

Environment and health – case study

The area of environment and health is relatively new and LWEC partners only began collaborating and funding research in this around 2004-6. However, there are now substantial investments and it is apparent that the work going on has some significant links between the different programmes, providing added value when compared with working in isolation. The programmes accredited under the LWEC Health Challenge are discussed below and the links drawn out.

LWEC Health Challenge Accredited Activities and associated programmes

(Accredited Activities appear in bold)

Figure 1 demonstrates the links between the programmes, discussed further in the text below.

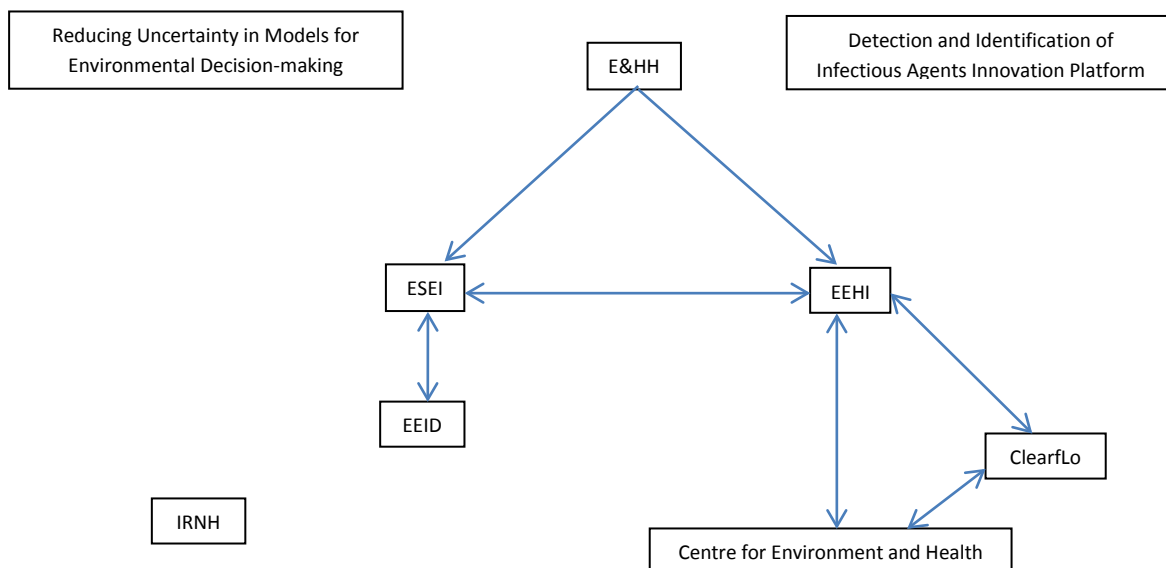


Figure 1: The links between the LWEC Health Challenge accredited activities. ClearLo = Urban Atmospheric Science: Clean Air for London; E&HH = Environment and Human Health programme; ESEI = Environmental and Social Ecology of Human Infectious Diseases Initiative; EEHI = Environmental Exposure and Health Initiative; EEID = Ecology and Evolution of Infectious Diseases; IRNH = Increasing Resilience to Natural Hazards. Note that Reducing Uncertainty in Models for Environmental Decision-making, IRNH and Detection and Identification of Infectious Agents Innovation Platform are all unconnected to other programmes.

The [Environment and Human Health \(E&HH\)](#) programme (NERC, Defra, EA, MoD, ESRC, MRC, BBSRC, EPSRC, Health Protection Agency, Wellcome Trust) was a ~£5M joint three-year capacity building programme which ran from 2007 to 2010. The programme was developed in response to the growing importance, at the time, of environment and human-health issues reflected in UK and international priorities, for instance in the Environment Research Funders’ Forum, the EU, the World Health Organisation, and International Year of Planet Earth 2006 (Earth & Health theme). The Environment Research Funders’ Forum identified Environment and Human Health as one of its priority areas for research investment and joint working. In an effort to advance that interest, NERC undertook a number of consultation exercises (e.g. a web consultation; bilateral meetings with stakeholders; and an open, jointly organised, town meeting) to further scope the research needs.

This programme was co-designed following a two-day town meeting which identified the science priorities as three broad areas: *pathogens* and *pollutants* (particles and chemicals), and the *pathways* these follow through the environment.

The main outputs of the **E&HH** programme were a community of researchers who can undertake multi- and inter-disciplinary work to help us understand the links between the environment and human health; improved ability to identify and predict emerging issues of potential concern; and improved evidence available to support risk assessments and regulation-setting by government departments, agencies, and other stakeholders. The main impact has been the creation of the community which were then able to bid into two successor programmes: [Environmental and Social Ecology of Human Infectious Diseases Initiative \(ESEI\)](#) (MRC, NERC, ESRC, BBSRC) (September 2009 to March 2017, £11.7M), [Environmental Exposure and Health Initiative \(EEHI\)](#) (NERC, MRC, DH, ESRC, Defra) (October 2009 to October 2015, £7.95M) and the 7th European Framework Programme (e.g. ERA Envhealth and NanoReTox).

ESEI and **EEHI** emerged from discussions following on from the success of the **E&HH** programme. Joint workshops and stakeholder meetings were held to co-design the programmes, which recommended a holistic systems approach to the study of pathogens (**ESEI**) and pollutants (**EEHI**).

ESEI aims to establish novel inter-disciplinary approaches to studying the ecology of infectious diseases. During the lifetime of **E&HH**, the Foresight Detection and Identification of Infectious Diseases (DIID) report was published that recognised we need to respond to the threat from new and emerging pathogens so that we are better able to anticipate, prepare for, and control future outbreaks, and the H1N1 Swine Flu pandemic occurred. **EEHI** will provide important new knowledge on the interconnections and pathways between environmental pollutants and interacting stressors, exposure routes and health effects in humans, including variations in susceptibility and the definition of health risks. It will respond to the on-going recognition of the contribution of environmental factors to chronic disease.

Organisational structures of the funders meant that **EEHI** and **ESEI** were developed as two separate programmes, but the links between the two are recognised and the work will be brought back together with the recruitment of a Science Coordinator responsible for both programmes.

[Urban Atmospheric Science: Clean Air for London \(ClearfLo\)](#) (NERC, Defra, EA, Met Office) (January 2010 to December 2012, £2.9M) aims to provide integrated measurements of the meteorology, composition and particulate loading of London's urban atmosphere. This was instigated because of the acknowledgment that poor air quality, particularly in urban areas, has a demonstrable effect on human health, but the processes responsible for producing the main pollutants, namely particulate matter, ozone, nitrogen dioxide and heat, are not well understood and are poorly predicted. In addition, the programme has a significant infrastructure element and aims to improve the spatial and temporal scale of the existing air quality network, supported by Defra and GLA. The work being conducted has a health aspect but not directly medical; instead data is structured for use by epidemiologists. The data from one of these projects is being used as part of one of the projects in **EEHI** which will allow the impact and reach of the work from this programme to be far greater. It is also working with stakeholders to capitalise on the timing of its intensive observation periods to coincide with the London 2012 Olympic Games.

[Centre for Environment and Health](#) (MRC, DH/HPA) (June 2009 to May 2014, £5.4M) is a multi-disciplinary grouping using a mix of more traditional and leading edge techniques centred around Imperial and Kings Colleges in London. It aims to identify and understand health impacts of a range

of environmental changes on the scales that influence management policies and practices. The investigators at the Centre have links to both **ClearLo** and the **EEHI** projects.

Detection and Identification of Infectious Agents Innovation Platform (TSB, National Institute of Health Research (NIHR)/DH, Defra) (January 2010 to January 2015, £55M) will fund research and development aimed at producing new rapid diagnostic tests and Point of Care (POC) devices for the detection and identification of infectious agents in both humans and animals. Infectious diseases are a constant threat to the health and wealth of the nation, hence the importance of this programme, and the range of diseases and areas chosen were prioritised by government (DH and Defra). A small amount of ESRC funding has contributed to the social science elements of the initiative and the platform may also potentially involve EPSRC, BBSRC and MRC contributions.

Ecology and Evolution of Infectious Diseases (EEID) (ESRC, BBSRC, NSF, NIH) (July 2011 to September 2016, £7.95M) is a rolling NSF programme to which the ESRC and BBSRC contributed in 2011. The programme supports the development of predictive models and the discovery of principles governing the transmission dynamics of infectious disease agents, with a strong focus on interdisciplinarity. The aim is to better understand animal reservoirs as a source of infectious diseases, how animal pathogens spill-over into human populations, and the spread of those pathogens through and between communities in the UK or other parts of the world. Work investigates pathogens that are considered to be a significant threat to public health now or in the future. BBSRC will continue to contribute to the 2012 round of the programme. There are links between this programme and both **ESEI** and **EEHI** with some PIs in common and some **ESEI** PIs attended a recent **EEID** science meeting in the US. Furthermore, ESRC has facilitated the **ESEI/EEHI** Science Coordinator and this person will be able to further foster links.

Increasing Resilience to Natural Hazards (IRNH) (NERC, ESRC) (2010 to 2015, £6.7M) is an interdisciplinary programme which aims to build resilience in earthquake-prone and volcanic regions by reducing risks from multiple natural hazards, increasing population resilience to high impact events, particularly as they increase in severity and frequency. A strong interdisciplinary approach to research throughout this programme aims to improve forecasting and uptake of scientific advice and increase understanding of vulnerability and risk. The health issues related to this programme are around the translation of outcomes into mitigation measures rather than direct research investigating the impacts of natural hazards on health. There is interest in the chain of events from an earthquake/volcanic eruption that knocks on to health, including both physical (respiratory, impacts of being caught in collapsed buildings etc.) but also mental (impacts of loss of livelihoods, family/friends killed, PTSD etc.). There may be an option for a dedicated Health KE Fellow for the programme.

Reducing Uncertainty in Models for Environmental Decision-Making (NERC, Defra). NERC, in collaboration with Defra is supporting a scoping study on 'Reducing Uncertainty in Models for Environmental Decision-Making'. With the overall aim of enhancing the performance of environmental models, this £80k study will focus on identifying priority science questions that a future research programme on this topic should seek to address, together with possible funding mechanisms for such a programme.