



Integrative policy development for healthier people and ecosystems: A European case analysis

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There is growing evidence of the inter-relationships between ecosystems and public health. This creates opportunities for the development of cross-sectoral policies and interventions that provide dual benefits to public health and to the natural environment. These benefits are increasingly articulated in strategy documents at national and regional level, yet implementation of integrative policies on the ground remains limited and fragmented. Here, we use a workshop approach to identify some features of this evidence–implementation gap based on policy and practice within a number of western European countries. The driving forces behind some recent moves towards more integrative policy development and implementation show important differences between countries, reflecting the non-linear and complex nature of the policy-making process. We use these case studies to illustrate some of the key barriers to greater integrative policy development identified in the policy analysis literature. Specific barriers we identify include: institutional barriers; differing time perspectives in public health and ecosystem management; contrasting historical development of public health and natural environment disciplinary policy agendas; an incomplete evidence base relating investment in the natural environment to benefits for public health; a lack of appropriate outcome measures including benefit–cost trade-offs; and finally a lack of integrative policy frameworks across the health and natural environment sectors. We also identify opportunities for greater policy integration and examples of good practice from different countries. However, we note there is no single mechanism that will deliver integrative policy for healthier people and ecosystems in all countries and situations. National governments, national public agencies, local governments, research institutions, and professional bodies all share a responsibility to identify and seize opportunities for influencing policy change, whether incremental or abrupt, to ensure that ecosystems and the health of society are managed so that the interests of future generations, as well as present generations, can be protected.

KEYWORDS

biodiversity, cross-sectoral policy, ecosystem services, environment, evidence, public health

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1 | PUBLIC HEALTH AND THE NATURAL ENVIRONMENT: AN INTRODUCTION

The natural environment is integral to the concept of public health. Public health is “what we, as a society, do collectively to assure the conditions in which people can be healthy” (Institute of Medicine [IOM], 1988, p. 1). This concept embraces both social and environmental conditions (Graham & White, 2016). Increasing evidence of the close relationships between healthy, resilient, and biodiverse ecosystems and human health (World Health Organization and Secretariat of the Convention on Biological Diversity [WHO & SCBD], 2015) has created the potential to develop integrative or cross-sectoral policies to deliver co-benefits for population health and the quantity and quality of the natural environment.

The variety of benefits that ecosystems confer on society are conceptualised increasingly in terms of natural capital and ecosystem services. Natural capital refers to the overall stock of natural resources (living and non-living), including biodiversity. Ecosystem services are the benefits provided by ecosystems to humans. Many ecosystem services are directly or indirectly beneficial to public health, including the provision of food and water, purification of air, provision of new molecules like peptides and antibiotics for medicine, protection from natural hazards such as floods and erosion, and the regulation of specific health threats such as infectious diseases (De Groot et al., 2002). Some biodiversity components of an ecosystem can be directly detrimental to humans as an emerging pathogen or as hosts for that pathogen (Ezenwa et al., 2015) or as allergens (D’Amato et al., 2007).

Although ecosystems and biodiversity are important contributors to human well-being and health, they are increasingly threatened by anthropogenic pressures, leading to habitat loss and fragmentation, ecosystem degradation through over-exploitation, the spread of invasive species and pathogens, and climate change. The significance of climate change for public health tends to be viewed in the context of proximal impacts such as the threat of injury and death or chronic illness due to extreme events such as flooding and heatwaves (McMichael et al., 2006). In contrast, the impacts of declines in biodiversity and ecosystem functioning on public health, though arguably of greater long-term consequence, have received much less attention (but see Flahault et al., 2015). Moreover, while the potential synergies of integrative environmental and health policies are articulated increasingly in key strategy documents across Europe (European Environment Agency [EEA], 2013), in all but a few cases there remains limited evidence for such cross-sectoral policies being delivered on the ground.

2 | A CROSS-COUNTRY COMPARISON OF INTEGRATIVE POLICIES

In this paper, we discuss recent progress in integrative policy development across public health and the environment in five European countries (Belgium, France, the Netherlands, England, and Scotland). A cross-country approach has previously been used to investigate environmental policy integration; it allows comparison of the different situations in different countries and the effects of contextual characteristics on policy-making (Sarigöllü, 2009).

A workshop was held in the UK with participants from five European Union countries. All participants held senior roles in policy and research development in public health and the environment. The workshop began with participants presenting overviews of public health and environmental policy in their countries, including departmental structures within government that facilitate or mitigate against cross-sectoral policy-making. The second part of the workshop focused on barriers to integrative policy development.

Data from the workshops were analysed collectively by all authors. Detailed notes of discussions at the workshop were made by one of the authors (PW), and thematic analysis was used to identify themes that emerged from the discussions. One of the authors (PW) initially identified themes, and these were cross-checked and confirmed by a second author (HG). The common emergent themes were then circulated with the full notes of the discussions to all participants in the workshop, and subsequently refined through further online discussion to identify key barriers and potential solutions. Approval for this study was given by the Department of Environment and Geography Ethics Committee, University of York.

3 | BARRIERS AND SOLUTIONS TO GREATER INTEGRATION OF THE NATURAL ENVIRONMENT IN PUBLIC HEALTH POLICY

In this section, we use examples from each of our case study countries to illustrate the barriers to integration that emerged from the collective analysis, and demonstrate situations in which these barriers have been overcome. The examples used are summarised in Table 1.

3.1 | Institutional barriers

The traditional sectorial separation of government departments can create an important institutional barrier to more integrated policy-making for the natural environment and public health. For example, in England, both the Department for the Environment, Food and Rural Affairs (Defra) and the Department of Health have produced strategy documents making explicit the links between public health and ecosystems (Defra, 2018; Department of Health, 2012; H M Government, 2010). Despite addressing the same topic, these documents were produced independently and have not resulted in cross-sectoral policies between the departments.

Scotland has also produced strategic guidance regarding the links between the environment and health (Scottish Government, 2008), which has not been translated into integrative policy, but here the problem resides in the splitting of policies between different levels of governance. Scotland's Public Health Act (Scotland) 2008 requires each health board (in conjunction with local authorities) to prepare plans for the protection of public health in its area. There is an absence of nature and health in many of these plans, as the high degree of independence between local authorities mitigates against a coherent approach to health promotion and, particularly, the role of ecosystems within this.

In the absence of a specific “focusing event” (Birkland, 1997), such as a health crisis that provides evidence of the societal cost of the lack of cross-sectoral action, there is very limited incentive to change existing practices. Nevertheless, the same financial pressures that mitigate against cross-sectoral cooperation can sometimes lead indirectly to greater integration. This has been the case in the Netherlands, where in 2010 the former Department for Agriculture, Nature and Food Security and the Department for Economic Affairs were combined to form a single department, the Ministry of Economic Affairs. Cross-ministry initiatives are not uncommon in the Netherlands. For example, in 2004 the Dutch Health Council and the Advisory Council for Research on Spatial Planning, Nature and the Environment (RMNO) were jointly commissioned to assess the linkages between nature and human health and provide advice on this relationship to the government by three ministries: Agriculture, Nature Management and Fisheries (LNV); Health, Welfare and Sport (VWS); and Housing, Spatial Planning and the Environment (VROM) (Health Council of the Netherlands and Dutch Advisory Council for Research on Spatial Planning, Nature and the Environment, 2004). However, these ministries were subsequently separated again in 2017.

Similarly, in France, there has been significant progress in bringing public health and ecosystem health together. However, in France, it has been policy networks between central government and the research alliances, Aviesan (for health research) and AllEnvi (for environmental sciences), that have been driving change. An example of their success is in agriculture and agronomy, where biodiversity and public health have been integrated within a new paradigm called “agro-ecology” (INRA, 2013). In this area, the Ministry of Agriculture and Food, which deals with agricultural and environmental policy, works with the Ministry of Solidarity and Health, and the Ministry of Ecological and Solidarity Transition to improve pesticide and antibiotic uses and practices. Evidence provided to these ministries by Aviesan and AllEnvi has informed bans on some pesticides such as neonicotinoids and better regulation of antibiotics used at the interface between animal and humans and in the environment.

3.2 | Differing time perspectives in public health and ecosystem management

The public health and natural environment sectors typically operate with differing time perspectives. Major environmental challenges such as reducing pollution or restoring habitats represent long-term goals, requiring up-front investment to ensure long-term benefits (Morand & Guégan, 2008). In contrast, the focus of much public health policy is on achieving rapid improvements in health by addressing individual-level risk factors (Graham & White, 2016).

For example, in England, policy targets for the environment are over a 25-year time-frame (2018–2043; Defra, 2018), while key public health outcomes are often set in much shorter time-frames of three to five years. Similar differences in timescales can also be seen in the Netherlands' policy on nature, The Natural Way Forward (2014–2024), and health plan, the National Prevention Plan (2014–2016), despite the fact that the Netherlands has begun to remove institutional barriers to integrate environment and health policy. Short timescales are also seen in France's public health plan (PNSE3).

3.3 | Contrasting historical development of public health and natural environment policy agendas

The different pathways along which health and environmental policies have developed can act as barriers to integrative working. For example, in the UK, Belgium, and France, the historical focus of public health has been around the negative aspects of the environment, e.g., pollution and poor air quality, rather than its positive benefits.

TABLE 1 Examples of barriers to environmental policy integration and where these barriers have been overcome.

Barrier	Achieving integration	No or limited integration
Institutional barriers	<p><i>Belgium:</i> The Flemish Centre of Expertise for Environment and Health CEH is funded and steered by three ministries (Science, Health and Environment) in the Flemish government and contributes evidence to policymakers (Keune et al., 2015)</p> <p><i>France:</i> Aviesan (for health research) and AllEnvi (for environmental sciences) link government research institutions and the ministries. The national Fondation pour la Recherche sur la Biodiversité, a grouping of French institutions on biodiversity research, is very active in the sector of biodiversity–health relationships, including participation in current PNSE3 and future PNSE4 public health plans to better integrate the ecosystem and species community levels in health policies and decisions</p> <p><i>Netherlands:</i> Department for Agriculture, Nature and Food Security and the Department for Economic Affairs combined as a single department (Ministry of Economic Affairs), although have now been separated again. The Dutch Health Council was assigned the responsibility to assess the relationship between nature and health</p>	<p><i>England:</i> Two departments, the Department for the Environment, Food and Rural Affairs and the Department of Health, have independently produced strategy documents on the links between public health and ecosystems, which have not resulted in integrative policy</p> <p><i>Scotland:</i> Health boards are required by national legislation (the Public Health Act 2008) to prepare plans for the protection of public health within their areas in conjunction with local authorities. In Scotland, local authorities have a high level of independence, which creates difficulties in establishing a coherent approach to health promotion and has led to an absence of nature and health in many of these plans</p>
Differing time perspectives in public health and ecosystem management	<p><i>France:</i> Increased efforts are being made in the preparation of PNSE4, which better integrates human health and well-being in a national context</p>	<p><i>England:</i> Policy targets for urgent biodiversity action cover a ten-year period (2011–2020) whereas key public health outcomes operate over a much shorter three-year time-frame (2013–2016)</p> <p><i>France:</i> France's current public health plan (PNSE3) has a short timescale (2015–2019)</p> <p><i>Netherlands:</i> The Netherlands' policy on nature, 'The Natural Way Forward' (2014–2024), operates over a longer timescale than its public health plan, the National Prevention Plan (2014–2016)</p>
Contrasting historical development of public health and natural environment policy agendas	<p><i>Belgium:</i> National Environment and Health Action Plan includes positive linkages between biodiversity and human health (NEHAP, 2015)</p> <p><i>Netherlands:</i> Moves to modify Environmental Impact Assessment procedures to incorporate positive or negative health effects as a regulatory requirement.</p> <p><i>France:</i> Public health crises have led to the integration of the Agence française de sécurité sanitaire de l'environnement et du travail (Afsset) and the Agence française de sécurité sanitaire des aliments (Afssa) into a single agency, Agence nationale de sécurité sanitaire, de l'alimentation et du travail (Anses). Institut national de Veille Sanitaire (InVS), Institut national de prévention et d'éducation pour la santé (Inpes) and Établissement de préparation et de réponse aux urgences sanitaires (Eprus) have recently been reorganised to form a single institute, Santé publique France, in order to be better prepared to deal with major 21st-century global threats, e.g., Ebola epidemic, arboviral diseases</p>	<p><i>Belgium:</i> Belgian National Climate Change Adaptation Strategy Plan focuses on negative associations between environment and health, specifically the direct health impacts of climate change, including heatwaves and the potential spread of infectious diseases (Climat.be 2013)</p> <p><i>England:</i> Policy documents (e.g., Committee on Climate Change, 2014) concentrate on the direct negative health impacts of physical environmental changes and pay much less attention to the potential longer-term health impacts associated with ecosystem degradation</p>

(Continues)

TABLE 1 (Continued)

Barrier	Achieving integration	No or limited integration
Incomplete evidence base relating investment in the natural environment to benefits for public health	<p><i>Belgium:</i> CEH is funded and steered by three ministries (Science, Health and Environment) in the Flemish government and contributes evidence to policymakers (Keune et al., 2015)</p> <p><i>France:</i> Aviesan (for health research) and AllEnvi (for environmental sciences) link government research institutions and the ministries. Fondation pour la Recherche sur la Biodiversité (FRB) is very active on all the interactions between biodiversity and ecosystem services and other sectors of research and activities (e.g., health, agriculture, economy)</p>	<i>Scotland: Good Places Better Health</i> (Scottish Government, 2008) is a strategic guide on health and environment for decision makers; institutional barriers prevent its use

In France, various public health crises, such as asbestos and H1N1pdm variant, have had a strong impact on decision-making and health policies at the Ministry of Health and Solidarity. Recently, the agencies for environmental health (Afsset) and food safety (Afssa) have been integrated into a single agency for environmental and food safety, Agence nationale de sécurité sanitaire, de l'alimentation et du travail (Anses). This merger was prompted by the last pandemic of avian flu because this type of virus can infect both wild and farmed birds and so fell under the remit of both agencies.

This focus on negative and short-term implications for health is also evident with regard to climate change. For example, in policy documents from England (e.g., Committee on Climate Change, 2014) and Belgium (e.g., Climat.be, 2013), the direct and short-term health impacts of climate change, such as heatwaves and the spread of infectious disease, are far more prominent than the indirect and longer-term benefits for public health that are provided by healthy ecosystems.

However, thinking has broadened recently in both policy domains to consider the ecosystem and its positive interactions with public health (Demaio & Rockström, 2015), potentially creating a more receptive political climate for policy change (Owens, 2015). This effect can be seen to some extent in Belgium, where the DG Environment informs the National Environment and Health Action Plan (NEHAP) of developments regarding biodiversity and health, and the NEHAP decides on actions at the national level (NEHAP, 2015). Another example can be seen in the Netherlands, where the new Environment and Planning Act ("Omgevingswet"), due to come into effect in 2021, requires authorities to explicitly incorporate positive or negative health effects in spatial visions and plans (Netherlands Ministry for Infrastructure and Environment, 2017).

3.4 | Incomplete evidence base relating investment in the natural environment to benefits for public health

The nature of the evidence available is a barrier to uptake in public health policy of evidence on the beneficial health effects of the environment. Within public health, there is a strong tradition of systematic reviews of interventions (Haynes, 2001), as enshrined in the Cochrane Library (a database of systematic reviews and meta-analyses of trials-based evidence). While the benefits of green and blue spaces are increasingly reported (Twohig-Bennett & Jones, 2018), the evidence base remains largely correlative rather than causal; there is little consistency of methodology and a lack of information on specific exposures and health outcomes.

Research organisations can be important in overcoming this evidence barrier and contributing to policy integration. In France, the Aviesan and AllEnvi research alliances support cross-ministry cooperation, while in Belgium the Centre of Expertise for Environment and Health (CEH) is funded and steered by the Flemish government (by three ministries: Science, Health, and Environment), so that the outcomes of its work can inform environment and health policy-making (Keune et al., 2015). Examples of this research include the linkages between green space in cities and citizens' health (Van Herzele & De Vries, 2012), and the impact of citizen behaviour in Belgium on global sustainability (Keune et al., 2013). Several research projects have recently been funded as part of the Federal BRAIN research programme (BELSPO, BRAIN; https://www.belspo.be/belspo/brain-be/index_en.stm). Further, a number of networking activities have arisen within Belgium in recent years, such as the Belgian Communities of Practice on Biodiversity and Health (Keune et al., 2013). There have also been several major networking events, such as a European One Health EcoHealth workshop in 2016 (Keune et al., 2017). These organisations have acted as an advocacy coalition (Sabatier, 1998), organising events and producing publications to raise awareness of biodiversity and health interlinkages, which has helped motivate the DG Environment of the

TABLE 2 Barriers and opportunities for greater cross-sectoral integration of policies around ecosystems and public health. Policy processes as identified by Cairney (2016): actors; institutions; networks; ideas (including framing); and context and events.

General barrier	Specific barrier	Policy process and specific opportunity
Institutional barriers	Sectoral separation of government departments Benefits spread over different departments whereas costs tend to concentrate more in single department Budgetary pressures	<i>Institutions and networks</i> – Encourage cross-sectoral policy integration and tentatively merging institutions as in France
Differing time perspectives in public health and ecosystem management	Short-termism of public health policy contrasts with more long-term concerns of the natural environment policy	<i>Ideas and networks</i> – Highlight health benefits of ecosystem interventions with short lag times, e.g., green and blue space links with well-being <i>Ideas and networks</i> – link to climate change/global change policy agenda, emphasising the short- and long-term implications of climate change/global change for human health both directly and indirectly via ecosystems
Contrasting historical development of public health and natural environment policy agendas	Public health policy focus on negative aspects of ecosystems, e.g., pathogens, versus natural environment policy focus on species and habitat conservation	<i>Ideas</i> – Ecosystem services frameworks provide means of considering both positive and negative impacts of ecosystems on public health <i>Context and events</i> – Regional and global public health crises can act as tipping point for radical changes in approach and institutional organisations <i>Institutions</i> – Training of future professionals by embedding understanding of natural environment–public health linkages in educational programmes
Incomplete evidence base relating investment in the natural environment to benefits for public health	Disparate outcome measures used for health and well-being Inconsistent and insufficiently robust methodologies used in studies of ecosystem-based interventions Mechanisms of causality between exposure to green or blue space and improved health and well-being not proven or consistent	<i>Evidence</i> – More consistent use of recognised outcome measures, e.g., internationally standardised measures of well-being, to allow comparisons across initiatives <i>Evidence</i> – More experimental methodologies and greater use of systematic review-type approaches; better documentation of case study initiatives <i>Evidence</i> – More robust research to isolate mechanisms
Lack of outcome measures and benefit–cost trade-offs	Use of disparate outcome measures regarding health and well-being, and the environment	<i>Evidence</i> – Alignment of outcome measures with internationally or nationally standard measures <i>Evidence</i> – More rigorous application of process and outcomes frameworks, e.g., distinguishing health promotion actions, health promotion outcomes, intermediate health outcomes, and health and social outcomes <i>Evidence</i> – Greater use of qualitative and deliberative approaches, alongside quantitative ones, for evaluating environment-based interventions alongside health and social outcomes <i>Evidence</i> – Development of toolkits to monitor and evaluate process and outcomes around ecosystem based health interventions
Lack of integrative policy frameworks across the health and natural environment sectors	Public health policy dominated by the Social Determinants of Health family of frameworks, which are generally directional and include no feedback mechanisms between health and the natural environment Plethora of natural environment frameworks, most of which do not include any link with public health	<i>Ideas and institutions</i> – Adoption of alternative frameworks to guide policy <i>Ideas</i> – Development and adoption of new integrative frameworks, e.g., based on ecosystem services or nature-based solutions, that show the varied ways in which public health and natural ecosystems interact

Federal Public Service Health, Food Chain Safety and Environment to designate these linkages as an area for future policy development. The French Fondation pour la Recherche sur la Biodiversité (FRB), a grouping of research institutions, and the Belgian Communities of Practice on Biodiversity and Health were very active in the creation and development of a European ERANET BiodivERsA call on biodiversity and health for 2018–2019.

3.5 | Lack of appropriate outcome measures including benefit–cost trade-offs

A key requirement for evaluating integrated policies is the availability of outcome measures that enable evaluation of impact and cost-effectiveness. Benefits articulated in terms of multidimensional outcomes like well-being, some of which are inherently subjective, are particularly hard to measure. In addition, measuring outcomes from “real world” ecosystem-based interventions and attributing causality is extremely challenging.

For cross-sectoral policy interventions, evaluations that account for process (Wimbush & Watson, 2000) as well as outcome may offer ways forward (Nutbeam, 1998), especially where there are temporal lags between interventions (e.g., environmental restoration) and health and social outcomes.

3.6 | Lack of integrative policy frameworks across the health and natural environment sectors

A further challenge to evidencing the health impacts of the natural environment is their mediation via other contextual factors, including individuals’ living and working conditions and their lifestyles (Krieger, 2008). For example, susceptibility to infectious disease is affected by lifestyle and exposure to microorganism-level biodiversity, which can provide a beneficial immunoregulation service (Rook, 2013).

A plethora of frameworks and conceptual models exist to describe the impacts of the natural environment on human societies, but only a minority of these frameworks explicitly include a link to health or well-being; a review of ecosystem services frameworks identified 84 frameworks in total, of which only 38% included health (Ford et al., 2015). The paucity of overarching frameworks making explicit the links between ecosystems and health is a barrier for developing effective joined-up policy (Reis et al., 2013). Additionally, few frameworks incorporate feedbacks (Ford et al., 2015), a key dimension of integrative policy-making. On a global scale, development and wealth creation in the poorer countries of the world can impact negatively on natural ecosystems, including increased risk of vector re-invasion and emerging infections (Ngonghala et al., 2014), as well as on the global climate. At a local scale, increases in physical activity and nature-based recreation, as promoted by lifestyle-focused health initiatives in western countries, may lead to increased use of motorised transport to access nature, with implications for pollution and air quality (Flahault et al., 2015). Developing new frameworks for conceptualising and quantifying such unintended consequences, and evaluating them in an integrative way, is likely to contribute to significant advances in capturing co-benefits across health and environment (Ford et al., 2015).

4 | CONCLUSION

The benefits of integrative approaches to policy-making for public health and the natural environment are well recognised; however, progress is to be slow. While much of the evidence on policy-making has come from documentary analyses and surveys, workshop-based approaches have also been used (Clarke et al., 2007; Petticrew et al., 2004). Such approaches bring key stakeholders together, enabling them to step outside their institutional roles and to share perspectives and insights. Our workshop discussions highlighted important differences in policy cultures and institutional structures, both between countries and between the public health and environmental policy sectors. We would encourage further use of the workshop approach, and note that it also aligns well with the broader shift to collaborative knowledge production (Jagosh et al., 2012).

Through the sharing experiences, six key barriers to integrative policy development were identified, and the workshop approach enabled us to drill down into the nature of these barriers. For example, institutional barriers revolved around the sectoral and budgetary separation of public health and the natural environment in systems of governance, a separation that meant that costs and benefits of integrative policies could be unequally spread across policy sectors. Different time perspectives meant that health policy was framed by targets to be achieved within short time periods (e.g., within a few years) while environmental policy recognised that long-term investment was required to protect and enhance the natural environment. Contrasting policy histories meant that ecosystems could be differentially viewed both negatively (as a potential source of threats to people’s health) and positively (a vital resource to be protected). The lack of evidence to inform integrative health–environment policies was identified as another major barrier, with the diversity of outcome measures, evaluation

methods, and causal models cited as particular examples. The final two barriers were closely related to this set of barriers: the lack of shared outcome measures across health and the environment and the lack of integrative policy frameworks with, for example, the natural environment largely absent from social determinants models of health and public health largely absent from ecosystem frameworks. Table 2 summarises these barriers to integrative policies for public health and ecosystem health and offers recommendations to address them.

Governments, government agencies, local governments, research institutions, and professional bodies all share a responsibility to take action to ensure that ecosystems and public health are managed in such a way that the interests of both present and future generations are safeguarded. The foundations of public health have a strong future orientation (Graham, 2010), but the short-term focus of much current health policy and potentially of safety agencies and research institutions works against its stewardship function. Future public health can only be ensured within a healthy and resilient natural environment. In the face of rapid demographic, social, and economic change, with the context of increasing ecosystem degradation and climate change, the development of more concerted, integrative policy action across ecosystems and public health is now more urgent than ever.

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DATA AVAILABILITY STATEMENT

The notes from the initial workshop that formed the data for this study are available from the corresponding author upon reasonable request.

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REFERENCES

- Birkland, T. (1997). *After disaster: Agenda setting, public policy and focusing events*. Georgetown, DC: University Press. <https://doi.org/10.2307/2658081>
- Cairney, P. (2016). *The politics of evidence-based policy making*. London, UK: Palgrave Macmillan. <https://doi.org/10.1057/978-1-137-51781-4>
- Clarke, A., McCarthy, M., Álvarez-Dardet, C., Sogoric, S., Groenewegen, P., Groot, W., & Delnoij, D. (2007). New directions in European public health research: Report of a workshop. *Journal of Epidemiology and Community Health, 61*, 194–197. <https://doi.org/10.1136/jech.2006.048504>
- Climat.be. (2013). *National Adaptation Strategy*. Retrieved from <http://www.climat.be/fr-be/politiques/politique-belge/politique-nationale/strategie-nationale-adaptation/>
- Committee on Climate Change. (2014). *Managing climate risks to wellbeing and the economy*. Adaptation Sub-Committee Progress Report, Committee on Climate Change, UK. Retrieved from https://www.theccc.org.uk/wp-content/uploads/2014/07/Final_ASC-2014_web-version.pdf
- D'Amato, G., Cecchi, L., Bonini, S., Nunes, C., Annesi-Maesano, I., Behrendt, H., Liccardi, G., Popov, T., & van Cauwenberge, P. (2007). Allergenic pollen and pollen allergy in Europe. *Allergy, 62*, 976–990. <https://doi.org/10.1111/j.1398-9995.2007.01393.x>
- De Groot, R. S., Wilson, M. A., & Boumans, R. M. J. (2002). A typology for the classification, description and valuation of ecosystem functions, goods and services. *Ecological Economics, 41*, 393–408. [https://doi.org/10.1016/S0921-8009\(02\)00089-7](https://doi.org/10.1016/S0921-8009(02)00089-7)
- Defra. (2018). *A green future: Our 25 year plan to improve the environment*. London, UK: H.M. Government.
- Demaio, A. R., & Rockström, J. (2015). Human and planetary health: Towards a common language. *The Lancet, 386*, e36–e37. [https://doi.org/10.1016/S0140-6736\(15\)61044-3](https://doi.org/10.1016/S0140-6736(15)61044-3)
- Department of Health. (2012). *A public health outcomes framework for England 2013-2016*. London, UK: Department of Health and Social Care.
- European Environment Agency. (2013). *Environment and human health*. Joint EEA-JRC report. Luxembourg City, Luxembourg: Publications Office of the European Union.
- Ezenwa, V. O., Prieur-Richard, A. H., Roche, B., Bailly, X., Becquart, P., García-Peña, G. E., Hosseini, P. R., Keesing, F., Rizzoli, A., Suzán, G., Vignuzzi, M., Vittecoq, M., Mills, J. N., & Guégan, J.-F. (2015). Interdisciplinarity and infectious diseases: An Ebola case study. *PLoS Path, 11*, e1004992. <https://doi.org/10.1371/journal.ppat.1004992>
- Flahault, A., Schütte, S., Guégan, J. F., Pascal, M., & Barouki, R. (2015). Health can help the negotiation on climate change. *The Lancet, 385*, PE49–E50. [https://doi.org/10.1016/S0140-6736\(15\)60866-2](https://doi.org/10.1016/S0140-6736(15)60866-2)

- Ford, A. E. S., Graham, H., & White, P. C. L. (2015). Integrating human and ecosystem health through ecosystem services frameworks. *Eco-Health*, 12, 660–671. <https://doi.org/10.1007/s10393-015-1041-4>
- Graham, H. (2010). Where is the future in public health? *Milbank Quarterly*, 88, 149–168. <https://doi.org/10.1111/j.1468-0009.2010.00594.x>
- Graham, H., & White, P. C. L. (2016). Social determinants and lifestyles: Integrating environmental and public health perspectives. *Public Health*, 141, 270–278. <https://doi.org/10.1016/j.puhe.2016.09.019>
- Haynes, R. B. (2001). Of studies, summaries, synopses, and systems: The “4S” evolution of services for finding current best evidence. *Evidence Based Medicine*, 6, 36–38. <https://doi.org/10.1136/ebmh.4.2.37>
- Health Council of the Netherlands and Dutch Advisory Council for Research on Spatial Planning, Nature and the Environment. (2004). *Nature and Health. The influence of nature on social, psychological and physical well-being*. The Hague, The Netherlands: Health Council of the Netherlands and RMNO.
- H M Government. (2010). *Healthy lives, healthy people: Our strategy for public health in England*. London, UK: HMSO.
- INRA. (2013). *Agro-ecology: a priority area for INRA*. Communiqués de Presse. Retrieved from <http://presse.inra.fr/Ressources/Communiqués-de-presse/Agro-ecologie>
- IOM. (1998). *The future of the public health in the 21st century*. Washington, DC: National Academies Press. <https://doi.org/10.17226/10548>
- Jagosh, J., Macaulay, A. C., Pluye, P., Salsberg, J., Bush, P. L., Henderson, J., Sirett, E., Wong, G., Cargo, M., Herbert, C. P., Seifer, S. D., Green, L. W., & Greenhalgh, T. (2012). Uncovering the benefits of participatory research: Implications of a realist review for health research and practice. *Milbank Quarterly*, 90, 311–346. <https://doi.org/10.1111/j.1468-0009.2012.00665.x>
- Keune, H., Dendoncker, N., Popa, F., Sander, J., Kampelmann, S., Boeraeve, F., Dufrière, M., Bauler, T., Casaer, Jim, Cerulus, T., De Blust, G., Denayer, B., Janssens, L., Liekens, I. ... Verboven, J. (2015). Emerging ecosystem services governance issues in the Belgium ecosystem services community of practice. *Ecosystem Services*, 16, 212–219. <https://doi.org/10.1016/j.ecoser.2015.06.001>
- Keune, H., Flandroy, L., Thys, S., De Regge, N., Mori, M., Antoine-Moussiaux, N., Vanhove, M. P. M., Rebolledo, J., Van Gucht, S., Deblauwe, I., Hiemstra, W., Häslér, B., Binot, A., Savic, S. ... van den Berg, T. (2017). The need for European OneHealth/EcoHealth networks. *Archives of Public Health*, 75, 64. <https://doi.org/10.1186/s13690-017-0232-6>
- Keune, H., Kretsch, C., De Blust, G., Gilbert, M., Flandroy, L., Van den Berge, K., Versteirt, V., Hartig, T., De Keersmaecker, L., Eggermont, H., Brosens, D., Desein, J., Vanwambeke, S., Prieur-Richard, A. H. ... Bauler, T. (2013). Science–policy challenges for biodiversity, public health and urbanization: Examples from Belgium. *Environmental Research Letters*, 8, 025015. <https://doi.org/10.1088/1748-9326/8/2/025015>
- Krieger, N. (2008). Proximal, distal and the politics of causation: What’s level got to do with it? *American Journal of Public Health*, 98, 221–230. <https://doi.org/10.2105/AJPH.2007.111278>
- McMichael, A. J., Woodruff, R. E., & Hales, S. (2006). Climate change and human health: Present and future risks. *The Lancet*, 367, 859–869. [https://doi.org/10.1016/S0140-6736\(06\)68079-3](https://doi.org/10.1016/S0140-6736(06)68079-3)
- Morand, S., & Guégan, J. F. (2008). How the biodiversity sciences may aid biological tools and ecological engineering to assess the impact of climate changes. *Revue Scientifique Et Technique De L'office International Des Epizooties*, 27, 355–366. <https://doi.org/10.20506/rst.27.2.1806>
- NEHAP. (2015). *Belgium fights exotic mosquitoes*. Retrieved from <https://www.environnement-sante.be/fr/actualites/la-belgique-combat-les-moustiques-exotiques>
- Netherlands Ministry for Infrastructure and Environment. (2017). *Environment and Planning Act*. Retrieved from <https://www.government.nl/topics/spatial-planning-and-infrastructure/documents/reports/2017/02/28/environment-and-planning-act>
- Ngonghala, C. N., Plucinski, M. M., Murray, M. B., Farmer, P. E., Barrett, C. B., Keenan, D. C., & Bonds, M. H. (2014). Poverty, disease, and the ecology of complex systems. *PLoS Biology*, 12, e1001827. <https://doi.org/10.1371/journal.pbio.1001827>
- Nutbeam, D. (1998). Evaluating health promotion – progress, problems and solutions. *Health Promotion International*, 13, 27–44. <https://doi.org/10.1093/heapro/13.1.27>
- Owens, S. (2015). *Knowledge, policy and expertise. The UK royal commission on environmental pollution 1970–2011*. Oxford, UK: Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780198294658.001.0001>
- Petticrew, M., Whitehead, M., Macintyre, S. J., Graham, H., & Egan, M. (2004). Evidence for public health policy on inequalities: 1. The reality according to policymakers. *Journal of Epidemiology and Community Health*, 58, 811–816. <https://doi.org/10.1136/jech.2003.015289>
- Reis, S., Morris, G., Fleming, L. E., Beck, S., Taylor, T., White, M., Depledge, M. H., Steinle, S., Sabel, C. E., Cowie, H., Hurley, F., Dick, J. M. P., Smith, R., & Austen, M. (2013). Integrating health and environmental impact analysis. *Public Health*, 129, 1383–1389. <https://doi.org/10.1016/j.puhe.2013.07.006>
- Rook, G. A. (2013). Regulation of the immune system by biodiversity from the natural environment: An ecosystem service essential to health. *Proceedings of the National Academy of Sciences*, 110, 18360–18367. <https://doi.org/10.1073/pnas.1313731110>
- Sabatier, P. (1998). An advocacy coalition framework of policy change and the role of policy-oriented learning therein. *Policy Sciences*, 21, 129–168. <https://doi.org/10.1007/BF00136406>
- Sarigöllü, E. (2009). A cross-country exploration of environmental attitudes. *Environment and Behaviour*, 41, 365–386. <https://doi.org/10.1177/0013916507313920>
- Scottish Government. (2008). *Good Places, Better Health: A new approach to environment and health in Scotland*. Edinburgh, UK: Scottish Government.
- Twohig-Bennett, C., & Jones, A. (2018). The health benefits of the great outdoors: A systematic review and meta-analysis of greenspace exposure and health outcomes. *Environmental Research*, 166, 628–637. <https://doi.org/10.1016/j.envres.2018.06.030>

- Van Herzele, A., & de Vries, S. (2012). Linking green space to health: A comparative study of two urban neighbourhoods in Ghent, Belgium. *Population and Environment*, 34, 171–193. <https://doi.org/10.1007/s11111-011-0153-1>
- Wimbush, E., & Watson, J. (2000). An evaluation framework for health promotion: Theory, quality and effectiveness. *Evaluation*, 6, 301–321. <https://doi.org/10.1177/13563890000600302>
- World Health Organization and Secretariat of the Convention on Biological Diversity. (2015). *Connecting global priorities. Biodiversity and human health: a state of knowledge review*. Geneva, Switzerland: WHO. <https://doi.org/10.13140/RG.2.1.3679.6565>

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