

in Bangladesh, malaria in the east African highlands) may in part reflect regional climatic changes.<sup>4-6</sup>

Climate change is not merely another addition to the list of environmental health hazards each warranting separate epidemiological study and risk management. It is a complex global environmental hazard, with knock-on effects, and is unlike exposure to a dose of some specific toxic chemical or radiation. Hence the overall risk to health is more than the aggregation of itemised disease risks due to particular climatic factors.

Widely evident, climate induced changes to physical and non-human biotic systems—such as glacial melt and altered seasonal timing of flowering, breeding, and migrating<sup>7-8</sup>—provide insight into how biogeophysical systems can become uncoupled and dysfunctional. In similar fashion, the complex array of consequences of climate change, often perturbing social systems, can have impacts on health that are not well captured by itemised tallying. Unabated climate change would impair regional food and water supplies and thereby disrupt social and economic conditions—particularly in already poor and vulnerable populations. Conflicts would arise, migrant flows would increase, and a mix of violence, injury, infectious diseases, malnutrition, mental disorders, and other health problems would result.

The relation between climate change and health is also distinctive in signifying that collectively we are on a non-sustainable path. Viewed anthropocentrically, sustainable development is about improving the quality of human life while maintaining Earth's life supporting biogeophysical systems and ecological processes. Our unprecedented impacts on the planet's climate system, ecosystems, biodiversity stocks, fresh water supplies, and other systems indicate that we are now eroding natural capital globally.<sup>9</sup>

Recent advances in understanding climate change and its impacts highlight the need for extraordinary and rapid reductions in emissions of carbon dioxide. Russia's recent decision to ratify (and thus activate) the Kyoto protocol is heartening but insufficient. More developed countries must adopt Britain's commitment to stepwise halving of national emissions by 2050. The technical knowledge required to meet world energy

needs, while radically reducing greenhouse emissions, already exists.<sup>10</sup> However, both biosphere and human society are complex dynamic systems, and climate change therefore cannot be remedied by a single intervention. We need a multifaceted approach that encompasses decreased waste generating consumerism, improved energy efficiency, reduced deforestation, and greater use of non-fossil fuels.

As our understanding of the biosphere and climate system grows, we see that the main issues are not about such things as fine tuning the economic modelling of future emission trajectories, or noting the palaeo-evidence that Earth's climate is ever changeable. The real challenge is to understand the complexity and uncertainties of changes in Earth's natural systems, the likely human impacts (and adaptive strategies to lessen those impacts) and the fundamental significance of human induced climate change in relation to the great task of achieving a sustainable way of living.

Anthony McMichael *director*

Rosalie Woodruff *postdoctoral fellow*

National Centre for Epidemiology and Population Health, Australian National University, Canberra, ACT 0200, Australia (tony.mcmichael@anu.edu.au)

Competing interests: None declared.

- Houghton JI, Ding Y, Griggs DJ, Noguer M, Linden PJ, Dai X, et al. *Climate change 2001: the scientific basis. Contribution of Working Group I to the Third Assessment Report of the International Panel on Climate Change*. Cambridge: Cambridge University Press, 2001.
- Karl TR, Trenberth KE. Modern global climate change. *Science* 2003;302:1719-23.
- Patz J. Global warming—health impacts may be abrupt as well as long term *BMJ* 2004;328:1269-70.
- McMichael AJ, Campbell-Lendrum D, Ebi K, Githeko A, Scheraga J, Woodward A, editors. *Climate change and human health: risks and responses*. Geneva: World Health Organization, 2003.
- Hales S, Woodward A. Climate change will increase demands on malaria control in Africa. *Lancet* 2003;362:1775.
- Reiter P, Thomas CJ, Atkinson PM, Hay SI, Randolph SE, Rogers DJ, et al. Global warming and malaria: a call for accuracy. *Lancet Infect Dis* 2004;4:323-24.
- Root TL, Price JT, Hall KR, Schneider SH, Rosenzweig C, Pounds JA. Fingerprints of global warming on wild animals and plants. *Nature* 2003;421:57-60.
- Parmesan C, Yohe G. A globally coherent fingerprint of climate change impacts across natural systems. *Nature* 2003;421:37-42.
- Wackernagel M, Schulz NB, Deumling D, Linares AC, Jenkins M, Kapos V, et al. Tracking the ecological overshoot of the human economy. *Proc Natl Acad Sci* 2002;99:9266-71.
- Pacala S, Socolow R. Stabilization wedges: solving the climate problem for the next 50 years with current technologies. *Science* 2004;305:968-72.

## Getting well from water

*Bottled water exploits our worries about what affects health in the modern world*

**W**ater is now everywhere. It has become a modern fashion and health accessory, as ubiquitous as the mobile phone. Students have a bottle in their bags or in front of them during lectures, people are jogging with water, and office workers have a bottle within easy reach of their desk. The rise of water as a health product is underpinned by people's worries about modern life. Bottled water is seen as a natural antidote to what the consumer sees wrong with modernity and bad for their health—chemicals and technologies full of risk and hazard, genetically engineered food, low level radiation, harmful medications, and sinister viruses.<sup>1</sup>

Sales figures confirm that bottled water is the world's fastest selling drink. In the United Kingdom, consumers spent £1bn (\$1.9bn; €1.4bn) on bottled water last year, a 70-fold increase from 20 years ago. In the United States, consumption of bottled water has risen from 2.5bn gallons (9.5bn litres) in 1992 to almost 6bn gallons in 2002. Advertisers conjure up a thousand variations on the same theme—the theme of pure, clean, fresh, and unspoiled water. Drinking “pure” water restores energy and ensures health. Samuel Hahneman, the inventor of homoeopathy, knew this well. His product was also nothing but the purest of pure water, in which the deliberately added substances had been diluted away beyond

Avogadro's number, leaving nothing behind but their memory. The homoeopathic version of bottled water, which has had negative memories removed and replaced with beneficial energy patterns, is called "Blue Water" and sells for £11 a litre.

But consumers can only take so much purity. Bottled water has also become an "aquaceutical," the ultimate health food. It is now fortified with additives and produced using special processes claimed to improve health. Nestlé, the maker of Contrex bottled water, says its product contains traces of calcium and magnesium that help reduce weight, eliminate toxins, and reduce fatigue. Penta H<sub>2</sub>O is claimed to have a unique structure with smaller clusters of H<sub>2</sub>O molecules that ensures more efficient absorption of its health giving properties. Super-oxygenated waters claim to increase energy levels and concentration by increasing the concentration of oxygen in the blood. Lakeland Willow Spring water, voted best designer water in 2003, contains traces of salicin, which is claimed by the company to be useful for "eliminating toxins." In California, a company is now selling chemical-free bottled water specifically designed for pets.

Water can also make people feel very vulnerable when they think it has been tampered with. Water contamination incidents are associated with particular disruption and morbidity, which cannot be explained on toxicological grounds.<sup>2</sup> General Jack Ripper, who believed that fluoridation was a communist plot to poison our "vital body fluids," was a product of Stanley Kubrick's imagination, but his views are only an exaggeration of a widespread concern. The continuing fluoridation controversy confirms that adding anything to public supplies of water causes anxiety.

The public is particularly unforgiving when companies produce water that is less than pure. When high concentrations of benzene were found in Perrier, sales plummeted and the company has struggled to regain its market share. The example of Coca Cola is instructive. Bottled Coca Cola was associated with a health scare in Belgium, which was almost certainly an example of mass hysteria.<sup>3</sup> The brand was temporarily

withdrawn, but sales eventually recovered and the company has not been affected in the long term. On the other hand, when Coca Cola's Dansani water, produced through a process labelled as reverse osmosis developed by NASA, was found to contain concentrations of bromate above the legal limit, the company faced hostility from consumers. Despite the multi-million pound marketing campaign, the company withdrew the product completely from the market.

Bottled water is another of the modern paradoxes of health—a product born out of our success at reducing waterborne disease. In the developing world such diseases cause over two million deaths a year, most of them among children aged under 5.<sup>4</sup> In these countries, adding chlorine to water is viewed as a health intervention with the potential to save a huge number of lives. In the developed world, bottled water owes part of its popularity to the view that tap water is impure, contaminated, and hence risky. Bottled water is seen as natural, clean, fat-free, and with traces of health giving minerals. In fact tap water is as safe as bottled water and about 1000 times cheaper. The marketing of bottled water exploits people's worries about what affects their health in the modern world. There is a message in that bottle.

Keith J Petrie *professor*

Health Psychology Department, Faculty of Medicine and Health Sciences, University of Auckland, Private Bag 92019, New Zealand (kj.petrie@auckland.ac.nz)

Simon Wessely *professor*

Academic Department of Psychological Medicine, Guy's, King's, and St Thomas' School of Medicine, Institute of Psychiatry, London SE5 8AF (S.Wessely@iop.kcl.ac.uk)

Competing interests: None declared.

- 1 Petrie KJ, Wessely S. Modern worries, technological change and medicine: new technologies mean new health complaints. *BMJ* 2002;324:690-91.
- 2 David A, Wessely S. The legend of Camelford: medical consequences of a water pollution accident. *J Psychosom Res* 1995;39:1-10.
- 3 Nemery B, Fischler B, Boogaerts M, Lison D, Willems J. The Coca-Cola incident in Belgium, June 1999. *Food Chem Toxicol* 2002;40:1657-67.
- 4 MacDonald R. Providing the world with clean water. *BMJ* 2003;327:1416-8.

## In my chosen doctor I trust

*And that trust transfers from doctors to organisations*

The season of goodwill provides the occasion to consider the importance of trust in facilitating social intercourse and a well functioning society.<sup>1</sup> Trust provides the glue that makes cooperation possible without costly and intrusive regulation. Trust has declined in all social institutions in recent decades<sup>2</sup> and medical leaders in the United States elicit as little public confidence as leaders in government and business.<sup>3</sup> Trust in doctors has also diminished with the explosion of public information on betrayals of trust, failure to follow evidence based standards, and poor quality care, but patients remarkably retain much trust in their personal doctors.<sup>4</sup> Such trust encourages sharing of intimate feelings, cooperation in treatment, and adherence to medical advice.<sup>5</sup> Patients may have assimilated some of the negative media images of doctors and health organisations but they typically believe their doctor is different.

Choosing one's doctor and care settings, continuity of care, and good communication contribute importantly to such trust and to the quality of health care.

When trust erodes, public authorities may appoint expert commissions and introduce new rules and regulations to control substandard and unethical behaviour. They do this to assure the public that health services meet high standards, and that doctors can be trusted. These measures may help, but rarely do they have the high credibility that trusted doctors have in guiding and reassuring patients.<sup>6</sup>

Trust in doctors is built on patients' beliefs that doctors are technically proficient, on interpersonal competence, and on indications that the doctor is their ally.<sup>7</sup> Typically, patients cannot judge technical competence but assume that educational and certification requirements ensure this. They also use interpersonal

*BMJ* 2004;329:1418-9