, longer, more productive lives. These policies would also enable future generations to be less adversely affected by climate change.

The report begins with a measured assessment of the likely impact of climate change on human health, weather-related natural disasters, agriculture and forestry. We summarise a series of contributions made by some of the most eminent experts in their fields, which are included as subsequent chapters. These expert analyses were commissioned in order that we might better understand how humans have been affected by climates in the past and in the present; how we have adapted to those climates – or not; and thus what the real prognosis might be for the future.

The major difference between these expert analyses and the reports produced by the IPCC (and other biased analyses), is that we asked the authors to analyse how humans have responded and might respond realistically to the problems they face. We did this in recognition of the fact that humans are intelligent problem solvers. When faced with a threat, humans are not generally passive; we react, identify the source of the threat and seek to address it. The more entrepreneurial among us

convert the threat into opportunities. So it has been with agriculture, forestry, health threats and natural disasters in the past – and, barring aggressive interventions by governments, so it will be in the future; as the following section demonstrates.

Human health

Alarmists claim that a rise in global temperatures will result in a dramatic increase in all sorts of diseases. The World Health Organization even claims that human-induced global warming is already killing at least 150,000 people per year, including 77,000 due to protein malnutrition, 47,000 due to diarrhoeal disease, and 27,000 due to malaria (explained in more detail by Indur Goklany in this report, page 51).

While it is true that many millions of people currently suffer from communicable diseases, there is little if any substance to the claim that people are dying from these diseases as a result of climate change. Paul Reiter observes:

Two factors are key to the transmission of infectious diseases of humans: human ecology and human behavior. When the cycle of transmission includes mosquitoes, ticks, rodents or other intermediaries, their ecology and behavior are also critical. When multiple species are involved, the levels of complexity are even greater. Lastly, the virulence of the pathogen, the susceptibility of its hosts and the immunity of the host populations can be critical at all levels.

Climate and weather are often invoked as the dominant parameters in transmission, but their true significance can only be assessed in the perspective of this daunting complexity. (page 22)

Enteric (intestinal) diseases are much more common among people in poor countries than people in affluent countries. Approximately one million people die each year from dehydration as a result of diarrhoea, practically all of them in poor countries. In wealthy countries, diarrhoeal diseases such as cholera and dysentery were eliminated primarily through the introduction of modern sanitation and sewerage systems in the late nineteenth and early twentieth centuries. However, as Reiter notes (page 25) there has been a

resurgence of some food-borne pathogens in affluent countries as a result of modern agricultural and food preparation practices. Favourable conditions for the spread of enteric diseases often prevail in hospitals, day-care centres and homes for the elderly.

Though many poor countries have public sanitation laws on their books, in practice, such measures frequently are non-existent. In the densely populated peri-urban shanties that are ubiquitous in such countries, a lack of clean water and sewerage exacerbates the conditions which enable both enteric and vector-borne diseases to run rampant.

With regard to enteric diseases, Reiter concludes that

Human health is determined by a constellation of events and circumstances. In the developing world, the main defects are in the social matrix: a scarcity of basic needs: shelter, food, clothing, electricity, clean water, a safe living environment, education and access to healthcare. In wealthier countries, new and challenging problems have arisen as a direct result of economic success. In both cases, straightforward strategies are available to correct the problems, given suitable economic circumstances.
(page 26)

Vector-borne diseases such as malaria are essentially diseases of poverty. Many of today's affluent countries once experienced levels of vector-borne diseases similar to those now experienced by poor countries. In the fourteenth century, one-third of Europe's population died from the Black Death, which was spread by fleas that thrived on rats living in the sewers of medieval towns. Wealthy countries have largely eliminated such diseases through a combination of environmental interventions (such as the use of pesticides and mechanized agriculture), improved water and sewerage systems, improved human living conditions, and the development of vaccines and medicines.

However, such diseases remain a significant public health problem in Sub-Saharan Africa and in poorer parts of Asia and Latin America. Reiter notes:

Malaria is the most important of all mosquito-borne diseases. Each year, 350–500 million cases of malaria occur worldwide, and over a million people die, most of them young children in sub-Saharan Africa.

This appalling toll is mainly restricted to the tropics, but less than forty years have passed since the final eradication of the disease from Europe. (page 28)

Reiter outlines no fewer than nine behavioral and ecological factors, and three climatic factors, which affect the transmission of malaria to human beings. He concludes that the complex interaction of these factors makes it difficult to predict the likely impact of long-term climate change on the transmission of malaria.

Another area of concern is mosquito-borne zoonoses (animal diseases that are capable of transmission to humans) such as yellow fever, dengue, and Chikungunya. Reiter says that "infections in humans are incidental, acquired by an arthropod that has been infected by feeding on a bird or mammal" (page 36) and this makes their transmission even more complex than enteric diseases or malaria.

Finally, diseases such as tick-borne encephalitis (TBE) are frequently invoked to be symptomatic of global warming but like the other types of diseases he considers, Reiter observes that the factors which govern the transmission of TBE are interconnected and complex. In fact, he says:

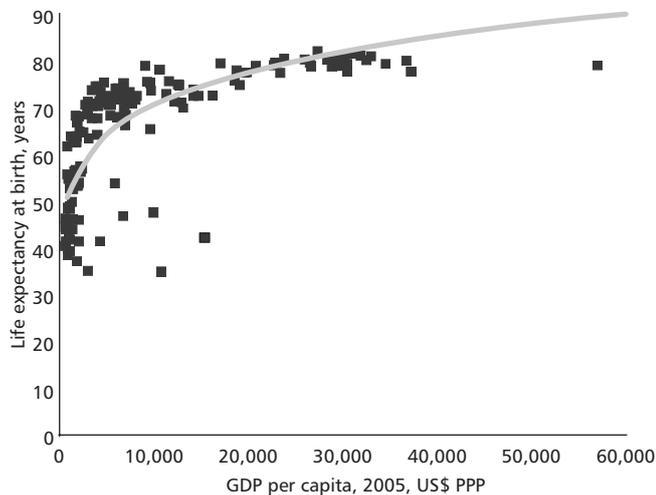
The factors that influence transmission are so complex that they present an outstanding example of how intuitive thinking from a starting point of changing climate can offer an explanation that is simple, persuasive, and wrong. (page 40)

In conclusion, Reiter states:

The ecology and natural history of disease transmission, particularly transmission by arthropods, involves the interplay of a multitude of interacting factors that defy simplistic analysis. The rapid increase in the incidence of many diseases worldwide is a major cause for concern, but the principal determinants are politics, economics, human ecology and human behaviour. (page 41)

Given the complexity of the transmission and distribution of these diseases, and especially given the important role of human action as a determining factor, it is clearly unrealistic to make predictions of future incidence of disease simply on the basis of changes in climate.

Figure 1 **GDP per capita and life expectancy at birth**



Source: World Development Indicators, World Bank (2007). Most recent available data were used.

There is an inconsistency in the forecasts of disease incidence produced by the IPCC. The scenarios in which the highest rates of increase of disease are experienced are the same scenarios in which the world is assumed to warm the most – as a result of rapid increases in emissions of carbon dioxide. These increases in emissions result from rapid increases in economic activity – especially in poorer countries.

Yet there is a very strong and robust relationship between average GDP per capita and life expectancy at birth (Pritchett and Summers, 1996). This is especially true of GDP per capita at lower levels (see Figure 1), where a small increase results in a comparatively large increase in life expectancy. The reason is that such increases in output coincide with people accessing clean water, sanitation and other services that reduce the incidence of communicable diseases. If economic growth did occur at the rates envisaged in the more extreme IPCC scenarios, it seems most unlikely that there will be a substantial increase in mortality from communicable diseases; it is far more likely that the opposite would happen.

Given the strong relationship between GDP per capita and the prevention of communicable diseases, the main policy implication is that societies – and especially poorer societies – should be structured in such a way as to increase rates of GDP per capita.

In addition, it is of utmost importance that existing restrictions on the ability of people to access clean water, sewerage, and sanitation services be removed. For example, in many poor countries, governments fail to supply clean water and sewerage to peri-urban and rural populations (Solo et al. 1993). Meanwhile, those same governments have made it illegal for private companies to supply water and sewerage, even though this is the only option for hundreds of millions of people (Okonski and Cudjoe, 2006). Removing restrictions on the private supply of water and sewerage is a matter of extreme urgency.

The success of the Rotary Club programme to vaccinate against polio, as well as other programmes run by various private and public organizations, suggests that there is also a role for vaccination programmes. Beyond the removal of any regulatory restrictions, tariffs and other government-imposed barriers that may unnecessarily increase the cost and difficulty of implementing such programmes, the policy implications are not clear. While governments do get involved in vaccine programmes, their success is mixed, and there is considerable evidence of waste and ineffectiveness in government-run healthcare programmes in poor countries (Lewis, 2007), so a general rule cannot be proposed.

Another area where intervention may be beneficial (either through private or public sector actors) is through vector control programmes, especially for the *Anopheles* mosquito which transmits malaria.

There is also clearly a role for increasing access to existing treatments for the diseases of poverty, as well as for the development of new treatments. Again, the main policy implication is that existing barriers to such access – including pervasive tariffs and regulations – should be removed (Irvine, 2004; Bate, Tren and Urbach, 2005).

Finally, it is worth re-emphasising that at present, hundreds of millions of people continue to suffer and millions of people die each year as a result of diseases that are readily prevented and/or cured. The fact that the incidence of such diseases remains so high is testament to the failure of measures taken by the international community to address this problem.

The reasons for this failure are manifold but

fundamentally two factors are significant. First, the UN and its various agencies do not have the capacity, knowledge or competence to implement programmes that would reduce significantly the incidence of these diseases. Second, the governments of many poorer countries actively prevent entrepreneurial wealth generation and thereby perpetuate both poverty and disease. It is simply unacceptable that the UN as a whole and many of its member governments blame ‘climate change’ for problems that either they have failed to address or that they have actively caused.

Weather-related catastrophes

In mid-November 2007, a cyclone hit the southern coastline of Bangladesh. Estimates suggested that at least 5,000 people died as a result of the tidal surge and winds, which were equivalent in force to a hurricane. In addition to this tragic loss of life, thousands were displaced and lost their homes, hundreds of fishermen lost their boats, rice farmers’ crops were destroyed, as were shrimp farms. In 1991, at least 143,000 died in a similar event. This year’s tragedy might have been far worse but for the fact that over a million people were given sufficient forewarning to move out of harm’s way.

Simultaneous to the cyclone, the IPCC released its Fourth Assessment Report. Environmental activists and television media, as well as one of the Bangladeshi representatives to the IPCC, were quick to allege that the cyclone was the result of global warming caused by industrialized nations.

Indeed, it has become commonplace for climate alarmists to use individual weather events – cyclones, hurricanes, floods, storms, droughts, and other phenomena – as definitive ‘evidence’ of present global warming. They warn that future planetary warming will cause such events to become more frequent, more fierce, and thus cause more devastation and loss of life.

In this report, Indur Goklany analyses available US and global data regarding mortality and mortality rates from extreme weather events, for a time period covering approximately the past century, up to 2007. His analysis indicates that:

Aggregate mortality and mortality rates due to extreme

weather events are generally lower today than they used to be. Globally, mortality and mortality rates have declined by 95 percent or more since the 1920s. (page 47)

In the context of global deaths from all causes, Goklany shows that while extreme weather-related events “garnish plenty of attention worldwide because of their episodic and telegenic nature”, their contribution to the global mortality burden is only 0.03–0.06 percent. In summary, the data show that:

The average annual death toll for 2000–2006 due to all weather-related extreme events was 19,900. By contrast, the World Health Organization estimates that in 2002, a total of 57.0 million people died worldwide from all causes, including 5.2 million from other kinds of accidents. Out of these, road traffic was responsible for 1.2 million deaths, violence (other than war) for 0.6 million, and war for 0.2 million. (page 50)

Thus, as a relative proportion of all deaths, the death toll from weather-related extreme events is small. Goklany says:

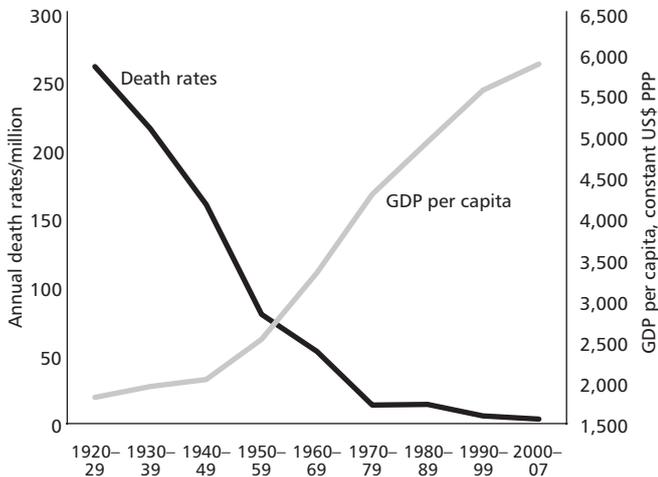
Based on current contributions [of extreme weather events] to the global mortality burden, other public health issues outrank climate change. (page 51)

Moreover, as Figure 2 shows, death rates fall dramatically as wealth and technological sophistication increase. All indications suggest that deaths from natural disasters will continue to fall as societies become more technologically and economically sophisticated. However, as Goklany concludes,

Greater adaptive capacity is necessary but not sufficient to effectively cope with extreme events. Such capacity must be deployed more rapidly and used more fully. (page 56)

While the climate of a region – especially associated floods, droughts, storms, heatwaves and cold spells – affects everyone, it disproportionately affects the poor. This is because poor people are less able to adapt than are wealthy people. Wealth has enabled the development of better building technologies, so that dwellings are better able to withstand the elements. It has made possible the development of better infrastructure such as the Thames Barrier, which protects London and its

Figure 2 **Death rates from extreme weather events and GDP per capita**



Note that while the number of deaths and death rates were apparently lower in the period 1900–1920 than in 1920–1950, this is largely an artefact of poor data during those early years. If better data were available, it would most likely indicate that death rates were similar or perhaps even higher than in subsequent decades.
 Source: EM-DAT (2007) and WDI (2007). Most recent data available were used in each case.

surrounds from tidal surges. The wealthy also have wider access to the better warning systems afforded by mass media and communications technologies, which enables them to escape adverse events.

People who reside in wealthy countries can also limit indirect effects by – among other things – economic diversification and using modern agricultural technologies (which means that climate-sensitive activities such as agriculture constitute a smaller proportion of economic output), and by purchasing insurance. In combination, these factors contributed heavily to the decline in deaths and death rates due to weather-related disasters in the 20th century.

In general, insurance is highly beneficial, but inappropriate insurance schemes can encourage people to build in disaster-prone areas. Government-subsidised insurance programmes are particularly susceptible to this – since they are often created in response to disasters – and result in ‘moral hazard,’ encouraging people to engage in such risky behaviour.

The above discussion of extreme weather, and in particular the decline in weather-related mortality over the past century, indicates that policymakers should

undertake specific measures to enhance the adaptive capacity of their people, and nations, to deal with extreme weather events.

Wealthy countries have developed insurance markets because they have created an underlying institutional order – namely, property rights, freedom of contract, and a transparent judicial system – which supports the transactions that occur in those markets. Because poor countries tend to lack these institutions, few if any entrepreneurs are willing to supply insurance.

At the same time, a lack of property rights means that the poor are not able to create more robust structures – such as brick homes, instead of mud and thatch huts – in which to dwell. Thus, when a cyclone hits Bangladesh, thousands of people lose their lives, and hundreds of thousands of people lose their homes in the deluge. When a hurricane hits Florida, there is certainly physical devastation – but few people die, and few homes are washed away or destroyed beyond repair. The important difference between the two places is that most people in Florida own their property, whereas in Bangladesh, the opposite is the case.

Thus, our first suggestion to policymakers is that poor countries urgently need to undertake economic and legal reforms to enable insurance markets to develop and function. Specifically, this means formalizing property rights, eliminating government-imposed barriers to entrepreneurship, and creating functioning, transparent legal systems. For similar reasons, governments must recognize currently disenfranchised citizens, and extend formal legal rights to them.

This brings us to a second potential reform. Those governments who seek policies that enable their citizens to cope with potential climate changes should remove barriers to private insurance. In addition, they should eliminate government subsidies to insurance, including bail outs and other policies that encourage moral hazard.

Third, there are real improvements which need to be made in the physical infrastructure of poor countries – for instance, bridges, dams, dykes, electricity, water and sewerage, and telecommunications. This is particularly applicable in those countries such as Bangladesh where millions of people live in low-lying deltas. But corruption is rife among government officials of many such

countries, meaning that funds for infrastructure projects are often siphoned away and used for other purposes altogether. If governments cannot organize themselves to provide infrastructure, then they should enable private entrepreneurs to do so – and not inhibit them, as currently tends to be the case.

A related problem is that state-run monopolies – whether they provide electricity, water, or telecommunications services (e.g. telephone, Internet) – generally provide poor service at an extremely high cost and prevent the poor from availing themselves of lower prices from competition. For this and a variety of other reasons, our fourth recommendation is that such state-operated companies should, at the very least, be subjected to competition. Then entrepreneurs will have incentives to serve more customers with better products, in a less costly manner (Arunga and Kohara, 2007; Okonski and Cudjoe 2007). Such competition will enhance the adaptive capacity of individuals to be prepared for extreme weather events.

Bangladesh is often used as an example of an underdeveloped country whose 130 million inhabitants are greatly at risk of global-warming-induced flooding because they live in a low-lying river delta. Bangladeshi officials frequently invoke global warming in their appeals for the governments of wealthy countries to provide their country with foreign aid.

It is thus appropriate to compare Bangladesh with The Netherlands, a country of around 16 million inhabitants. Most of The Netherlands lies below sea-level but it has not experienced a flood since 1953. Purely on the basis of the threat of inundation from the sea, The Netherlands should be more ‘at risk’ than Bangladesh. So why is Bangladesh so much more at risk of losing human life and experiencing economic losses from flooding compared to The Netherlands?

The simple reason is that The Netherlands has been a liberal democracy for over three centuries and has benefited from more-or-less continuous economic growth during that period. That economic growth has enabled Holland to invest in infrastructure – in the form of dykes – which protect it from flooding. By contrast, prior to independence in 1971, Bangladesh was ruled by a series of more-or-less oppressive absentee landlords

(the Moguls, the British, Pakistan). Since independence, it has been ruled by a series of more-or-less oppressive and incompetent elected officials. As a result, and in spite of (perhaps even in part because of) billions of dollars in aid, the majority of its inhabitants remain poor and disenfranchised, unable to control their immediate environment.

This comparison demonstrates why the policy measures recommended above are imperative, and especially for poor countries, which are almost certainly more vulnerable to the potential effects of extreme weather events – with or without climate change.

Agriculture and forestry

Alarmists have made much of a few models that predict a decline in the Indian monsoon, saying that this could have a devastating effect on agricultural output in that continent. But such models fail to take into account changes in technology which are already occurring and which are likely to continue into the future. An unstated presumption is that India will remain largely agricultural and that farmers will not have access to financial markets.

However, in reality India and other countries in the region have the potential to shift quite dramatically from agriculture into manufacturing and services, with the result that the proportion of people likely to be affected by any decline in output would be smaller. Meanwhile, financial markets could in principle soften further any blow by enabling farmers to insure their crops and hedge weather-related risks.

These observations serve to highlight the contrast between an entrepreneurial, opportunity-seeking view of the world and the misanthropic, passive recipient view promoted by the alarmists. In their analysis of the likely impact of climate change on agriculture and forestry, Professors Douglas Southgate and Brent Sohngen demonstrate the merits of thinking through the problem from an entrepreneurial perspective:

In a market setting, the choices made by individual economic agents reflect personal and local circumstances. These choices are also conditioned by prices, which are reliable indicators of the scarcity of goods such as food

*and timber which are bought and sold in markets.
(page 62)*

*If the exchange of goods, services, inputs, and resources is not subject to egregious regulation, then shifts in demand, supply, or both lead to quick adjustments by individual actors. This capacity of markets will serve agriculture well as it adapts to global warming.
(page 65)*

However, Southgate and Sohngen are careful not to paint a Panglossian view of the current situation, especially as regards the political mismanagement of water resources, which are and will remain crucial for agriculture:

Already excessive, the waste and misallocation created when water is supplied too cheaply to farmers will grow worse as the planet warms. (page 66)

When it comes to forestry, Southgate and Sohngen dismiss another myth often perpetuated by environmentalists – the myth of the wild, untainted forest:

*Most of the world's forests have been heavily influenced by human management, having been harvested once or multiple times or having regenerated after prior agricultural use. Simply recognizing that climate change could have substantial consequences in the absence of management, as the ecologists have done, ignores human responses and the costs of these responses.
(page 66)*

It is often claimed that less developed regions close to the equator will suffer disproportionately because of global warming. Commercial forestry is a major counter-example, however. As temperatures rise, wood products obtained from warm settings will increase, not decrease, and it is likely that the portion of global timber supplies coming from the low latitudes will increase as the portion harvested in temperate settings declines. (page 67)

Southgate and Sohngen then go on to suggest the appropriate policy response to the threat of possible climate change – both generally:

As emphasized in this paper, successful adaptation to global warming is most likely to happen where goods, services, inputs, and resources are allocated in markets

*that are free and competitive. In part, this means unencumbered agricultural trade at the international level. By the same token, efficient pricing of water – as occurs if that resource is bought and sold freely as opposed to being distributed by governments at subsidized prices – is essential at the national level.
(page 66)*

...and also specifically in the context of the forestry sector:

The best way to capture the benefits of higher temperatures in the forestry sector is to allow markets to work. For this to happen, governments need to refrain from regulating or otherwise meddling with prices and commerce. Instead, they must solidify the legal and institutional framework that markets require, by strengthening property rights for example. (page 68)

So, if governments are concerned about the implications of climate change on agriculture and forestry, there are various policy implications. First, they should remove all subsidies, price-distorting taxes, and regulations from agriculture, forestry and related sectors. Such policies hinder the ability of individual actors to adjust to changing circumstances, and thus stifle the benefits that free competition yields in terms of managing scarce resources.

Second, they should enable private ownership, exchange and management of land and water, without bureaucratic intervention. Third, they should privatize government-owned land and water. This combination would enable effective and efficient pricing of water and other scarce resources, meaning that people and entrepreneurs have an incentive to use those resources more efficiently.

Fourth, governments should not unduly restrict the deployment of new technologies, for instance, genetically modified crops and trees. Such technologies offer real potential for humanity to use its resources more efficiently, enabling us to adapt more effectively.

A framework for adaptation and sustainable development

As potential problems resulting from climate change are multiple, no single solution can be proposed. However,

underlying many of the problems is a lack of wealth and technological development, so actions that lead to wealth creation and technological advancement are likely to be beneficial. The question is: what can actually be done to improve the situation?

Today, two worlds exist. Children in poor countries still die of diseases that are utterly preventable and which have been eradicated in wealthy countries. Women and children in poor countries spend their days in pursuit of water, energy and food, while their counterparts in wealthy countries enjoy the political, social and economic freedoms afforded by relative prosperity. Poverty is the single most important factor in determining vulnerability to climate and other whims of nature. The best way simultaneously to achieve adaptation, human wellbeing and sustainable development is for poor countries to adopt a strategy which strikes at the fundamental causes of poverty.

Such a strategy would involve the adoption of institutions that provide stronger incentives for people to invest their time, effort and resources in the pursuit of better solutions. What do we mean by ‘institutions’?

Institutions are the framework within which people act and interact – they are the rules, customs, norms, and laws that bind us to one another and serve as boundaries to our behaviour. The right institutions can reduce the number of decisions that we need to take; they can remove the responsibility to calculate the effect of each of our actions on the rest of humanity (an impossible task) and replace it with a responsibility to abide by simple rules.

The single most important institution for generating incentives compatible with sustainable development is the rule of law, which at its most basic level means that the same laws apply to everyone – the governed and the governing alike. An implication is that laws must be of general application. If societies were governed by the rule of law, political decision-makers would be less able to favour special interests, since they could not enact specific laws favouring any individual, group or company. Without the ability to impose specific regulations, such as restrictions on the use of SUVs and incandescent lightbulbs, politicians would have a stronger incentive to identify the best way to address

any particular problem through the establishment of clear, abstract rules with general application.

Such rules would likely include: clearly defined, readily enforceable and easily transferable property rights, the ability to create and enforce contracts, open trade, and limited government. These ‘institutions of the free society’ enable adaptation by fostering resilience in the face of uncertainty. The absence of such institutions creates poverty and creates vulnerability to change in general. Following is a brief discussion of the importance of each institution:

- *Rule of law*: The rule of law is the best guarantee against corruption. When it is absent – that is, when the power of discretion is vested in politicians, bureaucrats and civil servants – bribery and corruption are inevitable.
- *Property rights*: Property rights offer an effective means to resolve competing claims over resources. To function effectively as an incentive both to use and conserve resources, property rights must be well-defined, enforceable and transferable. In this way, property rights are capital; they give people incentives to invest in their land and they give people an asset against which to borrow, so that they might become entrepreneurs. The innovation of new technologies occurs when people are allowed to benefit from the investments they make through ownership of property.

However, most poor countries lack well-defined, readily enforceable, and transferable property rights. People in such countries are oppressed by tenure rules which make it difficult for them to rent, buy or sell property formally. Land transactions typically involve paying large bribes to local officials, who have a vested interest in maintaining the status quo.
- *Contracts*: Another fundamental institution for sustainable development is freedom of contract. This includes both the freedom *to* contract – the freedom to make whatever agreements one desires, subject to fair and simple procedural rules – and the freedom *from* contract – the freedom not to be bound by the decisions of others. Freedom of contract is a fundamental part of the freedom to associate with others. It includes the freedom to transact – to buy

and sell property – and as such it is an essential adjunct to the right to clearly defined and readily enforceable property rights. Contracts and property rights underpin the functioning of markets. Freedom from contract prevents others from attempting to interfere with one's right to engage in exchange. The freedom to contract also enables people to bind themselves to agreements and thereby creates greater legal certainty. This in turn encourages people to engage in trade and investment. Armed with enforceable property rights and contracts, the peasant becomes a merchant.

- *Open trade:* Open markets and free investment encourage competition. By removing barriers to trade, all people can engage in mutually beneficial exchanges. This enhances competition, creates incentives for innovation and leads to more rapid advances in human welfare and environmental protection. Removing market-distorting taxes and subsidies, especially to agriculture and other products where people in poorer countries have a comparative advantage, encourages economic development and benefits consumers.
- *Limited government:* While there is no magic formula for good governance, the imposition of limits on the power of the state at least reduces its capacity to cause harm. The most fundamental limits are those formal and informal rules governing what the legislature can and cannot do. Well-specified constitutional rules can create effective limits, especially when enforceable by citizens through the courts of law. In addition, rules requiring transparency and accountability of elected officials and bureaucrats may be helpful in restraining bad and self-serving behaviour.

When societies are governed by the institutions of the free society, entrepreneurs are able to compete with one another, driving innovation – as each seeks to identify new, better and cheaper ways of satisfying the wants of others. Over time, such innovation results in efficiency gains, as products and production methods are devised that consume fewer resources per unit of output. This in turn frees up more resources for other investments, leading to a virtuous circle of economic growth.

Economic growth benefits all members of society. Even the poorest benefit because they are able to purchase everyday goods at lower cost, freeing up their individual resources (including their own human capital) to be utilised in alternative ways. For instance, economic growth enables people more readily to acquire life-enhancing technologies, such as clean water and cleaner forms of energy.

Unfortunately, the institutions of the free society cannot be imposed from outside, since by their nature they rest upon cultural acceptance and attempts to impose them externally would likely result in cultural opposition. However, civil society organisations both within and outside countries that lack these institutions can have an impact on the culture. The civil society organisations that are the publishers of this report stand in solidarity with one another to support the rule of law and the institutions of the free society in every country in the world. By so doing, we challenge those who seek to undermine the rule of law through the imposition of arbitrary and discriminatory laws.

In the context of the debate over climate change, we specifically reject the introduction of laws that arbitrarily support – through subsidies or regulations – specific technologies (such as so-called 'renewables', nuclear power and insulation for housing) as well as laws that arbitrarily restrict – through taxes or regulations – specific technologies (such as incandescent light bulbs, petrol-powered motor vehicles, etc.). In so doing, we seek to make clear that we do not oppose or support any specific technology but rather believe that each should be forced to compete on an equal footing.

Thus, for the same reason we believe that specific regulations imposed on certain technologies in response to heightened public fears and pressure group lobbying, rather than because of any inherent problems with the technologies, should be removed. We refer in particular to nuclear power, agricultural biotechnology, and other technologies that might offer effective ways to address climate change. Likewise, subsidies to technologies such as coal mining, which contribute unnecessarily to the use of this high-carbon technology, should be removed.

If technologies are allowed to compete on a true level playing field, rather than on a playing field rigged by

regulations, taxes and subsidies, then cost-effective solutions to societies' many problems will be identified and implemented more quickly. Thus, if governments are truly concerned about threats that might arise as a result of climate change, they should swiftly enact programmes that focus on the removal of such barriers.

In addition, we recommend that governments do more to ensure that individual property rights are well-defined, easily enforced, and openly tradable. The lack of such property rights remains a severe barrier to efficient and equitable use of resources, and results in overexploitation of resources as diverse as water, wood and whales.

Insuring against climate catastrophe

On the basis of the foregoing analysis, it seems reasonable to conclude that human society should be able to adapt to future changes in the climate, whether caused by man or by natural fluctuation. However, this assumes gradual change – which is what most scientists studying climate change say is likely to happen (the IPCC, for example, suggests that the earth will likely warm gradually by between 2°C and 4.5°C in the coming century)(IPCC, 2007).

It is nevertheless possible (though very much less likely) that the climate might change more abruptly, making adaptation at best more difficult and at worst impossible. While it still makes sense to implement the above-mentioned policies to enhance humanity's ability to adapt, it is worth also considering what sorts of policies might enable us effectively to address the problem of abrupt, possibly catastrophic change.

The threat of abrupt climate change is currently being used as a justification for taking urgent action to reduce human emissions of greenhouse gases. However, such a policy is unlikely to have the desired effect and will certainly have many undesired effects.

First of all it is important to stress that climate change is only one of many potential catastrophes awaiting humanity. Others include an asteroid impact and the eruption of a supervolcano (NASA, 2007; Sparks, Self et al. 2005). Such catastrophic events could end human life.

Potentially, all of humanity's available resources could be spent attempting to counter these threats. The problem is that in so doing, humanity would have nothing left to address more mundane problems, such as providing clean water, food and shelter. So the challenge is to identify policies that would provide some degree of insurance against catastrophe without consuming excessive resources.

An insurance policy is one that either pays out in the future in response to specific but unforeseen events materialising, substantially reduces the probability of specified harms occurring, or substantially reduces the extent of those harms should they occur. However, most climate related policies advocated under the header of 'insurance' do none of these things.

The Kyoto Protocol, for example, seeks to reduce emissions of greenhouse gases, but it does so only to a very limited extent. Lomborg (2001, p. 304) estimates that the Kyoto Protocol – if adhered to strictly by all signatories until 2100 – would delay the warming predicted by the IPCC by six years. Meanwhile, the cost of implementing Kyoto has been estimated at over \$100 billion per year (Energy Information Administration, 1998; ICCF, 2005). That does not appear to be a very cost-effective insurance policy: actually, since the likelihood of catastrophe is barely reduced, it is not really an insurance policy at all.

The limits of the Kyoto Protocol were apparent when it was negotiated and are now the subject of much discussion, as nations prepare to enter into negotiations for a post-2012 agreement to address the threat of dangerous climate change (the objective of the UN Framework Convention on Climate Change). However, again the discussion is largely focused on reducing emissions of greenhouse gases.

In the years since Kyoto was agreed in 1997, emissions from most countries have risen dramatically, especially in rapidly developing countries such as China and India, but also in countries developing at a more moderate pace such as the US, and Australia. Emissions have also risen in most of the countries that have ratified the Kyoto Protocol, such as Canada, Japan and the EU. The costs to such countries of limiting emissions substantially would be enormous and could only be

achieved through a combination of massive investments in energy efficiency improvements and a switch to lower carbon fuels.

While some of these investments would make economic sense anyway (many Chinese State Owned Enterprises are highly inefficient in their use of energy, for example), most would not. The resources diverted into reducing energy use and switching to lower carbon fuels would not be available for other investments. As a result, economic growth would be reduced. Given the importance of economic growth to reducing poverty and in many countries also to political stability, it is difficult to envisage most politicians signing up to, let alone ratifying such a commitment.

Given the implausibility of persuading China, India, Brazil and South Africa to agree to major emissions reductions, consider an alternative scenario: Rich countries agree to reduce emissions by, for instance, 5 per cent below 1990 levels – i.e. the Kyoto Protocol commitment but continued indefinitely. This might cost somewhere between \$100 billion and \$1 trillion a year by 2020.²

Yet, as noted earlier, the impact would be to delay warming by only a few years. Meanwhile, if the alarmists are correct, then at some point in the coming century, a dreaded ‘tipping point’ might still be passed, beyond which devastation becomes inevitable. Now, the investment in reduced emissions might delay the onset of the catastrophe by a few years, but on its own that would seem to have little real merit. In other words, we might end up blowing a trillion dollars and still find ourselves without a planet.

If the alarmists are correct and a relatively small rise in GHG concentrations would result in catastrophic climate change, then relying on limiting emissions seems an extremely hazardous approach. A recent paper by Weaver et al. (2007) concluded that “if a 2.0°C warming is to be avoided, direct CO₂ capture from the air, together with subsequent sequestration, would eventually have to be introduced in addition to sustained 90% global carbon emissions reductions by 2050.” That’s a pretty extreme set of measures – and the cost would be similarly extreme!³

Some proponents of Kyoto-style restrictions on

emissions claim that they will not be costly or will even have economic benefits. If that were true, then such restrictions would clearly be acceptable, even desirable, regardless of the size of benefits they supply. But it is almost certainly not true. Indeed, it is difficult to imagine the circumstances under which such restrictions might be costless. As noted in this report by economist Wolfgang Kasper:

Mitigation costs in terms of lost long-term global economic growth are much more difficult to assess than the household costs inflicted by specific legislative proposals. Politicians and bureaucrats around the Western world are now imposing piecemeal regulations ‘to save the planet’, often without much analysis of their effectiveness and the costs. (page 81)

Energy users are being burdened with costly regulations and compliance costs; taxes are being diverted into subsidies for some politically preferred solutions; and new ‘climate regulations’ block otherwise promising avenues for wealth creation. These costs of climate mitigation will without doubt on balance be massively negative. (page 81)

Energy is an essential ‘factor of production’; that is to say, it is an important ingredient in all economic activity. Society can either obtain its energy from low-cost sources, such as coal, oil, gas, and (to an extent) nuclear and hydro, or it can get its energy from high-cost sources, such as wind turbines, solar cells, and biomass fuels (wood, dung, corn-alcohol, etc.).

If society obtains its energy from low-cost sources, then more resources are available to be spent on other inputs to production (including wages), which means that economic growth occurs at a faster pace and people earn more money while doing more fulfilling jobs. If society obtains its energy from high-cost sources, then there will be correspondingly fewer resources available for wages and growth-enhancing activities.

So, by increasing the cost of all forms of energy, mitigation policies will reduce the total number of jobs, reduce the average level of skill of workers, and reduce the rate of economic growth. This is hardly a recipe for a more sustainable economy or society. While such policies would almost certainly reduce the differential in income and wealth between people in rich and poor countries,

they would do so in the main by destroying wealth and reducing income of those in rich countries. The reason for this is twofold. First, energy is a basic factor of production, so increasing the cost of energy by mandating a shift to lower-carbon forms will reduce output. Second, hydrocarbons are used by consumers in all manner of applications, both directly, for example in cars and gas stoves, and indirectly, when they turn on their lights. So, reducing the availability of hydrocarbons will create energy poverty.

Some industrial production might shift from richer to poorer countries as a result of tighter restrictions on emissions in the former. However, for the most part people in the poorest countries would suffer because they have little industrial capacity but would see a fall in demand for their (mainly agricultural) products.

In defence of their ‘economic benefits’ claim, some climate alarmists assert that mitigation policies will lead to job creation and economic benefits. It is probably true that some jobs will be created as a result of such policies. However, it is also highly likely that the number of jobs lost will exceed the number that are created – so there will be a net loss of jobs. Moreover, the value of the jobs lost will probably be greater than the value of the jobs gained – so mitigation will be responsible for reducing average incomes.

Others see the opportunity to make money in mitigation policies, such as carbon trading programmes, and subsidies for low- or zero-carbon energy technologies. Again, it is true that some people will probably make money as a result. However, it is also true that the amount of money gained will be smaller than the amount of money lost. And the number of people who benefit will almost certainly be smaller than the number of people who lose.

Economists have coined a term to describe the activities of those who seek regulations, taxes, subsidies and other government programmes that result in personal benefits to them at a cost to society: ‘rent seeking’. As Kasper notes:

Pervasive rent seeking is counterproductive in economic terms, as well as profoundly unjust. To the extent that arguments about global warming are detected as just a new excuse for rent seeking, they will be treated with

disdain and contempt – regardless of their scientific merit. (page 87)

To most natural scientists, concepts such as public choice and rent seeking are of course unfamiliar. They therefore fail to understand that social scientists and the public are cynical about the climate advocacy of recent years, which they view as a case of massive rent seeking. This is the main reason why economists are recalcitrant to uncritically accept the assertions of the climate activists. (page 87)

Still others justify climate mitigation on the basis that we must avoid *all* risks associated with climate change. To such observers, who often suggest that the social sciences should not be involved with addressing the question of how best to deal with climate change, Kasper says:

[It is not] legitimate to suggest that any hypothetical risk of future damage to human wellbeing must be avoided at all cost. The appropriate approach is economic; namely, to weigh properly assessed and priced costs and benefits, taking account of fundamental social values, such as freedom, justice, security and peace. (page 78)

He maintains:

The climate experts will fail if they disregard the fundamental insights of these social-science disciplines. Experts frequently fail in their pursuits not because they make a mistake in the narrow area of their expertise, but because they overlook some very fundamental insight in another discipline. (page 79)

Finally, Kasper notes that mitigation policies seem to appeal to scientists and technocrats, in contrast to the apparently ‘disorderly’ workings of the market system:

Most observers with a scientific or engineering background are inclined to a system of coordination akin to a centrally designed and controlled train timetable, rather than the rules-based coordination of independent motor car [drivers]. Many do not seem to comprehend the working of the invisible hand. They prefer instead some high-minded, well-informed authority to sort out all necessary information prior to any action, and to control all subsequent actions. (page 90)

Yet the fundamental problem is that mitigation relies on central government planning to achieve a particular outcome: a target. Kasper proposes that:

Humans have diverse wants – Mao suits for all may have been technically efficient, but made the Chinese unhappy. Diverse alternatives which are allowed to compete in the market are often the seed for solutions that prove useful only later. If a central planning committee in 1895 had picked steam engines to propel cars (at the time this technology looked promising), then we would not have today's car industry. (page 91)

Technocratic plans for the climate (whether driven by global agencies or national governments) are predicated on the same fatal conceit that led to the failure of socialism: that government is better able to identify and act upon information that is ultimately only available to individual economic actors within society (Hayek, 1945). Kasper observes:

Entire nations – let alone the entire world economy, as in the case of global greenhouse gas management – are not organisations like firms. A nation is an association of free individuals, not employees of a government whose orders they must obey. The citizens are the principals, and the government is but their agent. (page 90)

In most cases, as already noted, it is apparent that limiting GHG emissions will very likely make any problems resulting from climate change more intractable by slowing down rates of economic growth, reducing average incomes and limiting the adoption of existing technologies and the development of new technologies.

Moreover, an obsession with global target-setting will go far towards enabling rent-seekers to achieve private benefit at public expense, but it will serve to undermine the very social values that have enabled humanity to flourish.

An alternative insurance policy

If we really are on the verge of a climate catastrophe, then the policies promoted by most alarmists are not sufficient to address the problem (Weaver et al, 2007) – even through they would be enormously costly (Kasper, This Volume).

Ross McKittrick has suggested instead the introduction of a tax on carbon that is proportional to the temperature of the tropical troposphere. The logic is this: all climate models predict that the tropical troposphere (the part of the climate from about 1 to 15 km above the surface of the earth and between 20° North and 20° South of the Equator) should warm more rapidly than the lower atmosphere. Indeed, so strong is the predicted warming in the tropical troposphere that it would act like the proverbial 'canary in a coal mine'. By linking a carbon tax to that temperature, therefore, there is the potential to introduce a self-correcting mechanism. If the tropical troposphere begins to warm dramatically, the tax would rise substantially, incentivising the development and use of lower carbon technologies.

But even McKittrick's proposed tax might not be enough, in which case other technologies would have to be introduced that would limit the warming of the atmosphere. These might be technologies that suck carbon out of the atmosphere (Markels and Barber, 2001), or they may be technologies that reduce the temperature more directly – such as shooting sulphur into the upper atmosphere (Crutzen, 2006). In any case, alarmists in search of an insurance policy might consider investing in the development of a smorgasbord of such technologies. Some, such as James Lovelock and Chris Rapley (2007), have at least begun to look at alternatives.

While we do not advocate either McKittrick's carbon tax or substantial investments in geoengineering, we acknowledge that these are likely substantially superior to the other 'insurance' policies being advocated by alarmists.

Adaptation: a new role for 'foreign aid'?

A parallel strategy to mitigation advocated by many climate alarmists, including so-called 'development' NGOs and international agencies, is that of 'adaptation'. But this is not to be confused with the kinds of adaptation discussed above. These folks narrowly construe adaptation to mean 'aid' transfers from the governments of wealthy countries ostensibly for the purpose of combating the effects of climate change. This

has, unsurprisingly, resulted in a dramatic widening of the supposed consequences of climate change.

Such foreign aid is partly motivated by feelings of guilt: wealthy countries are presumed to have caused the climate to change as a by-product of wealth-creation, so some of that wealth must be transferred to poor countries in order to help them deal with the impacts. In reality, foreign aid is mainly being offered as a carrot to encourage poor countries to assume obligations under a post-2012 agreement.

Yet transfers of financial resources from the governments of rich countries to the governments of poor countries have been largely unsuccessful in stimulating adaptation. Consider Figures 3 and 4, which show the relationships between cumulative per capita spending on aid and economic growth (3) and changes in life expectancy (4).

From 1975 to 2002, foreign aid made no net contribution to the economic development of recipient countries.⁴ The governments of two countries, Gabon and Nicaragua both received over US \$2,000 in aid per capita, yet GDP per capita in both fell by more than \$2,000 – a remarkable feat!

Figure 4 is perhaps the most striking. Since 1960, aid

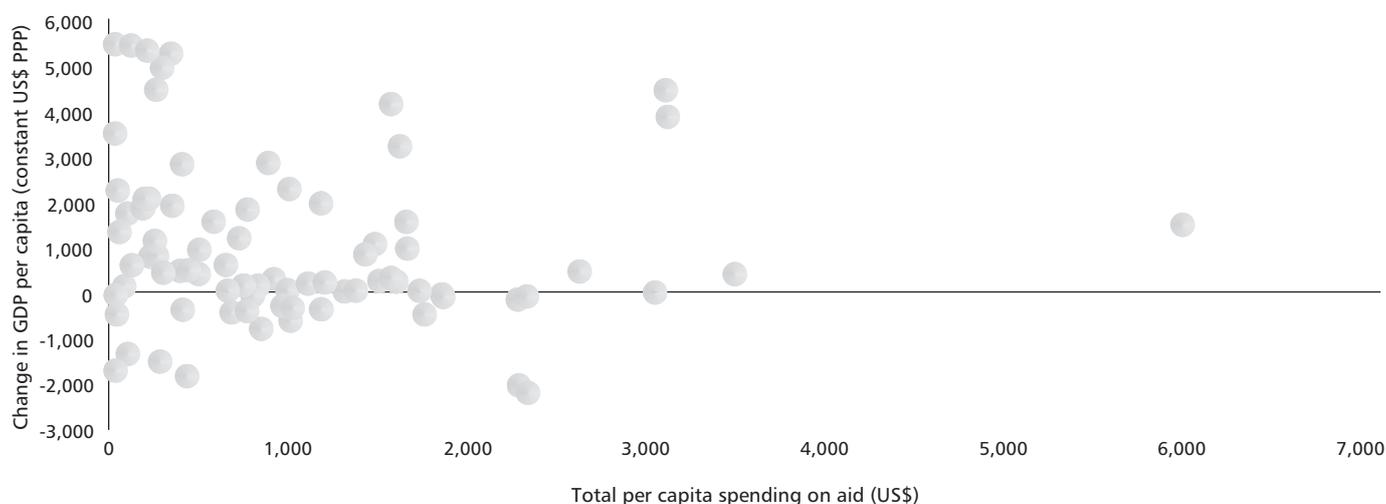
has – on average – had no perceptible impact on life expectancy.

Aid has been a failure because a lack of government funds is not the primary problem in poor countries. To illustrate, consider the case of Nigeria – a country which happens to contain one of the largest oil deposits on the planet. Oil wealth in Nigeria has been controlled by government officials – until recently it was in the hands of the murderous kleptocrat General Sanai Abache –who used it to line their pockets and to placate the political elite, rather than to promote development.

There is little point to pouring money into a country whose government has no intention to encourage economic development and the elimination of poverty. Indeed, as Mengistu showed in Ethiopia, Mobutu in Zaire, Pol Pot in Cambodia, and Idi Amin in Uganda, dictators will happily accept ‘aid’ if it helps to prop up their regimes. In such cases, government-to-government transfers are not merely counterproductive, they are murderous.

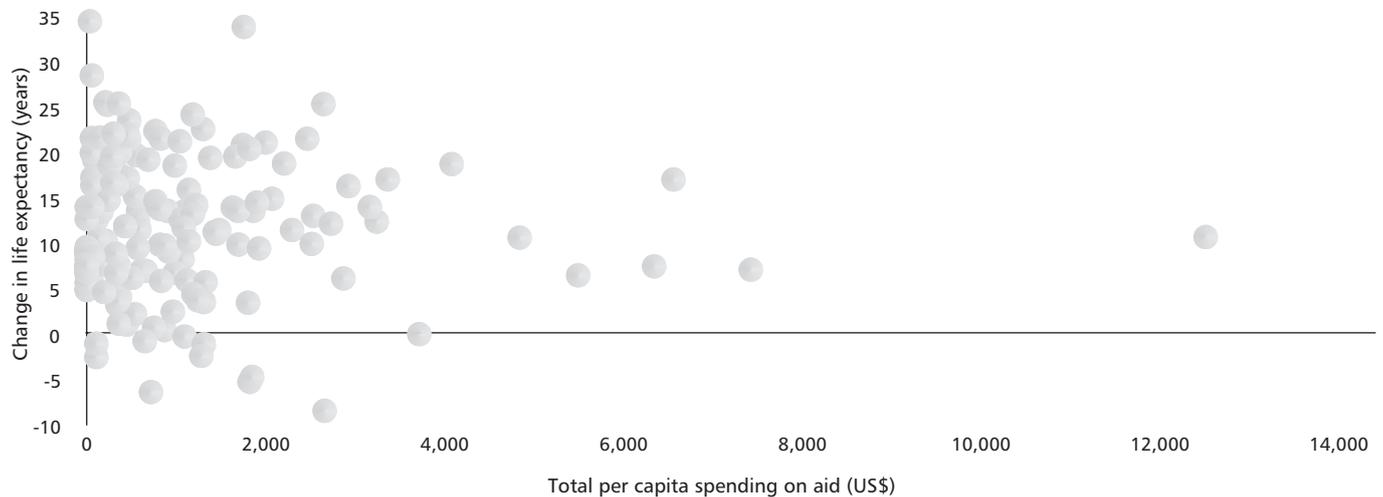
The more fundamental problem is that ‘aid’ is based on a largely false premise, namely that poverty itself is a barrier to development. In general this is simply not true. Economic development in Western Europe did not

Figure 3 **Impact of aid on economic development 1975–2002**



Source: World Development Indicators, World Bank, 2004

Figure 4 Impact of aid on life expectancy 1960–2002



Source: World Development Indicators, World Bank, 2004

require massive redistribution from the rich to the poor. Rather, it required a change in the structure of Europe's institutions; a move away from the feudal system of the early middle ages to a trading economy.

While some parts of sub-Saharan Africa now appear to be facing a genuine crisis, in the form of disease (HIV/AIDS) that is destroying part of the economically productive sector of society, it is probably unique in the world (if not world history) in requiring external assistance to escape from such a quagmire. And even then, such assistance is unlikely to lead to significant growth; rather, it might merely prevent total economic collapse.

What aid schemes have done is to short-change the poor. While aid is given in the name of the poor, bureaucracies have generally not used aid in ways that benefit poor people at large. If countries are to develop sustainably, institutional reforms that eliminate the fundamental causes of poverty are far more likely to deliver benefits to poor people.

Conclusion

To the extent that global warming occurs gradually, the best strategy is likely to be adaptation. The appropriate

policy response in such circumstances is to reduce barriers to adaptation, such as regulatory restrictions and taxes that inhibit the free flow of information and prevent entrepreneurs from identifying and seeking to fill market niches.

Access to modern technologies allows people to use their resources more efficiently, to be healthier and to live a more benign existence. Such technologies are not an end in themselves: they allow people to work fewer hours and with less effort, to earn a living rather than subsist, to control their environment and to invest in the future of their children, their community and their country, as well as their environment.

Economic development and the associated increases in wealth, enhanced technologies and improved infrastructure have been the primary drivers of the improvement in the lives of people globally. Increased wealth means that children can go to school rather than working on the farm. Improved technologies enable the eradication of water-borne diseases. Improved infrastructure means children can obtain the variety of foods and medicines that will enable them to grow up and live healthy, long lives.

Given the strong relationship between prosperity, health and a clean environment, the best policy for reducing

the vulnerability of people to potentially negative aspects of climate change is one that enables people to become rich and thereby avail themselves of all the adaptive measures that the wealthy can afford. As Wolfgang Kasper concludes in this report:

Global economic growth of the sort attained over recent decades seems an excellent method of 'future proofing' human civilisation, should the need really arise.
(page 81)

Climatic change may turn out to be benign or malignant – we do not know. But policies aimed at mitigation through control of atmospheric carbon would almost certainly be harmful. Meanwhile, aid transfers given under the pretext of 'adapting' to possible negative effects of future warming are unlikely to be cost-effective and might even be counterproductive.

The political commentator HL Mencken once said that 'for every problem there is a solution that is simple, direct and wrong'. In the case of climate change the simple, direct and wrong solution is to impose restrictions on emissions of greenhouse gases. A more constructive perspective suggests that poverty exacerbates all sorts of problems, whether or not they are caused by changes in the earth's climate. Under this view, only by eliminating poverty can we solve the myriad problems that prevent humans from achieving sustainable development.

Development is not just about fulfilling people's basic needs, but allowing them to choose how they develop and to choose which technologies they use. We have a moral responsibility towards fellow human beings who are alive today to ensure that this happens.

Summary of policy recommendations

General recommendations

- Property rights should be well-defined, easily enforced and openly tradable.
- Restrictions on formal ownership of property should be removed.
- Governments should recognize currently disenfranchised citizens, such as those who live in peri-urban areas of poor countries, and extend to

them the same formal legal rights that are available to other citizens.

- Legal systems should be open and transparent; the judiciary should be independent of the legislature and the executive.
- Government-imposed barriers to entrepreneurship, such as licensing systems and other arbitrary or discriminatory regulations, tariffs and taxes should be removed.
- Subsidies, taxes and regulations that arbitrarily support or restrict specific technologies (such as 'renewable' energy, nuclear power, incandescent lightbulbs, and insulation for housing) should be eliminated.

Health-specific recommendations

- Existing restrictions which limit the ability of people to access clean water, sewerage, and sanitation services should be removed.
- Regulatory restrictions, tariffs, taxes and other government-imposed barriers that may unnecessarily increase the cost and difficulty of delivering vaccines, medicines and other medical treatments should be removed.
- Targeted vector-control programmes, such as indoor residual spraying with insecticides, should be undertaken to control the spread of malaria and perhaps other vector-borne diseases.

Weather-related recommendations

- Individuals should be free to purchase private insurance.
- Government-subsidised insurance programmes and other policies that incentivise people to expose themselves and their property to otherwise uninsurable risks should be scrapped.
- Where services such as water, electricity, and telecommunications are provided by statutory monopolies, those companies should be forced to compete with private suppliers.

- Other government-imposed barriers to the private provision of such services and to the supply of infrastructure – such as bridges, roads, dams, and dykes – should be removed.

Agriculture and forestry recommendations

- All subsidies, price-distorting taxes, and regulations should be removed from agriculture, forestry and related sectors.
- Private ownership, exchange and management of land and water, should be permitted without bureaucratic intervention
- Government-owned land and water should be privatized.
- Technologically specific regulations, taxes and subsidies that act as a barrier to the development and deployment of new technologies, such as genetically modified crops and trees, should be removed.

Notes

- 1 Although many studies of the possible costs of Kyoto were carried out in the late 1990s, few actual cost estimates exist. In 2005, the International Council on Capital Formation looked at actual policies being implemented by European countries in an effort to comply with Kyoto and estimated the total cost to Germany, Italy, Spain and the UK at over \$100 billion (ICCF, 2005). Even if the ICCF is out by a factor of 10 (which seems unlikely), the cost to those four countries would still be at least \$10 billion.
- 2 Based on ICCF's estimates for Europe and the Energy Information Administration's (1998) estimates for the US.
- 3 A 2005 study by Charles Dumas of Lombard Street Research estimated the total cost of preventing human induced global warming at an enormous \$18 trillion (Heath, 2005).
- 4 The dates were chosen because of data availability at the time the graphs were produced (2004).

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Members of the Civil Society Coalition on Climate Change

The Civil Society Coalition on Climate Change comprises 41 member organisations from 33 countries.

Alabama Policy Institute, USA
<http://www.alabamapolicy.org>

Alternate Solutions Institute, Pakistan
<http://asinstitute.org>

Asociación de Consumidores Libres, Costa Rica
<http://www.consumidoreslibres.org>

Association for Liberal Thinking, Turkey
<http://www.liberal-dt.org.tr>

Bluegrass Institute for Public Policy, USA
<http://www.bipps.org>

CGC Forum, China
<http://www.cgcforum.org>

Cathay Institute of Public Affairs, China
<http://www.jiuding.org>

CEDICE, Venezuela
<http://www.cedice.org.ve>

Centro de Innovación y Desarrollo Humano, Uruguay
<http://www.cidhu.org>

CEPOS, Denmark
<http://www.cepos.dk>

CEPPRO, Paraguay
<http://www.ceppro.org.py>

CIIMA-ESEADE, Argentina
<http://www.esade.edu.ar/ciima/ciima.asp>

CORE, USA
<http://www.core-online.org>

European Center for Economic Growth, Austria
<http://e-growth.eu>

Free Market Foundation, South Africa
<http://www.freemarketfoundation.com>

Frontier Centre for Public Policy, Canada
<http://www.fcpp.org>

Fundacion Atlas 1853, Argentina
<http://www.atlas.org.ar>

Fundacion Libertad, Panama
<http://www.libertad.org.ar>

Hayek Institute, Austria
<http://www.hayek-institute.at>

IEEP, Ecuador
<http://www.ieep.org.ec>

Imani: The Centre for Humane Education, Ghana
<http://www.imanighana.com>

Initiative of Public Policy Analysis, Nigeria
<http://ippanigeria.org>

INLAP, Costa Rica
<http://www.inlap.org>

Institut Constant de Rebecque, Switzerland
<http://www.institutconstant.ch>

Institute for Free Enterprise, Germany
<http://www.iuf-berlin.org>

Institute for Market Economics, Bulgaria
<http://www.ime-bg.org>

Institute of Economic Analysis, Russia
<http://www.iea.ru>

Institute of Public Affairs, Australia
<http://www.ipa.org.au>

Instituto de Libre Empresa, Peru
<http://www.ileperu.org>

Instituto Liberdade, Brazil
<http://www.il-rs.com.br>

International Policy Network, UK
<http://www.policynetwork.net>

Istituto Bruno Leoni, Italy
<http://www.brunoleoni.it>

Jerusalem Institute for Market Studies, Israel
<http://www.jims-israel.org>

John Locke Foundation, USA
<http://www.johnlocke.org>

Liberalni Institute, Czech Republic
<http://libinst.cz>

Libertad y Desarrollo, Chile
<http://www.lyd.com>

Liberty Institute, India
<http://www.libertyindia.org>

Lion Rock Institute, Hong Kong
<http://www.lionrockinstitute.org>

New Economic School, Georgia
<http://www.nesgeorgia.org>

New Zealand Business Roundtable, New Zealand
<http://www.nzbr.org.nz>

Tennessee Center for Policy Research, USA
<http://www.tennesseepolicy.org>