ENVIRONMENT WELL-BEING AND HUMAN WELL-BEING

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Summary

This article examines the interface between human health well-being and environment well-being, arguing that the two are intimately and inextricably intertwined. The article begins with a historical examination of how human society increasingly divorced itself from the resources that sustained it, and in doing so degraded our understanding of this connectivity. More recent conceptual and model developments, coupled with technological improvements, help us to grasp the complexity and depth of these impacts. The current challenge is to develop management frameworks that are flexible enough to accommodate these emerging intellectual paradigms and to utilize these to provide linked, actionable programs.

1. Introduction

Human well-being and environment well-being are, and always have been, intimately related. This connectivity provides the basic premise of this article—that the health and well-being of humans can not be separated from the health and well-being of the environment. After reviewing the meaning of ‘well-being’ in the context of both environment and human health, this article examines the linkages between the two. It explores how the industrial and scientific revolutions have blurred humankind’s understanding of this linkage, and highlights how recent developments in science and technology, coupled with improved strategic policy formulation, have propelled this issue to the forefront of transdisciplinary thinking.

The term 'well-being' is a construct more typically associated with human-beings than environments. With reference to the environmental sciences, the word 'integrity', in the context of ecological or biological integrity, is more frequently used to suggest wholeness or integration of ecosystem structure and function. Ecological communities that have such integrity would support the full range of species and ecosystem processes expected of a natural habitat in that region and be able to recover from normal stresses. Clearly this notion of ecological integrity would be a central and necessary element of environment well-being.

Another perspective on environment well-being can be gained through interpretations about its loss. In other words, an 'unwell' environment is presented as one that has been degraded—that is impoverished. The symptoms or indicators of an unwell environment are perhaps easier to envisage and comprehend than the concepts of wholeness or well-being. Degraded soils, polluted air and contaminated water, damaged habitats and species extinctions are among the more obvious of these indicators. Nonetheless, indicators of degradation have been difficult to quantify and comprehend at larger spatial scales. Only with recent advances in science and technology have the less tangible symptoms of decline associated with global climate change and altered bio-geo-chemical cycles been better characterized and used to provide a deeper understanding of what constitutes ecological integrity and impoverishment.

The metaphors of 'planet as patient' and 'healthy ecosystems' have played an important role in communicating both the tangible and intangible dimensions of environmental well-being to the non-scientific community. The successful "Healthy Waterways" project in South-East Queensland, Australia is an example of this. People have been able to relate to the project easily because health is a familiar concept. Despite engendering considerable debate within the scientific community metaphors such as healthy ecosystems have paved the way for transdisciplinary thinking about the many interfaces the biophysical environment shares with human society. Regardless of whether scientists support or oppose the use of metaphors such as ecosystem health, there is little contention that to protect both ecological integrity and human society, the needs of both and their interdependence have to be understood.

To this end, it is useful to consider what the needs of human society are, and as an adjunct, what constitutes human well-being. From their biophysical environment individual humans require clean air, a safe and adequate water supply, adequate nutrition and shelter and a global ecosystem that will continue to provide these services. However, human well-being is a holistic construct that goes well beyond the dimensions of biophysical health at an individual level. Its meaning is captured in the often quoted World Health Organization's definition of health as "a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity". Both health and well-being are powerful constructs that could, theoretically, be applied across each of these dimensions of body, mind and spirit at a range of nested levels, from individuals and communities through to global populations. However, without satisfactory operational definitions, they have served primarily as immeasurable ideals or slogans.

Partly due to this, the biomedical model of health, with its attendant focus on measures

of ill-health, has dominated within the structures of modern societies. Particularly in Western societies health is viewed primarily as an individual asset to be transacted within the health care system. Many have argued, that the 'disease care system' would be a more accurate descriptor of this system. The challenge to this dominance of the biomedical model of health has come from the public health movement, which continues to evolve towards a more ecological understanding of public health and well-being. Mirroring the difficulties in the environmental sciences, there is on-going debate around issues such as how to measure and operationalize the less tangible dimensions of health such as social well-being and social harmony/capital. Renewed interest in the measurement of human well-being has been generated as the public health movement attempts to define 'indicators' of well-being to monitor its own success.

From this brief discussion of environment and human well-being, it is possible to sketch out the nature of the interface between the two. There is little doubt that they are related—it is intuitive, but the nature of the relationship between human beings and their environment is not depicted easily. As illustrated in Figure 1, this interface represents a complex and paradoxical domain, with goals for human health and natural ecosystems being compatible at one level, yet incompatible at other levels. There are also ethical dilemmas and paradoxes, particularly when considering the temporal dimensions of the interface. For example, while the exploitation of environmental resources can enhance human well-being through raising standards of living, if these resources are exploited at a non-sustainable rate, the well-being and standard of living for future generations will be compromised. Australia's problems with dry land salinity exemplify this. This erosion of natural capital that is happening along numerous fronts can be difficult to cost and convey to those making decisions today.

Characteristic	Explanation
Paradoxical nature	Modern conveniences of everyday life that contribute to "improved standards of living" go hand-in-hand with new chemicals and substances that "survive the destructive forces of nature and therefore accumulate in our environment and our bodies." This is a paradox of progress.
"Fuzzy" (low perceptibility)	(a) Hazards: Modern environmental health hazards (radiation, chemicals, global warming) are less perceptible than traditional hazards (putrefying wastes, dirty air, and foul water) at the forefront in the second half of the twentieth century (b) Health outcomes: Relatively few diseases associated with environmental hazards are readily evident and serious enough to describe their impact using routine biostatistics
Multifactorial etiology	Many chronic illnesses are caused by multiple factors such as exposure to a combination of pollutants, or a combination of genetic predisposition and environmental factors
Variability (low specificity)	Causal inferences are complicated by specific exposures being associated with variable outcomes

Shifting benchmarks	(a) Upper bounds: The borderline between working and ambient environments has become less distinguishable, with the result that the differential diagnosis between occupational and general population diseases is made more difficult (b) Lower bounds: Ubiquitous exposures to certain environmental hazards (e.g. lead) make selections of appropriate health status baselines more difficult

Table 1: General characteristics of the environment well-being and human well-being interface

Despite these complexities and uncertainties, if action to combat environmental degradation is delayed until the consequences to human populations are clearly enumerated, it may be too late to reverse or undo the damage. An increasing number of prominent scientific commentators have described this dilemma and have presented strong arguments for not deferring social and political action until the layers of scientific uncertainty have been removed. Inadequate but mounting evidence on how children's health is affected by their environment places an even greater burden of responsibility on this generation of adults, who can participate in the planning and decision-making process on behalf of the more vulnerable groups in society.

Even if political action can not be guided by scientific evidence of cause and effect at the interface of environment and health well-being, thefollowing basic principles can guide action:

- Healthy, sustainable communities are built on the foundations of both healthy human populations and healthy natural ecosystems.
- Human behavior and the social environment mediate the relationship between human and environment well-being.
- The ecological problems being faced by humankind cannot be addressed effectively unless they are considered within a transdisciplinary context.

2. Historical Aspects

An evolutionary perspective on how humans have related to their environment provides a useful backdrop for further discussion on more specific issues. The following section draws on the historical sketches of this evolving interface as seen by a range of commentators.

2.1 Early Days

Early societies exhibited a close connection between environmental well-being and human well-being, even though there was little documentary evidence about the actual state of environmental health interactions prior to the nineteenth century. As early as the fourth century BC, Hippocrates instructed physicians on the influence of the environment on disease through his treatise 'On Airs, Waters and Places'. These Hippocratic writings represent the oldest known systematic account of the environmental determinants of

human health and well-being; that this treatise was still being printed and used as a medical textbook up until 1874 attests to its profound influence on society. Environmental influences on health were also recognised in China at least 200 years BC. These early frameworks centred on the physician and a partly mystical 'medical model', in the absence of a strong scientific basis for human health and well-being.

2.2 The Sanitation Era

Major developments in understanding the interactions between environmental well-being and human well-being began around the late 1800s, when the germ theory of disease and the science of nutrition slowly undermined the authority of the earlier models of public health medicine. Rapid expansion of population, information and technology throughout the last two centuries encouraged the medical specialisation of physicians and the institutionalisation of public health. Preventative health strategies largely became state functions while medical professionals in the community adopted more of a curative or therapeutic role. The types of problems and issues dealt with at the environmental/health interface centred on human living environments with high population densities, and focused on sanitation, food hygiene and protection from contagious, infectious diseases such as measles, cholera and typhoid. This 'biological' or 'sanitation' era placed a high value on biophysical and technical types of specialist knowledge and on relatively simple and direct cause-effect models of disease and human well-being. The environmental hazards of primary concern were animate in origin and their associated illnesses were both direct and immediate. In turn, the administrative and technological frameworks adopted by centralised public health administrations were relatively straightforward, as were professional responsibilities. Probably the largest source of professional uncertainty in population health at that time was related to the identification of the specific disease-causing agent or in deciding how best to disrupt their transmission route to humans.

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Biographical Sketches

Anne Neller lectures in public health and environmental science in the Faculty of Science at the University of the Sunshine Coast, Australia. She is an active member of the enHealth Council, Public Health Association of Australia, Australasian Epidemiological Association and the International Society of Ecosystem Health. Dr Neller has held research, teaching and government positions in Hong Kong and Australia, undertaken research in Finland and has published in the area of environmental epidemiology and ecosystem health. She currently holds positions on several advisory committees in Australia in her areas of expertise for Local, State and Commonwealth Government agencies.

Ron Neller is a Senior Lecturer in the Faculty of Science at the University of the Sunshine Coast, Australia and, concurrently, a Docenti in the Faculty of Natural Sciences and Mathematics at Turku University in Finland. Over the past twenty years, he has held teaching and research positions in environmental sciences at Griffith University, University of New England, Turku University, The Chinese University of Hong Kong and the University of the Sunshine Coast. Dr Neller obtained his doctorate in fluvial geomorphology in 1984, focusing on the management of urban impacts on river systems. Whilst a recognized and published expert in this field, Dr Neller has more recently broadened his research to whole catchment (watershed) management in coastal environments, with particular emphasis on landuse impacts, erosion and sedimentation, and coastal environmental reconstruction. He is currently researching sustainable land management practices in acid sulfate coastal environments and is evaluating in-stream technologies for sediment control in rivers.