VALUING NATURE PROGRAMME

**Identifying Priorities for the
Health & Wellbeing Funding Call:**
Results from Scoping Meeting

May 2015

Valuing Nature Programme Report No. 2
Identifying Priorities for the Health and Wellbeing Funding Call: Results from Scoping Meeting

The Valuing Nature Programme aims to better understand and represent the complexities of the natural environment in valuation analyses and decision making, by considering the economic, societal and cultural value of ecosystem services. A Programme Coordination Team is running events and activities to help build an interdisciplinary research community capable of working across the natural, biological and social sciences, and the arts and humanities, and to build strong links with research users through the Valuing Nature Network.

Identifying Priorities for the Health and Wellbeing Funding Call: Results from Scoping Meeting

Section 1: Summary & recommendations

The Valuing Nature Programme Coordination Team (VNPCT) organised a one day meeting at the Royal Society on 20 March 2015 to help define research priorities for the upcoming 'Health & Wellbeing' funding call. The 48 attendees represented a diverse range of academic disciplines and included end-users of research from policy and practice.

The focus of the call was defined as improving understanding of the role biodiversity and ecosystem services play in human health & wellbeing for three specific topics: natural hazards & extreme events, vector borne disease and marine toxins, and urban ecosystems (greenspace). The funded projects would need to deliver a step change in understanding of valuation (monetary and / or non-monetary) and help develop interdisciplinary research capability.

The outputs of the workshop are summarised below. Recommendations and key research areas were identified for each of the three research themes, and for the cross cutting area of interdisciplinary research.

Research Theme 1. Natural Hazards & Extreme Events

Recommendation: redefine scope to include extreme temperatures (heatwaves, cold)

Key research areas/challenges identified:

- Improving our understanding of health & wellbeing impacts from natural hazards & extreme events across time, space, & scale
- Understanding & valuing the impact natural hazards & extreme events on health & wellbeing impacts with monetary and non-monetary values (e.g. cost to NHS)
- What are the perceived risks of natural hazards and extreme events? How do these affect people's relationships with the natural environment?
- How do we integrate the management of the natural environment to mitigate against natural hazards and extreme events with management for other objectives? (i.e. multiple benefits including health & wellbeing, biodiversity)

Research Theme 2. Vector Borne Disease & Marine Toxins

Recommendation: redefine scope to Pathogens & Aquatic Toxins

Recommendation: ensure medical scientists are included when the call is promoted (e.g. Medical Research Council, Wellcome Trust, National Institute Health Research)

Key research areas/challenges identified:

- Review / scoping (e.g. What do we know & where are the gaps? What is the significance? (health burden, economic costs / benefits); What existing monitoring could help and what is needed? What can we learn from international / historical experience?)
- Future forecasts (e.g. Risks in context of environmental change, underlying mechanisms, needs for evidence base for modelling, what are the implications of human behaviour?)
- Land and Water management (e.g. catchment management to reduce the risk of disease / toxins, understanding risk / mitigation, assessing pre-emptive vs reactive approaches)

Research Theme 3. Urban Ecosystems (greenspace)

Recommendation: ensure scope includes bluespace

Key research areas/challenges identified:

- Scoping and describing what is already in place / being used
- Evaluating what works / what doesn't work (e.g. existing initiatives, international policies / design / management, green/blue health and wellbeing experience of different groups)
- Understanding why it works / doesn't (e.g. how to get impact on health & wellbeing, understanding mechanisms, characterising effect)
- Design & management (including social, cultural, historical)
- Mainstreaming (from research to decision makers, toolkits, governance issues)

Cross-cutting issues & interdisciplinary research

Recommendation: also recognise the public as a major stakeholder in this research

Key research areas/challenges identified:

- Historical perspective (e.g. how the past informs present & future, historical contingencies)
- Temporal dimension (e.g. intra/inter-generational, interventions in the context of wider health, future planning, cumulative impacts of repeated exposure)
- Pluralistic methodologies, data, infrastructure & evidence (e.g. developing interdisciplinary capability, beyond monetary methods, potential for public evidence)
- Social and cultural dimension (e.g. inequality/environmental social justice, value of nature and health culturally defined, class/race/gender)
- Links to decision making (e.g. different models / scales of governance)

Recommendations about the funding call

What are the essential elements bids should include?

A wide variety of viewpoints were expressed, including the following proposals:

- Projects should include direct involvement of end-users in planning and delivery.

- To develop interdisciplinary capability, projects should be across disciplines and institutions. They should define how they will develop "cross-disciplinary literacy", recognising that time and resource will be needed for activities both within projects and as part of wider VNPCT-led activities.
- Funders need to define geographic scope (UK?), what is meant by valuation, and expectations from research.
- Projects should include case studies.
- Ideally projects should try to leverage funding from other sources.

What should the distribution of projects be? How big, how many?

- There were a range of responses, recognising that because of the breadth of the topic there would be a trade-off between how many projects were funded, and the extent to which research could be truly interdisciplinary.
- There was some support for the suggestion that 2 to 4 large projects should be funded.
- Additional small projects could be included e.g. for early career researchers, to promote collaboration or for curiosity studies; if this was later these could fill gaps. However, this would reduce the main budget.

How should projects address the call topics? Do all projects need to address all topics, how should the funders create a coherent programme?

- Funders should define expectations on this.
- There are natural links between themes, but it is not necessary for every project to cover all themes.

What can the Programme Coordination Team do to help the programme work?

A variety of ideas were suggested included the following:

- Pursue additional funding (e.g. businesses, MRC, NIHR, BIS, EU directive implementation, local authorities, LEPs).
- Support projects and help them interact (e.g. interdisciplinary working, shared approach to metrics / definitions).
- Help develop broader interdisciplinary community beyond projects (shared terminology, meetings e.g. on case studies).
- Promote high level engagement e.g. national policy implementation.

Section 2: Approach taken at the meeting

The Valuing Nature Programme Coordination Team (VNPCT) organised a one day meeting at the Royal Society on 20 March 2015 to help define research priorities for the upcoming 'Health & Wellbeing' funding call. The focus of the call was defined as improving understanding of the role biodiversity and ecosystem services play in human health & wellbeing for three specific topics: natural hazards & extreme events, vector borne disease and marine toxins, and urban ecosystems (greenspace). The funded projects would need to deliver a step change in understanding of valuation (monetary and / or non-monetary) and help develop interdisciplinary research capability

The 48 attendees represented a diverse range of academic disciplines and included end-users of research from policy and practice. See Annex A for list of attendees.

The aim of the meeting was to start to build the wider Valuing Nature Network by engaging with representatives of the broad discipline areas relevant to the call (natural science, social science, economics, arts & humanities) and the potential end-users of research from policy and practitioner organisations. This engagement had two objectives:

i.   to inform attendees about the Valuing Nature Programme and the Health & Wellbeing funding call such that potential research communities and end users were prepared to be engaged with the programme and the call
ii.   to enable different disciplines and end users to work together to identify research priorities that could help develop interdisciplinary capability in this area.

The meeting was attended by the funding organisations and outputs from the meeting will be used by them in defining the scope of the Health and Wellbeing Call. The outputs from this meeting were complemented by other information collated by the VNPCT and described in separate reports: the results of a web survey which closed on 13 March 2015 and the input from the VN Business Interest Group held on 30 March 2015. To stimulate thinking about the call objectives the Programme Coordination Team prepared a "thinkpiece" which was circulated to attendees before the meeting. This is included in Annex B.

Prof Rosie Hails introduced the meeting and gave an overview of the Valuing Nature Programme. Prof Mike Depledge gave a brief introduction to Health & Wellbeing, Prof Dave Raffaelli introduced Interdisciplinary Working and Valuation, and Dr Ruth Waters shared perspectives from potential research users (practitioners, policy makers, businesses). These presentations are available from the Valuing Nature website at valuing-nature.net.

The presentations were followed by a brief question and answer session, in which it was confirmed that research under this call would need to be primarily focused on the UK, but could bring in relevant international examples.

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The rest of the day was run through a series of facilitated activities. For these attendees were grouped onto tables focussed on the following topics:

Topic 1:   Natural Hazards & Extreme Events
Topic 2:   Marine Toxins and Vector Borne Disease
Topic 3:   Urban Ecosystems (Greenspace)
Topic 4:   Cross Cutting Issues

During the day, each group carried out five activities:

Activity 1:   **Identify "What do we already know?"** about the role biodiversity and ecosystem services play in human health & wellbeing for their topic

Activity 2:   I**dentify "What are the key research areas / challenges?"** for the role biodiversity and ecosystem services play in human health & wellbeing for their topic. Each attendee wrote their own ideas on post-it notes and the group together organised them into groupings of ideas. Ideas from the web survey were also included on post-it notes. Each group moved to each of the other three tables to add ideas.

Activity 3:   **Vote for priority of key research areas / challenges.** Each attendee had 10 stickers to put on whichever post-its or groupings they felt were most important – across all of the topics. The totals given for each heading include votes for the grouping and all the post-it notes within the grouping.

Activity 4:   **Develop (up to) five key research areas / challenges**. Each group reviewed the voting, agreed up to five priority areas for their topic and developed each of these to define the area / challenge and consider how it could help develop interdisciplinary working and understanding of valuation (monetary and / or non-monetary) and meet end-user needs (e.g. business, policy, practitioner).

Activity 5:   **Identify practical issues for funders to consider** about the call. The group recorded ideas and Rosie Hails led a discussion for the whole room.

The outputs for activities 1 to 4 are presented for each theme group, followed by collated feedback for activity 5.

Section 3: Outputs from the meeting

Section 3.1: Natural Hazards & Extreme Events

This group was facilitated by PCT member Prof Michael Winter for activities 1-4 and by VN Programme Advisory Group member Jim Wharfe for activity 5.

The group recommended that the scope should include extreme temperatures i.e. heatwaves and extreme cold.

Activity 1: What do we already know?

What do we already know about the role biodiversity & ecosystem processes play in human health & wellbeing, in the area of natural hazards & extreme events?

- We know that floods affect people's mental health – but not the extent, cost, services, etc.
- Changes in land management and land practices impact on floods and resilience of land use systems
- Floods can bring together communities and bring social interaction – but a lot more to do here – international disasters bring together organisations effectively
- Heat waves impact on human health immediately and different demographic groups are vulnerable
- Air quality and prolonged cold can lead to health issues
- A lot of quantitative and qualitative evidence but not sufficient or especially to enable interventions.

Activities 2 & 3: What are the key research areas / challenges? & voting

What are the key research areas / challenges for improving understanding of the role biodiversity & ecosystem processes play in human health & wellbeing, in the area of natural hazards & extreme events?

Groupings and ideas on post-it notes	Votes
1. Overview	**3**
Marry academic and citizen science and local knowledge to bring this up to academic / actionable standards	0
How to integrate cross-departmental responses to extreme events (short & long term)	0
How can we scale up the governanac3 of wellbeing / nature activities	0
Issues of governance / deliberation of actions: who decides	2
From web survey: increasing collective sense of agency and responsibility to act to prevent/mitigate natural hazards and extreme events	0
Different people's attitudes and behaviours to risk	1
2. Important other (cultural etc)	**4**
Cultural determinants of health, cultural impact of events	0
What is extreme? Whose extreme? When does an extreme event become extreme & why? Context matters – spatial / temporal contingency.	1
History and memory – value of tapping into this. Experimental learning → resilience	0

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→ knowledge improvement Both of these can help with identifying places / peoples / aspects of the built environment of risk	
How can you communicate with users with "commidifying" values – what language?	0
From web survey: People's responses to perceived and actual risks of flooding	0
3. Value	**9**
Non-economic valuation of the impacts of extreme events	0
How can we understand value and process and dynamic?	0
From web survey: How management interventions to ameliorate flooding may impact upon the cultural benefits of heritage in monetary and non-monetary terms	0
From web survey: How to value the health benefits of resilience to natural hazards?	1
From web survey: Valuing resilience to drought - how much are natural intervention measures to improve drought resilience worth in the long-term?	0
From web survey: How to calculate the benefits of natural hazard resilience measures beyond the natural hazard resilience itself?	0
From web survey: How to value the health benefits of resilience to natural hazards?	1
From web survey: Quantification of the benefits to well-being from regulatory ecosystem services provided by water bodies	1
From web survey: Valuing flood water storage through (semi) natural processes e.g. farm tillage practices that increase water retention, surface water storage etc.	0
From web survey: Understanding the mental health impacts of natural hazards and extreme events, and identifying practical, self-sustaining methods for reducing the likelihood and severity of these effects. There is an increased focus in increasing both environmental and community resilience to flooding, but limited understanding as to how these forms of resilience are valued, especially in terms of their mental health benefits. There is a need to more fully understand the mental health costs of flooding (monetary and non-monetary), and monitor the reduction in costs as a result of different interventions.	0
From web survey: Consideration of how the location and functioning of urban and rural ecosystems (wetlands including natural and constructed systems, forestry including street trees, interventions in catchments, etc.) affect health-relevant, ecosystem service-mediated outcomes that may include flood and drought risk, urban air quality, water pollution, and access to green spaces and nature with physical and mental health implications.	0
Relating actions to deal with natural hazards with wider ecosystem services	1
Costs of health vs benefits of interventions	0
Produce better aggregated costs of natural hazard impacts on mental and physical health	0
Understanding and valuing the impact of natural hazards on human health and wellbeing. Quantifying the cost and the impact on health services.	2
What health / wellbeing parameters do we measure over what time / space?	0
4. Urban	**12**
Rapid response – urgency funding	0
Urban design combined with green / blue space provision to maximise resilience to extreme weather	1
Availability of green space in cities offers resilience in times on earthquakes e.g. Kobe places to get out of buildings. Could these also be important in relation to other extreme events?	0
Use of green blue space to mitigate heatwave / air quality	1
Scenario development – intervention options / behaviour / policy / operational	0
How can we mitigate and adapt to climate change through ecosystem management in ways that contribute positively to human health	0

Does green and blue space ameliorate health impacts of extreme events in urban settings (in relation to valuation)	2
What is the most effective management of green infrastructure to ameliorate the impact of heatwaves – what and where?	0
Use of natural approaches to flood management in the urban environment and their role in improving resilience in the face of climate changes	2
Improve local air quality modelling to support the design of green/blue space	0
From web survey: The relationship between blue and green infrastructures, natural hazards and extreme events, and physical and mental health	0
From web survey: The impact of storm events on maritime communities	0
5. Misc	
Convert generic existing understanding into actionable knowledge = better quantification and consequential modelling	0
6. Health & Wellbeing Cumulative Impact	**17**
Do current indicators of wellbeing capture enough of the contribution from the natural environment?	1
Scale of the health impacts of natural disaster and extreme events in relation to other health & wellbeing issues?	2
What are the impacts of extreme events such as flooding on peoples' health & wellbeing? (ideas about cohort research or interdisciplinary work to get at this)	1
Do extreme events and the threat of natural disasters produce behavioural changes that have positive or negative health & wellbeing impacts?	2
Impacts of natural disasters on short and long term biodiversity and associated health & wellbeing.	0
Studies of the mental health impacts of flooding / extreme events – mainly short term, no long term studies and getting funding is very difficult.	2
Improved understanding of health / wellbeing impacts resulting from extreme events over time	2
7. Natural Environment Research	**4**
From web survey: What is the role natural ecosystems have in buffering flood impacts at the catchment scale	0
From web survey: Multiple uses and biodiversity enhancement on flood defence and coastal infrastructure	1
From web survey: Protection from natural hazards or reactions to extreme events usually result in calls for engineering/infrastructure/'concrete pouring' solutions as they tend to be big and noticeable. How can we communicate that changes elsewhere in, for instance, a catchment can have significant results downstream without such solutions? Can this ever be reassuring? Can the multifunctional benefits be highlighted?	0
How does the spatial arrangement and quality of the natural environment affect the magnitude and frequency of natural hazards?	1
Natural environment mitigating regulating against extreme events? E.g. saltmarsh / mudflats / offshore reefs. Which elements of biodiversity / function / habitats are important for management or protection	2

Activity 4: What are the priority research areas / challenges?

Priority research areas / challenges	How would it benefit end users?
1. Improved understanding of health & wellbeing impacts across time, space, & scale from natural hazards& extreme events.	Evidence to manage biodiversity / land and sea
2. Understanding & valuing the impact of natural hazards on human health and wellbeing, both monetary and non-monetary values. Quantifying the cost and impact on the health service.	Values that can be used in decisions such as flood protection – extreme event plans
3. What are the perceived risks of natural hazards and extreme events? How does it affect people's relationship with the natural environment?	Education Programmes to inform people and steer on how to communicate & deal with risk
4. How do we integrate the management of the natural environment for natural hazards and extreme events in which we get multiple benefits including health & wellbeing & biodiversity (through interdisciplinary working)?	Management advice

Notes: Valuation is implicit in all the ideas above, but it is about improving decision making, not putting a pound sign on every dragonfly.

Section 3.2: Marine Toxins and Vector Borne Disease

This group was facilitated by PCT member Guy Duke.

The group made two recommendations:

1. Re-defining the topic and broadening the scope to "Aquatic Toxins and Pathogens".
2. Ensure medical scientists (MRC, Wellcome Trust) are included when the call is promoted.

Activity 1: What do we already know?

What do we already know about the role biodiversity & ecosystem processes play in human health & wellbeing, in the area of marine toxins & vector borne disease?

- We know something on each, but 'in silos' – not interconnected
- Should be 'aquatic toxins'
- VBD – primarily agricultural in the UK? Increasing risks or new human VBD? Can learn from other countries. What next? Lyme disease.
- Modelling/epidemiology work done – not much linkage with environment & social sciences.
- VBD & toxins
  - Expand to wider environmental role in disease?
  - To what extent does biodiversity mediate VBD?
  - Various exposure routes

- Marine – we know change in marine. Increasing incidence of blooms, increasing risks of illness. Increased Interaction with marine environment through recreational consumption, living at coast. What will this mean in future?
- No MRC/NiHR participation – no epidemiological input. Avoid bad epidemiology!
- MRC work on zoonoses with environmental change component (ZELS)
- MRC work on environment and social ecology (ESEI) of diseases.
- Need to engage with <u>planning</u>
- The 3 topics are interlinked – urban space – hazards – VBD/toxins
- Some policy makers interested in health benefits, others not – how to engage non-health policy-makers in health issues?
- EA – know where problem <u>is</u> and deal. But don't know where problem is <u>coming from</u> – to address <u>causes</u> not effects.

Activities 2 & 3: What are the key research areas / challenges? & voting

What are the key research areas / challenges for improving understanding of the role biodiversity & ecosystem processes play in human health & wellbeing, in the area of marine toxins & vector borne disease?

Groupings and ideas on post-it notes	*Votes*
1. Monitoring	**6**
How should we best monitor elements of biodiversity that might lead to increased incidence of MT VBD?	0
How can we improve monitoring of incidence and cost of marine toxic / marine VBD related to illness?	0
What is the cost of increasing incidence of VBD + MT – social / economic?	0
Historical events and lessons learnt not just impacts e.g. Foot & Mouth Disease, Badgers & BVT	0
From web survey: Is the risk of exposure to vectors and disease increasing in high risk groups (i.e. hunters), is this being detected and are their health needs being met	0
From web survey: Long term monitoring of parasite biodiversity to provide essential baseline data for predicting disease spread under variable climatic conditions	0
From web survey: effects of vector-borne disease/environmental hazards on reproductive health	0
Incidents of shellfish poisoning and infection by bacterial and other sources captured / recorded by an agency / organisation	0
Monitoring vectors of (human) disease in the country e.g. *Aedes aegypti, Aedes albopictus* - what mechanisms?	0
Understand effect of different pathogens on health / risk severity. e.g. bathing waters, human, livestock (equestrian, cows, sheep), birds, seagulls dogs etc.	0
Impact of marine policy on algal blooms	0
Impact of land management and flood defence policy	0
How can we detect emerging threats?	0
Sensor development for toxins – wider spatial / temporal measurement. Coupling with satellite imagery and ground trothing.	0
Evaluation of actual risk (e.g. oak processionary moth) and real rather than perceived adverse impacts of human health	0
2. Behaviour	**13**

Will increase in use of bluespace / coastal urban population increase also lead to increase incidence of MT/VBD and why?	0
How will increase in aquaculture affect incidence of VBD/MT?	0
How does human behaviour affect likelihood of exposure to VBD/MT?	0
Increased resistance through regular exposure to toxins and VBD – for recreational users / consumers behaviour	0
Other pests – beyond vectors? E.g. vermin, other zoonotic disease	0
From web survey: Impact of digestate and sewage sludge on consumer acceptance and ecosystem health	0
From web survey: Understanding the potential changes in disease vectors with a changing climate, and how does this effect public awareness, concern, and behaviour.	0
Indirect impact on value from fear of disease / toxins or scares about them. E.g. if it leads to reduced use / appreciation of different environments / behaviour change etc	0
What can we learn from UK public response to ebola – resource required for reassurance, what would happen with a new VBD?	0
How does human behaviour affect exposure to toxins, pathogens and diseases in terrestrial and aquatic environments?	1
Include disciplines more focussed on social science / behaviour into infectious disease studies. Also urban planners / architects / open space design.	0
How do current human behaviours exacerbate health effects of MT / VBD?	0
What is the cultural and ecological frame of reference for algal blooms, oil spills, jellyfish plagues?	1
In an era of climate change, how much to social norms and expectations of behaviour in relation to disease need to change? How easy is it for us to adapt to the presence of new or different health hazards in the landscape?	0
Cross cutting: how much learning from previous research • Learn from RELU etc • Systematic evaluation of what we don't know	0
Behaviour/management: More beyond just marine? E.g. algal blooms in urban blue, urban dogs	2
Behaviour/management: significance as a health issue	1
Behaviour/management: wider definition of "vectors" e.g. water borne etc	0
Behaviour/management: historical perspective of human behaviour management c.f. black death and plague	2
3. Mechanisms	**14**
Which elements of biodiversity change are of most concern with respect to VBD & MT and why?	0
Will incidence of VBD & MT increase in the future in marine environment / what are the environmental changes that cause this?	0
What are the mechanisms of changes of biodiversity and ecosystem function that lead to VBD & MT?	0
Is climate change important as a factor of change in biodiversity and ecosystem function that might affect incidence of VBD & MT?	0
How are VBD & aquatic toxins inter-related?	2
What is the human health / wellbeing impact (current and future) in UK of VBD & MT?	1
Evaluating possible changes in pathogen vector (genetics, adaptability) on Disease Transmission Potential	1
Landscape modelling to improve VBD mapping	0
Social and economic impacts of outbreaks of VBD & MT disease (increased incidence)	0

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Compile case studies of biodiversity, environmental change on likely VBD of relevance to UK	0
Can we model how landscape structure and composition affect spread of vectors for water borne diseases?	0
How do extreme events affect the supply and delivery of pathogens to aquatic environments?	0
How do extreme events affect the supply of nutrients to the aquatic environments which subsequently affect algal growth and toxins?	0
How ecosystem processes including river transport moderate the quantity of pathogens and toxins (including viruses) accumulating in shellfish?	0
What socio-cultural, economic and environmental contexts influence emergence and re-emergence of disease (particularly in epidemic proportions) use of historical examples to explore this complexity	0
What are the key controlling factors for the production of marine toxins and how can these be better managed to reduce levels?	0
Higher temperature (Sea Surface Temperature) in human cases of Vibrios (climate change effect)	0
Interaction between extreme events (climate) and land use change in VBD & MT	0
Make weather / climate data (e.g. UK Met Office) open access to allow researchers to include this information more easily	0
Add infectious disease data and / or environmental change data into existing long term cohorts	0
From web survey: Environmental impacts on health - from pesticide to infection	0
What relationships exist between extreme weather events and emergence / re-emergence of diseases	1
Cross cutting: Scoping of current and future extent of ecosystem – human health interactions and impacts of aquatic toxins in the UK	2
4. Management	**10**
How can we best manage the environment to make it resilient (more resilient) to VBDs?	0
What are the biggest risk VBDs in the future and how can we manage our ecosystems to be resilient to them?	0
Scenario development – changing climate / urban living and potential for disease spread. Behaviour / policy / operational response options.	0
Determining what is the relative importance of management of VBD reverses actual changing incidence of the disease	1
Travel advice needed when monitoring risks of vectors	0
In dealing with emerging diseases where do we achieve best value for money in terms of spend, in terms of prevention, management of disease, clean up?	0
What information is needed by decision makers – which decision makers - upstream causes	0
Process of trends which will increase or modify the occurrence of VBD & MT. To aid informing systems / management.	0
From web survey: Role of local and regional marine stewardship in detoxifying the seas	0
From web survey: Managing urban green spaces to minimise the risk of Lyme disease and its vectors	0
From web survey: Mitigating the effect of wetland redevelopment on mosquito habitat creation	0
From web survey: economic, political and social aspects of animal-human disease interactions (disease biobanks, public health, economic inequality, etc.)	0
From web survey: Understanding the best use of valuation for practical application in delivery of marine management	0

Disease prevention – vaccine production?	0
Are there environmental changes (management measures) we can take to reduce incidence of MT/VBD?	0
Which marine habitats are likely to be the ones from which incidents of MT/VBD will arise under climate change?	0
Develop apps to provide warnings of MT/VBD occurrence e.g. jellyfish on beaches, harmful algal blooms	0
Mosquito assessment requirements?	1

Activity 4: What are the priority research areas / challenges?

Priority research areas / challenges	What does interdisciplinary work bring?	What is the role of valuation?	How would it benefit end users?
1. Review / scoping • What we know, what the gaps are, • significance (health burden, economic) – costs / benefits • monitoring, (existing, needs) • International and historical lessons	All	Valuing significance of health & economic burden	Leads to avoided health impacts Costs to public & private sector
2. Forecast future • Exposure risks in context of environmental change • Mechanisms underlying the risks • Evidence base – what is needed for forecasting models • potential burdens/ opportunities • human behaviour change	All	Valuing risks	Avoiding future costs
3. Land & water management • Catchment management to reduce impact MT / VBD • Understanding risk & mitigation • Pre-emptive versus reactive approaches	All	Costs versus benefits of options	Reducing management and impact costs

The group proposed that project proposals should address all three aspects listed above. All need to be interdisciplinary, UK focus, encourage case studies, and include an epidemiological element (though this may need additional funding).

Section 3.3: Urban Ecosystems (Greenspace)

This group was facilitated by PCT member Ece Ozdemiroglu.

The group recommended that the scope of the call should ensure bluespace (water) was included within the greenspace definition.

Activity 1: What do we already know?

What do we already know about the role biodiversity & ecosystem processes play in human health & wellbeing, in the area of urban ecosystems (greenspace)?

- Last 10 years more data/evidence on the link
- Health inequalities: a policy issue
- Investment in GI – health cost (treatment) savings
- Lack of understanding cost of interventions
- What are the interventions
- Costs and benefits are spatially specific
- Contemporary neighbourhood plans include health and wellbeing priorities
- More cross fertilisation between regulatory/ planning statements
- We know lots in our own boxes – more joined up
- Doctors prescribing natural environment (obesity)
- Quality of greenspace / ecology (indicators of change)
- A lot of initiatives - evaluation
- Quality of Green Infrastructure we know – impact on wellbeing is quite <u>broad</u>
- Bodies of knowledge on greenspace/literature (not integrated) – urban parks movement in the 19th Century
- (Should use history to make a case) garden cities
- Green Infrastructure includes green & blue space (full agreement in table)
- Think of greyspace (framing greenspace)
- New buildings incorporating greenspace (walls & roofs) – recognise in planning decisions
- Focus on human side. But include green components & Biodiversity….
- Productive GI & urban agriculture (we know health benefits - food & activity)
- A lot of pieces of the puzzle – we need to link them for decision making

Activities 2 & 3: What are the key research areas / challenges? & voting

What are the key research areas / challenges for improving understanding of the role biodiversity & ecosystem processes play in human health & wellbeing, in the area of urban ecosystems (greenspace)?

Groupings and ideas on post-it notes	*Votes*
1 Evaluate / outcomes (evidence of impact)	**8**
Evaluate "green gyms" - health outcomes - implementation barriers etc	0
Analysis / evaluation of interventions / investments in urban greenspace and impact(s) on key health outcomes (plus multiple benefits including co-adoption)	1

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Groupings and ideas on post-it notes	Votes
- how could new interventions be designed to deliver these health outcomes - understand NHS / public health requirements for evidence	
Impacts of policy interventions on health	0
What are the costs of implementing specific interventions to deliver particular benefits	0
From web survey: How money can be saved by prescribing "greentime"?	0
Evaluation of existing interventions that are occurring – are they working, what effects, how are they working?	0
What can be learnt from cities that have engaged explicitly with health and wellbeing using natural capital / ecosystem services	0
From web survey: LNPs have a clear mandate to bring the three 'pillars' of sustainable development together. However, this is a large challenge. Examples or case studies of where this is proven within the UK, i.e. environmental improvements having a direct financial benefit re: health costs being reduced, would be extremely helpful, to increase meaningful engagement and enable effective interventions.	0
French have just introduced a law for green roof and solar panels on all buildings – chance to look into their experience (evaluate, e.g. UK experience)	0
How do we evaluate options for urban living that will improve health and wellbeing, e.g. green roofs, resilient buildings / elevated buildings on stilts, porous surfaces, water features	0
What health benefits do green walls and roofs deliver that greenspace on the ground doesn't & vice versa? How much overlap is there in terms of human wellbeing benefit.	0
What is the impact of art activities (narratives, pictures, music) based in blue and green space on health and wellbeing?	0
Benefits of close use of water environment to an individual's health – try to monetise benefit to Department of Health from use of resource (what's saved from A&E departments). Crudely into usage groups / activity types and frequency of use.	0
What is the impact of noise in the urban environment and how can we use green / blue space to ameliorate this?	0
From web survey: Determine the amount of exposure to different qualities of green space, water or coasts in and around urban areas delivers improved health and well-being	0
From web survey: The comparative worth of improvements in well-being and health delivered by green infrastructure (includes water) and other forms of interaction with other forms of green space (e.g. National Parks)	0
From web survey: health dose-response from provision of accessible semi-natural green space	0
From web survey: urban nature and psychological / physical health of children including obesity prevention and treatment	0
From web survey: green dementia care: prevention and interventions improving quality of life and occurrence of problematic behaviour	0
From web survey: urban nature and active and healthy ageing in the light of rising average age and rising health costs	0
What specific health conditions (especially mental health) are benefitted by access to greenspace?	0
What do we know about wellbeing (rather than health alone) in urban environments?	0

Answer the questions the health service cares about e.g.
   - A&E attendance
   - Emergency hospital admissions
   - GP consultations
   - Prescribing
	0

Groupings and ideas on post-it notes	Votes
2 Characterisation (green / <u>blue</u> = gru) (characterising green infrastructure and how it delivers benefits to health & wellbeing)"	**14**
How do we manage urban soil pollution / contamination to enhance and expand green space?	0
Do blue spaces create health threats in urban environments? (drowning, vector borne disease, unintended flood risk etc)	0
Trade-offs – is some green harmful e.g. pollen, VOCs?	0
Implications of green space and vector borne diseases need to be considered in planning	0
From web survey: Valuing healthy soils in urban environments	0
What qualities of green space are essential if it is to offer health and wellbeing benefits? How does this vary between different socio-cultural groups?	0
The importance of exposure to microbiota in building human immune systems	0
How do we measure urban greenspace quality in a way that does not just focus on facilities?	0
How substitutable is one type of greenspace for another for health?	0
Does maximum biodiversity equate to maximum wellbeing benefit in urban context?	1
Link physical modelling (air temperature, air pollutants) with other health benefits (physical activity, mental health) in integrated model.	0
Thinking vertically – health and wellbeing of urban atmospheres – health and wellbeing of the subterranean urban environment.	0
Do extreme events and hazards impact on use / benefits of blue/greenspace? Is climate change something we need to future-proof against?	0
What are relative roles of actual and perceived environmental conditions on wellbeing?	0
Ecological quality of the greenspace and biodiversity present – what effect on health & wellbeing?	0
Heritage greenspaces – and identity / wellbeing e.g. sense of place etc	0
Role of gardens in all forms as contributor to green infrastructure – understanding typology of green infrastructure	0
What are the specific aspects of urban greenspaces which provide particular health benefits?	0
Where does urban greenspace begin and the countryside end? Suburbs / deep surburbia? Is the countryside now an extension of urban space?	2
What characteristics of greenspace provide the most benefit?	3
Which components of nature are important to health & wellbeing?	0
Which elements of biodiversity habitats and ecosystem functioning influence human health benefits? e.g. seabirds vs mammals vs clean seas and clean water for bathing in blue urban	1
3 Mechanisms	
3a Mechanisms	**3**
From web survey: Identifying the mechanisms and size of distal health effects that biodiversity and ecosystem services deliver in urban environments and how these differ between urban centres at differing latitudes.	0
What are the optimal levels or thresholds (frequency, duration or type of exposure) of contact with natural environment to deliver different types of benefits? What are the barriers to achieving these levels?	1
Do blue and green spaces foster outdoor activity (with health benefits) in urban environments?	0
There is a behavioural dimension – just because it is there does not mean it is used. Is use a necessity?	0

Groupings and ideas on post-it notes	Votes
From web survey: Useable approaches for quantifying impacts of changes in quantity, quality and location of green space on people's wellbeing. Approaches are needed to help inform investment that are usable for relatively low cost interventions.	0
From web survey: how office worker productivity can be improved by having 'green time' during lunch breaks.	0
Do people believe green = healthy because of something inherent in human nature or because they are cultural programmed to? How did that process come about?	1
Are the perceived wellbeing benefits of existing greenspaces culturally driven or are there universal benefits?	1
Can / should we prescribe different types of greenspace exposure for different health conditions?	0
3b Mechanisms - Design & management	**5**
Ongoing research connect with ESRC funded project on healthy planning – PHE UWE LSHTM etc	0
How do we integrate green and blue space to maximise the benefits for wellbeing and health. Designing urban areas.	0
Urban fringe land use – plan and design to optimise health and wellbeing outcome.	0
From web survey: Optimum design of urban green space for health and wellbeing	0
From web survey: Inter society comparison of use, abuse and role of green space in urban housing. Does the UK model of house and garden ownership work against our children?	0
How should green infrastructure be designed and managed to optimise health outcomes	1
How can we manage access to bluespace / health of bluespace (clean waters) to enhance wellbeing? (includes communication of sources of information)	0
How do we retro-fit cities to improve wellbeing?	0
Integrating urban design, building design (e.g. lighting / aspects) and green / blue space to optimise health and wellbeing outcomes?	1
Will use of blue / greenspace have negative or positive feedback on the ecosystems underpinning them? E.g. trampling, urban modification at the coast, pollution from marine recreation?	0
Future – new town design incorporate health & wellbeing	1
4 Socio–cultural issues / history	**11**
Cultural vision of urban space philanthropy / history civic movement.	0
Are there vulnerable communities who we should target benefits towards?	0
Convert community needs and demands into actionable knowledge by academic partnering / intervention	0
From web survey: The role of urban food production for the provision of green space and in improving health (both physical and mental)	0
Can we differentiate between the greenspace needs of different user groups?	0
Concept of "nature" and "natural environment" – historical origins	0
History of relationship between water (bluespace) and health – spas, seaside resorts	0
"Nature" of greenspace linked to cultural / social background. Quality aspects need researching.	1
History of the changing nature of the built environment on health & wellbeing	1
When did people begin to consciously green towns? And why?	0
Tensions between different uses of greenspace – dog walking vs flower collecting	0
How does access to greenspace govern its use (and therefore benefit)?	1
Relationship between different urban settings (including green and blue space)in relation to health inequalities	0

Groupings and ideas on post-it notes	Votes
Focus on impact on health inequalities interventions must reduce health inequalities not increase them	0
5 Mainstreaming	**7**
Research that goes beyond exposure → outcome, but describes how to get knowledge into practice (professional behaviour change)	0
Public view of urban greenspace? (useful for making the case to politicians)	0
Is there a toolkit that can help optimise health & wellbeing in policy and decision making?	0
Get knowledge out of practice: • Incorporate evaluation into every initiative • Develop methodology tools to evaluate these complex spatially specific interventions	0
Understanding the barriers to adoption of ecosystem approaches and ways of overcoming these – particularly on a landscape scale	1
Cutting across different silos that health & wellbeing is situated in	2
From web survey: Translation of evidence on health benefits of greenspace into practical delivery of health outcomes	2
How do we maximise the health benefits of urban green in a time of austerity	2
How do we best integrate health & wellbeing considerations into planning?	0
How do you get buy-in from organisations for whom increasing blue-green space will increase costs	0
How do we cohere health policy and practice with green space planning design and management	0
What are the unifying hooks to help integrate the health & wellbeing agenda?	0
How do we join up the disintegrated government departments that fragment health?	0
How do we get built environment professionals to engage with value of nature and its link to wellbeing?	0
How can the research integrate the planning profession into this agenda given planners shape places and wellbeing?	0
From web survey: Construction of inter-disciplinary models and decision support systems to aid urban planners	0
How do people join in their local authority decision making?	0
Governance - analysis of policy decision context (national to local) – institutional governance context – integrating health benefits of urban greenspace into decision making	0
6 Uber – ideas that span all other areas	
6a Uber (overarching) - metrics	**5**
How do we assess urban biodiversity?	1
Methods to measure links between security, crime, health and green/blue space	0
Measures, metrics, indicators. What to use and or develop that will be meaningful for multiple disciplines and sectors.	0
Can we develop a consistent, core set of comparable health, wellbeing, educational, social measures to evaluation green infrastructure benefits so that we can compare data across studies	3
Metrics – comparability - evaluation	0
From web survey: Need for new, adjusted, standardized approaches for measuring impact of the urban green spaces on health and wellbeing to be shared in the Third sector (best practice guidelines)0	0
From web survey: Use of neuroimaging methods to monitor wellbeing in and around nature	0
From web survey: Novel assessments of wellbeing – phone apps for example	1

Groupings and ideas on post-it notes	Votes
6b Uber (overarching) - Valuation	**2**
Can we link investment in urban greenspace to health outcomes and cost savings to NHS?	0
Importance of parks in local authority spending – benefits to health, value by public	0
Capturing increased value of real estate / businesses and residential in relation to increasing quality of green and blue space	0
Relationship between leisure and greenspace – is greenspace necessarily recreational	0
What role for shared values in valuation	0
How do local communities value nature for health & wellbeing	1
From web survey: Identifying how different stakeholders, institutions, sectors, communities attach social and cultural value to ecosystems, green infrastructure and productive urban landscapes and the ways in which making these value-systems more apparent can feed into decision making processes and policy formation about provision of spaces for urban agriculture/PULs and how this is related to health and wellbeing outcomes at different scales.	0
From web survey: Whilst improving mental health and well-being using urban greenspace, environmental involvement etc. will have a monetary aspect (e.g. savings to the NHS, lower sickness absences etc.) there will also be significant non-monetary benefits: how can we effectively measure improved social adhesion without resorting to £?	0
From web survey: Putting an economic value on the life-long benefits to health and wellbeing which might accrue from childhood experience of nature.	0
From web survey: Valuing cultural services - cultural services as so important for how society engages with the environment and yet poorly understood	1
From web survey: Determining the value of the all services provided by different land use options in urban areas e.g. creating or maintaining green space vs developing	0

Activity 4: What are the priority research areas / challenges?

The group identified a continuum of research themes; the order presented does not represent the priority of the theme but the order in which research should be done.

Priority research areas / challenges	What does interdisciplinary work bring?	What is the role of valuation?	How would it benefit end users?
1. Understand what is going on? What is there?			
2. Evaluate what works / what doesn't work. • Initiatives (existing) • International policy / design / management • Green/blue health & wellbeing - different groups	All Governance e.g. methods, metrics, history	• Cost of intervention • benefits	Learning from experience
3. Understand why it works / doesn't • How to make (2) health beneficial • Mechanisms – delivery • Characterising green/blue space			
4. Design & management of greenspace • Including social & cultural & historical			
5. Mainstreaming • From research to decision makers			

• Toolkits • Governance issues			

Recommendation that projects identify metrics that could be used across disciplines and by different end-users.

Section 3.4: Cross Cutting Issues

This group was facilitated by PCT member Dr Rob Fish.

The activity on "what do we already know?" was not carried out by this group.

Activities 2 & 3: What are the key research areas / challenges? & voting

What are the key cross cutting research areas / challenges for improving understanding of the role biodiversity & ecosystem processes play in human health, in the area of natural hazards & extreme events, vector borne disease & marine toxins, and urban ecosystems (greenspace)?

Groupings and ideas on post-it notes	*Votes*
1. Social / Cultural context	**15**
Distributional aspects of health benefits according to social and cultural group;	1
Include health as outcome, health inequality, health equity and health economics	2
Spatial variations in health outcome	3
Need to know the social value. Create evidence for this	2
Spatial explicit sense – cultural specification of biodiversity. Golf course - allotment	1
Distinguish between the ways in which social / cultural interact with the problem. Shaping and defining values governing the amount of ecosystem services provided. As an end point in terms of benefit.	0
Methodological approach – shared values approach using deliberative techniques to capture value of ecosystem services – also conceptual issues (measurements)	1
Tease out different notions of health	0
Look at practices people are undertaking in accessing greenspace e.g. volunteering, walking	1
Practice people undertake to respond or be resilient to extreme events, marine toxins	1
2. Historical / temporal context	**27**
Project to the future based on evidence in hindsight + modelling	0
Recognition of limits to human resilience and adoptability	2
Temporal accumulated effects – not just here and now	5
Link to long term environmental, social, cultural changes	5
Use of historical sources to create an evidential base – takes an historical perspective	5
Power of past in the present / fosters and impedes ways of doing things in the present	2
Need scenario building plus responses	1
Consideration of long-term social change and demographies	1
Attribution and health impacts to environmental change	2
3. Decision making and evidence context	**14**
Interactions of environmental change risks – risk multipliers – synergies in policy	0

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Who is this evidence for?	1
Need for pluralistic evidence	1
Analysis of the powers to influence these complex systems – different models of power	1
Better understanding of real world decision making and place of valuation within this – specific example of public health at local level and move into local authorities	3
Experimentation with different models and scales of governance for health & wellbeing outcomes	6
Are we confident we can make the argument – have we got the methodologies?	1
4. Emphasise interactions / continuities between themes (+relevant agencies & stakeholders)	**6**

Activity 4: What are the priority research areas / challenges?

The group noted that the public are another end-user that needs to benefit from this work, in addition to businesses, policy-makers and practitioner.

The questions "what does interdisciplinary work bring?" and "what is the role of valuation?" were considered within the description of each priority research area / challenge.

Priority research areas / challenges	*How would it benefit end users?*
1. An historical perspective • Appreciation of how the past informs the present and future 'Applicability of the past' • Thinking as different time scales and historical contingencies • Informing policies • Historical contingencies and applicability • Recognising and explaining the quality of historical evidence to inform	• Policy forming • Public enabling
2. Temporal dimension (intra – inter generational) • Seeing interventions in the context of wider determinates of health which is cross-generational • Future planning in relation to societal, cultural, economic change • Cumulative impacts – repeat exposure	
3. Pluralistic methodologies, data, infrastructure & evidence • Virtues of pluralised approach - more than monetary methods. Evidence. • Recognition of pluralistic methods and forms of evidence • Awareness and use and combination and how they can mutually enrich each other • Developing future capacity in interdisciplinary methods of working across researchers and communities. • Potential for public/lay evidence/insight • Sensitivity to uptake and use in different costs • Methods that are capable of capturing ethical division / of decision	
4. Social & cultural framing • Inequality/environmental social justice/power/ economics • Health inequality/equity/economics – how we value nature and health is culturally defined – and this impacts on how they are used / respond / think about natural environments	

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• Incorporating consideration of social change e.g. 'holy trinity' of class/race/gender and their intersectionality.	
5. Links to decision making • Experimentation/explore with different models and scales of Governance for health outcomes e.g. landscape scale / local / national • Credible understanding of decision making and how valuation fits into map • Who is this evidence for?	

Section 3.5: About the call

Attendees were asked to consider 4 specific questions on the practicalities of the call:

1. What are the essential elements bids should include?
2. What should the distribution of projects be? How big, how many?
3. How should projects address the call topics? Do all projects need to address all topics, how should the funders create a coherent programme?
4. What can the Programme Coordination Team do to help the programme work?

Responses are given below, each is labelled with the initials of the group that proposed it (NH = Natural Hazards and Extreme Events, MT = Marine Toxins and Vector Borne Disease, UE = Urban Ecosystems) or D for responses that were made in open discussion.

Question 1. What are the essential elements bids should include?

Response	Group / Discussion
'Stakeholder/end user'* is part of consortium and make some commitment to co-delivery (e.g. KE) in kind. *who these might be will depend on the project	NH
End user engagement preferred	MT
Ask consortia to demonstrate how they'll go beyond engagement	UE
Every applications has stakeholder plans (with stakeholder commitments)	CC
Involvement of end-users: a lot of EPSRC has end-users, members of consortium (could hijack research). Just coming to PCT events is not enough. Has to be more than 'engagement. End-users as co-investigators.	UE
Multiple academic institutions	NH
Interdisciplinary	MT
Explicit section on working across disciplines. 'Literacy' – cross disciplinary literacy.	CC
Multidisciplinary team – every team to hit something of interest to all funders or not?	UE
Projects should help develop common measures / indicators / concepts that can be used for valuation comparison	UE
Be explicit – what is meant by valuation	NH
Focus on UK	MT
Values Focus	MT
What is the definition of 'cutting edge science' for all the funders, and/or gaining new insight from existing data	NH
Case studies recommended	MT
Encourage linkages between themes	MT
Address all 3 elements or 1 or 2 elements	MT
Address as comprehensively as possible	MT

Leverage additional resources desirable (EU? Local authorities?)	MT
Projects will need resources to have capacity to interact – need development element to projects	CC

Summary:

- Projects should include direct involvement of end-users in planning and delivery.
- To develop interdisciplinary capability, projects should be across disciplines and institutions. They should define how they will develop cross-disciplinary literacy, recognising that time and resource will be needed for activities both within projects and as part of wider VNPCT-led activities.
- Funders need to define geographic scope (UK?), what is meant by valuation, and expectations from research.
- Projects should include case studies.
- Ideally projects should try to leverage funding from other sources.

Question 2. What should the distribution of projects be? How big, how many?

Response	Group / Discussion
Could there be small 'networking' projects (previously worked well)	NH
Scope for joint funding (or cofunding)	NH
Some topics relevant to the call might be appropriate for 1 years funding rather than larger 3 year grants	NH
1 - 3 projects of 350K to 1.4m +	MT
If only 2 consortia, how much of dissemination done by PCT budget, not from project	UE
£4m won't go very far, especially if there is lab based.	UE
£1m / each theme & £1m for cross cutting project = £4m	UE
Allow small projects to pursue curiosities e.g. historical aspect	CC
If also allow small projects will reduce budget for big projects	D
If large project bids are judged on excellence criteria rather than to fill portfolio then there will be gaps – hold back some funds for 2 year projects on gaps	D
Could have a small pot for pilot projects for early career researchers to promote collaboration	D

Summary:

- There were a range of responses, recognising that because of the breadth of the topic there would be a trade-off between how many projects were funded, and the extent to which research could be truly interdisciplinary.
- There was some supporting the suggestion that 2 to 4 large projects should be funded.
- Additional small projects could be included e.g. for early career researchers, to promote collaboration or for curiosity studies; if this was later these could fill gaps. However, this would reduce the main budget.

Question 3. How should projects address the call topics? Do all projects need to address all topics, how should the funders create a coherent programme?

Response	Group / Discussion
Funders agree OVERALL what they want out of it. Every consortium cannot cover every base. Don't do the coming out at application level.	UE
MT & VBD – hard to marry with other themes	UE
If you ask for connections between themes, you'll get it in the bids but may not mean anything	UE
The themes are discrete – no reason to cover more than one theme in project	CC
Minimum 1 project each major theme (Green Space, MT/VBD, Natural Hazards)	MT
Links between themes • in marine area: are MT affected by natural Hazards or number of people using greenspace • climate change • spread of VBD from city to city	D

Summary:

- Funders should define expectations on this.
- There are natural links between themes, but it is not necessary for every project to cover all themes.

Question 4. What can the Programme Coordination Team do to help the programme work?

Response	Group / Discussion
Knowledge exchange £ - for all projects not small budget	UE
PCT can help with metrics/definitions for all projects (don't repeat NEAFO – create unity for all projects)	UE
Bring in multidisciplinary, not force to consortium.	UE
Can help projects interact – be interdisciplinary, innovative	CC
If try to leverage funds where from: • MRC • National Institute Health Research • Local Authorities – but could limit programme area • EU sources including funding implementation of EU directives • BIS • LEPs – but geographical constraint	D
Need to bring in other potential funders e.g. businesses	D
Research projects will need to build social capital between members of consortium – PCT can help facilitate that as part of a managed process otherwise will get silos – crucial for this programme as so broad topics	D
Support development of shared language / terminology for different people involved	D
It is usual to have public / stakeholder engagement – this programme is novel in having political engagement – many politicians never heard of NEA, could get these ideas on political wavelength	D

Need to get broad research community involved – could hold "case studies" meeting	D

Summary:

- Pursue additional funding (e.g. businesses, MRC, NIHR, BIS, EU directive implementation, local authorities, LEPs)
- Support projects and help them interact (e.g. interdisciplinary working, shared approach to metrics / definitions)
- Help develop broader interdisciplinary community beyond projects (shared terminology, meetings e.g. on case studies)
- Promote high level engagement

Annex A: List of Attendees

First Name	Surname	Organisation	Table
Mel	Austen	Plymouth Marine Laboratory	Vector borne disease & marine toxins
Clare	Blacklidge	Environment Agency	Vector borne disease & marine toxins
Angie	Bone	Public Health England	Natural Hazards & Extreme Events
Peter	Borsay	Aberystwyth University	Urban Greenspace
Dominique	Butt	Natural Environment Research Council	Valuing Nature Programme
Peter	Coates	University of Bristol	Cross-cutting
Andy	Croxford	Environment Agency	Natural Hazards & Extreme Events
Mike	Depledge	University of Exeter	Natural Hazards & Extreme Events
Guy	Duke	Independent, VN Programme Coordination Team	Vector borne disease & marine toxins
Helen	Dunn	Defra	Valuing Nature Programme
Georgina	Endfield	University of Nottingham	Natural Hazards & Extreme Events
Rob	Fish	University of Exeter	Cross-cutting
Lora	Fleming	University of Exeter	Vector borne disease & marine toxins
Lorna	Friis	Economic and Social Research Council	Valuing Nature Programme
Kevin	Gaston	University of Exeter	Urban Greenspace
Roger	Goulding	Environment Agency	Vector borne disease & marine toxins
Hilary	Graham	University of York	Cross-cutting
Gary	Grubb	Arts & Humanities Research Council	Valuing Nature Programme
Rosie	Hails	Centre for Ecology & Hydrology	Valuing Nature Programme
Saskia	Heijnen	Wellcome Trust	Vector borne disease & marine toxins
Clare	Hickman	Kings College London	Cross-cutting
Katherine	Irvine	James Hutton Institute	Urban Greenspace
Laurence	Jones	Centre for Ecology & Hydrology	Vector borne disease & marine toxins
Anna	Jorgensen	University of Sheffield	Urban Greenspace
Jasper	Kenter	Scottish Association for Marine Science	Vector borne disease & marine toxins
Simon	Kerley	Natural Environment Research Council	Valuing Nature Programme
Sari	Kovats	London School of Hygiene & Tropical Medicine	Vector borne disease & marine toxins

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First Name	Surname	Organisation	Table
Rachel	Leader	Natural Environment Research Council	Valuing Nature Programme
Rebecca	Lovell	University of Exeter	Cross-cutting
Peter	Massini	Greater London Authority	Urban Greenspace
Simon	Maxwell	Defra	Cross-cutting
Louise	Newport	Department of Health	Valuing Nature Programme
Liz	O'Brien	Forest Research	Cross-cutting
Liz	Oughton	University of Newcastle	Natural Hazards & Extreme Events
Ece	Ozdemiroglu	eftec	Urban Greenspace
Dave	Raffaelli	University of York	Cross-cutting
Ranjan	Ramasamy	Anglia Ruskin University	Vector borne disease & marine toxins
Alister	Scott	Birmingham City University	Urban Greenspace
Tim	Sunderland	Natural England	Urban Greenspace
Catherine	Ward-Thompson	Edinburgh College of Art	Urban Greenspace
Ruth	Waters	Natural England	Natural Hazards & Extreme Events
Anita	Weatherby	Centre for Ecology & Hydrology	Valuing Nature Programme
Jim	Wharfe	Independent	Natural Hazards & Extreme Events
Michael	Winter	University of Exeter	Natural Hazards & Extreme Events
Val	Woods	Centre for Ecology & Hydrology	Valuing Nature Programme
Peter	Young	Aldersgate Group	Natural Hazards & Extreme Events

Annex B: Thinkpiece

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.

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[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?

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[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.

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