# Bringing the Human Health Dimension into Interdisciplinary Marine Research

Fleming LE, Austen M, Cheung V, Creencia L, Eales J, Garside R, Jack-Kadioglu T, Madarcos K, Morrissey K, Pahl S, Richter I, White M, Voronkova A

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BlueHealth Linking environment, climate & health
Seas, Oceans & Public Health in Europe Linking oceans and health research
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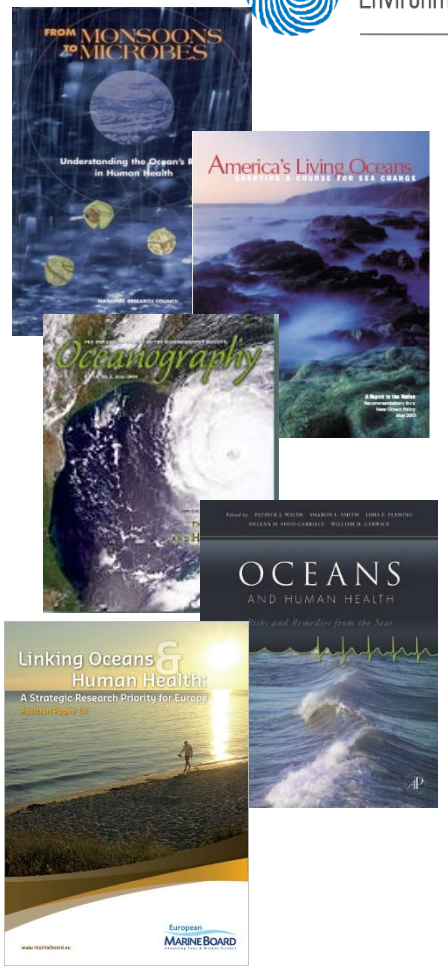
# Ocean & Human Health: A rather **negative** focus

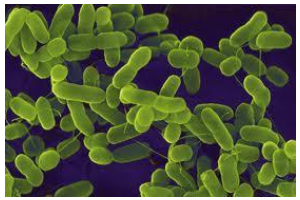


HABs & Other Toxins

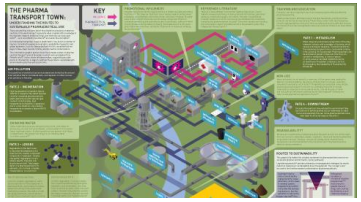
Fisheries Destruction

Storms, Floods & Climate Change

RISKS



Microbial pollution



Man-made Chemicals

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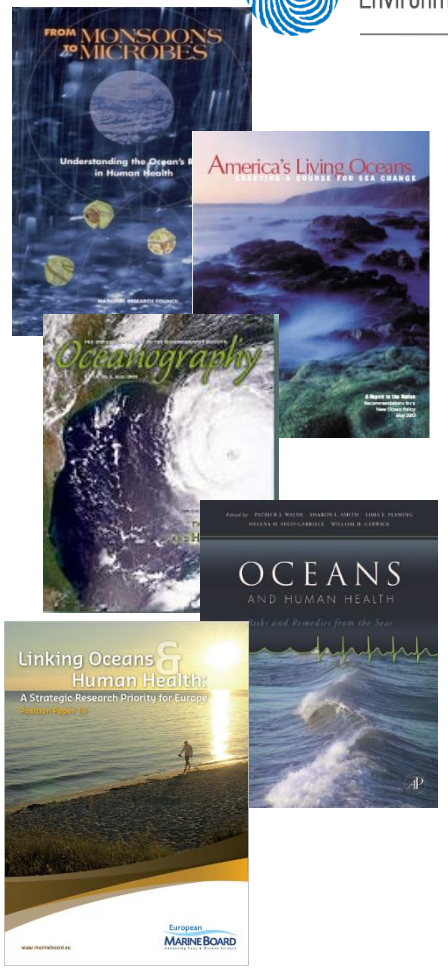
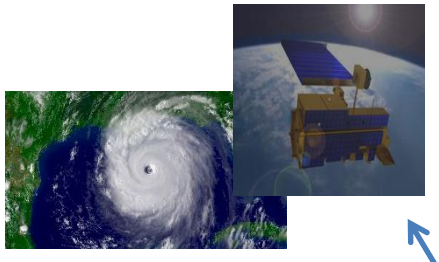
# Ocean & Human Health: Rather a **Positive** focus



Modelling & Forecast

Marine Natural Products

**Benefits**

Seafood & Aquaculture

Health and Wellbeing

Marine Models

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# EU Blue Growth Strategy

**Goal to reach 7 million jobs by 2020 with 5 Sectors**

## Environmental Sustainability

## +

## Risks, Benefits and Opportunities to Human Health & Wellbeing?

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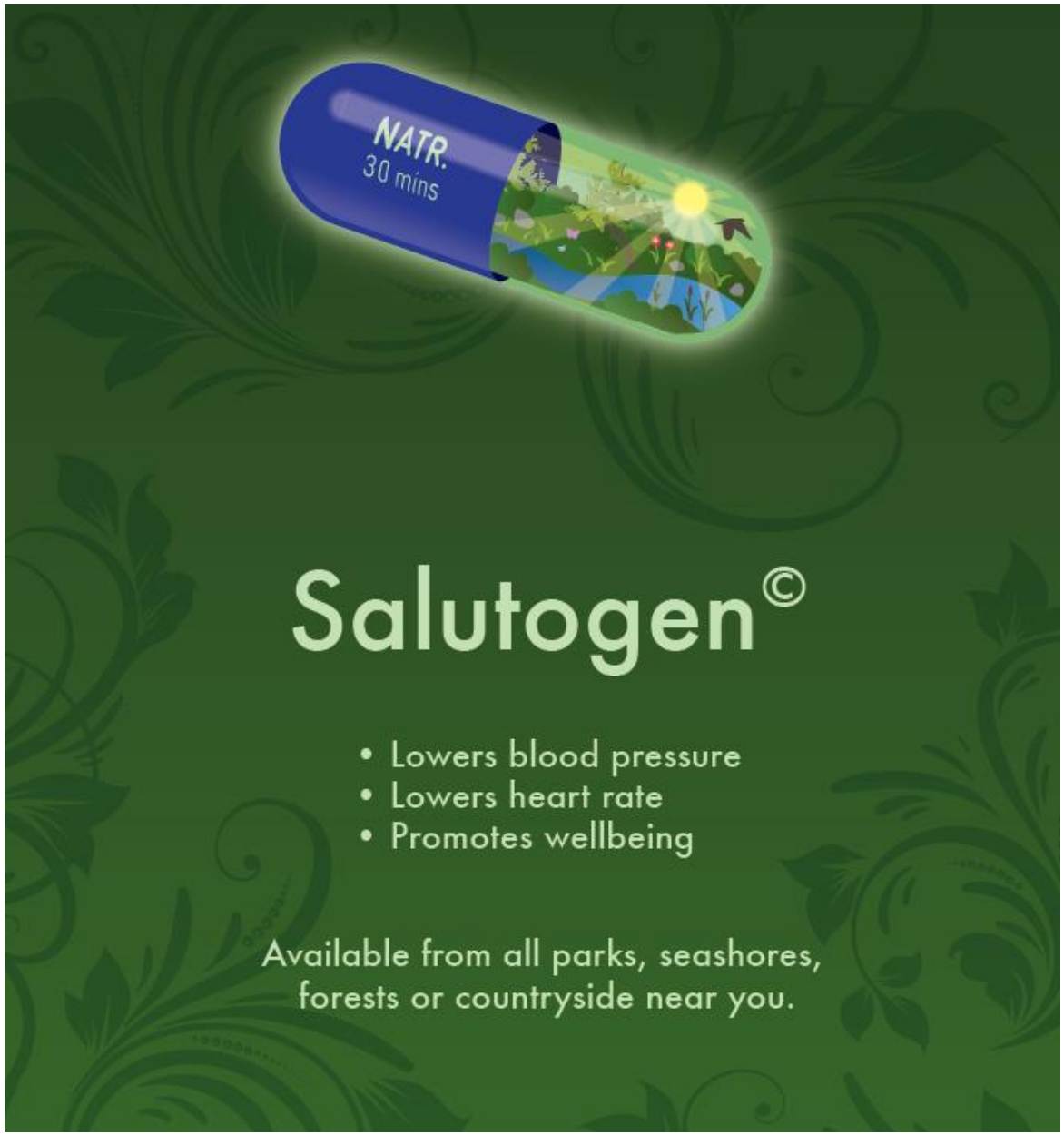
ecehh.org




Dr Will Stahl-Timmins

Prof Michael Depledge

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## Coast & health: Main pathways

< Stress

?

> Social

> Environ.

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## Multi-method approach

| Method | Pros (inc.) | Cons (inc.) | Our studies |
|---|---|---|---|
| **Qualitative interviews** | In-depth understand of people's motives & beliefs | Unrepresentative samples | - Parent interviews<br>- Child interviews |
| **Visitor surveys** | Big numbers /Multiple environments (controls)<br>Voluntary/chosen | Memory biases, selection effects | - MENE (N = 280,000)<br>- Wembury surveys<br>- Surfing / sailing studies |
| **Where people live** | Representative samples<br>Some longitudinal data | Causality?<br>Multiple confounders | - Census (N = 48 million)<br>- BHPS (N =12,000 x 18 yrs) |
| **Field experiments** | Realistic exposure condition some control | Hard to randomise/blind to condition | - Marine Aquarium<br>- Dental surgeries<br>- Volunteering studies |
| **Imaging (fMRI)** | Observation of brain activity using blood flow proxy | Risk of Type 1 errors, temporal snap-shots | - Urban/green/blue images<br>- Matched liking sets |
| **Lab experiments** | Reduced confounds & selection effects. Increased understanding of underlying processes (e.g. physiologic) | Small Ns (convenience samples); non-ecological e.g. may miss synergistic effects | - Videos/photos/sounds<br>- Attention processes<br>- Delay of gratification<br>- Risk taking<br>- Pain |
| **Systematic reviews** | Better overview; Meta-analyse data | Exclusion of important studies; Non-weighting of quality criterion | - Attention Restoration<br>- Biodiversity<br>- Nature volunteering |

# Choosing a hotel room…….

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**All 3 rooms are identical (2-3 star, size, furniture, en-suite, price) except view from the balcony**

| A | B | C |
|---|---|---|
| | | |
| £60.81 | £72.85 | £47.96 |

**Mean Willingness to Pay (per night)**

White *et al*., 2010, J Environ Psych

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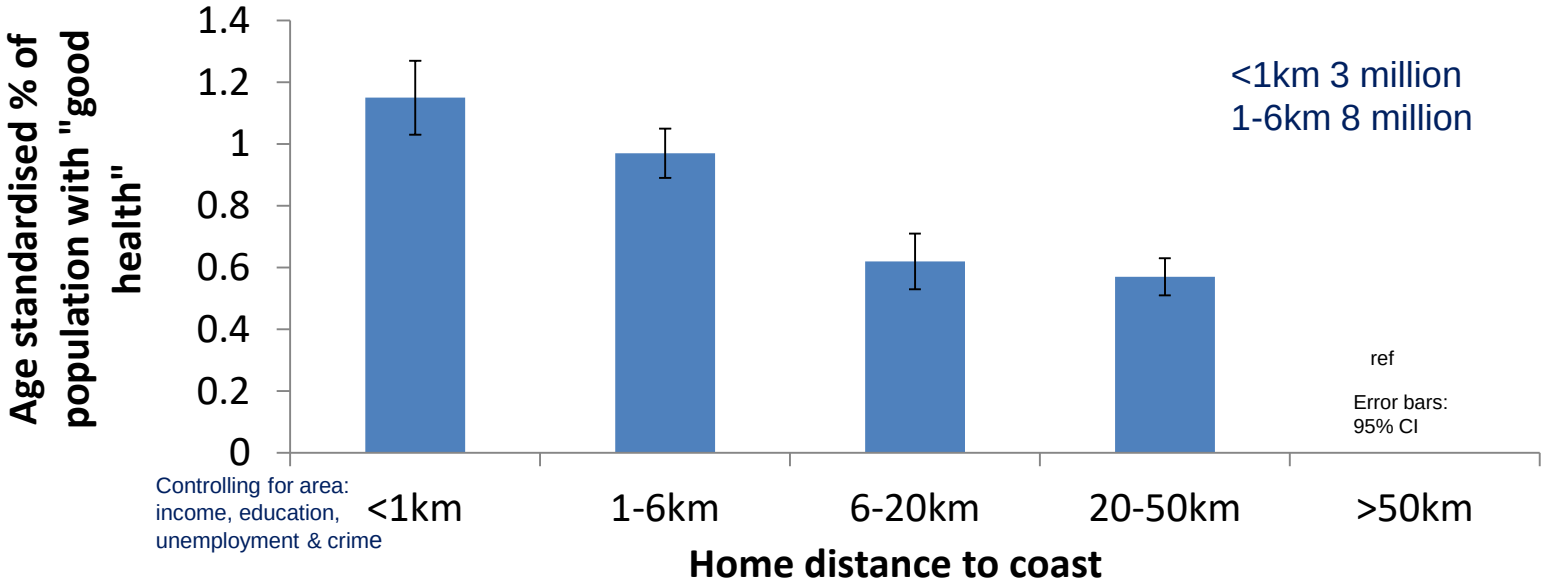
# Self-Reported Health

## Census Data (England, n = 48 million)




**The effects are strongest in poorer communities** [a]

**Same pattern when people move home** [b]

[a]Wheeler, White, Stahl-Timmins & Depledge (2012). *Health & Place, 18*, 1198-1201; [b]White, Alcock, Wheeler & Depledge (2013). *Health & Place,* 23, 97-103

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## **Activity Energy** expenditure at the coastline of England

Coasts are associated with the **highest energy expenditure** via recreational **physical activity**.

** Log-transformed MET minutes (metabolic equivalents of task x duration of leisure visit).*

Elliott, White, Taylor,, & Herbert. (2015). Energy expenditure on recreational visits to natural environments. *Social Science & Medicine.*

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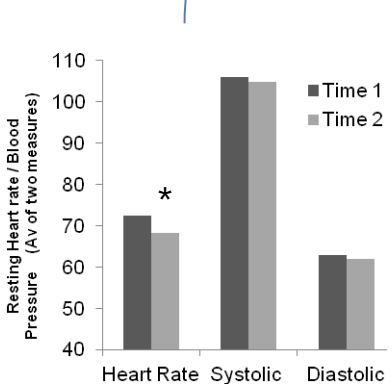
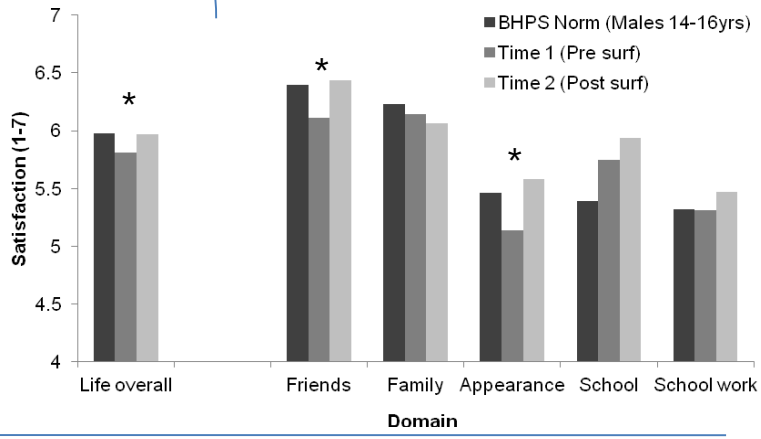
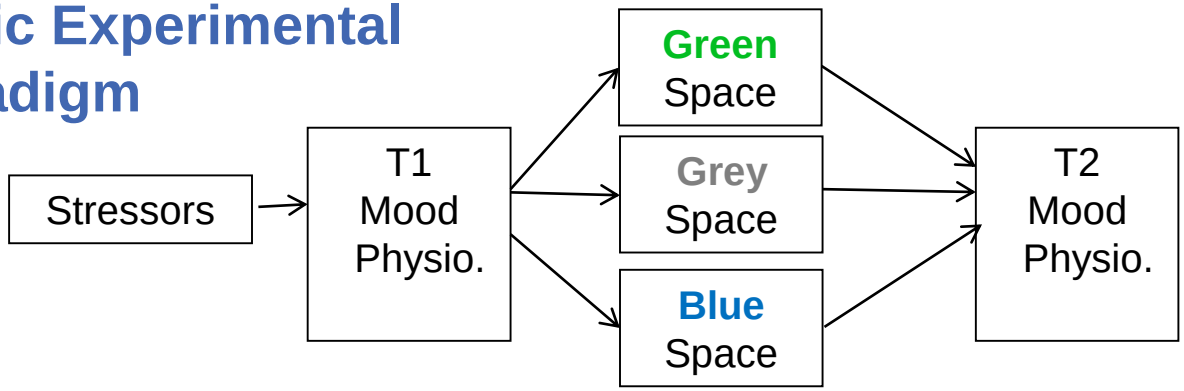
# Vulnerable Communities



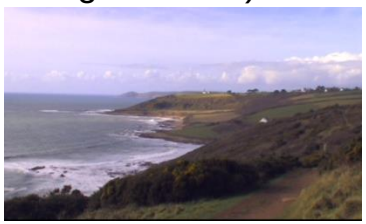

White, Hignett & Pahl (2012). *Surf to Success Outcomes: Can Learning to Surf Promote Individual and Environmental Well-Being?* Project Report for Ecominds.

# Basic Experimental Paradigm




## Lab work:

(Films, Sounds, + During Exercise)



## Applied Settings & Different Populations

NATIONAL MARINE AQUARIUM

Dental surgeries (+ VR)

**White, Pahl, et al**

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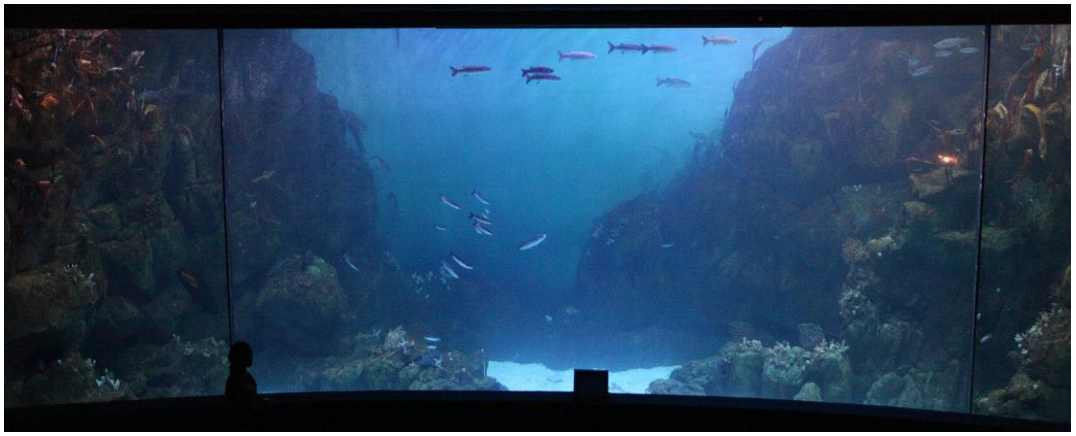
# **Stress Reduction** @ National Marine Aquarium



Thick-lipped grey mullet (*Chelon labrosus*)

Thornback ray (*Raja clavata*)

Flounder (*Platichthys flesus*)

Condition 1: Nothing! ("**No fish**"; n = 29)

(water and tank decoration - no fish or invertebrates)

Condition 2: Small number of fish ("**Low" biodiversity;** n = 26)

(2-10 fish species; 45-80 individuals)

Condition 3: Additional number of fish ("**Medium" biodiversity**; n = 29)

(Total of 19 fish species; 138 individuals (9 additional species, 58 extra fish))

Cracknell, White, Pahl, Nichols & Depledge (Under revision). Species diversity and psychological well-being: A preliminary examination of dose-response effects in an aquarium setting

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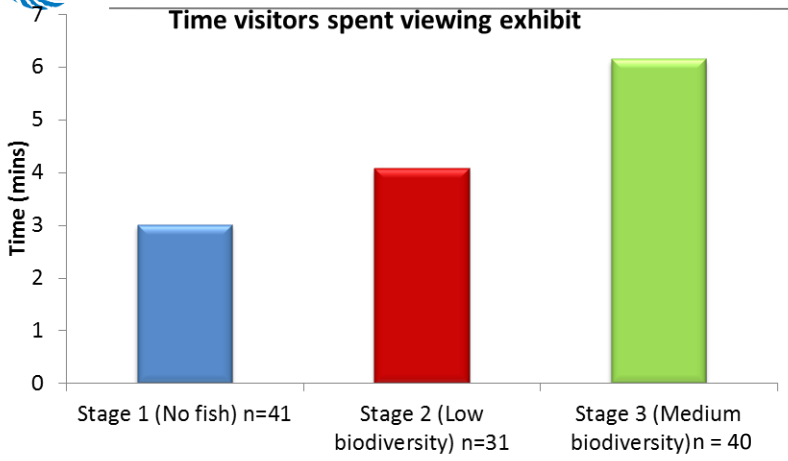
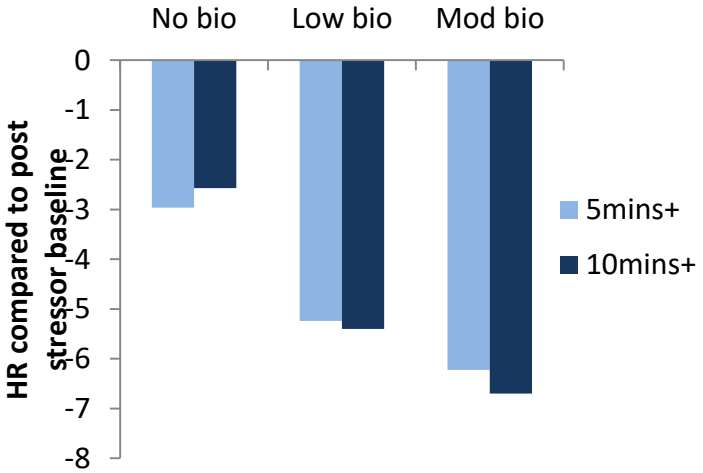
## Behavioural & Heart Rate data




**Visitor observation data**

- Participant **heart rate**
  - Significant drop in all conditions:
    - **Mod>Low>No**
  - No dose-response pattern for time spent

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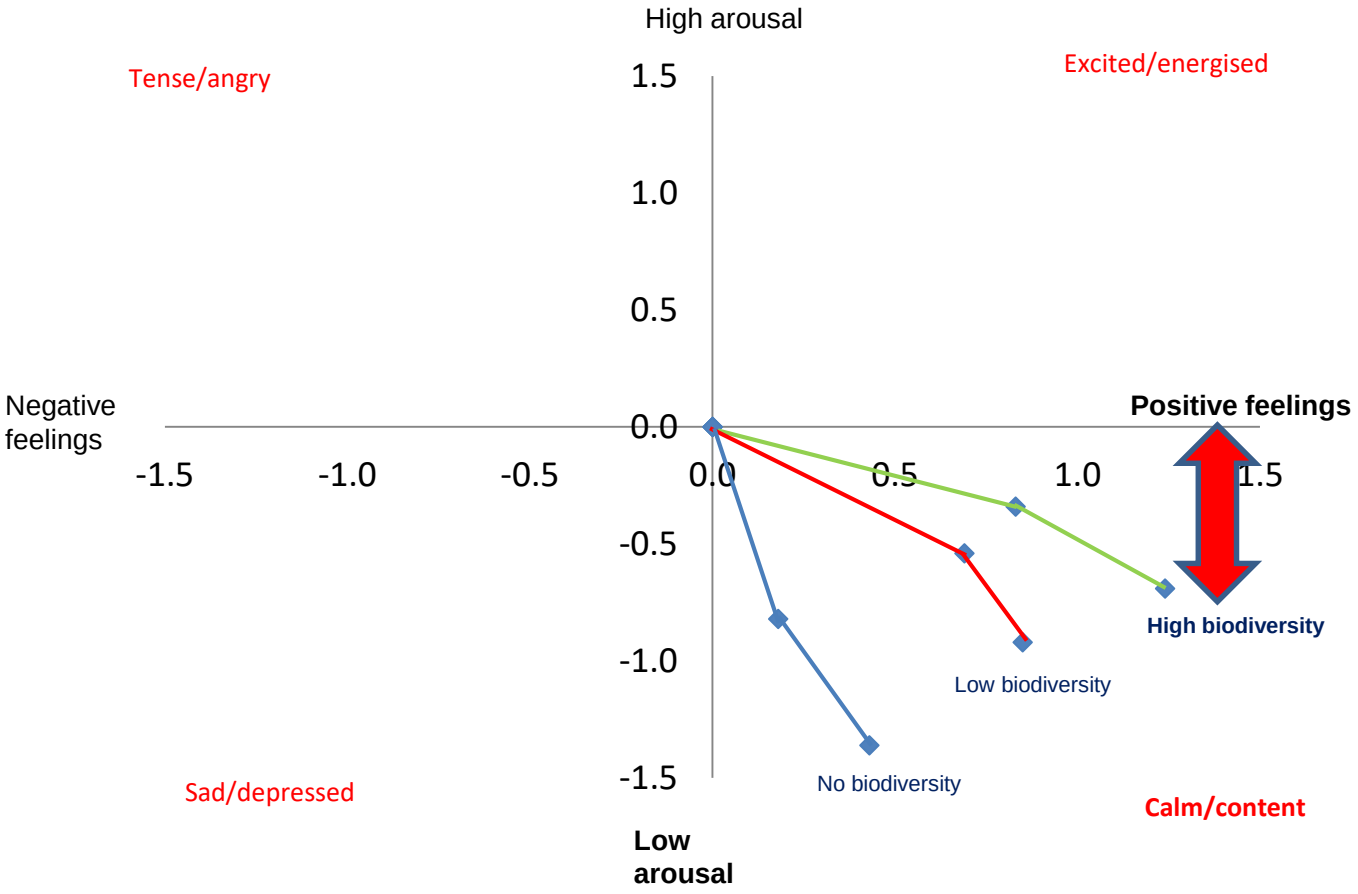
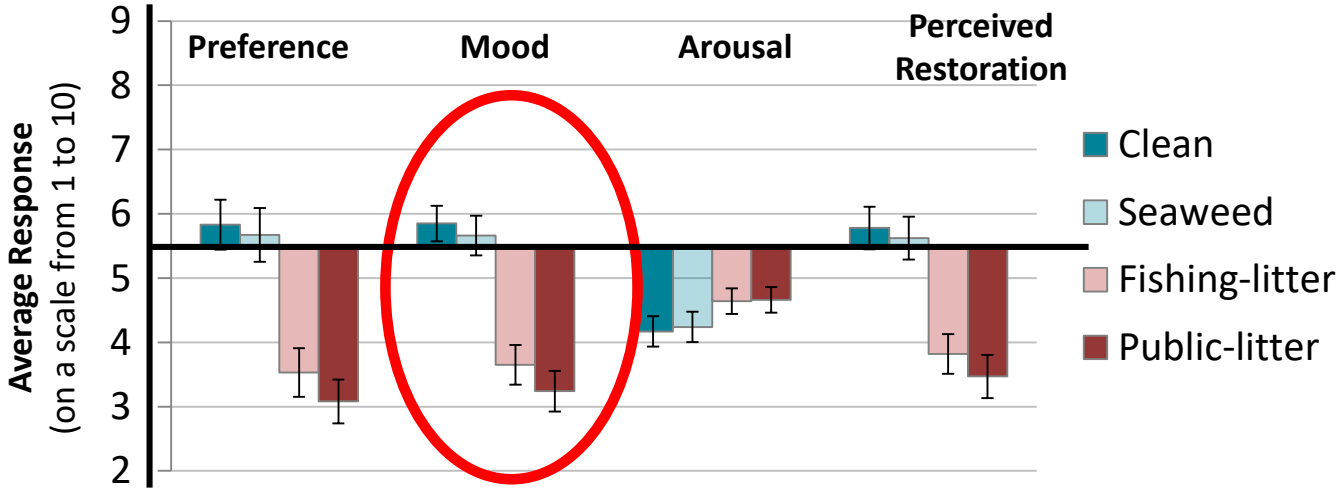
# Mood data



# Impacts on the Environment and Human Wellbeing?

[a] Wyles, K. J., Pahl, S., Thomas, K., & Thompson, R. C. (in press). *Environment & Behavior*

# Impacts on the Environment and Human Wellbeing




[a] Wyles, K. J., Pahl, S., Thomas, K., & Thompson, R. C. (in press). *Environment & Behavior*

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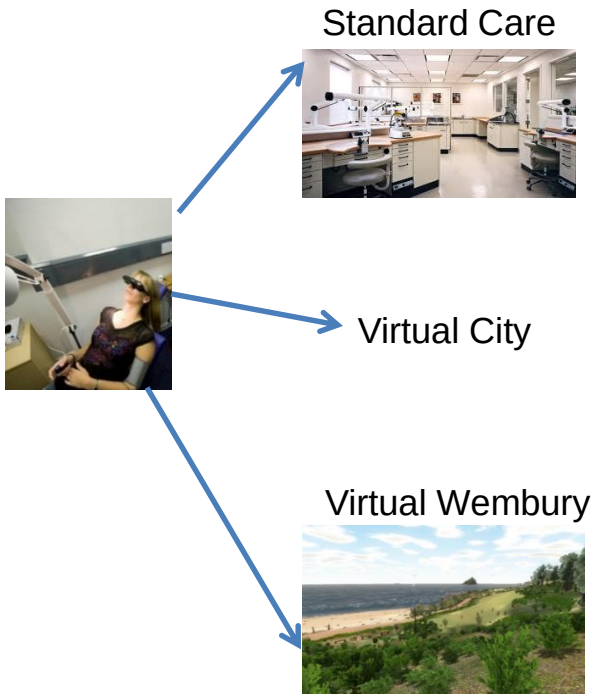
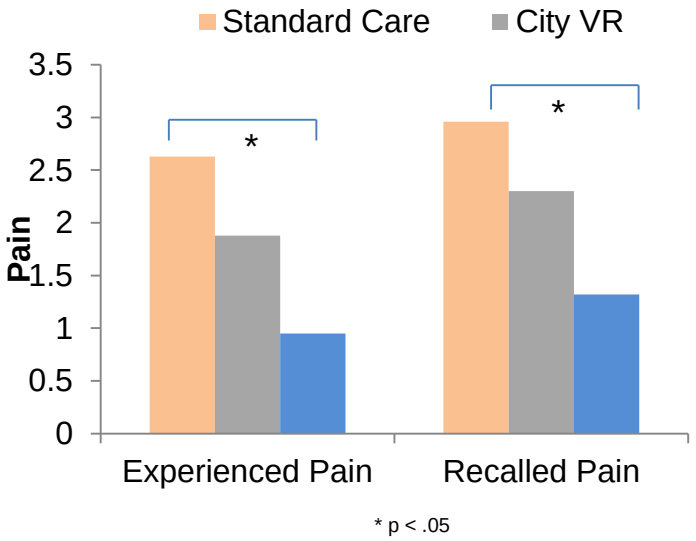
## RCT Real Dental Care – 72 patients




* p < .05

- **Lab findings extend to real situations (tooth extractions/fillings)**

Tanja-Dijkstra, Pahl, White, Andrade, May, Stone, Bruce, Mills, Melissa Auvrey, Gabe & Moles (2016). The soothing sea: A virtual walk on the coast reduces experienced and recollected pain. *Pain*

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# Complex Mixtures?

> Environ.

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# BlueHealth

Linking environment, climate & health

BlueHealth: Linking Up Environment, Health and Climate for Inter-Sector Health Promotion and Disease Prevention in a Rapidly Changing Environment

**Project overview**

**Lora Fleming (UNEXE)**

**BlueHealth is funded by the European Union's Horizon 2020 research and innovation programme, grant agreement No 666773**

# Challenges to society

**What are the big global issues?**

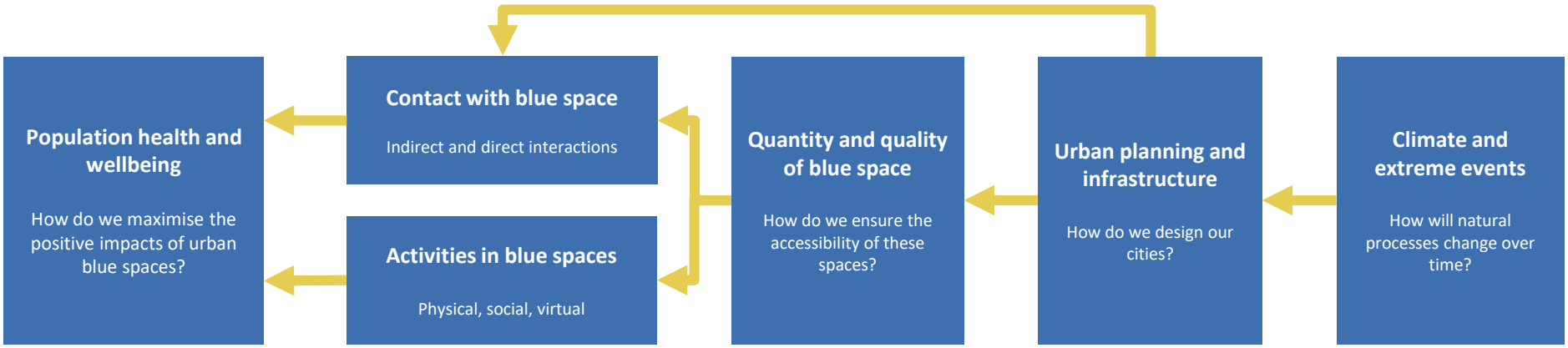
- **Health**: Ageing, chronic diseases, inequalities
- **Climate**: Global change
- **Environment**: Other environmental change
- And the **intersections** between them, both **risks and benefits**

We must shift from treatment to **prevention**

And from a focus on longevity to **quality** of life over the life course

# Conceptual model

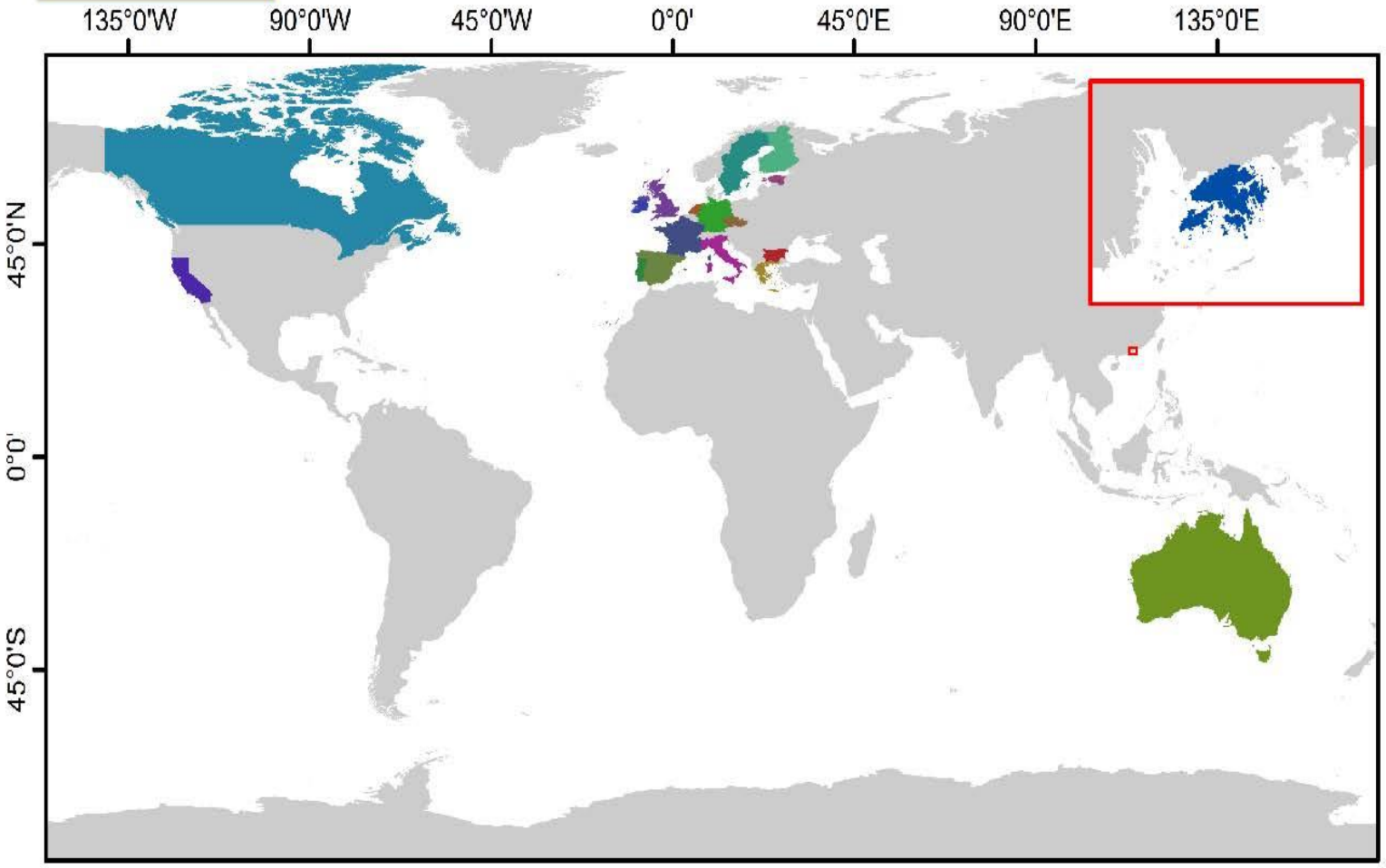
**Understanding the benefits of urban blue spaces**



# Method

## International BlueHealth Survey

**Participants**




Online

N≈1,000 nationally representative (sex*age, region).

Four seasonal waves (Jun 2017 – Mar 2018).

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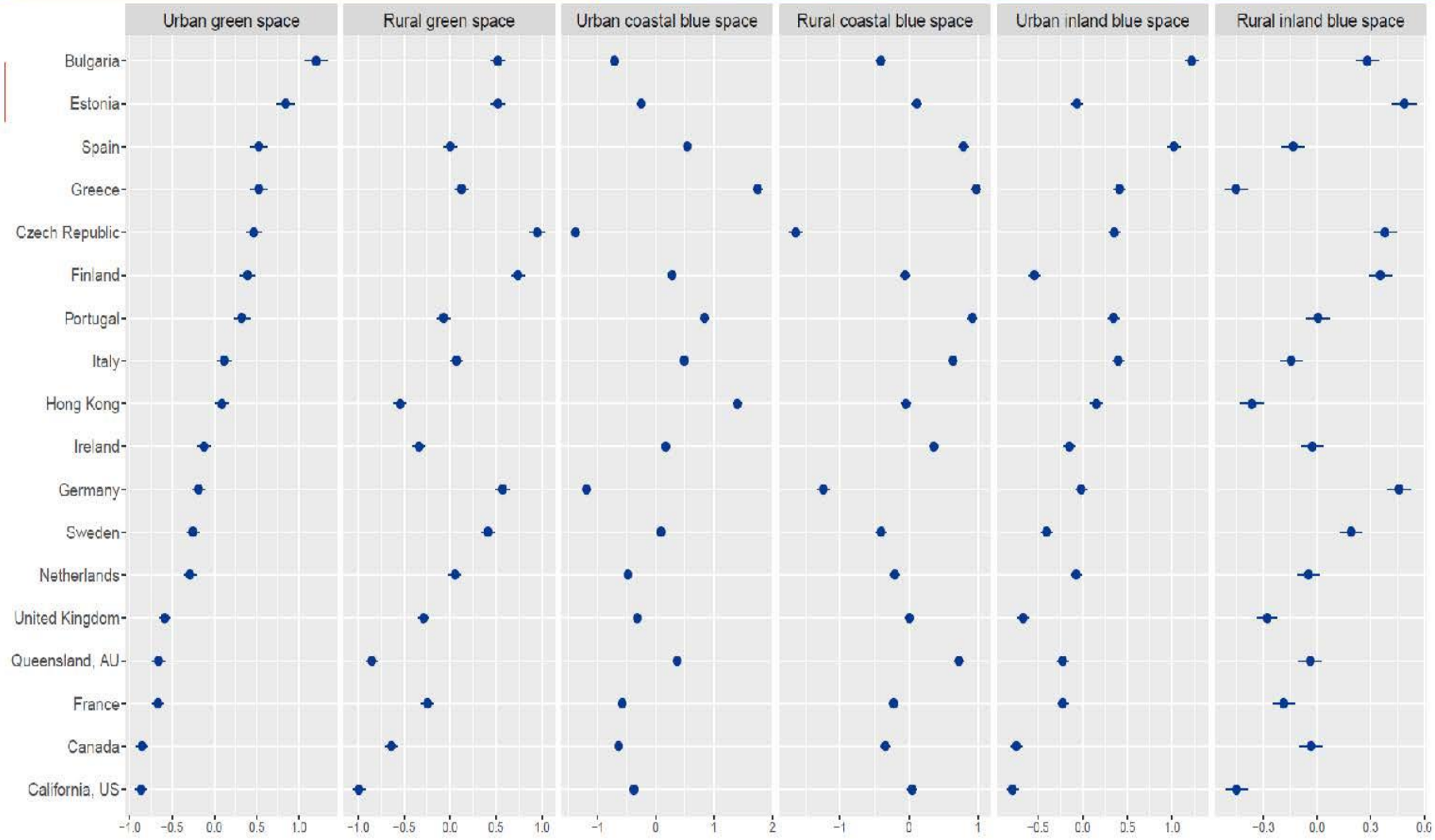
# Results

# International BlueHealth Survey

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# UN sustainable development goals

**How do blue spaces fit in?**

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PML | Plymouth Marine Laboratory

RESEARCH WITH PLYMOUTH UNIVERSITY

UNIVERSITY OF MALAYA

CSERM Centre for Sustainable Energy and Resources Management

IPNLF FOR ONE-BY-ONE FISHERS

NORTH DEVON BIOSPHERE

UNIVERSITY OF EXETER | MEDICAL SCHOOL

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CERE

UNIVERSITY OF EXETER | ENVIRONMENT AND SUSTAINABILITY INSTITUTE

blue ventures beyond conservation

# GCRF Blue Communities

Building capability for M**arine Planning** in SE Asia:
Actively, well-managed marine ecosystems are better able to support the **health, wellbeing,** food security and livelihoods of people

ASIA-PACIFIC ACADEMIC CONSORTIUM FOR PUBLIC HEALTH

PEMSEA

WorldFish

THE BOARD OF TRUSTEES OF THE SABAH PARKS

UNESCO United Nations Educational, Scientific and Cultural Organization

HIST International Centre on Space Technologies for Natural and Cultural Heritage under the auspices of UNESCO

UNESCO United Nations Educational, Scientific and Cultural Organization

MaB North Devon's Biosphere Reserve member of the World Network of Biosphere Reserves

UNESCO United Nations Educational, Scientific and Cultural Organization

MaB Vietnam's Man and Biosphere Program

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# Co-Creation with Communities

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# Project 6: Developing a health & wellbeing survey for use with local coastal communities in Palawan (Mat White, Lota Alcantara-Creencia & Team @ WPU)

## Step 1: Listening & understanding the context

7th-16th May 2018

We began our visit by spending time at the two main research sites (Aborlan/Taytay) and listening to local stakeholders voice their interests and concerns about health and wellbeing issues.

Focus groups were organised by the WPU team and included representatives from local Barangays, health officials, environment officials, etc.

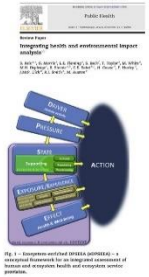
## Step 2: Synthesising and prioritising

22nd-24th May 2018

Back at WPU's campus in Puerto Princesa we spent several days developing the structure of the survey through:

- logic mapping
- priority identification
- linking to Project 12 scenarios
- making sure that a single survey could cover the issues raised at both sites

## Step 3: Developing a structure



25th May 2018

Building on theoretical work linking ecosystems services and health using the eDPSEEA model co-developed by the PML & Exeter team we grouped the survey sections in a way that could be easily coordinated when the results were being analysed.

## Step 4: Refining & piloting

June-August 2018

The survey went through several iterations with input from all partners to ensure:

- All key topics were covered
- Items were clear and understandable
- It could be completed < 25 mins

Repeated piloting was conducted in situ by the WPU team during this stage

## Step 5: Finalising and ethics

Sept-November 2018

- Based on piloting it was decided to use interviews
- Interviews will be conducted by the WPU team
- Several iterations of ethics application were undertaken
- Ethical approval was granted in Exeter on 8th Nov subject to ethical approval also being obtained in the Philippines

## Step 6: Collecting the data

xxx 2019

- Interviews will be undertaken in approx. 6 Barangays
- 3 in Taytay and 3 in Aborlan
- Barangay Captains will be key access brokers
- Aim to collect 40-60 people per Barangay

## Step 7: Analysing the data

xxx 2019

- Draft analysis plan drawn up in May
- Opportunities for training in analysis of survey data identified
- Exeter to support WPU analyse the data for reports and publications

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# Some of Expertise in BlueHealth @ www.ECEHH.org

Prof Sabine Pahl

Prof Mike Depledge

Dr Becca Lovell

Prof Lora Fleming

Dr Mat White

Dr James Grellier

Dr Lewis Elliott

Ms Nicky Yeo

Dr Tim Taylor

Dr Ben Wheeler

Mr Alex Smalley

Ms Em Squire

Ms Sophie Davison

University of Exeter Medical School

Plymouth University

NHS National Institute for Health Research

Seas, Oceans & Public Health in Europe
Linking oceans and health research

Natural England

rspb giving nature a home

BlueHealth
Linking environment, climate & health

Dr Claire Eatock

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 666773. and 774567

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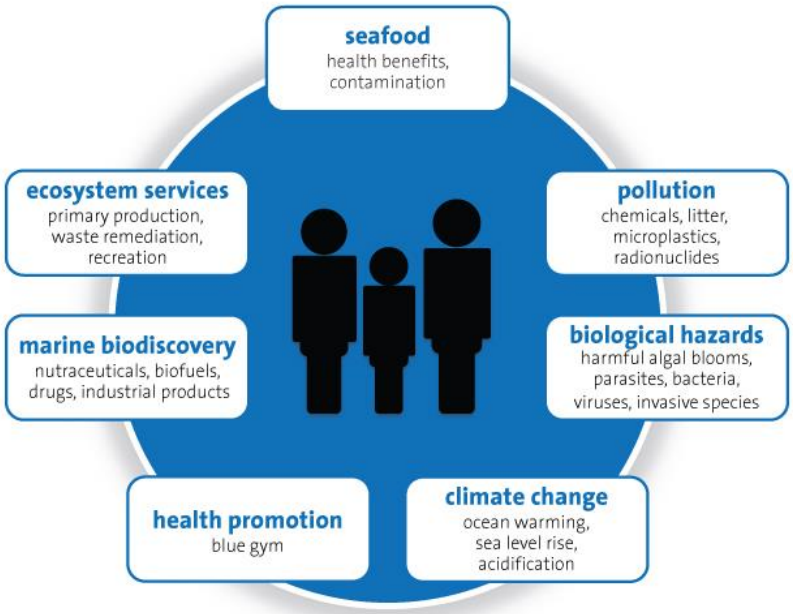
# Thank You




**With thanks to my current and future Oceans & Human Health Colleagues, including:**
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***SDG 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development***

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