#Coastalfutures19

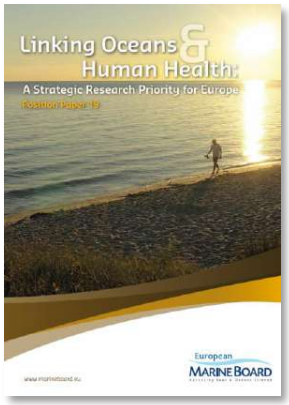
Oceans & human health:
Latest findings & a roadmap for European research

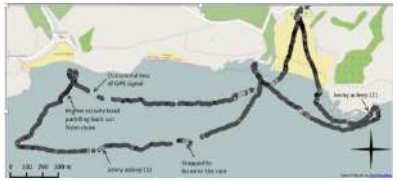
(Mat White, University of Exeter)

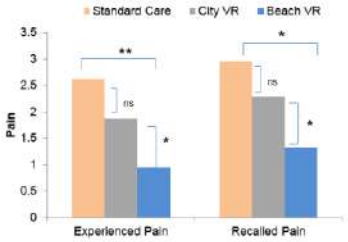
The threats to human health from the marine environment are well known

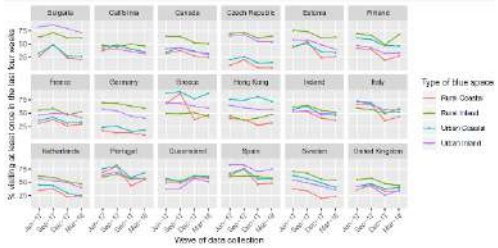
Evidence of the benefits to health & wellbeing is growing

Research exploring these issues globally is underway









BlueHealth
Linking environment, climate & health

Blue Communities

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

European Centre for Environment & Human Health

University of Exeter
College of Medicine and Health
Medicine, Nursing and Allied Health Professions

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SOPHIE is funded by the European Union's Horizon 2020 research and innovation programme, grant agreement No 774567.

GCRF Global Challenges Research Fund

Overview

1. Quick reminder from Jan 23rd 2013

2. Update on findings from the last 6 years
   - Systematic review
   - New methods (e.g. viewsheds & geo-narratives)
   - 'Quality' matters
   - Tackling inequalities
   - Virtual coasts
   - Encourage pro-environmentalism?
   - New risks
   - Monetising 'value'

3. Ongoing research
   - BlueHealth
   - Blue Communities

4. Gaining traction & next steps (help please)
   - Planetary health initiative
   - SOPHIE (Seas Oceans & Public Health in Europe)

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Jan 23rd 2013: Flashback #1

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NEWS

Home | UK | World | Business | Politics | Tech | Science | Health | Family & Education

Politics | Parliaments | Brexit

David Cameron promises in/out referendum on EU

23 January 2013 | Share

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Jan 23rd 2013: Flashback #2

Environmental

Ecosystem degradation, flooding, storm surges, water/vector borne diseases, current/wind changes, earthquakes/tsunamis, invasive species, harmful algal blooms, ocean acidification

Pollution

Microbial, chemical, air (from coastal shipping/industry), pharmaceutical, nutrient (run-off), plastics

Human activities

Urbanisation; Mining; Shipping; Fishing Aquaculture; Marine renewables; Marine biotechnology

Socioeconomic -cultural

Demographic change, destruction of traditional (e.g. fishing) communities; shifts in economies and industries; Tourism & 2nd home ownership; peripherality/remoteness

Health Outcome

Drowning
Injury
Infectious diseases
Pollutant exposure
AMR
Acute toxicity,
Respiratory/cardiovascularB
birth defects
Chronic diseases
Mental health
Body burdens of toxins

Depledge, Lovell, Wheeler, Morrissey, White, & Fleming (2017). *Review of Evidence: Health and well-being of coastal communities*. Government Office of Science Foresight 'Future of the Sea' Project. London: Author.

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Jan 23rd 2013: Flashback #3

- ***Health inequalities***: Lower at the coast[1]

- **Depression/anxiety**: Lower at the coast[2]

- **Physical activity**: Higher at the coast[3]

- **Stress reduction:** Strongest on coastal visits[4]

1.Wheeler et al. (2012). Does living by the coast improve health and wellbeing?. *Health & place*, *18*(5), 1198-1201.84
2.White et al., (2013). Coastal proximity and health: A fixed effects analysis of longitudinal panel data. *Health & Place*, 23, 97-103.
3.White et al. (2014). Coastal proximity and physical activity. *Preventive Medicine, 69, 135-140.*
4. White et al. (2013). Feelings of restoration from recent nature visits. *Journal of Environmental Psychology*, *35*, 40-51.

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Blue space systematic review

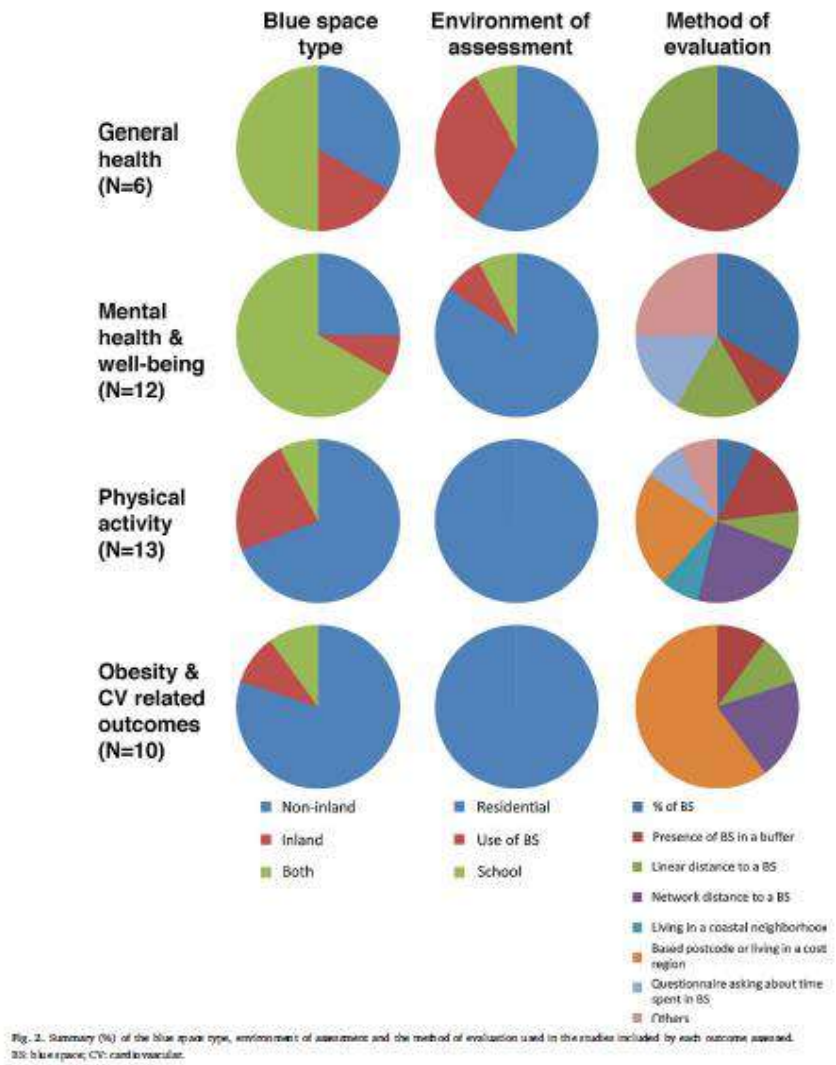

Fig. 2. Summary (%) of the blue space type, environment of assessment and the method of evaluation used in the studies included by each outcome assessed. BS: blue space; CV: cardiovascular.

Studies: N = 35 (22 good quality)

"The balance of evidence suggested a positive association between greater exposure to outdoor blue spaces and benefits to both *mental health* and wellbeing and *physical activity*…

The evidence for … *general health, obesity, CVD* and related outcomes was less consistent."

Gascón, Zijlema, Vert, White & Nieuwenhuijsen (2017). Blue spaces, human health and well-being: a systematic review. *International Journal of Hygiene and Environmental Health, 1207-1221.*

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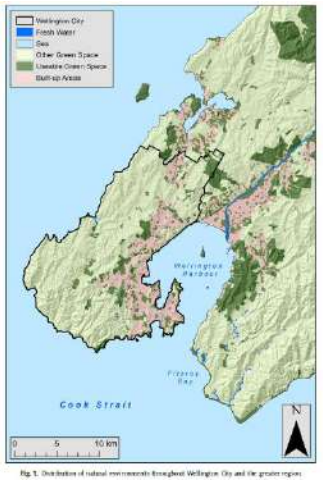
Participants: n =442 residents of Wellington, NZ.



Outcomes: Psychological distress Kessler-10

Exposure: 'Vertical Visibility Index'
of green & blue spaces

Results: Blue (but not green) views
had with less psychological distress

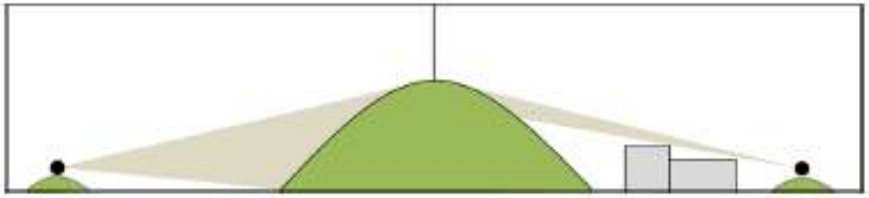


Fig. 2. Cross-sectional diagram of the VVI measure, highlighting how visibility can be represented as degrees of visibility. The observer on the left (indicated by the dot) has higher visibility of the grassy hill (indicated by a higher VVI value).

Nutsford, D., Pearson, A. L., Kingham, S., & Reitsma, F. (2016). Residential exposure to visible blue space (but not green space) associated with lower psychological distress in a capital city. *Health & place*, *39*, 70-78.

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Geo-narratives

N.B. A dot is plotted every 10 seconds (provided the GPS could detect signal). The colour of the dot corresponds to the relative activity level detected by the accelerometer, whilst the location of the dot is determined by the associated GPS reading. Darker coloured dots indicate relatively greater accelerations per 10s time period (i.e. participants were being more active). The greater the distance between the dots, the faster the GPS unit was travelling. This canoe trip lasted approx. five hours.

Rachel: "Oh yeah and that's the park. There were lots of people in there. We met some friends at Charlestown and walked round and then the children all played in the park"

N.B. Due to accelerometer malfunction, Rachel's maps are based only on GPS data, with a dot plotted every 10 seconds. Based on a visit lasting approx 2 hrs. Base map: Data-CC-By-SA by OpenStreetMap

Rachel: "I just love it down there. There's just something so chilled out and everyone's on holiday so they exhibit that relaxed tendency… I've noticed a complete personality shift since becoming a mum… you've got weird pressures in the stress of getting them ready or being with them all the time… but you've got a lot of time and people on holiday also have a lot of time, so when we get somewhere there's no, we're not necessarily aiming to *do* anything so it's just nice to chat to people and be in that frame of mind whereas generally wherever you are, everyone is kind of 'I have got my agenda, I'm off on that ....I've got....' you know missions! ((laughs)) So I think that's the holiday feel that I like, it's just people have time to talk"

Rachel: "I think that night it was quite, um, intense waves. We couldn't get onto the beach, so we walked round that bit of it instead to see it, and watched the mad children. Like parents were letting their children in that - it was really crashing down! There's two walls aren't there at Charlestown, and it doesn't take much for a wave to crash you in. I mean I know you'd have gone down and you'd have got them out but they'd have still got a good bash on the head. So, anyway, yeah we watched from a distance! ((laughs))"

Rachel: "There's the little, we have to do the tunnel 'cos my husband has to be the monster in the tunnel for the children ((laughs)). He has to run away!"

Fig. 3. Seeking a positive social ambience at the coast.

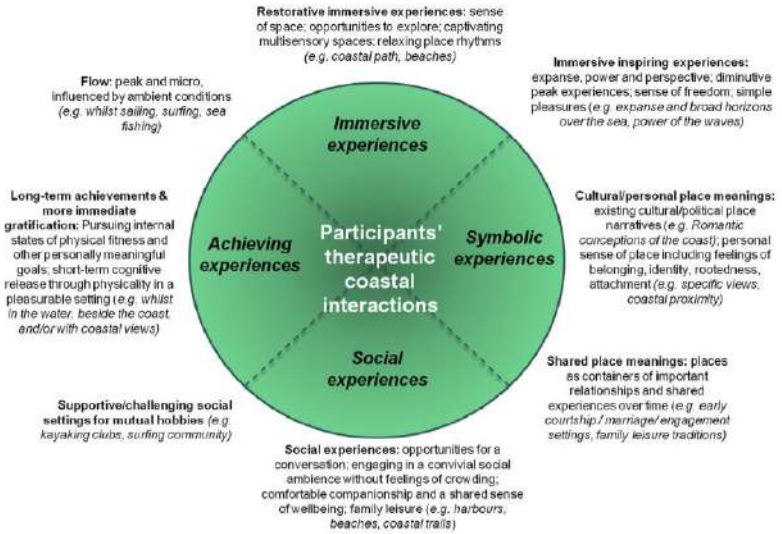

Fig. 6. Four overlapping therapeutic experience dimensions (building on Völker and Kistemann, 2013).

Bell, S. L., Phoenix, C., Lovell, R., & Wheeler, B. W. (2015). Seeking everyday wellbeing: The coast as a therapeutic landscape. *Social Science & Medicine*, *142*, 56-67.

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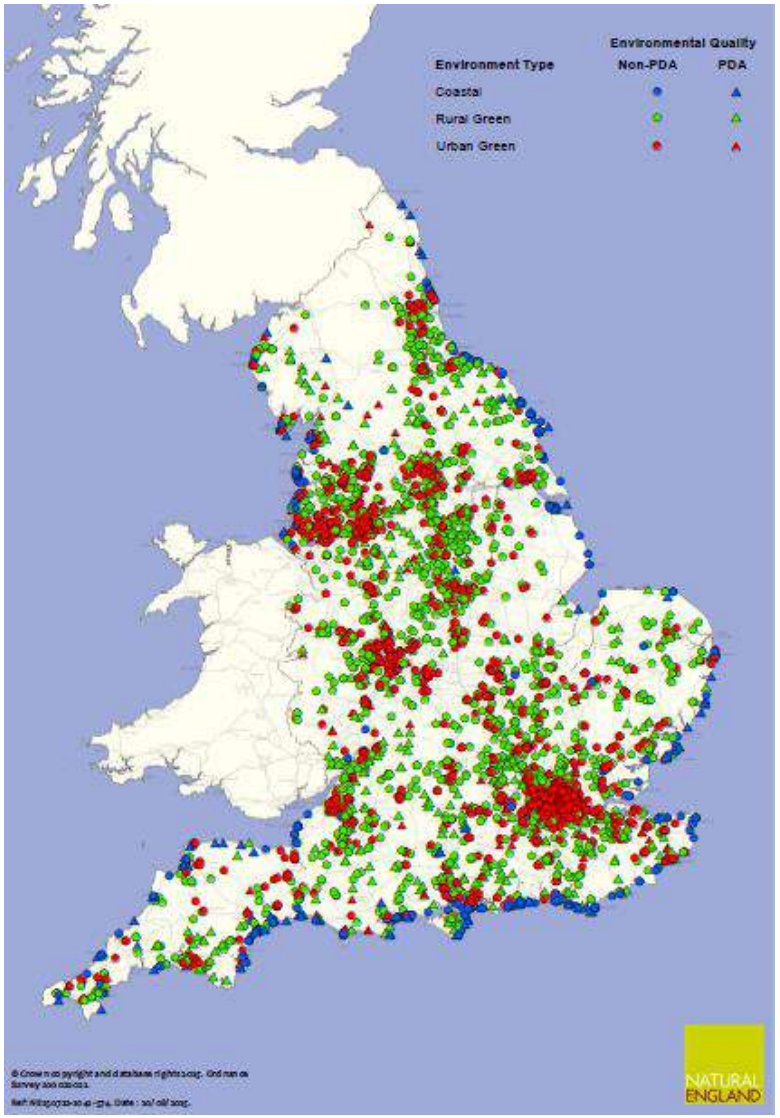
MENE visit locations

MENE Subset (n = 4,515) asked about experiences

Stress reduction & connectedness to nature: To what extent did they feel 'x' after the visit:

1) Calm & relaxed
2) Refreshed & revitalised
3) Close to nature

Controlled for Who (Age, gender, SES) & What (activities, duration, who with, distance travelled etc.)



Wyles, White, Hattam, Pahl, King, & Austen, (2019). Are some natural environments more psychologically beneficial than others? *Environment and Behavior*, 51(2), 111-143 .

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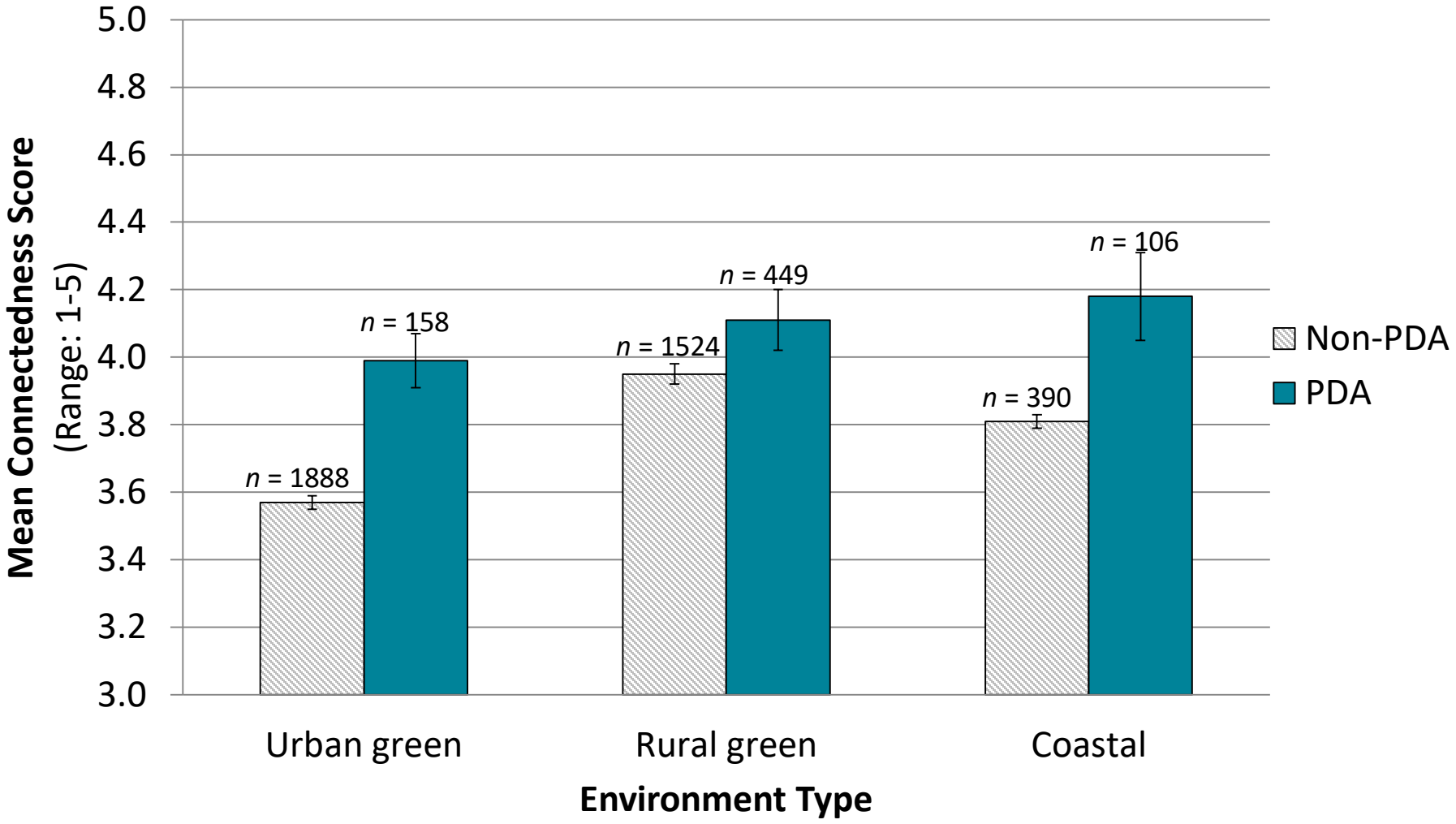
Importance of protected/designated areas?



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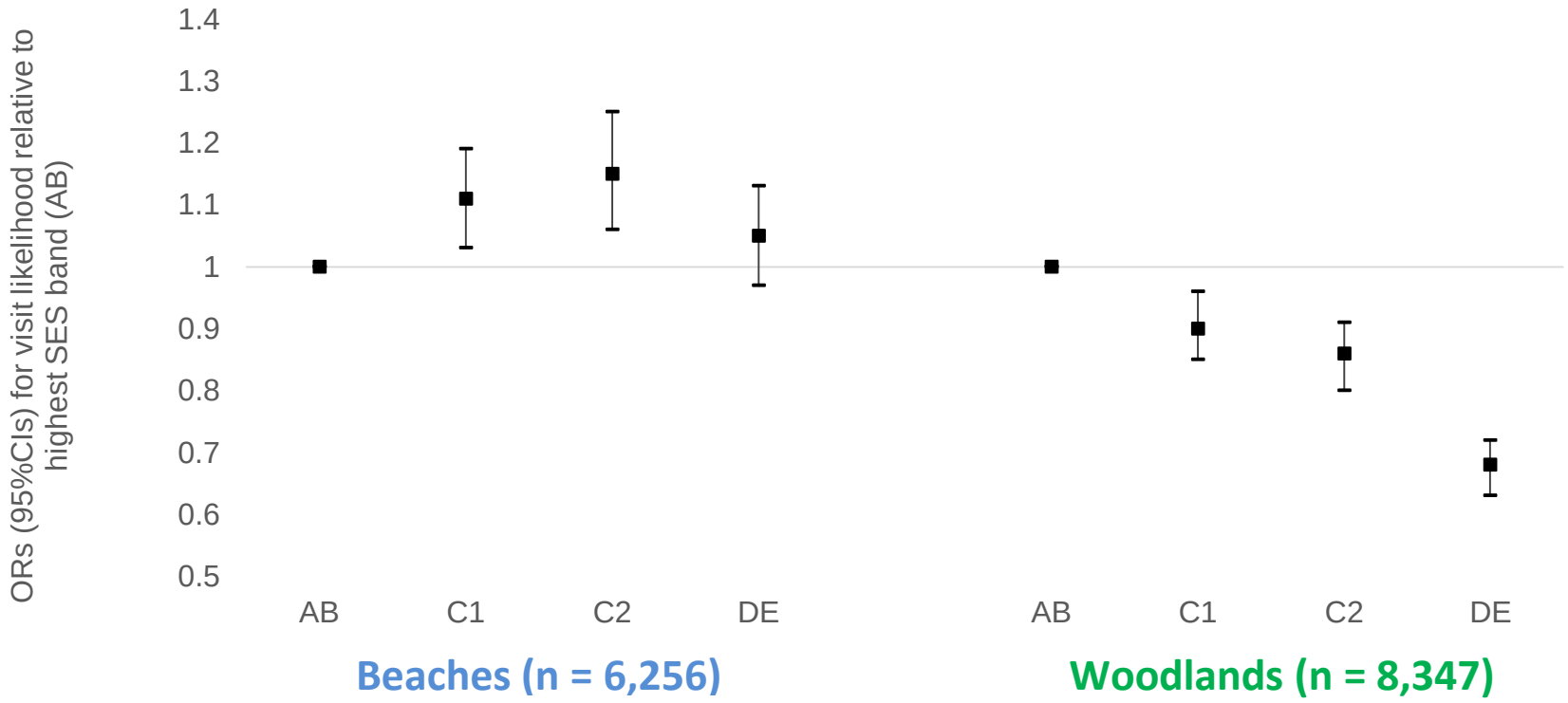
Beaches are used by all sectors of society

NATURAL ENGLAND

MENE n = 82,322 visits (urban parks most)



Other natural areas (e.g. woodlands) are dominated by the middle classes

Elliott, White, Grellier, Rees, Waters, & Fleming (2018). Recreational visits to inland and coastal waters in England: Who, where, when, what and why. *Marine Policy*, 97, 305-314

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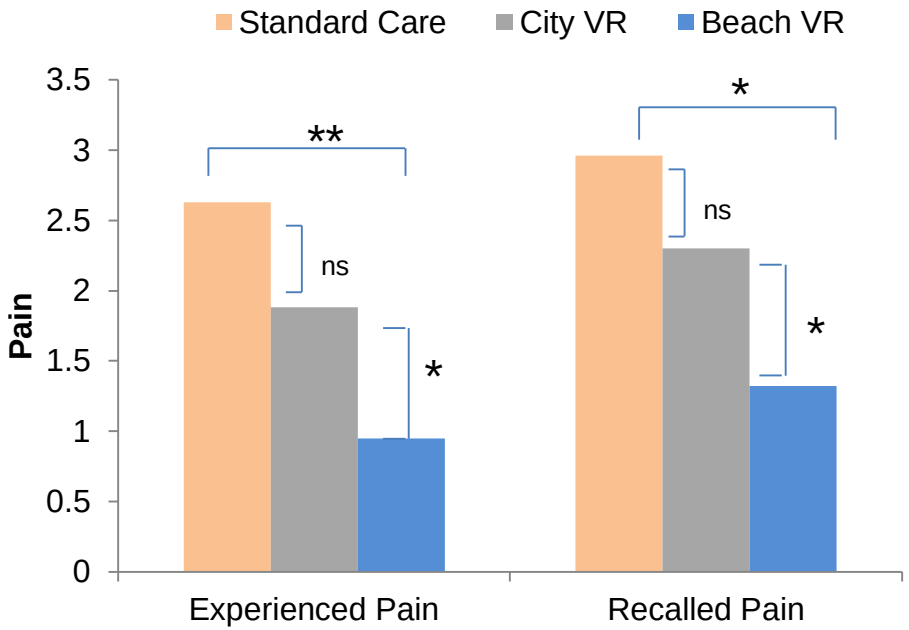
Tanja-Dijkstra et al. (2018)

Participants: 70 dental patients undergoing minor treatment (fillings etc., mean duration = 13 mins)

Exposure: Standard Care vs Virtual City vs. Virtual Beach

Outcomes: Pain a) immediately + b) 7 day recall



*p< .05; **p<.01

Tanja-Dijkstra, K., Pahl, S., White, M.P., Andrade, J., May, J., Stone, RS., Bruce, M., Mills, I., Auvrey, M., Gabe, R. & Moles, D.R. (2018). The soothing sea: A virtual walk on the coast reduces experienced and recollected pain. *Environment & Behavior* , *50*(6), 599-625.

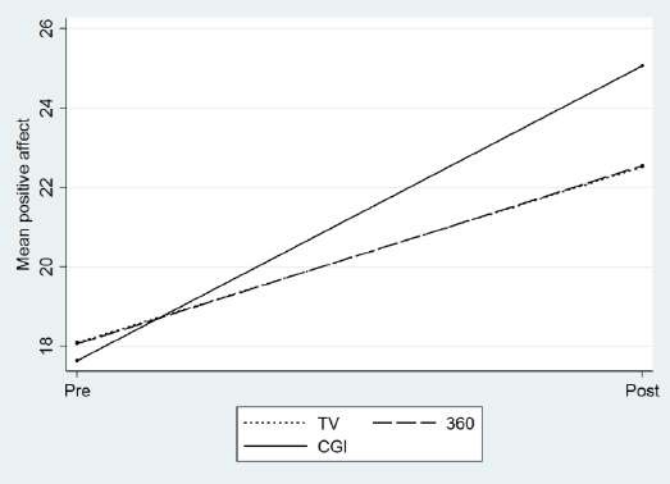
Yeo (2019)

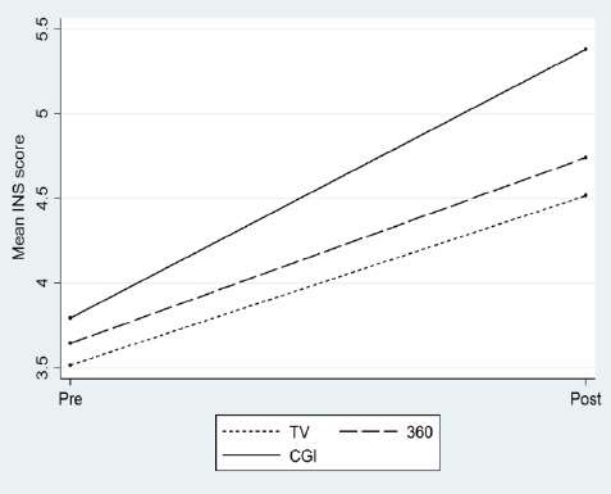
Participants: n=96 general adult public

Manipulation: Boredom induction (boring video)

Exposure: TV or 360-VR or CGI-VR underwater scenes (matched content)

Outcomes: Pre/post: boredom, affect, cognition, nature connectedness. Post: presence





Yeo, N., White, M.P., Garside, R., Dean, S., & Smalley, A. (in prep). Virtual nature and wellbeing: 2D vs. 360º vs CGI

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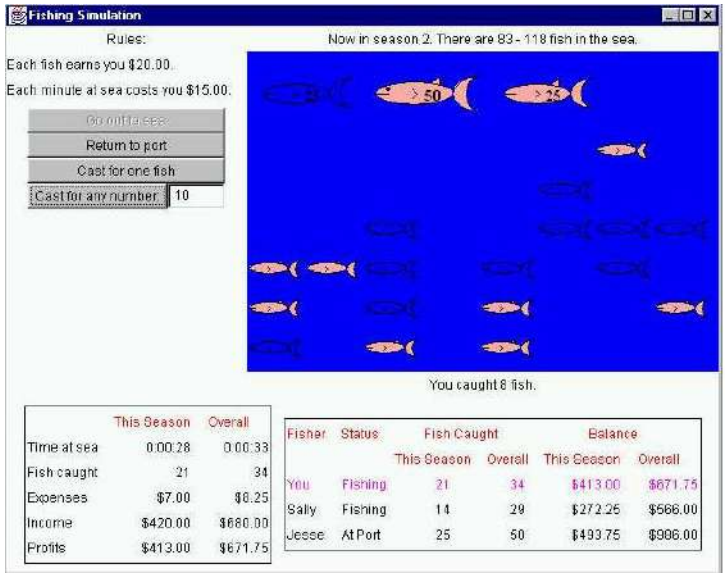
Zelenski 2015

Participants: 2 Studies, S1: n = 111; S2: n =121 - students

Exposure/Design: 12 min videos: Nature (BBCs Planet Earth – no fish!) vs Urban (Walks with an Architect - NYC)

Outcomes: Commons dilemma – selfish fishing?



25% less fish exploitation following BBC Planet Earth video

Zelenski, J. M., Dopko, R. L., & Capaldi, C. A. (2015). Cooperation is in our nature: Nature exposure may promote cooperative and environmentally sustainable behavior. *Journal of Environmental Psychology*, *42*, 24-31.

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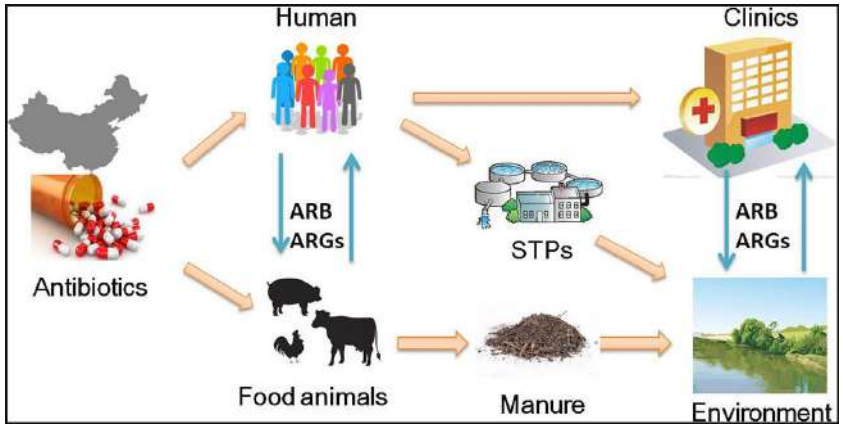
A new threat?: Drug resistant E.coli (genes)



The number (%) of surfers and controls colonised by antibiotic-resistant *E. coli*.

	Surfers (N = 143)	Controls (N = 130)	Risk ratio (95% CI)	*p* value
Carriage of cefotaxime-resistant *E. coli*	13 (9.1%)	4 (3.1%)	2.95 (1.05 to 8.32)	0.040
Carriage of $bla_{CTX\text{-}M}$ bearing *E. coli*	9 (6.3%)	2 (1.5%)	4.09 (1.02 to 16.4)	0.046

Leonard, et al. (2018). Exposure to and colonisation by antibiotic-resistant E. coli in UK coastal water users: Environmental surveillance, exposure assessment, and epidemiological study (Beach Bum Survey). *Environment international*, *114*, 326-333.

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A QALY based approach to valuing physical activities in natural settings

Participants: n = 280,790 English population (MENE)

Exposure: Physical activity in nature

Outcomes: % of people who achieve PA recommendations all or in part in nature

Table 3
In which type of natural environments did 'active visits' in England take place (2009/10–2014/15)?

	Moderate intensity visits 3–5.99 METs (Annual M)		*Vigorous intensity visits ≥6 METs (Annual M)*	
	N/%	(Std error)	N/%	(Std error)
Town parks	272,409,5007	(12,2970,703)	13,644,500	(1,333,222)
	23.4	(0.4)	20.7	(0.9)
Play areas	88,372,167	(2,181,257)	2,550,833	(277,520)
	3.7	(0.1)	3.9	(0.2)
Open space towns	59,812,833	(3,707,415)	3,257,000	(558,036)
	5.1	(0.1)	5.1	(0.8)
Allotments	4,600,333	(349,158)	0	(0)
	0.4	(0.0)	0	(0)
Country parks	75,291,500	(3,745,706)	4,355,000	(366,573)
	6.5	(0.2)	6.7	(0.3)
Woodlands	102,087,833	(3,369,598)	4,626,500	(463,317)
	8.8	(0.2)	7.0	(0.4)
Inland waters	66,643,333	(3,369,597)	3,540,167	(325,030)
	5.7	(0.1)	5.5	(0.5)
Open countryside	83,000,333	(4,477,708)	3,715,000	(170,544)
	7.2	(0.6)	5.8	(0.3)
Farmland	46,245,000	(1,585,392)	1,794,833	(205,460)
	4.0	(0.1)	2.9	(0.4)
Uplands	17,043,667	(1,566,540)	1,715,333	(360,272)
	1.5	(0.1)	2.6	(0.5)
Pathways	52,354,333	(2,053,455)	9,583,833	(504,654)
	[illegible]	[illegible]	[illegible]	[illegible]
Beaches	51,364,167	(2495,8343)	1,681,833	(259,204)
	4.4	(0.2)	2.5	(0.3)
Other coast	27,983,167	(1,174,162)	1,057,333	(208,246)
	2.4	(0.1)	1.6	(0.2)
Other	28,309,333	(2,137,877)	2,553,167	(363,243)
	2.5	(0.2)	4.0	(0.5)
Multi-environment	188,627,167	(15,037,827)	11,109,333	(971,702)
	16.1	(0.8)	17.1	(1.1)
Total	***1,164,152,000***	***(40,479,926)***	***65,191,667***	***(4,243,887)***
	100*		100*	

Bold/italic = defined as 'Active visits' in the present analysis.
* Column totals may not sum to 100% due to rounding.

White, Elliott, Taylor, Wheeler, Spencer,, Bone,... & Fleming, L. E. (2016). Recreational physical activity in natural environments and implications for health: a population based cross-sectional study in England. *Preventive medicine*, *91*, 383-388.

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A QALY based approach to valuing physical activity in marine/coastal settings

Participants: n = 8,290 English population (Health Survey for England)

Exposure: Water sports

Outcomes: Annual energy expenditure

Table 5
Potential QALY gains and health benefits valuation for water based PA for England (lower estimate).

	Estimated number of participants	MET per hour	Total hours	Total METhr	Potential QALY gain for England	QALY valuation for England		
						Low	Central	High
						£0.73	£2.45	£3.08
Sailing	110,541	3.3	22,958,235	75,762,177	7778	£55,306,389	£185,617,333	£233,347,504
Kayaking/ canoeing	78,945	5.4	10,753,203	58,067,295	5961	£42,389,125	£142,264,872	£178,847,268
Fishing/angling	73,708	3.5	19,609,040	68,631,639	7046	£50,101,096	£168,147,515	£211,385,447
Surfing	42,113	3.0	3,763,831	11,291,493	1159	£8,242,790	£27,664,157	£34,777,797
Rowing	31,596	5.8	855,712	4,963,127	510	£3,623,083	£12,159,662	£15,286,432
Scuba diving	26,315	7.0	2,862,199	20,035,395	2057	£14,625,838	£49,086,717	£61,709,016
Water skiing	15,798	6.0	57,047	342,285	35	£249,868	£838,597	£1,054,237
Wind surfing	10,517	5.0	341,812	1,709,059	175	£1,247,613	£4,187,195	£5,263,903
Snorkelling	10,517	5.0	256,359	1,281,794	132	£935,710	£3,140,397	£3,947,927
Total	400,050	–	61,457,438	242,084,263	24,853	£176,721,512	£593,106,445	£745,619,531

Papathanasopoulou, E., White, M. P., Hattam, C., Lannin, A., Harvey, A., & Spencer, A. (2016). Valuing the health benefits of physical activities in the marine environment and their importance for marine spatial planning. *Marine Policy*, *63*, 144-152.

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5. Some closing thoughts

European Centre for Environment & Human Health

2 example OHH projects

BlueHealth
Linking environment, climate & health

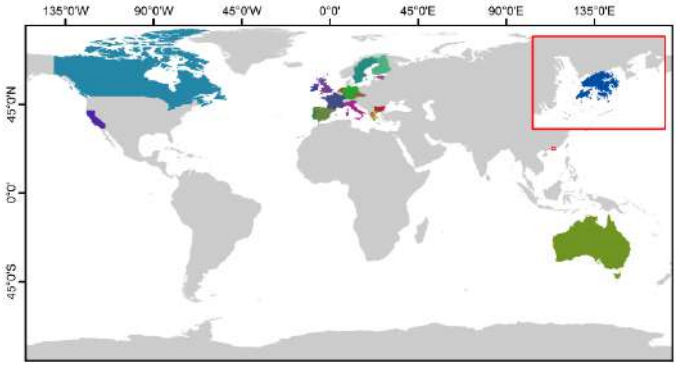
€6,000,000

2016 → **2020**

Investigate the relationship between urban blue infrastructure and health and wellbeing in Europe

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

Pan European project looking at blue space & health across 14 European (+ 4 non-European countries).



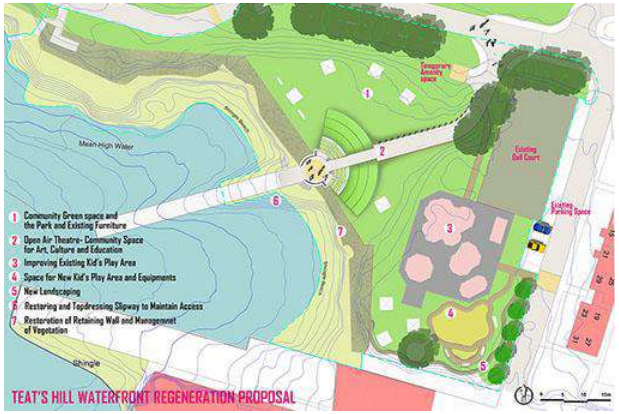
WP1 - Management

WP2 – Large surveys

WP3 – Natural experiments

WP4 – Health care & VR

WP5 – Acupuncture interventions



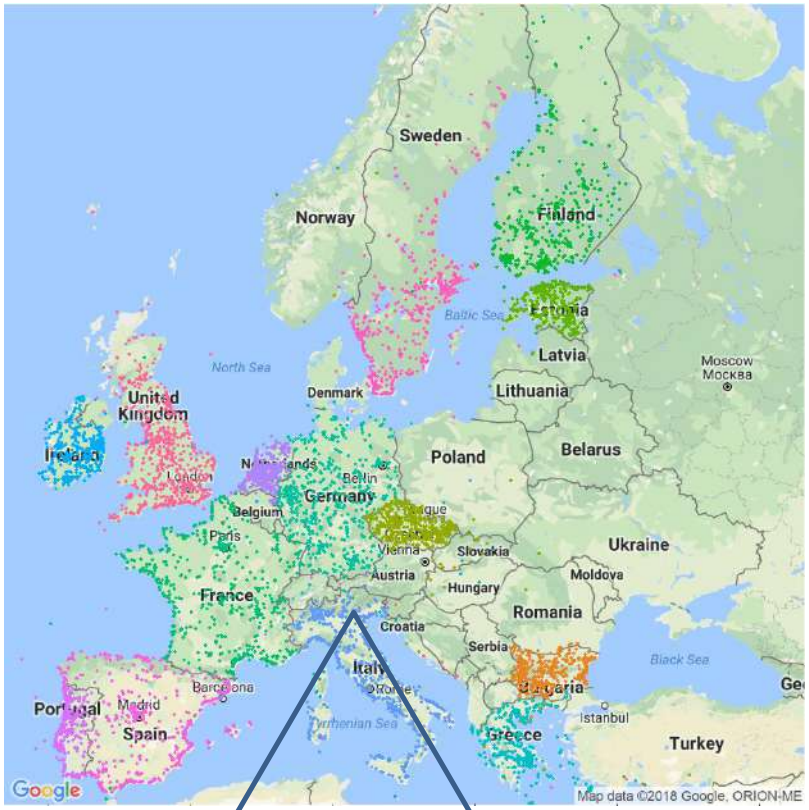
WP6 – Future scenarios

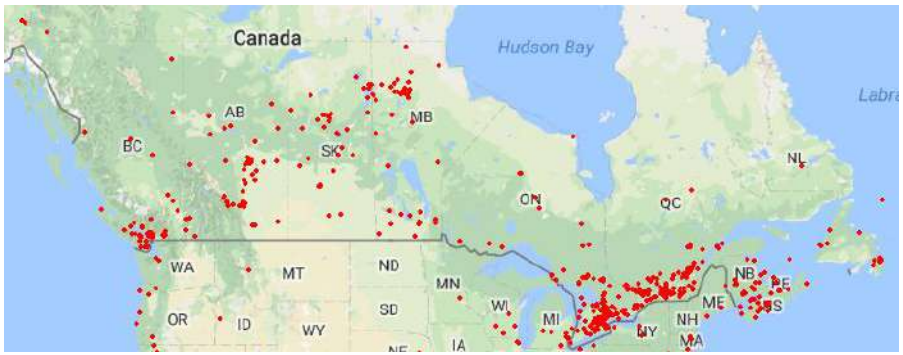
WP7 –Policy development (WHO)

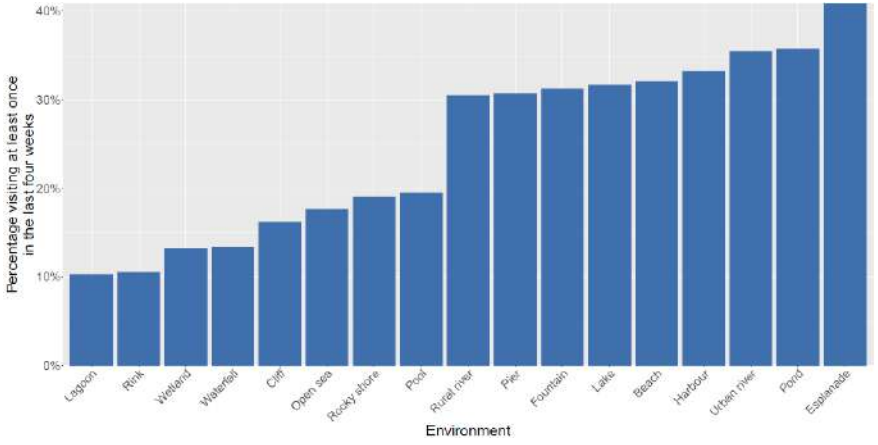
WP8 – Communication/Dissemination

European Centre for Environment & Human Health

Blue health survey (>18,000)







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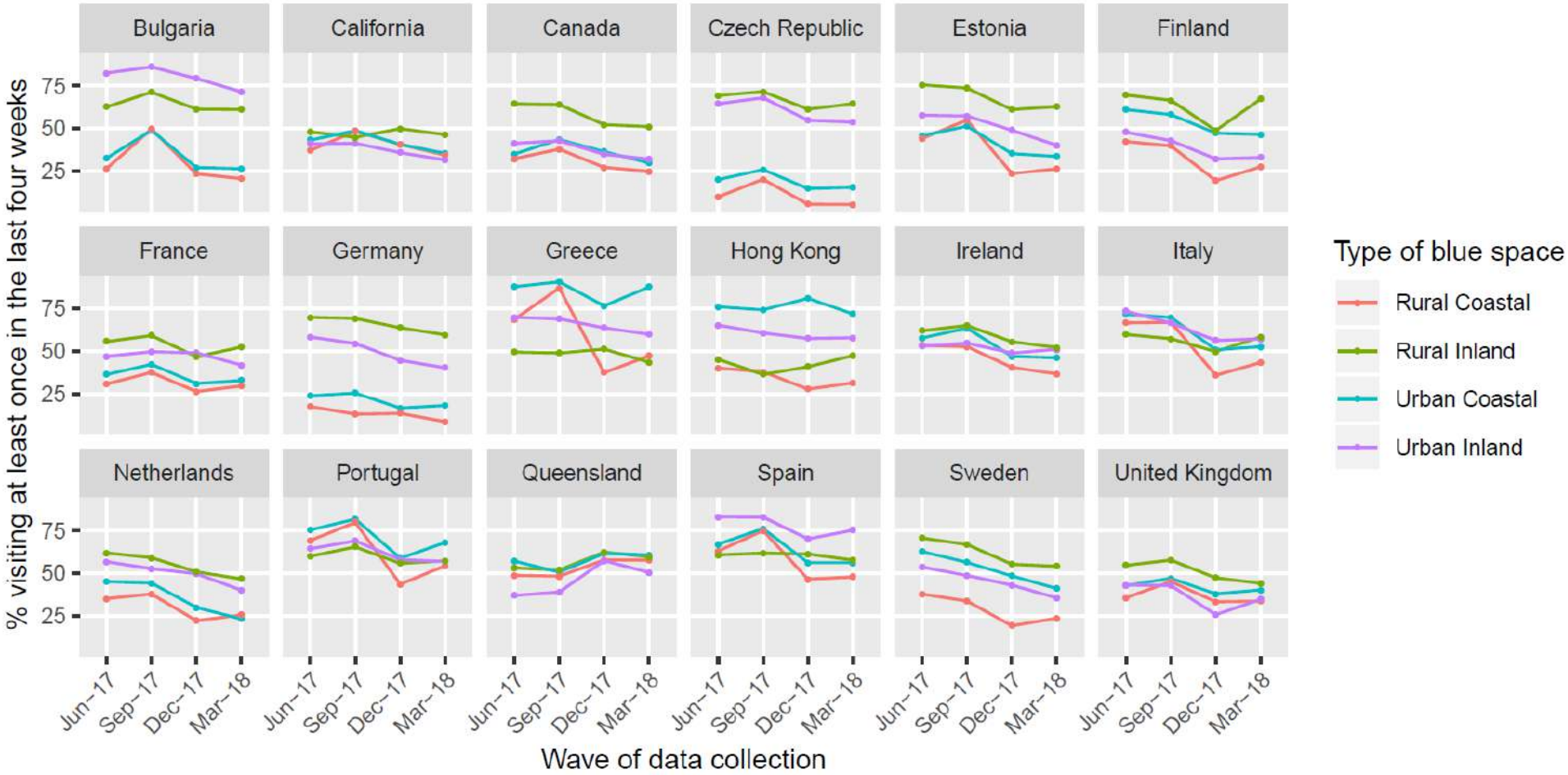
How typical are the UK findings (e.g. 2013)?

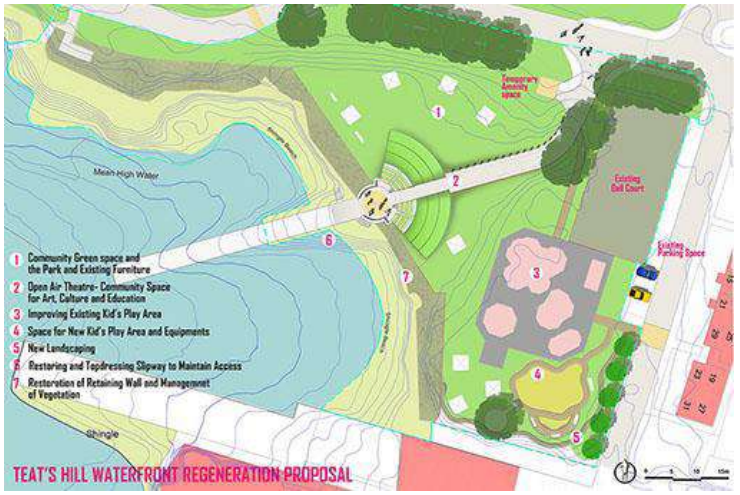


Frequency of visits to different locations across the world during different seasons

Elliott, White, et al. (in prep). Blue space visits across 18 countries worldwide.

European Centre for Environment & Human Health

Acupuncture Interventions: e.g. Teat's Hill in Plymouth



High deprivation, mainly social housing, and poorly maintained park/beach area

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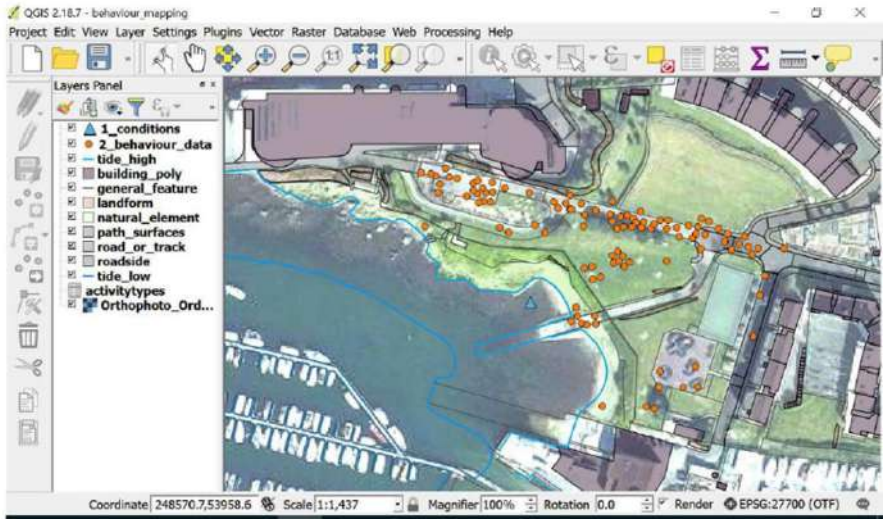
Integrated assessment of (potential) benefits

Site observations[1]

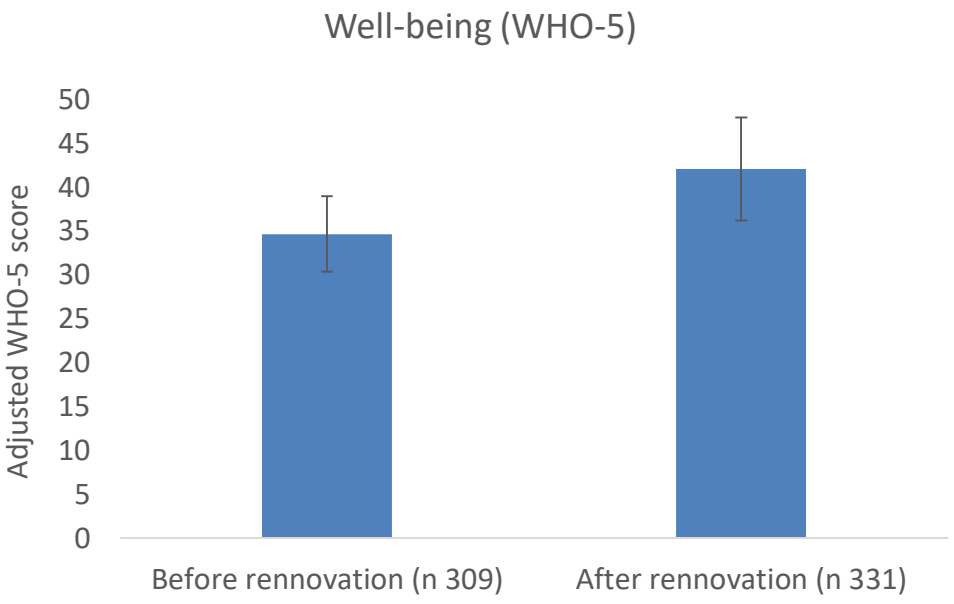


Willingness to pay for the regeneration[2]

CARD D: Payment Card

○	0
○	£0.50
○	£1
○	£2
○	£3
○	£4
○	£5
○	£7.50
○	£10
○	£12.50
○	£15
○	£20
○	£30
○	£40
○	£50
○	£75
○	£100
○	£150
○	£200
○	Over £200

Local resident survey[3]



Adj: Age, gender, income, dog ownership, marital status, household composition, home distance,

1. Mishra, Bell, White, Elliott, et al. (in prep). Behavioural observational before and after a coastal regeneration project.
2. Shellock, Hattam, Borger & White (in prep). A contingent valuation study of an urban bluespace regeneration project.
3. van den Bogerd, Elliott, White, Bell, Sekhra, Fleming (in prep). Urban blue acupuncture & well-being: A case study from a deprived area of Plymouth, UK.

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€6,000,000

2016 → 2020

Investigate the relationship between urban blue infrastructure and health and wellbeing in Europe

Blue Communities

£6,000,000

2018 → 2022

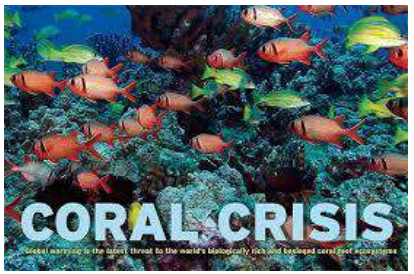
Build capacity for sustainable interactions with marine ecosystems for the benefit of health, well-being, and livelihoods of coastal communities in Southeast Asia

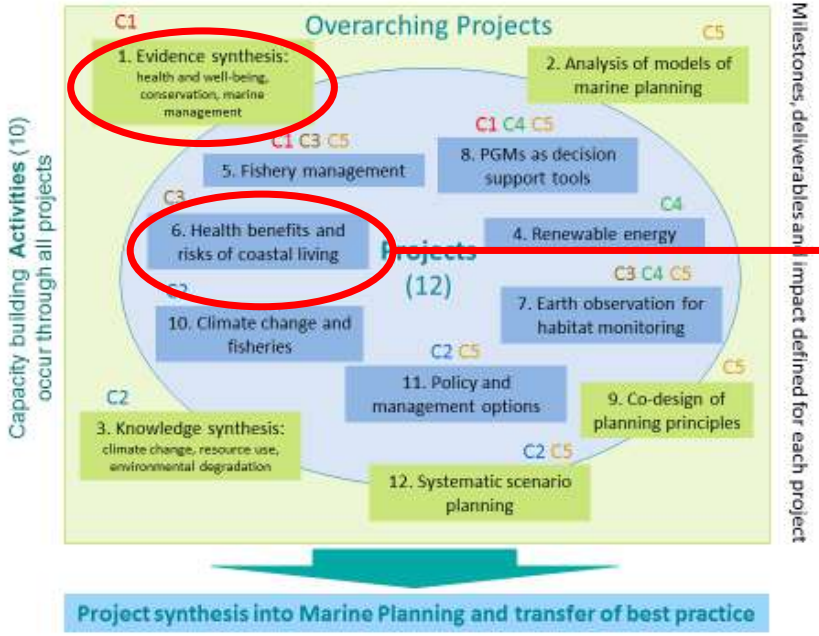
GCRF
Global Challenges Research Fund

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

European Centre for Environment & Human Health

Blue Communities: Sustainable Marine Planning





Section 1: **Perceptions of the marine environment in Palawan**

In this section we would like you to think about Palawan, how has it changed over the last ten years, what do you think will happen in the next 10 years. In particular we would like you to think of the following activities:

Q1) Compared to 10 years ago (2009) would you say the state of the following features in Palawan is better, worse the same?	*Much worse (1)*			*About the same (4)*			*Much better (7)*	*Don't know/ prefer not to answer*
Resources								
a) Amount (number) of wild fish, diversity of fish types	1	2	3	4	5	6	7	99
b) Amount of wild shellfish, diversity of shellfish types	1	2	3	4	5	6	7	99
c) Amount of fish aquaculture (e.g. fish cages)	1	2	3	4	5	6	7	99
d) Amount of shellfish aquaculture (e.g. mussel lines)	1	2	3	4	5	6	7	99
e) Amount of seaweed farming	1	2	3	4	5	6	7	99
Habitats								
f) Quality of coral reefs, diversity of coral types	1	2	3	4	5	6	7	99
g) Seagrass coverage, number of seagrass species	1	2	3	4	5	6	7	99
h) Mangrove coverage, diversity of mangrove types	1	2	3	4	5	6	7	99
i) Other beach tree cover	1	2	3	4	5	6	7	99
Water quality								
j) Amount of farming pesticides/fertilisers in the water	1	2	3	4	5	6	7	99

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European Centre for Environment & Human Health

Marine in the Commission on Planetary Health (2015)

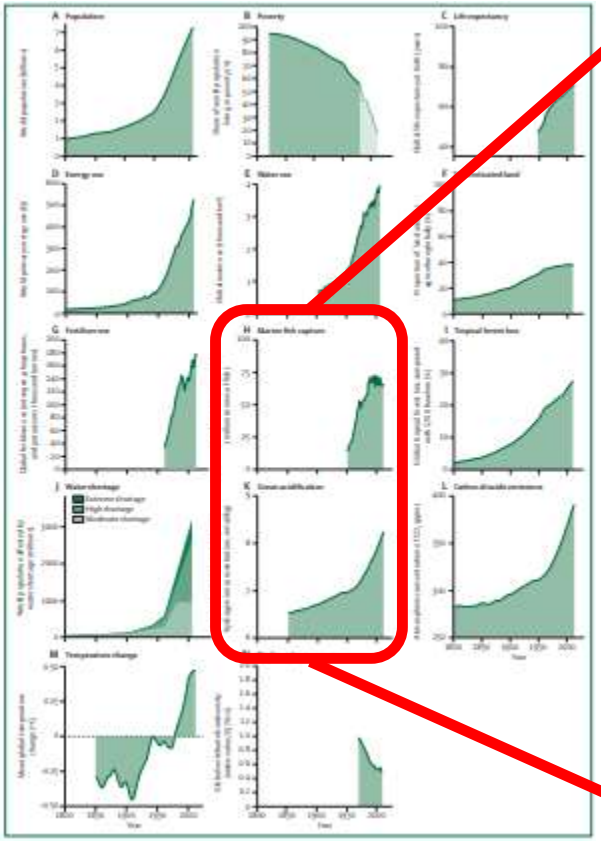
The Rockefeller Foundation THE LANCET

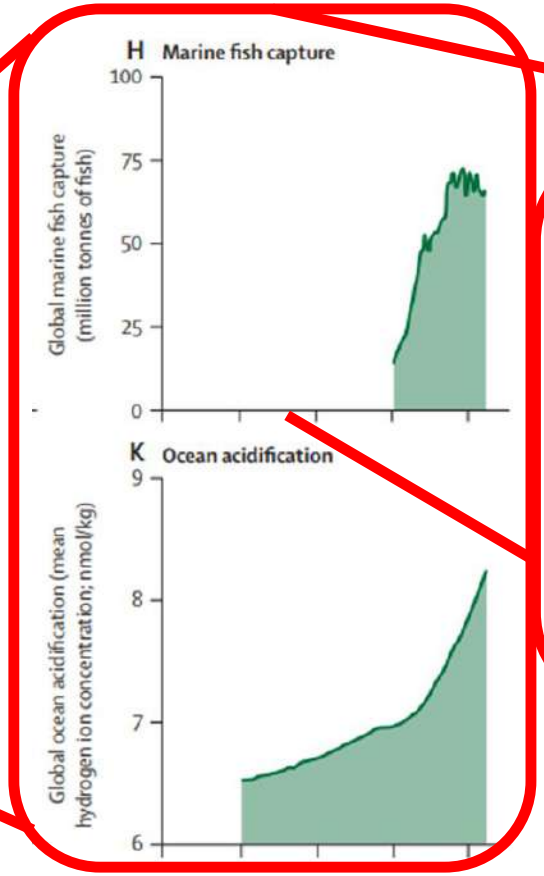
The Rockefeller Foundation–*Lancet* Commission on planetary health

Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–*Lancet* Commission on planetary health

Sarah Whitmee, Andy Haines, Chris Beyrer, Frederick Boltz, Anthony G Capon, Braulio Ferreira de Souza Dias, Alex Ezeh, Howard Frumkin, Peng Gong, Peter Head, Richard Horton, Georgina M Mace, Robert Marten, Samuel S Myers, Sania Nishtar, Steven A Osofsky, Subhrendu K Pattanayak, Montira J Pongsiri, Cristina Romanelli, Agnes Soucat, Jeanette Vega, Derek Yach

Search terms: marine (22); ocean* (44); coast* (23)





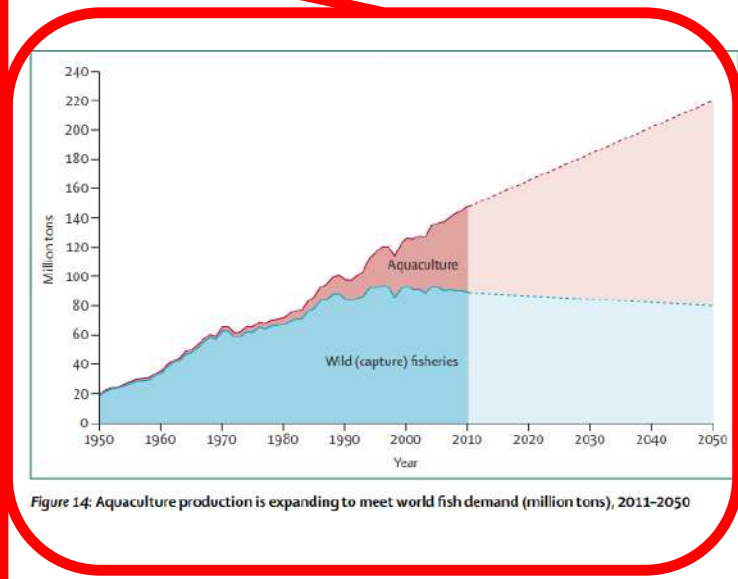


Figure 14: Aquaculture production is expanding to meet world fish demand (million tons), 2011–2050

14 Anthropocene trends

2 (mainly) marine

1 explored in detail

European Centre for Environment & Human Health

Oceans and human health in Europe: Timeline

European Centre for Environment & Human Health

Oceans and human health EU: Rome Declaration 2014

The Rome Declaration was adopted at the EurOCEAN 2014 Conference, Rome, 08 October 2014.

EurOCEAN2014

Rome Declaration

Setting a vision for seas and ocean science

Delivering impact, global leadership and sustainable blue growth for Europe

Europe is emerging from the worst financial crisis in recent history. Rebuilding our economies demands that we identify sustainable opportunities for jobs and economic growth. The ocean is a source of food, water, energy and raw materials; a medium for tourism, transport and commerce; and can provide solutions to many European and global policy challenges. But the ocean is neither inexhaustible nor immune to damage. In the context of rapid global change and human population growth, it is imperative to achieve human wellbeing by combining economic benefit with environmental protection. This presents a highly complex challenge. Collaborative and cross-disciplinary European research is the key to providing the knowledge and tools that we need to achieve ecosystem-based management and protection of valuable marine resources and services.

THE FOUR ROME DECLARATION GOALS

1. Valuing the ocean
   Promoting a wider awareness and understanding of the importance of the seas and ocean in the everyday lives of European citizens.
2. Capitalizing on European leadership
   Building on our strengths to reinforce Europe's position as a global leader in marine science and technology.
3. Advancing ocean knowledge
   Building a greater knowledge base through ocean observation and fundamental and applied research.
4. Breaking barriers
   Addressing the complex challenges of blue growth and ocean sustainability by combining expertise and drawing from a range of scientific disciplines and stakeholders.

EurOCEAN2014

The Rome Declaration was adopted on 8 October 2014 at the EurOCEAN 2014 Conference (7-9 October 2014, Roma).

Policy Goal 1: Valuing the Ocean

"Europe needs a coordinated, interdisciplinary and integrated programme on Oceans and Human Health, understanding and managing the risks *and benefits* of our interactions with the seas"

European Centre for
Environment & Human Health

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European Centre for Environment & Human Health

Creating a research agenda for OHH in Europe

BlueHealth

Linking environment, climate & health

€6,000,000

2016 → 2020

Investigate the relationship between urban blue infrastructure and health and wellbeing in Europe

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

Blue Communities

£6,000,000

2018 → 2022

Build capacity for sustainable interactions with marine ecosystems for the benefit of health, well-being, and livelihoods of coastal communities in Southeast Asia

GCRF

Global Challenges Research Fund

Seas, Oceans & Public Health in Europe

Linking oceans and health research

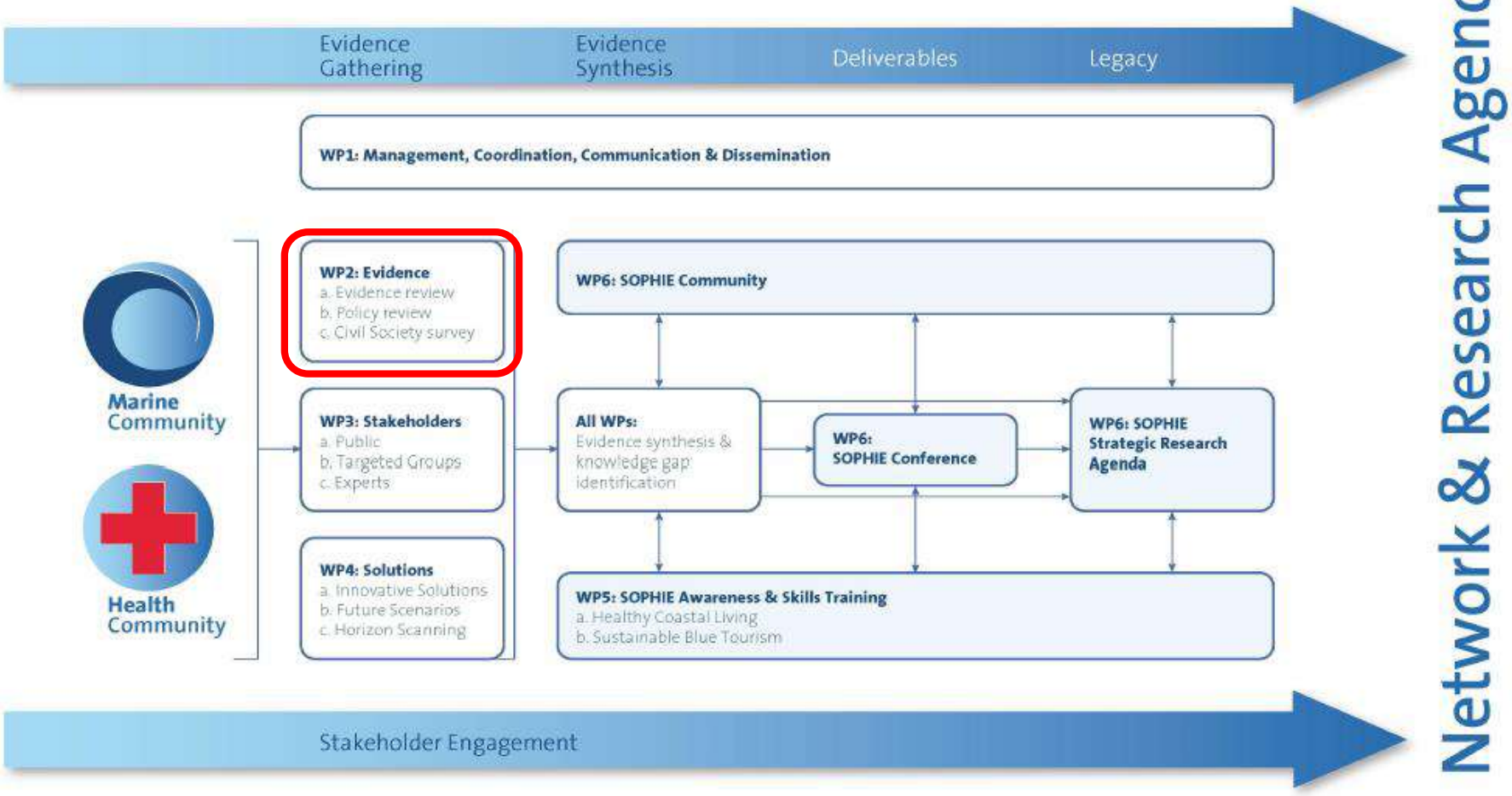
€2,000,000

2017 → 2020

Produce a **research agenda** for oceans and human health for the European context

SOPHIE is funded by the European Union's Horizon 2020 research and innovation programme, grant agreement No 774567.

Seas, Oceans and Public Health in Europe: SOPHIE



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Oceans and human health state of play: 2013-2019

- Evidence from around the world supports the UK data presented in 2013

European Centre for Environment & Human Health

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- Connecting to marine might improve sustainability (more research needed)
- We’re starting to monetise the benefits (appeal to policy makers?)
- Research moving well-beyond the UK
- Rolling up our sleeves to try and improve situations on the ground

European Centre for Environment & Human Health

A word of caution ……

Search words: marine OR ocean OR coast

2015 (56pp) → **2017 (51pp)**

The Rockefeller Foundation THE LANCET

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Marine = 22
Ocean* = 44
Coast* = 23

?

The *Lancet* Commission on pollution and health

Philip J Landrigan, Richard Fuller, Nereus J R Acosta, Olusoji Adeyi, Robert Arnold, Niladri (Nil) Basu, Abdoulaye Bibi Baldé, Roberto Bertollini, Stephan Bose-O'Reilly, Jo Ivey Boufford, Patrick N Breysse, Thomas Chiles, Chulabhorn Mahidol, Awa M Coll-Seck, Maureen L Cropper, Julius Fobil, Valentin Fuster, Michael Greenstone, Andy Haines, David Hanrahan, David Hunter, Mukesh Khare, Alan Krupnick, Bruce Lanphear, Bindu Lohani, Keith Martin, Karen V Mathiasen, Maureen A McTeer, Christopher J L Murray, Johanita D Ndahimananjara, Frederica Perera, Janez Potočnik, Alexander S Preker, Jairam Ramesh, Johan Rockström, Carlos Salinas, Leona D Samson, Karti Sandilya, Peter D Sly, Kirk R Smith, Achim Steiner, Richard B Stewart, William A Suk, Onno C P van Schayck, Gautam N Yadama, Kandeh Yumkella, Ma Zhong

Lancet 2018; 391: 462–512
Published Online October 19, 2017 http://dx.doi.org/10.1016/S0140-6736(17)32345-0
This online publication has been corrected. The corrected version first appeared at thelancet.com on November 7, 2017
See Comment pages 407 and

Executive summary

Pollution is the largest environmental cause of disease and premature death in the world today. Diseases caused by pollution were responsible for an estimated 9 million premature deaths in 2015—16% of all deaths worldwide—three times more deaths than from AIDS, tuberculosis, and malaria combined and 15 times more than from all wars and other forms of violence. In the most severely affected countries, pollution-related disease is responsible

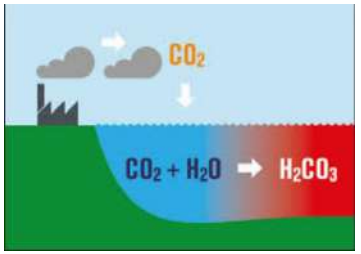
Pollution endangers planetary health, destroys ecosystems, and is intimately linked to global climate change. Fuel combustion—fossil fuel combustion in high-income and middle-income countries and burning of biomass in low-income countries—accounts for 85% of airborne particulate pollution and for almost all pollution by oxides of sulphur and nitrogen. Fuel combustion is also a major source of the greenhouse gases and short-lived climate pollutants that drive climate change. Key emitters of

Marine = 3
Ocean* = 3
Coast* = 0

2017 Pollution & health report:

- Methylmercury discussed but no mention that the main source of human contact is through eating fish/shellfish

- Ocean acidification barely mentioned despite being a major (CO_2) pollution issue



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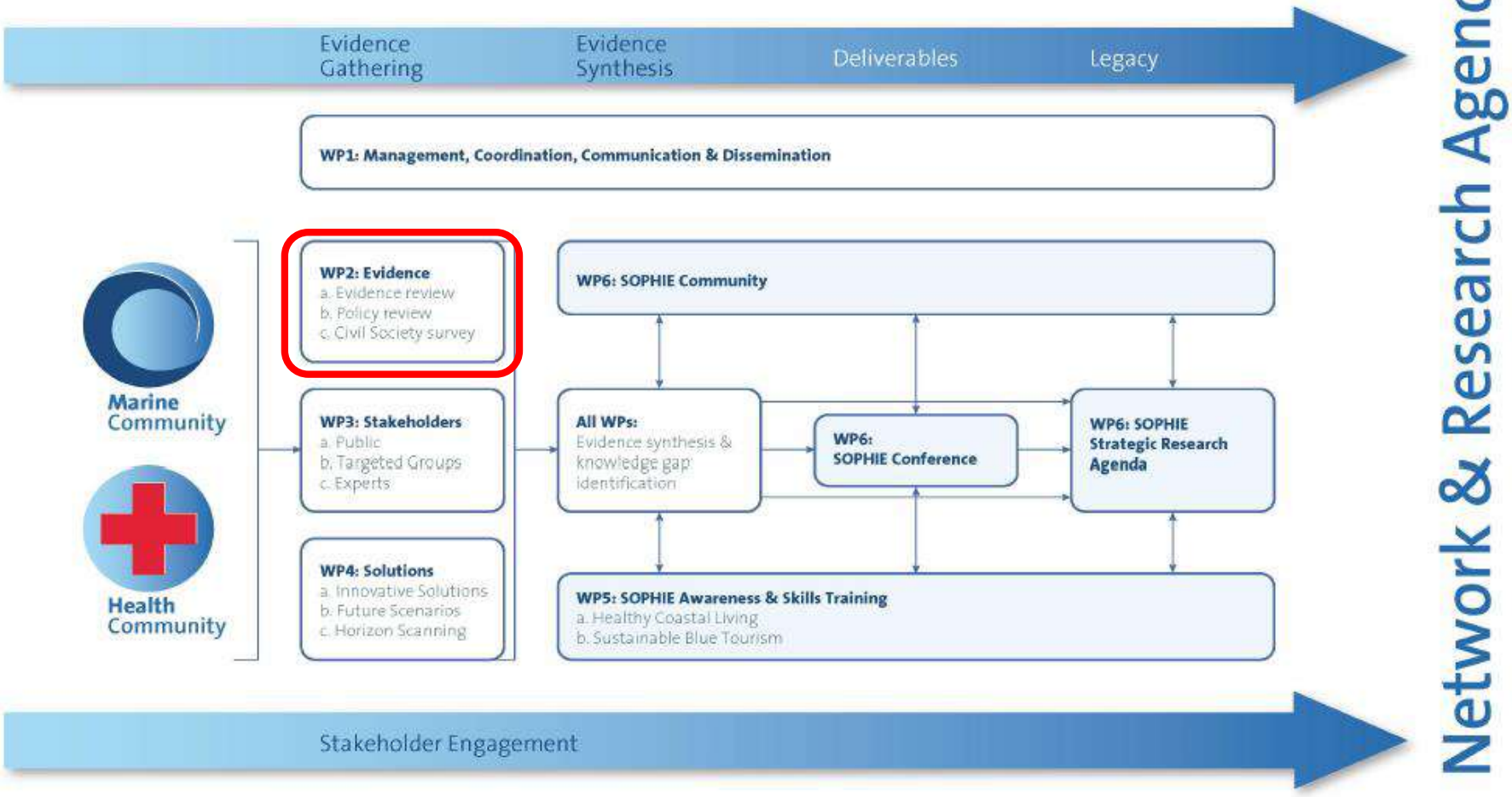
Please help us shape the agenda by engaging with SOPHIE (**https://sophie2020.eu/**)

Seas, Oceans and Public Health in Europe: SOPHIE



European Centre for Environment & Human Health

University of Exeter
College of Medicine and Health
Medicine, Nursing and Allied Health Professions

Coastal Futures 23/01/19

Oceans & human health: Latest findings & a roadmap for European research

Mat White (https://www.ecehh.org/people/dr-mathew-white/)


Michael Depledge


Lora Fleming


Will Gaze


Connie Guell


Rebecca Lovell


Karyn Morrissey


Mik Vos


Ben Wheeler

+ Ian Alcock, Sophie Davison, Sian de Bell, Claire Eatock, Jacqui Eales, Lewis Elliott, Jo Garrett, Ruth Garside, Caroline Hattam, James Grellier, Timur Jack-Kadioglu, Anne Leonard, Aimee Murray, Sabine Pahl, Rebecca Shellock, Em Squire, Tim Taylor, Nicole van den Bogerd, Anastacia Voronkova, Nicky Yeo, Lihong Zhang.