

ENVIRONMENTAL STRESS

WEDNESDAY 20 DECEMBER 2006

please remove the - at - in the email addresses and replace with @

Environmental stress and culture change: a view from prehistory – Prof Steven Mithen, School of Human and Environmental Sciences, University of Reading
In this talk I will address four key developments during human prehistory that may be related to environmental stress, ultimately caused by climatic change: the origin of symbolic culture in Africa at c. 80,000 years ago, the development of Upper Palaeolithic art in Europe between 35-10,000 years ago, the origin of agriculture in the Levant at 10,000 years ago, and the development of complex hunter-gatherer societies in southern Scandinavia at 7000 years ago. In each case I will briefly review how these developments may be related to environmental stress. I will then try and draw out some generalities about the relationship between climate change and long term change in humans society and culture.

Agents under stress: coupled modelling of social systems and their environment – Dr Mike Bithell, Department of Geography, University of Cambridge
Human impacts on the environment are the result of the collective effects of the actions of many individuals. As yet we do not have a dynamical theory that allows us to deal directly with the emergent properties of such collective phenomena. Agent-based modelling is a numerical technique that attempts to solve this problem by representing every individual in a population and allowing their interactions, both with each other and with the environment, to create the larger scale dynamics. This has the advantage that we can use sets of rules for behaviour that are intuitively reasonable to model the human aspects of the system, and therefore communicate results to policy makers or to the wider public in a way that is straightforward to understand: Large scale physical or economic simulations, by contrast, may seem remote, and may be hard to translate into a form that relates to everyday experience. At the same time we do not need to impose aggregate or mean behavioural rules on a population where heterogeneity may be important – individual variations in behaviour and culture can be retained. Agent models are now use in a wide range of fields including traffic simulation, disease modelling, market economics, impacts of tourism, effects of seasonal forecasting and land-use change. The technique will be illustrated by reference to subsistence farming and resource gathering in environments where the spatial constraints lead to significant human stressing of the environment. In the case of small pacific islands this allows us to begin to understand

how environmental impacts, and the adaptation and technical change designed to cope with them, are coupled to their social consequences.

Impacts of ozone on the future land carbon cycle: implications for society – Dr Stephen Sitch, Met Office

Surface ozone is a major secondary air pollutant which at high concentrations is detrimental to human health. Here we discuss future scenarios of ozone and possible impacts on society. In particular we focus on the effect of elevated future ozone concentrations on land productivity. We relate possible reductions in future land productivity to human appropriation of plant production and projections of future population growth to infer regions vulnerable in terms of meeting their future food security needs. Also we relate possible future ozone-induced reductions in the capacity of the land ecosystems to store carbon which has implications for future atmospheric CO₂ levels and therefore our climate.

Climate as a health stressor – Prof Glenn McGregor, Department of Geography, Kings College London glenn.mcgregor- at -kcl.ac.uk

Heat waves, as one aspect of climate, will be focused on in this talk. There is no formal definition of heat waves, however these can be considered as infrequent periods of unusual heat lasting for 3 days and beyond. Heat waves are a result of changes in the normal weather patterns and are associated with periods of blocking when a large area of high pressure stalls over the UK. Heat related illness and death occurs because the body is unable to shed heat gained by day and by night. Certain sectors of the population are especially vulnerable to the health effects of heat. The August 2003 heat wave was notable for the high level of “extra deaths” associated with it. These reached 2137 for England and Wales and 600 for London alone. A greater number of hot days are expected with human induced climate change. By 2050, a summer like 2003 will be almost a normal summer. This holds a number of implications for health and the economy in general. One way of preparing for heat waves is to develop a heat wave plan with early warning systems as part of this. On a longer time scale we also need to think about how we design buildings and plan/re-develop our towns.

Air pollution and human health: a question of attribution – Dr Rob Kinnersley, Environment Agency