Human health and the environment

20th May 2011, Royal Society of Public Health, London

1. Workshop responses to generic questions

Questions 1 to 4 were discussed in a plenary session chaired by Prof Mike Depledge. Questions 5 and 6 were discussed in breakout groups, briefly reported back to the main session, and scribes or rapporteurs provided written notes to the workshop co-ordinator (Rosie Hails).

Question One: Think of a system on which you work. What goods come from that system?

The principal systems discussed were:

- Forests (due to the presence of a representative of Forest Research)
- Urban areas (90% of the UK population live in urban areas, according to standard definitions)

Participants identified the following goods derived from these systems:

System		Goods
Forests		Mental well being Physical activity Social engagement Sensory stimulation Aesthetic appreciation Sense of place Culture (links with myths and legends) Livelihoods Tourism
Urban areas	Parks and other public green infrastructure	Air quality / reduction of pollution Areas to grow food (allotments) Peace (and opportunity for noisy activities for others)
	Domestic gardens	Peace and recreational value
	Trees in urban areas	Climate regulation Relief from heat stress (especially for old)

Given that thoroughfares (such as routes to school and work) are more important to many people, it was also suggested that the importance of urban green space can be over-stated.

It was also noted that there the natural environment provides health disbenefits as well as benefits. Examples include sports injuries, skin cancer and Lyme's disease. Both should be valued.

Question Two: What kinds of values (market? health benefits? aesthetic?) are you interested in deriving for that system?

- **Monetary value.** Health benefits are inevitably translated into monetary terms. There are, however, also non-monetary benefits. Multi-criteria analysis is needed to weigh-up different values. At the moment the focus for public health is the supply of medical services. Better costing methods are needed in order to determine a wider range of interventions that reduce demand. Some elements of economic value are easy to obtain. For example, the house price gradient from a central urban park indicates clearly an element of the economic value placed on the park by local people. It was claimed that 96-97% of acute care bed occupancy (costing £3,000 per day) is related to lack of physical exercise and is therefore preventable.
- **Emotional state scales**. These can be obtained from qualitative and participatory studies and are useful in indicating preferences for specific health outcomes.
- **Carbon footprints.** The NHS Sustainable Development Unit calculates the carbon footprint of different drugs. Whilst this cannot necessarily be used for direct comparative purposes, it represents a way that healthcare professions may be willing to assess healthcare service provision.
- **Ethical values.** This is particularly pertinent when considering children. To what extent do they have their own voice? How do you define their value in economic terms?
- **Political values.** There is a political aversion to environmental disasters. The values (held by politicians) are influenced by politics, plus what difference they are able to make within their terms of office.

Question Three: What processes and services underpin these goods?

'Process' and 'service' are terms not familiar to this sector, which think of environmental influences and benefits that result.

Question Four: What social, environmental and ecological drivers influence this system?

Much of the discussion in this area focused on the social drivers that could be put in place to drive improvements in health and well being. The following summarises the key drivers identified.

Urban parks	Governance. Ownership of parks by local people greatly influences the extent to which they are used and the types of activities that take place. For example, in Bow, there is a health centre in the park, vegetable growing and other activities, all connected by the local GP.
Forests and other 'distant' green spaces	Physical and social barriers that prevent access.
Institutions and instruments are needed to drive improvements	Pay people to loose weight? Would this be effective? Trips to take old people to the countryside?

Statistical models are available to which explore why someone's health is as it is (the 'social determinants of health model'). These disentangle social influences on health and conclude that income is a dominant factor. In other words, the least well off and unemployed are more likely to have poor health status.

Some participants felt that obesity is a much larger determinant of health than air quality. The interconnected nature of these drivers was noted.

Participants suggested that the contribution of the natural environment to social inequalities is missing from the Marmot Review. This is illustrative of a common gap that is found between ecosystem services and the medical community. This gap is bridged to some extent by the public health profession, although public health policy doesn't incorporate issues such as climate change. At a local level, people also work to bridge this gap (see Bow example). Reorganisation of public health institutions has a negative effect on this.

Question Five: What are the major uncertainties and gaps that need to be addressed with respect to proper valuation?

Medical data are provide a good evidence base in relation to the effect of temperature, air quality and diet on health. There is, however, no dialogue between medical specialists on how to maximise effectiveness of the use of data resources.

Much of the discussion focused on the quality of the evidence base for political decision making, rather than valuation. In relation to decision making, things that are intuitive to the non-expert may not require a detailed evidence base.

Major uncertainties and gaps identified were:

1. The need for clarity between expected and proven health benefits at the community level. For example, 86% of visits to 'green spaces' are local, but many still involve a car journey. The evidence base for understanding overall benefits and disbenefits is relatively poor. There is a need to find new ways of capturing this information. Systematic reviews have been very informative, but can exclude valuable information that does not reach the prescribed standard. In particular, qualitative research needs to be captured and incorporated into the equivalent of a systematic review. Clarity on the evidence base will facilitate prioritisation of interventions to improve health.

2. There is minimal evidence on the links between the various aspects of biodiversity and human health. In particular, the link between soil microbial diversity and health outcome is poorly understood.

3. There is a need for more longitudinal studies (ones that track the same people over time); developing appropriate population cohorts so effects can be studied over several years. To what extent do individuals differ in their response to ecosystems?

4. How do we manage ecosystems to stimulate behaviour change (to achieve more healthy lifestyles)?

5. What are the major health issues that can be tackled through ecosystem management?

6. Retrospective studies: there is a need to properly evaluated the success of past policy interventions related to environment and health. Have we evaluated the impact of previous policies on behaviour change?

7. How do decision makers take non-monetary values into account?

8. There is a need to assess how to scale up the links between ecosystem services and human health at the local level to the national level. There was some disagreement between participants about how difficult scale issues would be to resolve. For example, there are case studies populated with quite a lot of data; but probably not models to extrapolate to areas of no data. There is also a lack of scenario building to explore options (a development of the NEA Scenarios could help with this). As benefits aggregate, there are likely to be emergent properties at larger spatial scales.

9. There are also some data gaps (although it was not explicitly stated what the priority data gaps were), and in some cases there has been insufficient information to tease out cause and effect.

10. While the Government recognises that urban green space is important for human health, there is uncertainty about how much money should be spent to achieve particular outcomes. Quantitative valuation could be very important in guiding these decisions.

11. Governance issues. There are real issues around who pays and who is perceived to benefit or actually benefits. For example, local authorities pay for parks, but they don't quantify the full spectrum of benefits, which resulted in declining expenditure on parks. Similarly, some local authorities don't clear icy pavements because the authority pays but the NHS benefits.

12. Broad model frameworks are required that join up valuation studies. For example, a holistic view is needed of urban transport, mapping out the positive and negative consequences of different interventions, integrating what we already know, but which is fragmented across different studies.

13. Much less is known about the health benefits of our interactions with the marine environment than with the terrestrial environment. Any psychological benefits are less well quantified than physical benefits. We also do not know about the relative values of indoor / outdoor / virtual environmental benefits. Getting an idea about the scale and magnitude of these benefits is more important than precision.

Question Six: What should a future research agenda look like?

1. A key objective should be resource use effectiveness. We need to not only look at the health costs of ecosystem degradation but also the health benefits associated with current or improved natural environment. Both these aspects are important and should be included in a future research agenda.

2. The potential impacts of climate change should be an element of longer term studies of the link between environment and health. Furthermore, consideration of the links between ecosystem services and human health should cut across national boundaries.

3. There should also be an emphasis on integrating quantitative and qualitative research, as this is more easily comprehensible to decision-makers.

4. The focus should be on the most vulnerable groups in society, where there is potential to have most impact. These are young children and the old (see Marmot Review). Health inequalities continue to widen; key factors are a) the number of single mothers; b) the rise of electronic activities; c) poor diet. A second focus should be on urban environments, as 85% of the population is urban in the UK, where on average only 9% of time is spent outdoors. In fact globally, 2008 was the first year when more people lived in cities than outside cities. In summary, we need an integrated programme that targets these most vulnerable groups and geographical areas.

5. Epidemiologists need to collaborate with social scientists so as to translate the outputs from epidemiology into public policy. We can take advantage of 'natural experiments' (i.e. experiments that are not controlled) by investigating the change in disease burden locally and nationally in response to environmental factors. For example, mortality rates are very different in different parts of Glasgow. Although such experiments are low in statistical power, they will provide the first indications of potentially effective interventions.

6. Multidisciplinary teams are needed to tackle these issues, including clinicians, public health experts, hydrologists, epidemiologists and business. An example of a business that could play a useful role is Arup; a leader in urban design. There is a considerable body of knowledge in the area of health, environment and planning, and we should ensure we find out what is already known and build on this. The environmental psychology literature is a source of relevant knowledge.

7. A data 'warehouse' is needed with the explicit task of integrating health data, social data and appropriate environmental data (extending environmental data to include biodiversity and ecosystem services). These data need to be spatially explicit and freely available. There is a potential conflict here with the confidential nature of medical records. There will be considerable informatics issues with overlaying spatial data from different sources.

8. There is a need to value 'collective benefits' as well as individual benefits ascribed to 'nature'. There is greater uncertainty in collective benefits.

2. Additional themes and issues arising from the human health and well being workshop

It was suggested that the issues of ecosystem services and their valuation are not recognised by the health professions, which are focused on treating illness. There is a particular focus on this current 'medical model' is, however, failing. The efficacy of intervention with pharmaceuticals for more complex diseases is one example. . Given that much of ill health is preventable, there is a need to

find new ways to revitalise public health. This area also needs psychologists and neuroscientists, who were not represented at the scoping workshop.

A significant issue is synthesis and communication of the existing evidence base (let alone any new developments that arise through research in the future). Most of the health professions do not have the relevant evidence at their fingertips, and so cannot necessarily take appropriate decisions. This applies also to policy makers in the Department of Health. There is a need to make best use of existing initiatives on health and environment, such as work funded by the Wellcome Trust and the Environment and Human Health Programme[1]. A joint MRC-NERC workshop on Environmental Exposure and Health took place in 2009.

The Marmot Review has clearly been very influential in exploring the socio-economic factors that influence health. However, there is a view that the natural environment had been overlooked not included in the report. As a result, a key question is whether the state of the natural environment is influential in determining the health status of individuals and communities, or only for some social or demographic groups? For example, in the case of those living in households of low income, are there other influences such as diet that dominate?

[1] Supported by NERC, Environment Agency, Defra, the Ministry of Defence, the Medical Research Council, The Wellcome Trust, ESRC, BBSRC, EPSRC and the Health Protection Agency