

Global warming: Twenty inescapable facts about the inconvenient truth

Belatedly the wider community is realizing the 'inconvenient truth' about global warming; its significance, urgency and projected impacts. However, much misinformation remains on its causes, consequences and our response options to try to mitigate it, hopefully in time. To help overcome this misinformation many community organisations, such as the Nature and Society Forum, have been leading public debate on this issue. Significantly this debate has been able to consider wider views and options than that within academic or government forums which generally appear to need to maintain consistency with their previous statements and assumptions.

For such a debate to be most valuable, the issues raised need to be questioned critically. The recent debate on *The biology of global warming* within the NSF and following its republication through the CSIRO Sustainability Network has been valuable and welcome in this regard. The feedback received including recent international contributions have in fact highlighted the following 'inescapable facts' about global warming.

1. The concentration of CO₂ in the earth's atmosphere reached 382 ppm in 2006, up some 35% from the pre-industrial and natural interglacial maximum of 280 ppm (1). However when the effects from associated greenhouse gases, particularly methane and nitrous oxide, are included then we are already at a level equivalent to 430 ppm CO₂ (2).

2. If the global CO₂ level increases much above 550 ppm (450 ppm on NASA's estimate, Hansen) there is a very high likelihood that this will increase mean global temperatures from 2-6 degrees C (2), which in turn will risk triggering dangerous climate changes (3). We also risk further accelerating temperatures as we reduce emissions of polluting aerosols which currently offset some 75% of the CO₂ greenhouse effect via global dimming and cooling (4).

3. If we trigger such dangerous climate changes any of ten or more positive multiplier effects, such as the melting of ice caps or the tundra, can be expected to create severe climate chaos grossly disrupting economic, social and environmental normality (2). Extensive physical evidence confirms that many of

these high risk multiplier effects are real and accelerating (5).

4. Based on the increases in CO₂ levels, which are accelerating, currently at 2.5 ppm/an (1) and increasing faster than our CO₂ emissions, levels may be at 550 ppm CO₂ equivalent by 2025-30 as models predict, not the distant 2100 often referred to in policy responses (6).

5. These accelerating CO₂ levels are unavoidable as they reflect previous high CO₂ releases from the 1970s onwards which have not yet been fully expressed in the atmosphere due to the natural lag effect of oceans in equilibrating CO₂ levels, but will be over the coming decades (7).

6. The reality is that the earth and human societies can not now avoid CO₂ levels equivalent to 550 ppm as early as 2025-30 due to these locked in lag

effects (8). No level of reduction in future CO₂ emissions can now avoid the resultant 2-6 degrees mean temperature increases nor the risk that this will trigger dangerous climate change. No amount of talk or

research on hoped for future 'clean coal' technology, carbon geo-sequestration or nuclear power can now avoid these already locked in dangerous imminent climate consequences.

7. Effectively James Lovelock is right. We may have left it twenty years too late to avoid dangerous climate change by reducing the greenhouse effect through lowering our carbon emissions (9). Although we had the warnings, we ignored them in order to protect lifestyles and the status quo on the deception that 'the science was not yet clear enough'.

We now have to face the reality that global warming and its impacts are real, inescapable and imminent and cannot be prevented by hoped for agreements to lower future CO₂ emissions. So what can humanity do?

As Einstein advised; we may not be able to solve problems with the thinking that created them. We need to be prepared to think laterally to look for more effective systems solutions.

Fortunately, if we are prepared to do this, we may have one last chance, hopefully in time.

However, to do so we need to critically review our current assumptions about global warming and the following facts about the processes that have created and govern the earth's climate.

If Rome had nukes are we really to believe they would have stayed in the silos for the last 2,000 years?

*A comment posted to the internet
November 2006*

8. For over 4.2 billion of its 4.6 billion years, the 'blue planet', because of its location in the solar system, has been able to retain liquid surface water. This has created and buffered the earth's relatively stable climate enabling the evolution of life. It is this water and its unique capacity to absorb, retain, transfer and dissipate heat, via absorption, evaporation, clouds, condensation and precipitation, plus some 60-80% of the natural greenhouse effect, that governs over 90% of the earth's natural heat dynamics and heat balance (10). Can these water and heat processes help us in mitigating global warming?

9. By contrast CO₂ influences less than 4% of the earth's total heat balance as it provides some 20% of the natural greenhouse effect which contributes some 18% of the earth's net heat balance (11). It follows that the 35% increase in CO₂ levels from 280 to 382 ppm over the past 250 years may have increased the global heat balance by perhaps 1%. This 1% change in the global heat balance has been assumed in conventional climate models to be the cause of global warming.

10. Whatever the cause of global warming we can accept the reality that (12):

- CO₂ levels have risen abnormally,
- temperatures have increased variably in different regions,
- tundra, ice caps and glaciers are melting at abnormal accelerating rates, and that
- biological systems indicators suggest that the climate is warming rapidly.

As this is reality we must face it and promptly restore the earth's natural heat processes and balance. To do so we must understand these processes, not just accept prior conventional dominant assumptions and explanations about the cause and consequence of global warming. If we do so it becomes clear that:

11. The increase of CO₂ levels indicating the onset of global warming, occurred from 1750. Based on its low C¹³ ratio the CO₂ must have come from old stored carbon (13). Contrary to assumptions the initial emissions could not have come from human use of fossil fuels as this increased substantially only from 1900, some 150 years later (14). Consequently the initial rise in CO₂ levels and onset of global warming

could only have been caused by the extensive deforestation and the associated loss of soil carbon over the preceding centuries.

12. Only the deforestation of 6.3 of the earth's 8 billion hectares of primary closed forest prior to 1750 plus the associated degradation of soils and soil organic matters could readily account for the initial CO₂ increase (15). The deforestation could also readily account for the inability of the earth to adequately bio-sequester and stabilize the CO₂ levels as the Vostok ice cores data confirms such processes had done in previous inter-glacial cycles (16). It is this impairment of the natural bio-sequestration capacity that is likely to have caused the CO₂ increase and global warming. Consequently the CO₂ increase needs to be seen as a symptom of, as well as masking, this impaired bio-sequestration capacity and cause of global warming.

As for pointing to our mental failures with scorn or dismay, we might as well profess disappointment with the mechanics of gravity or the laws of thermodynamics. In other words, the degree of disillusionment we feel in response to any particular human behaviour is the precise measure of our ignorance of its evolutionary and genetic origins.

*Reg Morrison
Plague Species*

13. The critical causal role played by this impaired bio-sequestration ability is demonstrated by the seasonal variation of CO₂ observed in the Hawaiian and Cape Grim data. Whereas CO₂ is emitted constantly throughout the year and readily equilibrates in the atmosphere, the annual 'sawtooth' variations in CO₂ confirm that it is the difference

in bio-sequestration rates in the northern and southern hemisphere summers that govern the CO₂ levels, not their emission per se (17). Large emissions of CO₂ have also previously resulted from forest fires, volcanoes or methane releases. These did not trigger climate chaos while bio-sequestration was adequate (1). It is only now that deforestation has impaired this bio-sequestration capacity that CO₂ emissions, including from recent fossil fuel use, can not be sequestered adequately thereby increasing atmospheric CO₂ levels and the risk of climate chaos.

14. To date we have released some 300 GTC (billions tonnes of carbon) from burning fossil fuel. Comparatively over 2000 GTC may have been released by deforestation and soil degradation. Historically these forests may have bio-sequestered some 300 GTC/an (15). Restoring just 5% of this prior bio-sequestration capacity (ie 15 GTC/an) should enable us to balance the 7 GTC/an we are currently emitting plus sequester some past emissions to re-balance the global climate. Practical and profitable options exist for doing this.

15. However we may now not have enough time for just relying on this carbon component of the bio-sequestration process (6). We now may have no choice but to rely on other, much more important, processes integral to forests to restore the earth's prior heat balance.

16. In addition to changing the global carbon cycle, the extensive deforestation would also have greatly reduced global transpiration and through that cloud formation and rainfall. This reduced transpiration invariably reduced the transfer of water and heat from the earth's surface to form clouds thereby lowering the reflectance of incident heat and the transmission of latent heat back out into space. As these processes can govern over 50 per cent of the earth's heat balance, their impairment due to deforestation can directly increase surface temperatures (18). Temperature differences of 10 degrees C can occur in adjacent forested and cleared areas because of such cooling water effects (19). Consequently extensive past deforestation, by reducing water and heat transfers, may have had a much more significant effect in triggering regional and global warming than the CO₂ component of the greenhouse effect.

17. Deforestation may also be reducing the natural cooling capacity of large parts of the earth. Forests, because of their leaf area index, are often far more effective per unit area in transferring water into the troposphere and heat back out to space than areas of open water.

This is consistent with evidence that the earth is warming differentially depending largely on how local natural water and heat dynamics may have been altered. For example temperature increases are higher in the more deforested land based northern hemisphere than in tropical regions or the southern hemisphere where deforestation has been less and oceans dominate (17). The dry centre of Antarctica may be cooling while coastal regions are warming. Cleared urban 'heat islands' also have higher temperatures than nearby forested areas with natural water and cooling heat fluxes (17). Such variations in

regional temperature effects are inconsistent with the assumption that CO₂, which rapidly equilibrates and would be similar over these regions, could be the primary factor governing this variable warming.

18. Consequently we need to question assumptions in climate models that changes in water dynamics are not important in global warming and that humans could not have influenced global water and heat balances. Through their extensive deforestation humans could have significantly reduced global water dynamics and through that the transfer and dissipation of heat that previously cooled the planet. Indeed, the changes that deforestation caused to global water dynamics may have been the dominant factor in disrupting key processes in the earth's heat balance and in increasing global temperatures. Accepting and counteracting these realities may

now be our only option for mitigating global warming, hopefully in time.

19. Restoration of the earth's natural water and heat dynamics may not only be our only option to avoid dangerous climate chaos but also the most feasible, effective and beneficial. Whereas reductions in CO₂ levels may take decades to have an effect, the restoration of global water dynamics can be effective within days in restoring natural clouds and cooling processes. Reforestation should enable us to safely restore these natural water and heat processes. For example, by enhancing global cloud densities by 3 per cent, reforestation could increase albedo reflectance of solar radiation back to space by some 1 per cent. Theoretically

this would have an equivalent global cooling effect to reducing CO₂ levels back to pre-industrial levels (20).

20. Although there are details that we do not yet understand fully, we have sufficient knowledge of how forests influence terrestrial water dynamics, cloud nucleation, cloud albedos, rainfalls and the re-radiation of surface heat back out to space to safely use reforestation strategies to rapidly re-balance the natural water and heat dynamics of the planet. We

All government – indeed, every human benefit and enjoyment, every virtue and every prudent act – is founded on compromise and barter.

Edmund Burke 1729 - 1797

We have made this appalling mess of the planet and mostly with rampant liberal good intentions. Even now, when the bell has started tolling to mark our ending, we still talk of sustainable development and renewable energy as if these feeble offerings would be ... an appropriate and affordable sacrifice. We are like a careless and thoughtless family member whose presence is destructive and who seems to think that an apology is enough. ...until we stop acting as if human welfare was all that mattered, and was an excuse for our bad behaviour, all talk of further development of any kind is unacceptable.

James Lovelock

The Revenge of Gaia, p148

Showing that, while Burke can bargain with other humans, we cannot bargain with nature; nature does not compromise one iota

also have sufficient knowledge of reforestation and forest management options. However first we need to accept that reducing future CO₂ emission is now no longer adequate to mitigate global warming. We need to recognise that the above inescapable facts now provide us with our only chance to mitigate dangerous climate chaos, hopefully in time.

Being natural such reforestation represents a no risk win-win strategy, particularly as the forests will also deliver major synergistic benefits in enhancing carbon bio-sequestration, soil restoration, soil water retention, the resilience and bio-diversity of bio-systems as well as in providing material and energy feedstock for sustainable industries. The reforestation can be integrated with and enhance sustainable grazing and food agro-ecosystems and be profitable.

Such reforestation can also be initiated regionally with minimal capital or infrastructure pre-requisites. The benefits from such reforestation should be able to be captured locally by the responsible communities through improved material, fuel and fibre and eco-system services, particularly the development of more resilient, buffered and still livable regional climates.

The challenge is to look critically beyond the status quo, face the realities of global warming and its imminent consequences and consider more effective response options.

The above inescapable facts may help in this regard. Either Homo sapiens uses its intelligence to urgently restore these natural climatic processes or nature will do it for – but without – us.

It's no wonder we don't defend the land where we live. We don't live here. We live in television programs and movies and books and with celebrities and in heaven and by rules and laws and abstractions created by people far away in space and time; and we live anywhere and everywhere except in our particular bodies on this particular land at this particular moment in these particular circumstances.

*Derrick Jensen
Endgame, 2006, p. 761*

Walter Jehne

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Ockham's Razor and Global Warming

The Venerable William of Ockham (1285-1349) argued that 'entities are not to be multiplied beyond necessity', thereby advocating the principle of economy in seeking the simplest hypothesis.

The February - March 2007 edition of *Nature and Society* describes three apparently incompatible hypotheses on the causes of climate change. Stephen Boyden argues the case advocated by the Intergovernmental Panel on Climate Change (IPCC) that increase in atmospheric carbon dioxide levels is the principle cause of global warming, while Walter Jehne maintains that the increase in atmospheric CO₂ levels is a symptom rather than a cause of global warming. Taking a different tack, Duncan

Brown maintains that the heat of combustion of carbon compounds makes a significant contribution to global warming, the Earth acting as a sort of radiating hotplate.

It could be argued that all three hypotheses have an important bearing on climate change, in synergistic rather than incompatible ways. For example, the IPCC accepts that global warming increases the release of CO₂ from forests and oceans, and of methane from Arctic tundra (later oxidised into CO₂ and water), which can accelerate the greenhouse effect by feedback to a disastrous tipping point. Moreover, it cannot be disputed that *local* radiant heat is greater in deserts and cities denuded of vegetation than in pastures and forests, and that rainfall is greater over forested than deforested areas.

Attempting to attribute one or other *causative* hypothesis exclusively may have no more value than the debate by medieval schoolmen on how many angels can dance on the head of a pin. On the other hand, Ockham's Razor might usefully be applied to recommendations for the *mitigation* of climate change which are compatible with the three points of view. Such recommendations might include the following:

1. In Australia, to cease land clearing and forest clear-felling, making suitable arrangements to give farmers in marginal areas and foresters stewardship of the earth to promote the sustainable growth of indigenous vegetation. Internationally, to bring pressure to bear to reduce massive forest clearing and conflagration, particularly in Southeast Asia and South America.

2. Advocacy of steep reductions in fossil fuel combustion through carbon pricing, reduction of domestic energy hyper-consumption (including travel) and war-like activities, improvements in building design and operation, promotion of public and rail freight transport, walking and cycling, more efficient and low carbon emission cars, and more

effective re-cycling (e.g. of aluminium, tyres and building materials).

3. Progressive displacement of fossil fuel use by carbon neutral technologies such as centralised round-the-clock steam turbines driven by concentrated solar, wind, geothermal and tidal power, biofuels from algal ponds and localised solar hot water systems and photovoltaics using silver cells and nanotechnology.

Such adaptations for mitigation of climate change, which have long been advocated by Nature and Society Forum, constitute support for a holistic approach to a sustainable energy future which is consistent with William of Ockham's principle of economy in seeking the simplest hypothesis. It entails a revolution from linear fossilised industrial capitalism to cyclical environmentalism. Can

anything less lead to anywhere except disaster?

Bryan Furnass

We tell lies to each other. If Bill Clinton and the timber industry can frame the debate over deforestation as 'jobs versus owls', the deforesters have already won before we can start. If they can frame the debate such that people believe forests need to be cut down so they won't be killed by beetles, they've already won. If George Bush and the timber industry can frame the debate over deforestation such that people believe forests need to be cut down to keep them from burning, they've already won.

If those in power can frame the 'debate' over the murder of the planet into the question of how to implement 'sustainable development' (look how they've already framed it by calling industrialization 'development') they've already won: we are fighting over techniques to salvage industrial civilisation with its burgeoning population, not ways to save the planet.

*Derrick Jensen
Endgame, 2006, p. 756*

Human domination - some numbers

Consider the extent of our domination. Modern humans, now numbering six billion and predicted to go to ten billion, have left not one ecosystem on the surface of the earth free of pervasive human influence, transforming more than half the land on the planet for their own use (a quarter for forestry, a quarter for pasture, 3 per cent for industry, housing and transport), consuming more than 40 per cent of the total photosynthetic productivity of the sun, using 55 per cent of the world's fresh water,

controlling and regulating two-thirds of all rivers and streams, consuming a vast variety of plant, animal, and mineral resources, often to depletion, at a pace that is estimated not to be sustainable for more than fifty years.

Kirkpatrick Sale, *After Eden*, 2006 p. 3

If a little knowledge is dangerous, where is the man who has so much as to be out of danger?

Thomas Henry Huxley (1825–1895)
