

This essay takes off from the following:

Al Gore/ Davis Guggenheim (director), *An Inconvenient Truth*, 2006, 100 mins.
Paul Brown, *Global Warning: The Last Chance for Change*, Dakini Books, 2006,
320 pp.

Sushil Kumar Dash, *Climate Change: An Indian Perspective*, Centre for
Environment Education/ CUP, 2007, 262 pp.

Thomas E. Lovejoy and Lee Hannah (editors), *Climate Change and Biodiversity*,
TERI Press, 2006, 418 pp.

Can we avoid ‘dangerous’ global warming?

By Nagraj Adve

The most pressing scientific question and political challenge about global warming at present is this: can we avoid ‘dangerous’ global warming, and prevent it reaching levels beyond which it will become irreversible? This is the key question this essay attempts to address, and whether technological solutions really are the panacea they are so often made out to be. In doing so, it touches upon some themes in the Al Gore film and three books under consideration, including on some major impacts in India.

The sum total of all human activity generates 7.2 billion tons of carbon, or about 26.4 billion tons of carbon dioxide a year from fossil fuels currently, according to the Fourth Assessment Report of the IPCC published this year. Though transport is one of the fastest growing culprits, it presently accounts for only about 14% of CO₂ and other greenhouse emissions that human activity is generating each year. The other big sources are electrical power (28.5%), deforestation (18%), industry (14%), even agriculture (14%).

Over millenia, due to agriculture and deforestation carried out by ancient and medieval societies, CO₂ levels in the atmosphere inched along from 260 parts per million (ppm) to about 278 ppm until the time of the Industrial Revolution. However, since the mid-eighteenth century, CO₂ has jumped to 384 ppm, much of it in the past few decades. As the excellent website *realclimate.org* recently explained, adding the warming (and cooling) effects of other emissions – primarily methane (CH₄) and nitrous oxide (NO₂) but also including ozone, black carbon, etc – that figure stood at the equivalent (CO₂e) of about 375 ppm in 2006, and is going up by at least 2 ppm each year.¹

As a consequence, the Earth’s average temperature has risen about 0.8 degrees C since the Industrial Revolution, reaching 14.5 degrees C in 2005. This seemingly mild rise has already caused lands to be nibbled by rising sea levels in the Sunderbans and the Gujarat coast, the 2005 floods in Bombay which killed a thousand people, Himalayan glaciers to recede, and rainfall patterns to change. According to the UN, 66 million people were affected by floods this year in South Asia alone. What used to seem ‘natural’ phenomena

¹ ‘CO₂ Equivalents’, *realclimate.org*, 11 October 2007.

are not natural any more, as Bill McKibben lamented in *The End of Nature* nearly 20 years ago.

The problem, as Paul Brown explains in *Global Warming: The Last Chance for Change*, is that there's more warming in the pipeline. There's a lag of about 25-30 years between greenhouse gases being emitted and the full effects of their warming. So the recent climate chaos is actually the consequence of emissions in the late 1970s. The full effects of more recent emissions, including from China's coal-based power stations that some are suddenly and rightly concerned about, will be felt in the years to come. We are committed, Brown writes, to a further 0.7 degrees C. That would add up to 1.5 degrees C above pre-industrial levels. At 1.5 degrees, 18% of the world's species will die, and 400 million more people worldwide will be exposed to water stress.²

It gets worse. As the Earth gets warmer, it will trigger off certain 'feedbacks', which could be understood as the Earth's systems themselves contributing to warming: as Arctic ice melts, there will be less of it to reflect heat, warming further, melting more, and so on. Warmer Antarctic and Greenland ice sheets will create meltwater on the surface which, being darker than ice, will absorb more heat. Oceans, which currently absorb a lot of the CO₂ we emit, will take in less, and warmer soils will trigger off metabolic processes that allow carbon dioxide in soils to escape. Melting permafrost in the Arctic Tundra will release methane, of which there are 70 billion tons, and methane has 23 times the warming potential of CO₂.

These processes have already begun. Arctic ice was 1 million square km less in 2007 compared to the earlier lowest in recorded history. Waters from melting ice-sheets in Antarctica are flowing through moulins to the bottom of the ice sheets lubricating them towards the sea. CO₂ escaping from warmer soils has been recorded in England and Wales. Surveys in 2005 suggest methane has already begun escaping from the melting Arctic.

It's fairly widely accepted that were the Earth to become roughly 2 degrees warmer than pre-Industrial times, it could trigger off tipping points in the Earth's systems: for instance, melting polar ice could become an irreversible process. It could catalyse these feedbacks on a scale so massive that global warming could effectively get out of human capacity to control the process. There is a fair chance of reaching 2 degrees if greenhouse gases are allowed to build up to roughly 450 ppm CO₂e, just 75 units from the present. Some say we have barely about 20 years to prevent dangerous global warming. The UK's *Stern Review* puts the date at 2035, neither of which are very much time considering the magnitude of the problem at hand. James Hansen of NASA's Goddard Institute for Space Studies – one of the world's leading climatologists – has said we have until 2015, less than ten years.

Al Gore's *An Inconvenient Truth* deals with some of the phenomena wonderfully: melting polar ice, receding glaciers, more intense hurricanes, and a whole range of other serious facets of global warming. Barring overstating one link between CO₂ rise and the

² George Monbiot, *Heat: How to Stop the Planet Burning*, Allen Lane, 2006, pp. 9, 15.

magnitude of future warming, its science is largely solid and its complexity presented lucidly. What it doesn't do, however, is underline this urgency I've mentioned above. Additionally, its politics is flawed, both in conceptualising the problem and in the partial solutions he presents at the end (on which more later). But then I don't expect much in terms of political solutions from almost-Presidents. Yearly US emissions rose from 5,057 million tons of carbon dioxide (in 1992) to 5,823 million tons (in 2000) during the years that Gore was Vice President, a rise of 15% (US Energy Information Administration data). Influenced by the oil and timber lobby, thousands of acres of forest lands and whole mountain ranges were denuded, 24 million acres of the National Petroleum Reserve opened out to oil drilling.³ His film ignores the fact that entrenched political systems and powerful corporate processes, that have got us where we are in the first place, transcend individual preferences. But the key point about global warming currently is the very short time we have to deal with the problem, and the film misses out this crucial message.

Regarding **impacts in India**, some things are worth keeping in mind. One, it will exacerbate almost all existing inequalities of resource use, including access to food and water scarcity, and inordinately affect dalits, adivasis, rural women, agriculture workers, even the urban working class. Hence, two, it will intensify almost all existing contradictions of India's complex and violent social structure. Three, as its varied impacts – sea level rise, less water, tougher agriculture, more intense storms, etc – exacerbate, they will be felt simultaneously. Hence, various underclasses will be caught between the devil and, literally, the deep sea. Four, its impacts will hit an already impoverished country in which, a recent official report shockingly revealed, 836 million people live on less than Rs 20 a day⁴ (and someone who consumes Rs 20 can't really contribute much to global warming).

It is a truism that global warming's causes and effects are mediated by consumption and class, its causes by class globally and its impacts on class in a more local sense. This significance of class is missing in the film and all three books under discussion, except to a very slight degree in the work by Sushil K. Dash. His is a wide-ranging enquiry into, among other things, the carbon cycle, the science of global warming, and into the evidence and 'possible impact' of climate change in India. He is right to widen the ambit of impacts on climate beyond global warming "to the overexploitation of nature", land exploitation, destruction of ecosystems, environmental pollution, etc. I will restrict myself to a few important impacts, particularly in India, before addressing the question one hears so often: what can we do?

Regarding **agriculture**, a recent study by the Indian Agriculture Research Institute found that increases in temperature by about 2 degrees C "reduced potential [wheat] grain yields in most regions", and that "overall, temperature increases are predicted to reduce rice yields", the impact on rice yields being most in eastern India. Even the Intergovernmental Panel on Climate Change (IPCC), scarcely alarmist, says "a 0.5 degree

³ Micheal Cohen, 'Listen Gore', *ZMag*, March 2007.

⁴ Arjun Sengupta, *Report on Conditions of Work and Promotion of Livelihoods in the Unorganised Sector*, 2007, p. 6.

C rise in winter temperature would reduce wheat yield by 0.45 tons per hectare in India”⁵. This seems to contradict Professor Dash’s assertion (p. 133) that the impact of global warming on agriculture will be only indirect (less water, etc) and not direct in the short-term. In fact, irregular rainfall patterns are already affecting crops in many states.

Additionally, most studies ignore the abysmal crisis that Indian agriculture is in already, a crisis it has been pushed into by government policies over the last 20 years. The government itself estimates that over 1,12,000 farmers have committed suicide in India since 1993, many of these among marginal and small farmers, and this is alarming because marginal farm holdings number almost 60 million! Agriculture has become unviable for small farmers: holdings below 1 acre have declined by 4.7 million between 1992 and 2003.⁶ It is from this low base that agriculture is going to stumble and fall even further.

Around a quarter of India’s population live within 50 kilometres of India’s vast coastline. Coastal areas, which are also often the most fertile, face the threat of further **sea level rise** and storm surges because of warmer oceans. Dash suggests these would affect the Bay of Bengal, but makes the odd claim (p. 116) that most parts of the West Coast barring Gujarat do not face the threat of sea level rise. Even the IPCC says those subject to flooding will increase from 13 million to 94 million and “60% of this increase will occur along coasts from Pakistan, through India, Sri Lanka, and Bangladesh to Burma” (WGII, p. 484). Because of falling groundwater levels, saline seawater will enter groundwater sources; it will of course affect agriculture and also urban populations in general, particularly the urban poor, who as it is due to the crisis in agriculture are being pushed out of rural areas to city slums.

It gets worse. The IPCC estimation of maximum sea level rise of 59 cm this century is too low. James Hansen has said IPCC analysis “assumes an inertia for ice sheets that is incompatible with palaeoclimate data and inconsistent with observations of current ice sheet behaviour”. The last time the planet was 2-3 degrees C warmer, a certainty the way we are going, “it was a dramatically different planet then ... and the sea level [was] about *25 metres higher, give or take 10 metres*”. And a rise of at least 5 metres, he says, will happen within a century.⁷ Can one imagine the plight of Mumbai, Chennai, Puri, Kovalam, and numerous other cities and towns if sea level rose even a quarter of what Hansen predicts?

Another serious change in India will be in the nature of forest cover, from moist and dry savannah, to predominantly tropical dry and seasonal forests with its attendant impacts on millions whose daily life depends on them. The volume on **biodiversity** edited by Lovejoy and Hannah, with the foreword by R.K. Pachauri, is a superb collection of studies that underline how vast and varied the impacts of global warming will be the

⁵ IPCC (2007), WGII, p. 480.

⁶ J.P. Singh, ‘Changing Agrarian Relations in Rural India’, *Indian Journal of Agricultural Economics*, Jan-March 2006, p. 43.

⁷ James Hansen, *et al*, ‘Climate Change and Trace Gases’, *Philosophical Transactions of the Royal Society*, 2007, pp. 1925-54; also, James Hansen, ‘Climate Catastrophe’, *New Scientist*, 28 July 2007.

world over. The themes covered include the shifting ranges of species, the changing timing of life cycles, regional studies of known changes in past climate and their effects on biodiversity, possible impacts on marine ecosystems including corals and on freshwater ecosystems, conservation responses and the need to limit human-induced climate change. Unlike Edith's checkerspot butterfly, which had to make a hasty shift northwards due to global warming, I can only flit and float around a couple of themes therein. Hoegh-Guldberg's chapter on marine ecosystems underlines how central coral reefs are for life on Earth: an estimated million species of plants, animals and protists live in an estimated 400,000 square km of coral reef (p. 262). Seven major episodes of coral bleaching occurred from 1979 to 2002 due to warmer seas, the most intense being in 1997-98, when 10% to 16% of the world coral reefs died. The western Indian Ocean suffered the worst, losing as much as 46% of all living reef-building corals. At 1.4 degrees rise, the coral reefs in the Indian Ocean are expected to become extinct (George Monbiot, *Heat*, p. 9). And 1.5 degrees, remember, is assured.

Another reason why innumerable species are under threat is they are literally not being able to keep pace with shifting isotherms, corridors within which an average temperature prevails. Parmesan quotes a large study she and Gary Yohe did covering more than 1,700 species, which revealed that their boundaries were moving "on average, 6.1 kilometres per decade". Hansen suggests that temperatures shifts, however, have been occurring towards the poles at over 50 km per decade. Species are effectively being shunted polewards, or upwards.⁸ Those already at the poles, or at high altitudes, are being nudged off the planet. Species at the southern end of an isotherm shifting northward sometimes can't cope. Even moderate models predict that if we don't deal with global warming on an urgent basis, a significant percentage of species on Earth will become extinct.

So what can be done about the looming crisis? Unfortunately, all these books and the Gore film propose some technological and other measures, which, though important, will not prevent dangerous global warming, and some that are downright dangerous.

Growing crops to make biofuels for transport, which the Indian government encourages, is enthusiastically supported by Robert Watson in his contribution in the Lovejoy and Hannah volume, and these others. Palm oil, maize and jatropha plantations have expanded with the EU and US setting higher targets for biofuels in their fuel mix. The consequences have been greater emissions from deforestation to grow palm oil in Malaysia and Indonesia, people being driven out of lands they use (but designated 'wasteland') in Rajasthan and Madhya Pradesh, and spiralling prices of maize and wheat, sparking protests in Mexico. These crops also consume huge amounts of water and use land that could otherwise be used for basic foods. Should we be diverting resources on this scale to feed cars rather than feed people?

Nuclear power is routinely prescribed as contributing to a solution even though it will be only a tiny percentage of power generation, and has obvious, serious hazards: the real possibility of serious nuclear accidents; nuclear waste being recklessly dumped, as happened in the UK (*Heat*, p. 91); the long-term problem of nuclear waste; finally, the

⁸ James Hansen, 'The Threat to the Planet', *New York Review of Books*, 13 July 2006.

spread of nuclear power is more conducive to the proliferation of nuclear arms because of the fine technological line between nuclear power and weapons.

Expanding nuclear power (“by a factor of five by 2056”) and biofuels are part of Princeton’s Robert Socolow and Stephen Pacala’s well-known wedges to reduce greenhouse emissions, on which Gore relies. It also includes a series of technological fixes – solar power, hydro, wind, capturing CO₂ and burying it, geothermal, sea waves – which are routinely presented as possible solutions. In 2008, the Indian government will test iron fertilisation in the Scotia Sea near Antarctica to regenerate phytoplankton to absorb more atmospheric CO₂ (*New Scientist*, 22 June).

Some of these technologies will reduce CO₂ levels, will help delay its impacts, and are anyhow important. But few who present technology as a solution bother to ask: why is it that these technologies are not being and have not been implemented on a scale large enough to solve the problem, let alone preventing global warming becoming such a dire issue in the first place? What Al Gore, Paul Brown, Dash and others ignore in their framework is that the problem is a systemic one. The rise of global warming mirrors the history of capitalism. China’s rise in emissions in recent years illustrates this: from 3.050 million tons of CO₂ in 2001 to 5,322 million tons in 2005 (India’s, in comparison, rose merely 149 mt in those four years); China overtook the US earlier this year. This rise reflects the shift of manufacturing to China and it becoming the source of consumer goods consumed hugely elsewhere.

It is the tendency of capitalism to opt for the cheapest inputs, including the cheapest fuels like coal. (Why else would China, despite facing staggering environmental disasters, continue to build coal-powered plants at the rate it is?). And as John Bellamy Foster has repeatedly argued in *Monthly Review*, and most recently in *Ecology Against Capitalism*, capital tends to promote those energy sources that generate the most profits, the environment be damned. What’s more, capitalism’s constituent parts aren’t easily regulatable, as each individual enterprise cuts corners to make profits. Even if we assume technological solutions have the technical capacity to solve the problem, which I doubt, capitalism’s inherent drive to cut costs, generate profits and towards relentless growth will continue to prevent technological remedies from being adopted on a scale large enough to avoid dangerous global warming and ameliorate all the other myriad environmental crises that capitalism has already engendered.

Underlying technological fixes is also the assumption that elites can carry on their lifestyle. But the Earth cannot take ongoing levels of consumption and waste any more. Reducing consumption (if you are one of the haves) is absolutely essential. But again, voluntarily reducing consumption will not happen on a sufficient scale under capitalism to solve the problem of global warming.

Basically, the entire ‘development’ trajectory, in India and elsewhere, needs to be questioned, and resisted. Long-term, lasting solutions to global warming, and a host of other crises, I might add, will only come from more equitable (and hence less wasteful)

societies, with greater decentralisation, and which follow a less exploitative relationship between man and nature. Technology may then help; but it will follow, it cannot lead.

That's easier said than done. No such alternative large enough to make a significant difference is on the horizon. The economies of contemporary countries with Left governments are all intermeshed with First World consumption, such as Venezuela's (oil exports), Brazil's (Amazon's timber), even Cuba's (tourism). What's more, in the issue of human control over nature, socialist societies of the 20th century were not fundamentally different from their capitalist rivals. Also, while massive cuts are needed urgently, the two biggest emitters have not even signed Kyoto, nor does India need to make any cuts; most of those that have ratified the Protocol are not being able to meet its feeble cuts. All of which is why I don't believe we can avoid 'dangerous' global warming. Whether the planet can recover from the imbalance it will be pushed into is anybody's guess. But it certainly makes the issue of struggles towards more just and equitable societies an even more pressing one.

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