Managing the Environment to Improve Human Health & Wellbeing

Identifying Research Challenges for the Valuing Nature Programme

Introduction

The Valuing Nature Programme (VNP) is a new five year, c£6.5M research programme supported by NERC, ESRC, BBSRC, AHRC and Defra. It aims to better understand and represent the complexities of the natural environment in valuation analyses and decision making, and to consider the wider economic, societal and cultural value of ecosystem services, even where these have no perceived market value.

The next funding call will address the Valuing Nature Programme's goal of "*Improving our understanding of the role biodiversity and ecosystem processes play in human health and wellbeing"* and is supported by NERC, ESRC and AHRC. Within this area, the research will be specifically focusing on the themes of:

- natural hazards and extreme events
- the exposure of people to vector-borne diseases and marine toxins
- health improvements associated with urban ecosystems (green space).

The VNP Coordination Team are asking for input to identify key research challenges that could help develop interdisciplinary capability across the funders' remits. The text below is intended to provide background on the funders' perspectives and stimulate ideas to help identify key challenges. Responses will be used by funders of the Valuing Nature Programme *Health & Wellbeing call* to contribute to the shaping of the call, which will be announced in May 2015.

The context

The socio-economic drivers of human health and wellbeing are relatively well characterised, but there is much less understanding about the role of the environment in determining mental and physical health and wellbeing outcomes, or how environment might interact in different contexts with known socio-economic drivers and cultural factors. Biodiversity and ecosystem functions certainly influence human health and wellbeing through the broad range of benefits that we derive from the natural environment, including protection from natural hazards such as floods, toxins and disease; and the aesthetic, cultural and recreational benefits derived from ecosystems, habitats and landscapes. Despite our awareness of this influence, we know little about the precise links between the dynamics of ecosystems and the outcomes for physical and mental health and wellbeing, the responses of different groups in society over different time periods, or the role of biodiversity in modulating outcomes. Therefore it is currently not possible in many cases to evaluate the outcomes of different environmental policy or management interventions in terms of human health and wellbeing.

One of the key challenges recognised by the Valuing Nature Programme is to improve and advance valuation evidence in economic (including monetary) terms and in other terms, but also to clarify the limits to valuation (including where uncertainties and sensitivities may arise in the use of these approaches). A particular challenge for decision making is how to integrate monetary and other valuations, and this may be best advanced with some practical case studies. The specific focal topics outlined below give the opportunity for cross-disciplinary research which gives consideration to the environmental, social, cultural and health dimensions.

A strong focus within the programme will be on how research outcomes can be used to inform decision making, particularly for the health sector, at a range of levels (from national policy to local delivery). Hence the emphasis is not simply on improving understanding and the delivery of evidence, but also on potential barriers to translating that evidence into appropriate action. For example, new forms of governance may be necessary for individuals, communities, organisations and governments to take decisions which adequately reflect valuations. Addressing these issues could have significant impact: Department of Health figures estimate that poor mental health, for example, costs the UK economy £145 billion per annum in healthcare, benefits and lost productivity. Even if improved ecosystem management reduced only a fraction of these costs, the economic benefits of the research could be substantial. This will necessitate a broad interdisciplinary and cross-sectoral approach.

- What are the overarching research challenges the programme should address? Examples could relate to: the integration of natural science, social science and the arts and humanities into valuations; the integration of monetary and non-monetary valuations; improving translation of evidence into public and private sector action; improving understanding of the role of biodiversity in modulating mental and physical health and wellbeing outcomes. Do you agree with these and are there any missing?

The focus

The specific focus of the VNP Health & Wellbeing Call will be on the following areas.

1. Natural Hazards and Extreme Events

Natural hazards and extreme events have negative effects on physical and mental health and wellbeing[1]. In the language of ecosystem services, negative health effects frequently arise because ecosystems fail to regulate natural hazards. The extreme events of greatest relevance to the UK are floods and droughts, so these should be the principal focus, although drawing on overseas comparisons may prove useful. The motivation is to understand what environmental characteristics might prevent or ameliorate floods or droughts; how different management interventions (e.g. at the catchment level) might improve natural hazard regulation in ways that reduce negative health impacts; how such management interventions might impact on the delivery of other benefits, such as cultural or recreational benefits; and how outcomes might be valued in both monetary and non-monetary terms, and particularly in terms of health outcomes.

There is significant potential in adopting historical approaches to understand the health and wellbeing impacts of past events. Narratives may reveal how they were recovered from, if they influenced the impact of later events, or could do so in the future. Memories of past events could be used to explore the role of community participation and other social responses in relieving the impact of living with the risk of natural hazards and the negative effects of extreme events on mental health and wellbeing.

[1] Alderman, K. et al. (2012) Floods and human health: a systematic review. Environmental International 47, 37; Stanke, C. et al. (2012) The effects of flooding on mental health: outcomes and recommendations from a review of the literature. PLoS Currents Disasters 4.

- Is the emphasis on floods and droughts appropriate? Should heatwaves be included?
- What are the main interdisciplinary research challenges in this area (that link environment, interventions and mental and physical health and wellbeing outcomes)?
- Are there specific international examples that are particularly relevant?

2. Exposure to vector-borne diseases and marine toxins

Biodiversity can affect health through exposure to diseases or toxins[2]. Negative health effects can arise because ecosystems fail to regulate diseases to some extent. There is evidence that biodiversity plays a role in disease regulation[3]. However, less is known about the management interventions that could improve or worsen health and wellbeing outcomes. Patterns of exposure may not only be due to a changing environment but also to changing behaviours. How do behaviours affect risk, and what are the most effective methods of community engagement to inform behaviours to reduce risk?

- What are the main interdisciplinary research challenges in this area?
- How does this link to the other two areas?

3. Urban Ecosystems

Biodiversity and ecosystems in the form of green space and blue space can improve health (both physical and mental) and wellbeing through changes in the aesthetic, cultural and recreational attributes of natural systems[4]. How does the composition and design of natural space influence the health outcomes? There has been considerable research activity in this area, but gaps remain. For example, relatively little is known about the role of biodiversity in natural spaces in influencing health outcomes. How are experiential aspects of natural space influenced by biodiversity or culture? The existence of good quality space may be insufficient to deliver the intended benefits if not used, or if not used actively by some groups in society. What are the barriers to behaviour change?

It will be important for research to evaluate the multiple benefits of interventions in ways that will link together various sectors, such as Local Enterprise Partnerships, Local Nature Partnerships and Health & Wellbeing Boards. An important aim is to provide outcomes that enable different sectors to work together in whole system approaches to local issues.

- What are the main interdisciplinary and cross-sector research challenges in this area?
- The original call text confined this area to greenspace. Should blue space also be included? What are the advantages and disadvantages of doing so?
- What are the most important links between this and the other two areas?

[2] Keesing, F. et al. (2010) Impacts of biodiversity on the emergence and transmission of infectious diseases. Nature 468, 647; Chambouvet, A. et al. (2008) Control of toxic marine dinoflagellate blooms by serial parasitic killers. Science 322, 1254.

[3] Zaghi, D. et al. (2010) Literature study on the impact of biodiversity changes on human health. Comunita Ambiente Srl, report for the European Commission (Directorate General Environment), July 2010.

[4] Lee, A.C.K. & Maheswaran, R. (2011) The health benefits of urban green spaces: a review of the evidence. Journal of Public Health 33, 212.