



# Ecology and Health: People & Places in a Changing World

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This monograph contains five peer-reviewed essays (emanating from a workshop convened by the Victorian Health Promotion Foundation), and one introductory piece. They are all published here as a set of background papers for the Asia-Pacific EcoHealth Conference to be held in Melbourne, Victoria in late November - early December in 2007. The monograph presents materials relevant to the overall conference theme of **Ecology and Health: People & Places in a Changing World**. The essays also cover at least in part conference sub-themes: Cultural change, environments and health; Measuring the links between environments and health; Ecological literacies in health practice; Systemic thinking, environments and health; and Indigenous and local perspectives, environments and health.

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The notion of sustainable health – mirroring the concept of sustainable development – means to provide health for today's generation without compromising that same opportunity to future generations. This theme is interwoven throughout this monograph, **Ecology and Health: People & Places in a Changing World**, and illustrates how managing our natural resources is tightly linked to sustaining human population health. The monograph further offers an important reorientation that urges us to look beyond our disciplinary boundaries and work collectively towards solving our world's pressing and complex environmental public health challenges.

Within this monograph, *Colin Butler* describes in depth better ways towards achieving sustainable health, and delves into the inequalities of our current health and economic systems. Short-sighted gains, often involving the extraction of natural resources at unsustainable rates, rob benefits from our descendants. *Glenn Albrecht* further shows how modern lifestyles, via either automobile dependence or intensive livestock and other agricultural endeavours are increasing the size of our 'ecological footprint' on the globe. *Glenda Verrinder* calls for truly interdisciplinary approaches to tackle such issues, and outlines barriers and enabling factors towards this goal. From health officials working with urban planners, to disease epidemiologists working with cultural anthropologists and community leaders, new levels of collaboration are required to disentangle the myriad of factors leading to disease emergence (Parkes et al. 2005). *Valerie Brown* highlights the importance of participatory research and 'social learning' that is multi-stakeholder driven. Such community-based dialogue is essential to achieve mutual learning from across varying types of knowledge to enhance the likelihood of finding sustainable solutions to environmental/societal problems.

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The recent Millennium Ecosystem Assessment report addresses the question as to how ecosystem sustainability relates to human wellbeing across many sectors and regions. In the area of human health, for example, deforestation affects: the risk of injury and psychological distress from increased run-off and landslides in disturbed areas; livelihoods and mental health of indigenous forest dwellers when their settlements are displaced or their sustaining natural resources taken away; and a number of emerging and/or resurging infectious diseases (Patz et al. 2005).

Approximately 9 million hectares of tropical forests were cleared during the 1990s (FAO, 2001); at this rate, the world's rainforests could disappear by the century's end. While the value of forests is well recognised for the preservation of biodiversity across species, this monograph on ecology and health brings forth the broader array of 'ecosystem services' that intact ecosystems provide for our human species. Malaria, for example, has been associated with land use changes and human resettlement throughout the tropics. The clearance of forest has facilitated the colonisation of humans into previously unsettled areas, as well as created forest gaps, cleared lands, and culverts, in which anophelene mosquito species thrive. In Africa, deforestation is known to favourably promote a major disease vector, *Anopheles gambiae*, and the expansion of malaria is also occurring in Amazonia where deforestation has been shown to provide suitable breeding sites for *Anopheles darlingi* (Vittor et al. 2006).

As natural environments decline, therefore, so can our health – particularly the health of communities dependent on the supporting services that intact forests offer. On the other hand, we are also creating new and unhealthy 'habitats' from poor urban planning and urban sprawl across our 'built environments' – in cities with design flaws that preclude walking or biking, epidemics of chronic diseases caused by obesity are quickly rising as discussed in the chapter by *Sharon Friel*. This monograph covers well the human dimension of ecosystem degradation, and realistically blurs the distinction between human and non human natural systems, which are inextricably coupled. Trade-offs obviously exist between extraction of materials for near-term profit versus long-term sustainability of communities that rely on functioning of natural systems.

The challenge then is to identify and promote optimal situations whereby the maximum number of people - including future generations (as well as a number of species) – can benefit from policies geared towards sustaining both health and the environment. In today's economy would we, for example, still decide that wood products are the highest valued resource from a forest if other services of that forest are properly accounted, other services such as carbon sequestration, plant pharmaceutical or local food production, local climate stabilisation, biodiversity maintenance, cultural value foundation, or infectious disease suppression?

Yet, even with eyes wide open to the diverse societal benefits afforded by intact ecosystems, without a comprehensive approach (with knowledge input from a broad array of stakeholders) we may be continually at risk if we try to solve problems with a limited number of perspectives in mind. In 2007, when the Fourth Assessment Report of the United Nations Intergovernmental Panel on Climate Change (IPCC) concluded that, with '90 percent certainty' human activity (primary burning fossils fuels) is causing global warming, political will to reduce greenhouse gases finally arrived. These findings represented a major advance in both the scientific and policy communities, ending the debate over the anthropogenic nature of climate warming. In fact, the IPCC along with Al Gore were awarded the 2007 Nobel Peace Prize, heralding the need for rapid and major solutions.

While reducing our reliance on fossil fuels is immediately and obviously necessary, an unchecked development of biofuels as the potential mainstay source for mobile energy could threaten our world's food supply – the analogy being that instead of feeding people, we take our grains to feed combustion engines! Moreover, as pressure builds to expand croplands to meet energy demand, our remaining forests will be (and in some cases already have been) decimated by oil palm, soybean, and sugar cane production. The lesson: a fully informed systems-based assessment is warranted so that we take care that the 'cure' is not worse than the 'disease'.

Growing awareness of the linkages between human well-being and ecosystems is encouraging and a necessary reality as we attempt to achieve both human and environmental sustainability (e.g. the recent establishment of the International Association for Ecology and Health, along with its official journal, *EcoHealth*). Clearly, the issue of equity pervades as one weighs the interests of local communities and transnational corporations; livelihoods across generations; and survival and health across species. Education and communication to arrive at fully informed decisions on natural resource management and conservation policy are requirements as we consider the best path forward; this monograph offers an important step forward in this regard.

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## Educational Resource:

Website link for K-12 level educations and students:

[www.ecohealth101.org](http://www.ecohealth101.org)

[www.millenniumassessment.org](http://www.millenniumassessment.org)

[www.ipcc.ch](http://www.ipcc.ch)

# The promotion of sustainable health

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## Abstract

*Two tenets of health promotion are particularly attractive. The first is its claim to recognise and to seek to ameliorate many determinants of health whose importance is too temporally or conceptually subtle to attract the attention of other health disciplines. The second is that health promotion is ever-ready to resist powerful social and political forces that might otherwise undermine health. As with many ideals, the reality falls short on both counts. But while health promotion cannot claim a monopoly on these ideas, the theory and practice of these central elements of health promotion nonetheless remain essential for good population health. We live in an era of unparalleled affluence. Though never popular, the messages of Cassandras and other doomsayers are particularly unpalatable, not to say incredible, when times are so good. Yet unsustainability is a gathering crisis, threatening not only to unravel economies and to hurt the poor, but even to damage the health of affluent populations. Although perceived by the founders of the discipline of health promotion, two decades of affluence have blunted the awareness of this 'slow emergency', not only among wider society, but even among health promotion. In the intensifying struggle for sustainable population health, health promoters will be served by alliances with other sectors, including the emerging discipline of ecohealth, the wider social justice movement, and environmental and health workers concerned with the developing world.*

## Introduction

In the last two centuries global life expectancy has more than doubled, from roughly 25 years to 66 years (Riley, 2001). In 1950 it was about 46, but by 1985, when the Ottawa Charter (the founding document of health promotion) was signed, it had reached 61.<sup>1</sup> In Australia, life expectancy had risen from 70 to 75 in the same period. These improvements – most of which occurred well before health promotion as a discipline – have been perceptively attributed to an ‘intricate interplay of advances in income, salubrity, nutrition, education, sanitation, and medicine’ (Riley, 2001; Oeppen and Vaupel, 2002).

These factors are undeniable, but these causes themselves have causes. For example, the rationale for better sanitation had a scientific basis, while advances in nutrition were related to science, trade and, indeed, conquest and slavery. It therefore follows that ‘root’ causes will always be elusive and controversial, determined at least as much by the ‘focal depth’ of the enquirer’s mind as by the elements of the causal web she is looking at (McMichael, 1999). The role of politics in the causation of health effects is especially controversial (Butler, 2003). Yet this role has periodically been acknowledged, including by the eminent epidemiologist Geoffrey Rose who commented, near the end of his life: ‘medicine, health and politics cannot be kept apart, and they should not be kept apart’ (Rose, 1990). In this paper, Rose makes no reference to the radicalism of the Ottawa Charter. He has no obligation: a far longer lineage of such thought can be traced in public health, including Frederick Engels in Britain, Rudolf Virchow in Germany (Holtz et al., 2006) and Louis Villerme in France, who, writing during a time of extensive African slavery, described cotton workers as ‘white Negroes’ (Villerme, 1840).

Rose is also credited with calling for investigators to ascertain ‘causes of the causes’ (Marmot, 2005). While it is futile to look for a fundamental cause to explain the recent advance in life expectancy [or perhaps, recovery – there is growing appreciation that at least some hunter gatherers enjoyed long lives (Holden, 2006)] it is clear that many social forces have underpinned the reasons mentioned above. Of these forces, two warrant special mention: the struggle for greater justice and the Enlightenment, which nurtured the emergence of the scientific method.

Note that there is no evidence that the existence of a problem can always generate a rapid solution. This is relevant to the central theme of this paper, because some influential futurists and techno-optimists (Simon, 1981; Johnson, 2000) have in fact argued that the recognition of problems is sufficient to generate their solutions. Perhaps incredible to thoughtful readers, this belief has had considerable influence since the 1980s. That decade, which experienced a resurgence of cheap oil (following the oil shocks of the 1970s) and the maximum per capita harvest of grain, has been characterised as the heyday of the ‘cornucopian enchantment’ (Butler, 2007). This disconnection from reality persists today, given the stubborn resistance, including by the Australian government, to seriously tackle the problem of climate change and other ‘wicked’ problems (Rittel and Webber, 1973). This enchantment also underpins the failure to address global overpopulation and poverty (Butler, 2007).

The precipitous decline in European life expectancy and population size caused by the Black Death in Europe in the 14th century (Platt, 1996) is a salutary counter example to the hubristic belief that problems will generate solutions. Also of relevance to this essay, the Black Death eroded faith in the Christian Church and forced social and ecological changes that contributed to the emancipation of the serfs, and to the Reformation and the Renaissance (Platt, 1996). These changes eventually gave rise to our modern understanding of the plague, including its public health and antibiotic remedies; but this process took centuries.

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<sup>1</sup>United Nations Population Division. 2007. World Population Prospects: The 2006 Revision Population Database. Accessed 26 October 2007 at <http://esa.un.org/unpp/index.asp?panel=2>

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Analogously, our current sustainability crisis may have a long-term solution. While we should be sceptical that our current crisis has a quick solution, we can be sure that science will be crucial in its identification. Of concern, to date, the opinion of scientists in fostering the sustainability transition still carries insufficient weight. Technology will not be enough – changes to human institutions, including our culture and patterns of consumption are also vital (Butler and Oluoch-Kosura, 2006).

### **The threats of the future**

Our civilisation – including in Australia – is facing a threat which rivals the Black Death in its possible scale. This might seem incredible. Predictions made for Australia in the 4th report of the Intergovernmental Panel on Climate Change (IPCC) (Hennesy et al., 2007) and elsewhere, while gloomy, scarcely hint at such catastrophe. But to discern this threat requires imagination and the loosening of constraints which typically inhibit multi-authored, government approved documents such as the IPCC reports (Butler, 2005). Many scientists are uncomfortable with such speculation, but ‘Our Final Century’ written by the current president of the Royal Society, Lord Rees, is an important exception (Rees, 2003).

It is conceivable that an increasingly desertified southern Australia could transform itself into an Antipodean version of Abu Dhabi, where an affluent population relies on its mineral wealth to provide the means to import food and desalinate its plentiful supply of seawater. This future might seem tolerable. However, this is only half the story. The other half of this story – the global context – is as yet grossly under-explored in any consideration of future Australian or global health.

By this hidden half, I refer to the likely impact upon the global social system of the iceberg of regional and global consequences likely to occur if many of our current trends continue. These ominous trajectories refer to more than greenhouse gas accumulation, ecosystem degradation and the exhaustion of accessible oil. Many interactions and positive feedbacks between these and other phenomena are likely (Schellnhuber et al., 2006).

While global sea level is only rising at between 3 and 3.5 mm per year, this rate itself is rising (Rahmstorf et al., 2007). Worse, the trajectory of sea level rise is already much higher than forecast a decade ago, while a slew of recent papers have warned that the stability of the Greenland and Western Antarctic ice shelves is much less certain than previously considered (Shepherd and Wingham, 2007). However, even if the rise in sea level by 2100 forecast by the IPCC were to treble, this is unlikely to prove catastrophic, of itself.

However the IPCC – and the wider literature which it reviews – is likely to have under-estimated many other important elements and impacts likely to unfold by 2100. One such aspect is global food security. Until recently the dominant view was that climate change would generate a world in which agricultural winners and losers would be in rough balance globally. This is increasingly questioned including from doubts about the ‘carbon fertilisation’ effect (Long et al., 2006), the characteristics of higher-latitude soil, increased droughts (Burke et al., 2006) and a shrinking of the Himalayan glaciers, likely to reduce summer irrigation in some of Asia’s most fertile and densely populated river basins (Barnett et al., 2005).

Even less explored is the interaction between sea level rise, increased and more severe extreme weather, regional food insecurity, ongoing ecosystem degradation and worsened regional and global inequalities (likely to be aggravated by climate change), weaponisation, increased refugees and political tension (Butler and Oluoch-Kosura,



2006; Butler, 2007). At best, these consequences are likely to drive higher Australian spending on defence and refugee exclusion. At worst, this could lead to widespread conflict and severe erosion in the capacity of government, including the protection, provision and promotion of public health.

### **The role of health activists in confronting these risks**

This monograph, the conference these papers mark and the existence of the International Association of Ecology and Health show that some health workers have long been concerned about these risks. Yet this movement is insufficient. A much broader coalition of health disciplines is needed to add its weight to the social movement which has emerged in recent decades in response to the threats from 'planetary overload' (McMichael, 1993). There are many candidates, including health promotion (Butler and Friel, 2006) (belatedly rediscovering its ecological roots – at least in Australia) (Butler, 2007), the People's Health Movement, environmental epidemiologists (Soskolne et al., 2007) and the International Society of Doctors for the Environment. But even this coalition would still be insufficient. These concerns need to be placed on the agenda of all organisations concerned with health and human well-being.

### **Explaining our inertia**

In recent months a welcome increase in the volume of discussion concerning climate change has occurred in Australia and globally, but as a civilisation we remain hopelessly under-prepared. There are many reasons for this. Mainstream Australian political reaction continues to stress the uncertainty of these forecasts. It also emphasises the near-term pain associated with the radical reforms to our economy, lifestyle and energy systems which are required if the chance that coming generations will face catastrophe is to be minimised.

Australia is enjoying unprecedented prosperity. Memories of the Depression and World War II are fading, and more and more Australians are conditioned to consider material abundance as a birthright. This makes the possibility of future hard times seem, to many, as easily dismissed "doomsaying". And while ample poverty, misery and exploitation continue to exist globally, little of this penetrates the average middle class consciousness in Australia—not least because it is psychologically unpleasant to contemplate such aspects of reality.

However, this paper contends, society's current obsession with short term consumption and its persistent inability to rectify global injustice are almost certainly creating conditions for radical change, including a return to the historical mean of less prosperity. The current government frequently claims that Australians live in a time of unprecedented affluence. Would it not follow, therefore, that the present provides a fantastic opportunity to make the financial sacrifices and investments needed to minimise the risks to our children which our best scientists increasingly forecast as plausible? However, it is also plausible that our current wealth is a bubble, likely to burst unless changes are made.

For a start, if the world itself is benign and growing ever richer, then why have the vast majority of Australians acceded to policies which flout our international obligations to asylum seekers? (Marr and Wilkinson, 2003; Charlesworth et al., 2006) In fact, many people in rich countries, including the young (Eckersley, 2006) and

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retirees (Douglas, 2006) are apprehensive about the future, because of the ecological stresses we have collectively imposed. These fears, though officially denied and rarely voiced, is a likely factor in the widespread support Australians provide for its harsh policies towards those who seek asylum here.

Partha Dasgupta and others argue that 'inclusive wealth', which accounts for changes to both measured wealth and to natural capital, is in decline in many countries, or at least not rapidly growing (Arrow et al., 2004). The rise in the rate of global life expectancy has slowed because of the unanticipated and severe decline in life expectancy in many countries, including in sub-Saharan Africa, Russia and North Korea (McMichael and Butler, 2006). Joel Cohen has recently reminded us that global demographic forecasts assume there will be no collapse in population size or life expectancy due to nuclear war or a catastrophic change in the climate ecosystems (Cohen, 2006).

As a society, we are acting like a kangaroo frozen by the light of an approaching roadtrain. Global collapse may still be decades away but the task to rescue us is immense. Our solutions need time – probably several generations. Therefore we have not a moment to lose. Yet, collectively, we might still hop to safety.

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# Unhealthy systems, unhealthy weight

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## Abstract

*Health promotion has for many years called for the balancing of purely medical aspects of health care with greater emphasis upon the social, economic, and political determinants of health and asserted that environmental and ecological factors are of fundamental importance for health. Indeed the Ottawa Charter states “The fundamental conditions and resources for health are peace, shelter, education, food, income, a stable eco-system, sustainable resources, social justice and equity”. Implicit in the recognition that environmental and societal level factors, combined with personal attributes, lead to poor population health, is the notion of complex systems contriving to affect the health experience of individuals and communities. The global obesity epidemic is a health outcome that is a consequence of changes in a constellation of, and interaction between, environmental, social and economic factors that form a complex system.*

## Introduction

Increasingly it is recognised that population health risk and its social patterning do not predominantly arise from defects in the health care system, nor from individual genetic susceptibility, but rather from the wider socio-economic and socio-environmental systems in which people function (Marmot and Wilkinson, 2005). For many years health promotion has advocated for action in these areas, aiming to ensure the fundamental conditions and resources for health—peace, shelter, education, food, income, a stable eco-system, sustainable resources, social justice and equity (WHO, 1986). But non-communicable disease prevention, particularly in rich countries including Australia, has continued to focus on individuals and individual responsibility, neglecting to recognise that people live in complex ways in complex systems (McMichael, 1999). Obesity is a good example of a health concern that arises due to the confluence of many factors. Anyone involved in action to address the global obesity epidemic knows only too well how complex an issue it is, both in terms of its causes and also the necessary solutions.

The global nutrition transition i.e. the shifts towards highly refined foods and towards meat and dairy products containing high levels of saturated fats, together with marked reductions in energy expenditure through physical inactivity, has contributed to rises in the incidence of obesity and non-communicable disease (Popkin, 2006). Whilst true that the energy imbalance leading to obesity is ultimately due to risk behaviours, individuals make weight-related behavioural choices that are governed by the complex system of the social, food, built and natural environments (French et al., 2001).

## The social system and its influence on weight

The inequalities in obesity prevalence figures help illuminate the underlying structural and social factors that are involved (Friel and Broom, 2007). Where a person or group is within society's hierarchy contributes to them being differentially exposed to a number of factors that can either enhance or constrain the resources for health, including matters such as living conditions, working conditions, the neighbourhood and availability of commodities including food (CSDH, 2005).

Swinburn and colleagues characterised 'obesogenic' environments as contemporary environments that proffer not only an abundance of high energy foods, but also jobs and leisure which are predominantly sedentary, and a profusion of labour saving devices including changes in the type of transportation used and home production-related activities (Swinburn et al., 1999). Dixon and Broom identified seven social trends in modern living that are associated with increased obesity risk in Australia,<sup>2</sup> illustrating the weight consequence of the interplay between the food, built and social environments (Dixon and Broom, 2007). Working and living conditions play a major role in providing the material capacity to purchase and avail of a healthy standard of living (Morris and Deeming, 2004; Friel et al., 2006). The time and strain pressures associated with precarious formal employment conditions in the rich world correspond with sedentary work, disinclination to use active transport and ready access to energy dense foods (Broom and Strazdins, 2007; Roos et al., 2007).

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<sup>2</sup>Social trends: the commodified environment; the harried environment; the pressured parenting environment; the technological environment; the car-reliant environment; the market environment, and the environment of competing authorities (Dixon and Broom 2007).

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## **Food systems and weight**

### ***Food availability***

Changes in international and national food policy have led to profound changes in the food supply. Structural adjustment in low- and middle-income countries opened them up to the international market, supported in particular by the agriculture trade agreement in the 1994 Uruguay Round of the General Agreement on Tariffs and Trade, in which countries pledged to reduce (each of) tariffs, export subsidies and domestic agricultural support (Hawkes, 2006). These agricultural and food subsidies have arguably distorted the food supply and corresponding prices in favour of less healthful foodstuffs, including an over production of foods high in saturated fats (Elinder, 2005). With fewer geographical boundaries and greater foreign direct investment, there has been an explosion in the transfer of cheaper-to-produce processed foods, both in terms of variety and quantity, between developed and developing countries. This has created national marketplaces crammed with highly refined (and hence energy dense) foods that are now available to more groups and individuals (Hawkes, 2006).

### ***Food accessibility***

Accompanying the food supply changes is a shift in international and national food distribution systems away from the traditional smaller retailer and wet markets towards supermarkets and food service chains (Traill, 2006). The potential influence of supermarkets and fast food outlets on obesity risk in transitioning countries can be seen for example in the increasing energy density and fat content of foods from such outlets compared to a traditional Gambian diet (Prentice and Jebb, 2003). In some countries large supermarkets tend to offer the cheapest and widest range of healthy foods. There appears, however, to be conflicting international evidence on the relationship between retail outlet type, quality of dietary options and food costs (Cummins and Macintyre, 2006).

Accessing the food available at national and local level is determined very much by financial and physical constraints. While average global food prices have dropped substantially this is driven by subsidies supporting very cheap calories from oils, sugars and starches (Elinder, 2005). In comparison, USA domestic fruit and vegetable retail prices increased by almost 120 percent between 1985 and 2000 (Putnam et al., 2002) and in rich countries generally, foods recommended in healthy eating guidelines are more expensive than the less healthy options (Drewnowski and Darmon, 2005). Running in parallel to retail costs are levels of disposable income and the amount of money an individual or household allocates to food expenditure. Food budget standards research in rich countries has shown that unless more realistic financial provision is made the required allocation of household income to purchase food compliant with national dietary recommendations is unobtainable among low income households (Nelson et al., 2002; Friel et al., 2006).

### ***Food acceptability***

Culture, personal taste, food familiarity, attitudes to body shape, nutritional knowledge and peer influences of different social groups each play a very important role in determining the acceptability of different foods available and accessible to populations, and ultimately dietary intake (Grivetti, 1997). Working in tandem is the powerful medium of food advertising through television, omni-present in rich economies and ever increasing in developing economies (Popkin, 2006), aiming to persuade individuals, particularly children, that they want to consume foods high in saturated fats, sugars and salt (French et al., 2001).

## **The environment**

### ***Aspects of the built environment and weight-related behaviour***

The built environment, through urban design and therefore urban planning can influence weight in a number of ways. Residential density and land-use mix combined with street connectivity and walkability provides opportunities for physical activity. Neighbourhood disorder, or lack thereof, and a pleasing aesthetic encourages outdoor activity (Stafford et al., 2007). Provision of and access to local public facilities and spaces for recreation and play are directly correlated with individual level physical activity (Gordon-Larsen et al., 2006). Public transport systems, and their availability and quality play a major role in supporting people to partake in incidental physical activity (Hinde and Dixon, 2005). The converse of this is pervasive advertising, increasing access and escalating car reliance, important drivers behind shifts towards physical inactivity in both developed and developing countries (Popkin, 2006).

### ***Environmental degradation, food and weight***

We cannot think about population health, in this instance weight, and the related social and food systems without considering the environmental system which supports our living. It is impossible not to question both the ecological and population sustainability of the way society lives. The obesity epidemic, indeed many other chronic health conditions, clearly demonstrates that there is something progressively unhealthy about the nature of the complex system. Not only is the nature of the global food chain affecting the nutritional quality of the food supply, it is impacting negatively on the natural environment. For example, society's increased and unsustainable use of fossil fuels is contributing both to ecological degradation through increasing carbon dioxide levels (Vitousek et al., 1997) and possibly unhealthy weight. As described earlier, increasing car reliance is believed to be a major driver of the obesity epidemic and of course guzzles fossil fuels. In the endeavour to steer and respond to the global demands for foods high in fat and energy dense, such as red meats, processed foods or ready-made meals, intensive and energy consuming food production practices contribute substantially to global greenhouse gas emissions and other environmental degradation (Tilman et al., 2002; Butler, 2005). The long term implications of this damage to the natural resource base is not only an unsustainable food supply but threat to the life-supporting capacity of the biosphere (McMichael, 2001).

## **Intervention – whose responsibility?**

Much has been written about the plethora of policy actions necessary to tackle population health including obesity (WHO, 2004; James, 2005). Focusing on individual level behaviour is neither enough nor appropriate. As the global obesity epidemic and its social distribution illustrate, population health is a consequence of the changing complex system operating at global, national and local levels, shaping how we grow, live and work.

Encouraging healthy weight in societies requires approaches that ensure an ecologically sustainable, adequate and nutritious food supply; material security; a built habitat which lends itself towards easy uptake of healthier food options and participation in both organised and unorganised physical activity; and a family, educational and work environment which positively reinforces healthy living and empowers all individuals to make healthy choices.

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The interconnected nature of the causes of obesity implies the need for an integrated response comprising community level action and political will and investment. This requires joined-up action at global, national and local level across multiple sectors. Health promotion has for many years championed working in partnership to address the social determinants of health, recognising that often the capacity to make change lies within non-health sectors. Advances have been made in the obesity arena, with urban planners and health professionals working together to design, for example, healthy urban living. However a significant challenge remains to engage with the multiple sectors outside health in areas such as trade, employment, and education, areas in which action must take place if we are to redress the global obesity epidemic. Perhaps more fundamentally, the scale and long term implications of the relationship between drivers of obesity and the impact on environmental degradation calls for much better ways of working across related sectors.

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# Ecological Footprint Analysis and People Power: Linking Structural and Behavioural Approaches in Health Promotion

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## Abstract

*Two dominant models of improving public health are health promotion and health protection. Health promotion encourages individual responsibility and behaviour change to achieve improvements in individual health. Health protection imposes risk reduction on populations by government regulation. Neither individualistic nor structural concepts of risk have been all that successful in enabling people to see clearly the relationships between planetary and human health. Indicators of planetary health such as ecological footprint analysis tell us that we are going beyond reasonable limits. Moreover, as the ecological footprint gets bigger (individuals, institutions, corporations, states, nations and the planet), so too does the (super) size of people in Western societies with corresponding increases in lifestyle related disease (obesity, heart disease, diabetes). The links between planetary and human health can be identified by putting health into a public participation framework. Individuals (and populations) can become aware that the major components of their footprint involve food, transport and energy. Reduction of the personal and planetary footprint involves active participation or use of 'people power' in behavioural, lifestyle and structural change that symbiotically improves human health.*



## Introduction

Modern humans have rapidly changed the conditions that were prevalent during their emergence as a species some 200,000 years ago. For tens of thousands of years humans lived within the constraints of their bioregions and made adaptive adjustments to climatic and biophysical changes. Within the last 10,000 years, humans have successfully colonised nearly every type of ecosystem and bioregion on the planet. Until very recently in our history, human ecology existed relatively harmoniously within the limits of pre-existing bioregions.

The main source of energy available to humans within this evolutionary context was 'people power', the energy gained from the food hunted and gathered within given bioregions. The effort needed to gather essential nutrients

for life roughly equalled the energy gained from such enterprise. As a consequence, human ecology lived within the thermodynamic constraints of place and human health in all of its dimensions was an expression of such limitations (Boyden, 1999). By and large, the indigenous people of the world, prior to the agricultural and industrial revolutions had a light ecological footprint and a health profile that matched their 'lightness of being' (Rees, 2000). Such cultures engaged in what has been termed ecologically sustainable development (ESD). While living to a very old age may have been unlikely, obesity due to overconsumption of food as a factor in premature mortality would have only affected a tiny minority of the elite in a population.

However, as human cultural, agricultural and technological evolution proceeded, the ability to leapfrog the limitations of place grew exponentially. Surpluses in food production, and later virtually every form of productive capacity, have been associated with a number of problems with the human-nature relationship. Under the process of intense industrial development from the local to the global, the pollution of ecosystems, over-harvesting of renewable resources, landscape disruption, species extinction and other 'pressures' have led to what we might now call 'global distress syndrome' (after Rapport's ecosystem distress syndrome, Rapport and Whitford, 1999). *Homo sapiens* has moved from a local patch disturbing species (Rees, 2000) to a species that now disturbs not only the biosphere, but also the global atmosphere.

The human health impacts of such a transition have been well-documented (McKeown, 1988; Boyden, 1999; McMichael, 2001). The so-called 'diseases of affluence' such as heart disease, obesity, hypertension, diabetes and some forms of cancer (Hetzl and McMichael, 1987) have emerged within a post scarcity society. In addition, new forms of physical and mental illness have emerged in a response to global distress syndrome (Aron and Patz, 2001; Connor et al., 2004; Albrecht, 2005; Albrecht et al., 2007). Humans are now substantially maladapted to their biophysical support environment and the alternative constructed environment is poorly designed to meet optimum human health requirements. Overriding all of this is global warming and climate change where potentially irreversible, catastrophic impacts are possible for ecosystem and human health at a planetary scale (Lovelock, 2006).

## **Ecological Footprint Analysis**

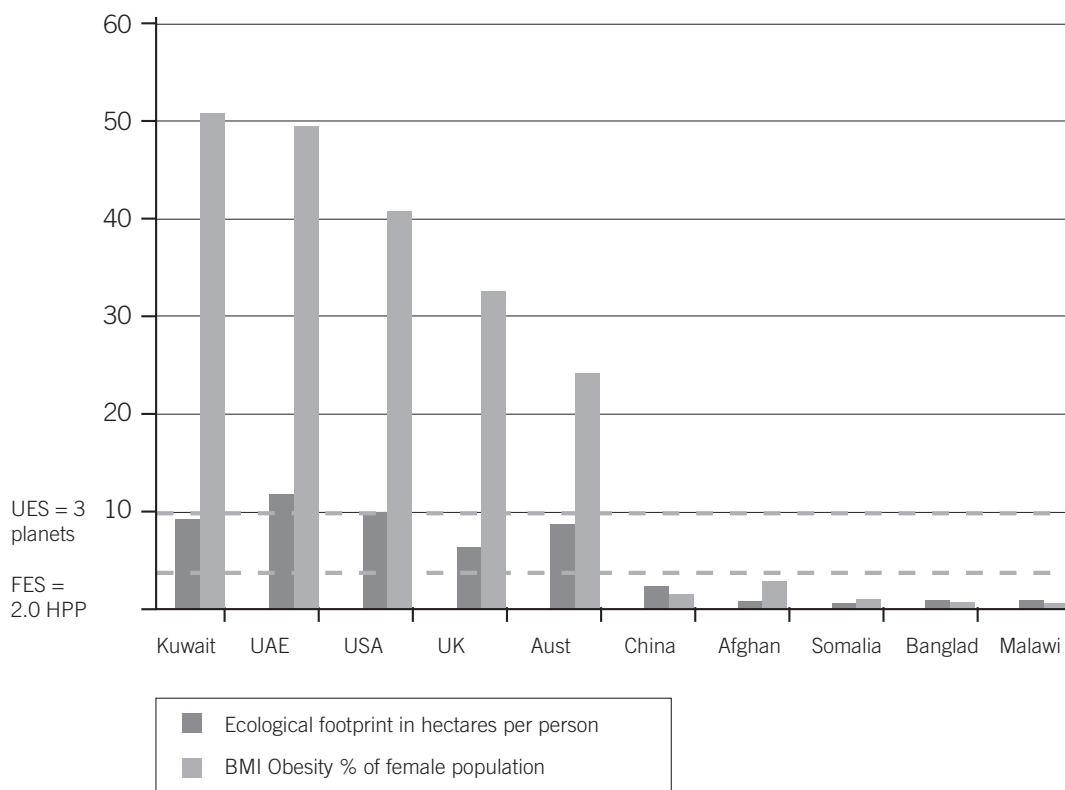
Ecological Footprint Analysis (EFA) has been developed as a relatively new tool to assess the impact and sustainability of humans on planet earth (Wackernagel and Rees, 1996; Chambers et al., 2000; Lenzen and Murray, 2001; WWF, 2006; Global Footprint Network et al., 2005). EFA differs from other measures of human impacts in that it offers a comparative insight into aggregate resource consumption and waste production at a number of different scales. By converting all forms of resource consumption and waste assimilation into a universal unit of biologically productive land (hectares per person) needed to produce those resource and waste assimilation services, meaningful comparisons can be made between the resource intensity of lifestyles worldwide. EFA is capable of generating data that takes into account the origins and destinations of the inputs and outputs of a complex, interrelated globalised economy. It is also able to give us a comparative analysis of the various components of our ecological footprint such as food consumption, electricity consumption, carbon dioxide emissions and transport at individual, institutional and national scales.

Examining these comparative data highlights the large Ecological Footprint (EF) for both people in rich countries and those with high per capita use of fossil fuels. This information, combined with other data generated on the

health problems of humans, gives us some compelling information about just how intimately the ecological footprint, health status, lifestyle and sustainability are connected. Using publicly available data from WWF in their Living Planet Report 2006 and the World Health Organisation data on obesity it is possible to see more clearly this connection. I have put into Figure 1, below, data on some of the top 10 national per person EFs in the world and their corresponding rates of obesity for females. The measure of obesity is body mass index (BMI) over 30.<sup>3</sup>

The graph also shows how an estimate of a 'fair earth share' of available resources can be undertaken. Current best estimates are that given the amount of biologically productive land available on this earth, plus the land needed to assimilate wastes such as carbon dioxide, there is approximately two hectares of land per person if all 6.5 billion people on earth were to have an equal share of biologically productive and useful land. The graph also shows that a number of countries have ecological footprints near 10 hectares per person which translates into approximately 3-4 planets worth of biologically productive land.

**Figure 1. Ecological Footprint and Body Mass Index Comparison**



FES = Fair Earth Share of 2 hectares per person for an ecological footprint within the limits of one earth  
 UES = Unfair Earth Share: At 10 hectares per person 3-4 planets are needed to support such an EF  
 UAE = United Arab Emirates, Aust = Australia, Afghan = Afghanistan, Banglad = Bangladesh

<sup>3</sup>The prevalence of overweight and obesity is commonly assessed by using body mass index (BMI), defined as the weight in kilograms divided by the square of the height in metres (kg/m<sup>2</sup>). A BMI over 25 kg/m<sup>2</sup> is defined as overweight, and a BMI of over 30 kg/m<sup>2</sup> as obese. (www.who.int/webloc)

## **A Heavy Footprint and Health**

While I do not wish to argue that there is a simple causal relationship between per person EF and obesity levels expressed as BMI, it is clear that countries with a high EF generally also have a high percentage of people with a BMI defined by the WHO as obese. The converse is also immediately obvious in countries with a very small EF. People in the Pacific Island nations defy this trend in that they have, in Tonga for example, about 60% of the population clinically defined as obese, yet they have a national ecological footprint that is hardly measurable. However, studies undertaken on obesity in the Pacific suggest that rather than caused primarily by genes or a traditional cultural preference for largeness, clinically defined obesity is a new problem connected to the importation and consumption of high fat and energy dense food and decreased physical activity (Obesity in the Pacific, 2002).

In the context of many developing nations, like those in the Pacific, the domestic consumption of oil-based energy and highly processed food is what ensures a person's ecological footprint exceeds its fair earth share and contributes to problems such as obesity. I argue that like people in wealthy nations with a high EF and high rates of obesity, the upwardly mobile in developing countries and those who are becoming increasingly dependent on imported food and energy in places like the Pacific are seeing their ecological footprint not only getting larger, but also much heavier. In developing countries like India and China, there is an emerging obesity problem, particularly in children, connected to the rise of affluence, the over consumption of food and sugar-based drinks and reduced physical activity. If a micro-analysis were done of the ecological footprint of individuals in these circumstances, it is likely that it would closely match those of people in wealthy countries. It goes without saying that in a proportion of the population, under nourishment occurs in all countries, even those like Australia that have a large ecological footprint.

In a wealthy country like Australia, approximately 40% of our EF of 7.7 global hectares per person (3 earths) is attributed to food and of that, 34% is linked to animal product consumption (Global Footprint Network-University of Sydney, ACF 2005). Meat product consumption is increasing worldwide and it comes at a huge environmental cost. Recent estimates put at 18% the contribution of meat production to total greenhouse gas emissions in Australia and in addition, meat production is implicated in land clearing and excess water use (Foran, Lenzen & Dey 2005). The transport sector of the EF contributes about 6% -11% of the total and it too is implicated in problems such as obesity as private mechanised transport replaces human energy in the form of walking etc. The net results for populations (or segments of populations) that over consume food and nutrition while at the same time reducing their physical activity levels are increasing rates of obesity (with attendant chronic disease), an ever increasing ecological footprint and non-sustainability.

## **People Power**

Reducing our ecological footprint is vital for planetary and human health. In particular, intensive agriculture uses massive amounts of fossil fuel in the form of farm machinery, petroleum-based fertilisers and produce transport (food kilometres). The cheap (until Peak Oil) and freely available energy involved in the fossil fuel based economy and agriculture is now, ironically, embodied in humans in the form of obesity. In effect, humans are eating fossil hydrocarbon energy and converting their 'high-hydrocarb' diet to body fat.

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It is unlikely that, on their own, health promotion or health protection policies will succeed in helping people break out of this obesity trap. The trap has structural dimensions that would require the political will to intervene in the operation of free markets, advertising and trade in a globalised and de-regulated economy. It also has ethical dimensions where health professionals need to support behavioural change in the value-laden and culturally difficult domain of body image and shape. Given that obesity levels worldwide are increasing, both traditional health promotion and health protection face formidable barriers for success in the context of personal overconsumption. Obesity levels become hard to reduce as lifestyles become more sedentary, energy intensive and dependent on technology. A non-sustainable feedback cycle is then firmly in place with no apparent way out until system failure.

The use of the personal ecological footprint calculator and further, provision of more detailed information about the EF in the form of environmental education, allows people to see their impact on the earth in terms of fair earth shares. Component analysis of the footprint clearly shows where, in everyday life, unfair earth shares are generated (mainly meat and petrol). If people can more fully appreciate that their social structure and its connections to total lifestyle are implicated in their body shape and weight, then it is possible that they will see an additional reason to change their lifestyle. Moreover, unless health professionals can appreciate the structural dimensions of obesity encapsulated within the excess ecological footprint, it is possible that they will continue to 'blame the victim' and achieve little as change agents.

With good environmental education about these variables, people can see that the problem of obesity is not strictly an individual and personal issue, but one that flows from the very structure of our non-sustainable society. Despite this, a personal response can come in the form of voluntarily reduction of an ecological footprint that, as a by product, will lead to a reduction in levels of obesity. Moreover, as the EF and BMI go down, ESD goes up.

If people do a calculation of their personal footprint (Calculating Your Ecological Footprint, ACF Green Home, EPA Victoria) and learn in more detail about why, for example, the food component figures so prominently, they will see for themselves the opportunities to simultaneously reduce their footprint, improve their health and contribute to genuine sustainability. Hence, health promotion advocates (both behavioural and structural) can champion the idea that participating in ecological footprint reduction requires a reduction in fossil fuel-based food and greater use of human energy. Ecological footprint analysis then becomes a vital part of a public policy approach to the problem of obesity.

To have realistic options to reduce an ecological footprint that is beyond a fair earth share we need to tap into that ancient source of clean, renewable energy that has been increasingly overlooked ... 'people power'. The excess potential energy in human bodies needs to find an outlet and be actualised. At present, our social structure and the designed environment militates against the use of our own energy to meet basic needs. Automobile dependence makes walking and cycling both unfashionable and dangerous for adults and children. Technological dependency makes it easy for people to not use their own potential energy. Like modern Tongans, people don't invest energy into growing their own food any longer as time constraints, lack of land and convenient 'fast foods' act as magnets for obesity and physical inactivity.

Providing structural change for more opportunities for humans to use 'people power' (cycleways, walkways, runways, promenades, stairways, meeting spaces, exercise precincts, biodiversity corridors, repair of degraded landscapes, etc.) is a challenge for urban planners, architects, engineers and developers who can also examine the (excessive) ecological footprint of contemporary buildings and cities (Girardet, 2000; Newman and Kenworthy, 1999). Getting involved in urban-based organic food production (city farms, community gardens, suburban

permaculture), is a way that citizens can simultaneously supply healthy food, improve fitness and make organic, living connections to the earth and fellow citizens.

Finally, greater use of people power invites citizens to become more involved in the decision-making that affects the ecological footprint. Ecologically aware and informed citizens can use that other form of 'people power', public participation in decision-making (organic democracy), to change the direction of our social and cultural evolution from an unfair, unhealthy earth share to one that is both fair and healthy.

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# Engaging the health sector in ecosystem viability and human health: what are barriers to, and enablers of, change?

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## Abstract

*Concerns about the environment now include ecosystem viability. What roles the health sector will play as the planet becomes warmer and more polluted and humans become sicker as a result is unclear. Currently the sector is unprepared. This paper proposes that there are three interdependent areas for change if the health sector is to continue to promote, protect and restore the health of populations: i) recognition of global ecosystem disintegration as a principal determinant of illness, ii) engagement of the health sector in this evolving discourse to increase its knowledge base, and iii) a commitment to work cross sectorally. This paper outlines some thoughts on the nature of sector change itself, and in particular the need to identify barriers and enablers to bring about that change.*

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## Introduction

Historically, the research and practice of health professionals about the relationship between health and the environment has been at the local level and meeting basic needs. While this is important, the role of health professionals in addressing the looming ‘public health emergency on planet earth’ (Hales and Corvalan 2006 p.130) is unclear despite calls for recognition of the links between ecological sustainability and health at the global as well as the local level (i.e. see Boyden, 1987; WHO, 1988; King, 1990; McMichael, 1999; Hancock, 2000; Brown et al., 2005; Hales and Corvalan, 2006; Haines et al., 2006). Such calls have urged us to be resolute, energetic and scholarly in our response to the predicted health impacts associated with global ecosystem changes. Further, as McMichael et al. (2000 p.1067) say, ‘...our task in this evolving discourse, as health professionals, is to make clear that population health is a central criterion in the sustainability transition’. However, generally speaking the health sector in Australia is not engaged in this conversation (Verrinder, 2007).

This paper proposes three interdependent areas to ensure that western societies like Australia promote, protect and restore the health of humans. First and foremost the health sector, those agencies whose core business is the health of populations, needs to recognise global ecosystem disintegration as a principal determinant of illness. Beyond this, the health sector needs to engage in this evolving discourse to increase the knowledge base within the sector. This will involve a commitment to cross disciplinary and sector boundaries by using an ecological perspective. Since these three imperatives will necessitate a shift in the current trajectory of the health sector, this paper considers the nature of change itself and in particular the need to identify barriers and enablers to bring about that change.

## Change theories

Change theories explaining how individuals, organisations, communities and cultures achieve personal and structural change usually address either predispositions (enablers) and/or resistance (barriers) to change. Across cultures there is a generalisable and ongoing tension between the desire to accept new ideas and things and the desire for changeless stability. It has also been suggested that there are three general sources of influence or pressure that are responsible for both change and resistance to it culturally: forces at work within a society; contact between societies; and changes in the natural environment (O’Neil, 1997). Health professionals may be familiar with behaviour change theories that provide insight into the dynamics concerning facilitating change in individuals to promote health such as the Health Belief Model (Becker, 1974) and the Theories of Reasoned Action and Planned Behaviour (Ajzen and Fishbein, 1980). When used as the only strategy to effect behaviour change in a population they have been shown to be limited (Baum, 2002). Such criticisms suggest that structural changes are needed as well, to facilitate change in individuals. Theories of organisational change (Goodman et al., 1997), Diffusion of Innovation (Rogers, 1995) and Community Organisation and Community Building (Minkler, 1999) are examples that have been tried, tested, critiqued, modified and been successful in change in organisations and communities. Theories of cross sectoral action have been less well explored. Boyden’s theory (1987) of cultural adaptation can be useful here, where ‘adaptation’ means, “a modification in an organism or a population which occurs as a consequence of the introduction of an environmental threat and which renders this organism or population better able to cope with the new conditions” (p.170). Four sets of conditions are needed for successful cultural adaptation: recognition that an undesirable state exists, knowledge of the causes or knowledge of ways of overcoming the undesirable state, the means to deal with it, and motivation or political will to take appropriate action (Boyden, 1987).

## **Barriers to making the link between health and the environment**

Barriers preventing the links between ecological sustainability and human health have already been identified, and a lack of knowledge and the behaviour of sectors as 'silos' are regarded as foremost. Some suggestions to address these include a need to: i) compile a fresh synthesis of evidence from all of the knowledge domains (Brown, 2006); ii) acknowledge complexity (McMichael, 2006); iii) 'resist those innately conservative influences [and] explore the edges of our disciplines' (Woodward, 2006, p.140); and iv) examine the institutions that mediate the way people relate to the environment (Noronha, 2006).

Funding priorities have an impact on capacity building and the opportunity for change. Decisions about the development of education programmes and research directions are made under the influence of dominant ideologies. Policy development is rooted in the current ideology and globally, the dominant ideology is neo-liberalism, emphasising individualism. This emphasis tends to produce a research funding bias towards disease states and behavioural/lifestyle factors that determine health. As a consequence, researchers may not examine particular topics or may not pursue particular lines of enquiry because wittingly or unwittingly, they conform to prevailing dominant social or research paradigms (Soskolne and Light, 1996). As the evidence of adverse changes to the environment accrues, the paucity of health discourse about this becomes stark (Verrinder, 2007).

Repression of the dissemination of information is also a barrier to change. The evidence presented in peer reviewed journals assists professionals in decision-making about their practice (Allery et al., 1997). In professional circles, the peer review journal is considered the ultimate repository of knowledge. However, the discourse about the relationship between health and the environment is relatively thin within the accepted channels of 'health' communication. The health sector in Australia, reliant upon these repositories of knowledge, therefore cannot be expected to be prepared (Verrinder, 2007). The history and culture of journals (and increasingly the disciplinary status of journals) influence in which journals researchers and practitioners choose to publish. It has to be acknowledged that health professionals come from a wide range of disciplines and publish in a wide variety of journals and further, that many more manuscripts are submitted to journals than can be published. Editors not only need to make decisions about the rigor of the research but also take into consideration the perceived priorities of the general readership (Sperschneider et al., 2003). This means that the prevailing professional bias dominates the discourse. Any paper with an emphasis on the 'edge of the discipline' (Woodward, 2006) is unlikely to be published in specialised disciplinary journals, relegating such papers to less powerful journals (usually new ones that cover emergent fields of endeavour). These dynamics lead to a distortion of scientific knowledge concerning risks to health and the conditions for promoting health, because the discourse about the relationship between health and the environment is lost amidst these ideological (disciplinary) imperatives (Verrinder, 2007). It is unlikely that the 'silos' will disappear yet the evolving discourse of the interplay between humans and their environment and the impact of this on health would ideally be widespread across all sectors.

Further exploration of theories and models to assist sectors to work together may be the most useful of the theories mentioned here. Emerging theories of cross sectoral action need to be systematically tested. Two important questions include what prompts sectors to work together and what makes that relationship sustainable. Different ways of sectors working together have been proposed including networking, alliances, partnerships, coalitions and

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full collaboration (O'Neill et al., in Nutbeam and Harris, 2004). Some factors have been identified as important in understanding the process: the extent of the dependence and the level of trust have been identified as two of the most important (Glendinning, in Nutbeam and Harris, 2004 p.53). Outstanding examples of sectors and organisations working together can be used as benchmarks and the processes leading to this success can be researched.

## Conclusion

Human health is fundamentally dependent upon ecological sustainability. It is hard to discuss what roles the health sector will play as the health of the Earth's natural systems deteriorates. Currently the health sector is not prepared. The health sector is wittingly and unwittingly conforming to dominant ideologies which influence funding priorities, research and practice paradigms. The pressure to publish in one's area of expertise makes it hard to explore the edges of our disciplines. It is also difficult to change curricula if the topic doesn't 'fit' commonly held notions of core business. To recognise that global disintegration is a principal determinant of illness, the health sector must engage in this evolving discourse. Committing to making boundaries more permeable will increase the knowledge base within the sector. Understanding how change happens, with the success and failures of cross sectoral action, will help develop an ecological perspective. Ideally, and together, these will allow the health sector to promote health.

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# Collective thinking for a connected world: combining knowledges towards whole-of-community change

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## **Abstract**

*Concerns for healthy people and a healthy planet have traditionally run along parallel lines. People working in public health and in environmental management have been working within separate interpretations of reality. They draw on different information sources, and have different professional skills, administrative systems, client groups, and set of problems they seek to solve. The strong relationship between global ecological integrity and a sustainable humane future means that it is past time that the two professional fields learn to act together as one.*

*A six-year study of local action on sustainability issues, the Local Sustainability Project, found not two, but five voices needing to hear one another and work together for long term whole-of-community change. Action on any serious issue, from local water quality to global warming, has been found to require collective thinking that brings together individual change agents, community aspirations, professional expertise, organisational efficiency and a shared holistic focus. These are often represented as conflicts of interests, competing for power. A systemic change from hierarchical to synergistic relationships, and from competing interests to collective learning is necessary if all these interests are to work constructively together. Collaboration within a cumulative social learning spiral offers a valuable tool for the difficult transition to collective thinking and action.*

## **What should be? From parts to wholes**

Advancing human health and working to ensure environmental sustainability have long been treated as two separate enterprises. Only too often they are represented as mutually exclusive, as jobs versus trees, as the future of people versus the future of the planet. Even the well-intentioned who are concerned about that future tend to

continue the divide. Two of the most influential documents in each category, the Ottawa Charter and the Brundtland Report, emerged in the same year (WHO Europe, 1986; WCED, 1986), with very little to say about each other. Yet they each called for the same elements of transformational social change: policy integration, more supportive environments, whole-of-community engagement, individual acceptance of responsibility, and institutions re-organised according to the precautionary principle (Figure 1).

The twin sets of health and environment principles for sustainability have been applied successfully in a range of contexts, but almost always as separate sets. An example from health is the worldwide Healthy Cities program (Tsouras, 1995; Baum and Brown, 1989), and from environment the European sustainable communities (Sustainable Communities, 2006; Deelstra, 1992). In each program, where the full set of principles was implemented by the full team of players listed in the third column in Figure 1, it proved possible to bring about significant social change. In Australia, the Victorian Health Promotion Foundation instituted the influential Healthy Localities Project, which explicitly linked all five of the areas of action in pursuit of better health for both people and planet (Garrard et al. 1995). In these cases, combining the principles proved more important than which field was the principal driver.

**Figure 1.**

**Social change models:  
Strategies for the new public health, sustainable development, and collective action**

Ottawa Charter WHO*1986	Our Common Future WCED+1986	Team of players LSP^2007
1. Integration of policies	Integrated monitoring	Holistic thinking
2. Socio-biological security	Global ecological integrity	Specialists, researchers
3. Strengthened communities	Intra-generational equity	Community as a whole
4. Individual capacities	Individual actions	Individuals as change agents
5. Re-orient services to reduce risks	Precautionary principle#	Government and social service organisations

\*World Health Organisation +World Commission on Environment and Development ^Local Sustainability Project

# *Not to wait for proof to act against risk nor to prevent action that increases the risk, where that risk is too great (definition from Council of Australian Governments, 1992).*

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On the other hand, consistent with the reductionist approach of the scientific era it has been more usual for sustainability programs in any field to consider only one of the five dimensions at a time. Evaluations of most sustainable development programs have consistently found that their effect remained largely confined to their host field (Baum, 2003). As an antidote, between 1996 and 2002 a collaborative action research program, the Australian Local Sustainability Program, partnered practitioners from each of the three fields of action in Figure 1, (namely public health, environmental management and local sustainability), in collective action towards a sustainable future. The aim was to explore the effects of combining all five strategies in team-based collaborative projects furthering ecologically sustainable development.

### ***What is? Five knowledge cultures***

During the first stage of its research program, the Local Sustainability Project team participated in ten pre-existing projects linking environment and health. Each project agreed to pursue all five of the strategies recommended for the New Public Health and Our Common Future. The projects included: individuals pursuing integrated inquiries into sustainability practice (Griffith, 2002); production of guidelines for whole-of-community engagement (Aslin and Brown, 2004); preparation of a text book for public health practice supporting global ecological integrity (Brown et al., 2005); adoption of sustainability as a strategic goal for local government (Brown, 2005); and the development of a holistic pattern language for resolving wicked problems (Schuler and Day, 2004). The second stage of the Local Sustainability Project (LSP) involved applying the findings from the first stage to collective practice (Brown, 2007).

At the commencement of this partnership in action research, the Local Sustainability Project partners found that barriers were socially constructed between each of the five strategies, seriously impeding any collective progress in either health-based or environment-based projects. Each strategy was served by a different set of players (as identified in Figure 1), drew on a different evidence base, forms their conclusions from different tests for truth, and interprets them within different frameworks (Figure 2). Each held their own ideals of good practice. These differences meet the criteria for Thomas Kuhn's diagnosis of distinct paradigms (or frameworks) of knowledge.

Further examination revealed not only five distinct paradigms of knowledge. Distinctly different organisational structures, and interpretation of the same concepts and a strong rejection of the contributions from any of the other strategies, expanded the differences between the five paradigms (Figure 2). The differences were therefore great enough to suggest that the five strategies in Figure 1 are drawn from distinctly different knowledge cultures.

The LSP studies found that in standard practice these knowledge cultures formed a distinct hierarchy. Organisational and specialised knowledge cultures vied for supremacy. Local community knowledge was accepted grudgingly, if at all. Individual contributions not backed by disciplines or organisations were rejected out of hand. Holistic knowledge, derived from a focus on the core or essence of a problem, was largely dismissed altogether. Any attempt to bring the knowledge cultures together therefore required a sharing of language, power and understanding to the extent required for cross-cultural communication.

Figure 2 offers a synopsis of the structure, sustainability concepts, and mutual rejection found among the knowledge cultures. Taking the knowledge cultures in turn, an **individual's knowledge** is grounded in personal experience. Perspectives on sustainability are linked to a desire for personal safety and global security. The other








knowledge cultures dismiss this knowledge as based on personal anecdote, and so to be disregarded. **Local community knowledge** is derived from shared events. Each community has its own stories and traditions, belittled by the other knowledges as being mere gossip. This knowledge culture is represented in Figure 2 as a wavy line of loosely connected and diverse communities. For each of these, sustainability is interpreted in the context of their valued sense of place.

**Specialised knowledge**, the dominant mode of our time, is constructed by a multiplicity of disciplines, each within their different framework, hence the ring of boxes in Figure 2. Specialised objectives for sustainability include to restore the integrity of the global ecological cycles (the biophysical sciences), to ensure the long-term well-being of the world's cities (the social sciences) and to maintain economic growth. The other knowledge cultures claim that specialised knowledge is hidden from them by jargon, or distorted by concentration on single factors.

**Organisational knowledge** takes a strategic view of sustainability, most frequently with action towards goals set by the organisation itself, whether government or industry. Hence the icon in Figure 2 is a closed circle with directional arrows. Sustainability often refers to the long-term survival of the organisation and its profit, rather than to people or planet. Yet skilled strategic planning is crucial for a sustainable ecological and human future. The difficulty of achieving a unified response is exemplified by the climate change debate.

**Figure 2.**

**Five knowledge cultures and sustainability**

Knowledge base	Structure	Concept of sustainability	Basis for rejection
Individual experience		Personal security	Subjective, anecdotal
Community shared events		Sense of place	Gossip, interests
Specialised framework		Ecological integrity, population health	Jargon, single factor
Organisational		Meeting objectives	Self-serving, biased
Holistic		Life-sustaining planet	Airy-fairy, impractical
Collective resource	Collective thinking among the above	A just, healthy and sustainable future	Inefficient, too intensive

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The core of a collective approach is a shared focus, a **holistic** understanding of sustainability that all concerned can share. Such a shared focus requires each of the knowledge cultures not only listening to, but hearing each other. The conditions that support such mutual understanding are rare under current management conditions. The capacity to seize the essence of an issue is more often conveyed by a community's artists. However, it can be found in science in terms like 'biodiversity' encapsulating a complex dynamic system.

The **collective knowledge** that combines all the knowledge cultures can be created through the synergy of connecting the parts. The contributing knowledges interact to generate far more than their sum. New knowledge emerges in all the participants that would have been impossible without the full set. In Figure 2 a collective approach to sustainability is identified as a just, healthy and secure future for both people and planet. Too frequently, even the suggestion of bringing all the knowledge cultures together on equal terms is dismissed as impractical and too consuming of resources of time and money. A second stage of the Local Sustainability Project faced the challenge of working with the participating projects to develop collective knowledge.

### ***What could be? A collective social learning spiral***

A second glance at Figure 2 confirms that all the knowledges are necessary for any significant change towards sustainability. Yet the labels by which the knowledge cultures reject each other have some validity, and so need to be taken into account. To be successful, a framework is needed that acts as a guide to meet the essential conditions for collected knowledge: first, mutual support in progress towards shared goals with all five knowledge cultures contributing on their own terms; second, each knowledge culture able to be understood and respected by all of the others; third, for human learning to build continually on itself, to be open-ended and cumulative in responding to change. Such a framework is provided by the experiential learning cycle developed by Kolb (1974) and his successors.

Studying experiential learning in adults, David Kolb and others found four sequential steps to be essential for any learning to become lasting (Kolb et al, 1974; 1986). Others, such as Malcolm Knowles working on adult learning, translated the theory into practice (Knowles, 1980). Together, their work confirms that the learning process begins with a set of ideals, guiding principles for *what should be* from taking part in the learning. They check their ideal against *what is*, a reality check, in order to establish what could actually be achieved. After this reality check, the learner moves on to explore the potential for new and novel ideas, to estimate *what could be*. After testing the new ideas in practice, the learner's develops their own construction of reality, of *what can be*. The learner then re-evaluates what *should be* in the light of their learning experience. The learning cycle is thus an unending spiral, not limited by a particular project time-line or an individual's lifetime.

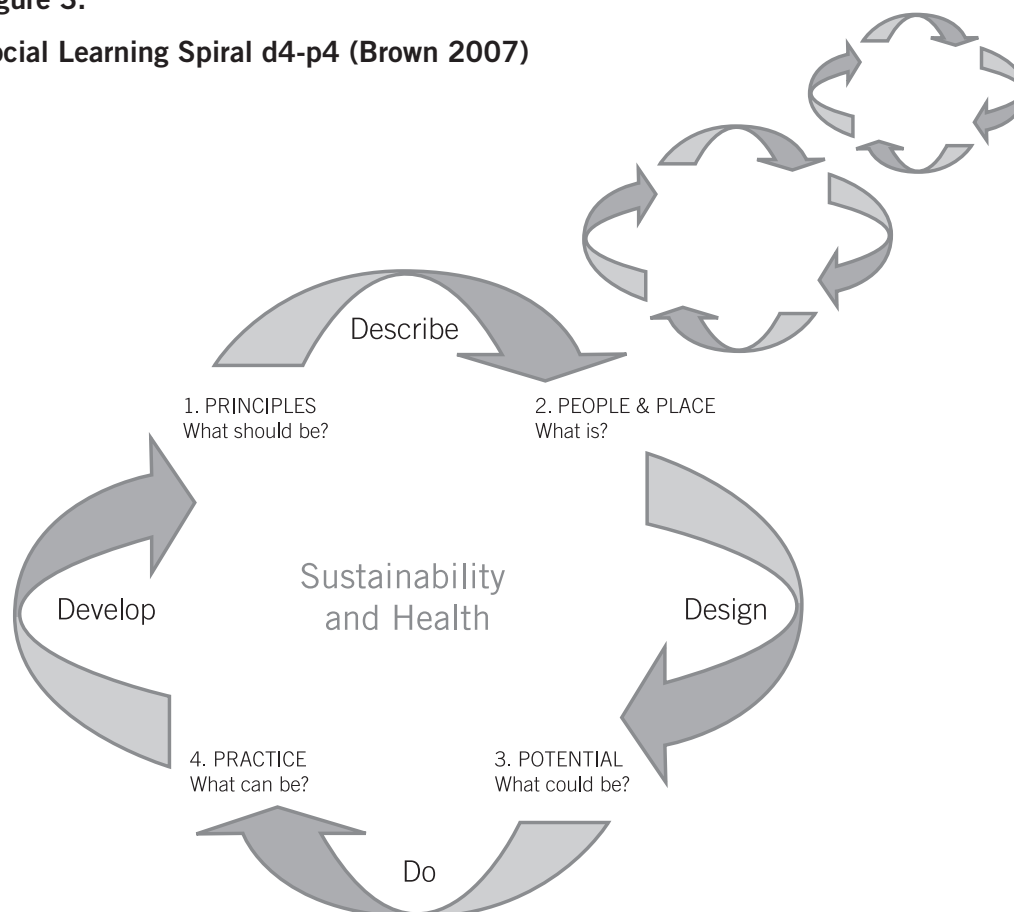
During the second stage of the Local Sustainability Project, the teams extended the experiential learning spiral to incorporate the collective formed by members of all the knowledge cultures (Figure 3). In each of the ten field studies, members of all five knowledge cultures were brought together in workshops which followed each of the four learning steps and a fifth synergistic workshop which reviewed the final product (Brown, 2007). The steps can be identified in Figure 3 as Developing principles, Describing people and place, Designing potential and Doing the new ideas in practice (d4-p4 for short).

### **What can be? Case study of a collective social learning process**

In the second stage of the Local Sustainability Project, a collective social learning cycle was initiated in a number of projects. One was a whole-of-community change project, a Sustainability and Health Action Strategy for the city of Canberra in the Australian Capital Territory (the national political capital, a university town, in a bush setting with population 400,000). The strategy adopted a 'snowball' process: a small group of participants from each of the knowledge cultures generated an initial series of projects which furthered both sustainability and health. The participants assisted one another through each of the four learning steps, generating a synergistic effect. The aim was to eventually have all aspects of the city involved.

The first event was an invited workshop to determine *what should be*, the shared aims that would drive their projects. Thirty people drawn from each of the five knowledge cultures met in a three hour session to brainstorm shared goals (Step 1 Figure 3.) Their vision was that ACT would be **an active, collaborative, networking, more peaceable community, using its wisdom and knowledge capital to build a just, sustainable and healthy city and society**. These goals reflected aspects of the city as the country's administrative and political core with a strong university presence.

**Figure 3.**  
**Social Learning Spiral d4-p4 (Brown 2007)**



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The next step was to decide *what is* as the parameters of the project. The criteria selected were that the project must:

- be feasible because it is practical, financial, and has the necessary resources to ensure it is completed;
- support ecological sustainability and advance community well-being;
- make a real impact on the mainstream community by stretching thinking and going beyond today's norms;
- involve collaboration and engagement of the community, especially those who are disadvantaged under present conditions;
- build individual and social capacity, involving clarification of values, action learning, problem solving and behavioural change; and
- support a connectedness of all forms of knowledge and interests, including relationships with all species.

At a workshop to design *what could be* held six weeks later, fifty people were ready to join in the program. The snowball effect and the creative synergy were beginning to gather strength. Twelve projects were developed as open-ended possibilities in the design workshop, and later fine-tuned to fit the set criteria: *what is*. The projects in Box 1 make up the actual program delivered by the group. The projects were monitored in order to determine what could actually be delivered: *what can be*.

Box 1. *What can be*: projects developed through participation in the collective learning spiral (with their sponsors):

1. **Sustainability Scinema**: Youth Film Festival on happy healthy sustainable living for youth (ACT Healthy Schools program, local art group members, video production trainers)
2. **Community Gardens** – food and plant production, with a focus on nutrition, and no waste, using grey water, at Curtin gardens (Bushcare, Rotary, Uniting Church, water recycling industry )
3. **Concerned Citizens of West Kambah** (CROWK): whole-of community collaboration for a sustainable future in a fringe city suburb on the edge of bushland experience (West Kambah community development committee, schools parents and friends groups, Landcare groups).
4. **Indigenous wellness pathways**: an indigenous-designed Wellness Centre (Steering committee of 10 local indigenous leaders, a pilot study in a country town)
5. **Sustainable Health Action** networks linking all the existing activities: continuation of collective learning workshops (Nature and Society Forum).
6. **Art of moving**: drama, design, sculpture, dance, throughout the city, including the buses (Action buses schools, ANU Art School, ACT community development network)
7. **YMCA Bush Capital Lodge**: a project to re-establish ACT Youth Hostel as a lodge for an Australian bush and indigenous foods adventure (YMCA, Canberra nutritionist, conservation groups)
8. **Assessing change towards sustainability** across the ACT (sustainability assessment project)
9. **Factor of X**: Art display and activities throughout ACT demonstrating reduction of all resource use, water, energy, consumption, to 1/10th. (Art School, Australian National University ANU Green project, CSIRO)
10. **Youth leadership in sustainability**: recruitment and design of youth-led program for advancing sustainability in the ACT (ACT Environment and Sustainability Centre, ANU Green and ANU and UCAN students)

- 11 **Sustainable economic development strategy for ACT 2005-10:** models of behaviour change eg grey water, financial products (Rotary, MECredit Union, review of Sustainability economic strategies elsewhere).
- 12 **Challenge to community funding** paradigm (local organisations wanting simpler protocols and greater transparency)

One year later, a workshop brought the projects together to review what had been able to be put into practice: *what can be*. Of the 12 projects 10 had proceeded to action. Seven of these had received significant funding and many had spun off still further projects. The roles played by the five knowledge cultures were becoming apparent. Particular individuals were the first, and foremost change agents. Community groups, such as students, artists, Landcare, teachers at all education levels, community nurses, parents, and service club members contributed actively to the projects. Specialists were recruited from all fields of operation, from administration, art, computing, education, film-making, finance, and science. Government agencies, from health promotion, community nursing, sustainable schools, and social services supported the project and gave their time to activities in their field of interest. The holistic focus was generated by the vision of *what could be* generated in the first workshop. The one area that proved difficult to add to the 'snowball' was small business. Although members came to the first meeting, the project did not hold out enough economic advantage for business to become involved.

After another six months the full suite of projects, now over 30, were due to meet again to share their learning, extend their collaboration and determine the next round. The program still has a long way to go before it reaches the entire city. But through the networks set in place, new people and new projects are continually emerging to join in the process. Whole-of-community change towards a sustainable future does not happen overnight. But once started, the spiral of collective thinking towards a connected community continues under its own steam.

## Conclusion

The social learning from this particular project is echoed in others in the Local Sustainability Project, and in an increasing number of programs fostering sustainable practices. The collective thinking and action combining the diversity, skills and learning of the five knowledge cultures generate group creativity, synergy, and a collective commitment to supporting each other in long-term change. This is in marked contrast to the many integrative endeavours which founder from a competitive spirit and a lack of trust among the contributing interests. In particular, the divisions between human and environmental health disappeared once these were placed in a wider context of mutual learning and the presence of the full range of knowledge cultures.

As collective thinking and practices continue, the mutual learning grows. The learning so far includes the need to allocate significant time and resources for the development of collective thinking. The minimum time for initiating the change appears to be about six months for the initial round of the social learning spiral. The essential resources appear to be: one, a partnership with an individual or group of facilitators committed to collective thinking; two, a critical mass of different interests within the community interested in significant change; availability of supporting resources of personal skills, funding or political backing (note that any one is sufficient to start with); and three, a sense of belonging to a common community (however divided that community might appear to be).

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Experience has shown that there are many pathways by which these conditions for collective thinking can be met. But in all cases, there is a marked change from present practice required for individual, community, specialised and organisational knowledge cultures to each include the others in whole-of-community change.

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