

Supplementary statement of witness Dr Geoff Meaden

1. I make this supplementary statement as a witness in the case of R v Hewke and others.
2. I am aware of the contents of the 'Defence Case Statement' and the various 'properties' that the defendants are seeking to protect.
3. The property that the defendants are seeking to protect consists of miscellaneous physical geographic features such as ice caps, ice sheets, permafrost, river banks and flood plains; biological features such as tropical forests; plus an assortment of public and private property including land, buildings and possessions. These 'assets' (property) are widely distributed across the planet.
4. The defendants believe that the aforementioned 'properties' are at risk from a wide range of environmental hazards that basically arise out of climate change, or more specifically 'global warming'. Thus an incremental but accelerating build-up of the Earth's temperature will have both direct and indirect consequences on climate and other physical systems, and given the purported exponential rate of warming, most of these consequences will increasingly be disastrous for the biological life on the planet. It is overwhelmingly perceived by the defendants, by the scientific community and by myself, that the causes of climate change are anthropogenic (human induced). There can be little doubt that there is an increasing urgency for all citizens and governments to take action on this matter.
5. Although the nature and extent of the risk to property, physical features and possessions varies enormously between the individual areas and circumstances listed by the defendants, there is absolutely no doubt that, by and large, the examples quoted by the defendants are true circumstances. For instance, with regard to ice caps, there is abundant aerial photography and remotely sensed imagery (satellite derived pictures) showing declines in polar ice cover. This is particularly true for the Arctic regions, and predictions made by the American Geophysical Union are that by 2013 all Arctic ice will melt during the summer. The Arctic ice-cap in 2007 covered only 50% of the area that it covered in 1980. For life that depends on these ice-caps, e.g. seals and polar bears, then this situation is indeed disastrous, as it is for many of the indigenous people's inhabiting these areas. They will have no option but to move into social and cultural milieux to which they are potentially alien. Similar but less pronounced ice reductions are occurring in the Antarctic. These have less effect on humans but a much greater effect on other animals. What is most crucial, is that the rate of this ice reduction is far outstripping what all the climate models have been predicting. Greatly accelerating ice reductions are with us, and only exceedingly urgent and drastic actions can ameliorate this.
6. The defendants cite a range of 'property' losses that are associated with tropical areas. In these areas there are a number of distinct (but related) factors that will lead to increasing deterioration of physical conditions. Firstly, higher temperatures in areas that are already dry will mean greater evaporation of any available moisture, thus increasing drought. We have seen that this is even affecting so-called 'developed' countries such as Australia, where large numbers of farmers have simply walked off from their

properties, thus incurring huge financial loss. Secondly, in coastal areas, where sea water is available for evaporation, there will be seasonal increases in rainfall leading to increased flooding. This is particularly likely in sub-tropical areas such as South-east Asia, parts of China, India, Central America, etc. Property here will mainly be affected by marine or riverine floods which, because of desirable water side locations, have a tendency to affect large human populations. Thirdly, increasing temperatures lead to the propensity for stronger cyclones, hurricanes, tornados, etc. This is because the warmer the air is the faster it will rise. Fast rising air leads to low air pressure and strong winds occur as air is sucked in to replace the rising air. Hurricanes, cyclones, etc can lead to death and property destruction on a massive scale. It is well documented that there has been an increase in the incidence of strong wind events that correlates well with rises in average air temperatures.

7. A most important point to emphasize is the fact of 'tipping points'. These points can be associated with individual processes or with a much broader scenario. A tipping point occurs when some threshold is reached which sets off some other reaction. Regarding global climate change the most well known tipping point is now happening where, for the first time in 11,000 years, the far northern perma-frosts are melting. As these frozen peat bogs melt millions of tons of methane is released into the atmosphere. Each unit of methane is more than 20 times as strong (in terms of global warming) as a unit of carbon dioxide. Another important tipping point will come with the demise of the co-called 'Atlantic conveyor'. At present north west Europe is kept much warmer than similar latitudes on the eastern side of the Atlantic. This is because of the North Atlantic Drift, a warm ocean current that moves from the Caribbean towards NW Europe bringing with it warm moist air. With increasing ice melt in the north, this colder water will force the Atlantic Drift southwards, and there is the likely danger that in the not too distant future this current will suddenly stop flowing. The dramatic temperature changes then caused would have a major effect on the whole population of NW Europe. On the broader 'tipping point' scenario, scientists have calculated that if mean global temperatures rise by more than an additional 2C, then there will be nothing that mankind can do to prevent the Greenland ice sheet melting. If this occurs sea levels will rise by about seven metres. The property damage experienced under such a scenario will be catastrophic and irreversible, and indeed countries such as the Maldives and Tuvalu would completely disappear. There is no indication that the current collective human efforts to reduce greenhouse gas accumulations will be sufficient to prevent this 2C temperature rise, and indeed it has been suggested that the most urgent 'tipping point' is a change in human attitudes (and actions towards) to the potential dangers arising from climate change.
8. I have briefly illustrated that the general principles that the defendants have alluded to are correct, and indeed there has been plenty of evidence over at least the last decade to show that climatic disasters are becoming more frequent. There has also been a wealth of climatic modelling done by numerous institutions throughout the world, and on the basis of this modelling it is relatively simple to list, as the defendants have done, a wide range of scenarios in which the human condition will be increasingly affected. A problem that the defendants, or anyone considering these issues, face is that specific scenarios will be difficult to accurately forecast,

and indeed their occurrence will be mostly, though by no means always, unpredictable but incrementally more frequent. So, whilst it is easy to recognise specific property damage that the defendants have done and have admitted to, it is far more difficult to perceive of the immensely greater property damage caused by climate change that will accrue over widely scattered areas of the planet unless urgent action is taken.

9. I am sure that it appreciated that this is a huge issue to which justice cannot be done in a relatively short brief. However, I would be happy to expand on any of these points if required.
10. Please note that this written Witness Statement is being produced because I am unable to attend the court in person. From August 23rd to September 8th I am on a lecture tour in Brazil. This tour includes giving the keynote speech at the most important conference in my research area. My tour has been planned for many months and cannot reasonably be cancelled.