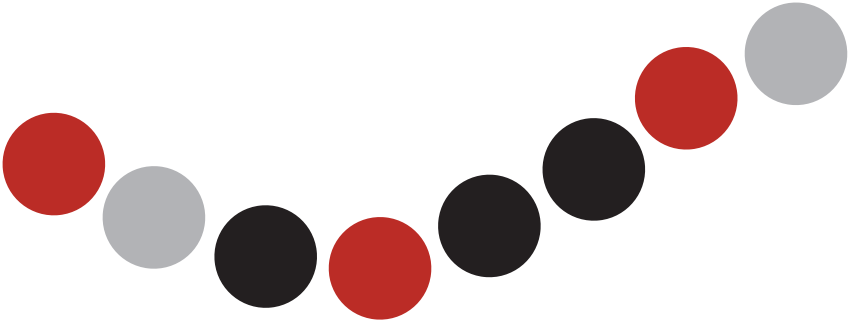
EDITED BY
CIMADAMORE, MITTELMARK, LIE & OTTEMÖLLER

DEVELOPMENT AND SUSTAINABILITY

The Challenge of Social Change



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DEVELOPMENT AND SUSTAINABILITY

THE CHALLENGE OF SOCIAL CHANGE

edited by Alberto D. Cimadamore, Maurice B. Mittelmark, Gro Therese Lie and Fungisai P. Gwanzura Ottemöller

Zed Books
London

Development and Sustainability: The Challenge of Social Change was first published in 2016 by Zed Books Ltd, The Foundry, 17 Oval Way, London SE11 5RR, UK.

www.zedbooks.co.uk

Typeset in Plantin and Kievit by Swales & Willis Ltd, Exeter, Devon
Index: Rohan Bolton
Cover designed by www.kikamiller.com

A catalogue record for this book is available from the British Library.

ISBN 978-1-78360-624-5 hb

ISBN 978-1-78360-623-8 pb

ISBN 978-1-78360-625-2 pdf

ISBN 978-1-78360-626-9 epub

ISBN 978-1-78360-627-6 mobi

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ACKNOWLEDGEMENTS

This book has its origin in a workshop organized by CROP, UiB Global and UiB's Department of Health Promotion and Development (HEMIL), and supported by the Worldwide Universities Network (WUN). The workshop had the title 'Development and Sustainability Science: The Challenge of Transdisciplinary Knowledge for Social Change' and took place in Bergen, Norway, in May 2013.

The editors would like to express sincere thanks to the institutions that made the workshop possible, as well as the CROP Secretariat, the contributing authors and all those involved in producing the final result: *Development and Sustainability: The Challenge of Social Change*.

FOREWORD

The University of Bergen is immensely proud of the cross-disciplinary research community we have in global and development-related research and education at our institution. We started this as a strategic priority area in the late 1980s after the Brundtland Commission's work on *Our Common Future* in 1987. We then established a cross-disciplinary centre structure and allocated specific resources for this purpose. Since then there has been a clearly defined connection between development and sustainability at our university. We have developed, and will continue to develop, global challenges as the overarching premise for our strategic priority areas. Development and sustainability science will play a central role in the future of the University of Bergen.

Knowledge is the key to solving contemporary and future global issues. Poverty, development and climate change are examples of challenges that need to be addressed from a variety of disciplinary viewpoints in order to be fully understood. Through the United Nations' Sustainable Development Goals we find the political goals for a more sustainable future. I firmly believe that universities have a key role in achieving these goals and the University of Bergen will do its part.

Development and sustainability science is one area where we are able to make a difference through high-quality research. Our strategic priority area, 'Global and development-related research and education', was recently evaluated by an international panel. They concluded that 'the quality and relevance of the scientific output within global and development-related research [...] is evaluated by the Panel as being of excellent international standard'.

Development-related research, marine research, climate change and sustainable energy have been and will continue to be key components at the University of Bergen. They are all fields that are essential in understanding global issues such as poverty, development, food shortage and climate change.

This book provides new insights into development and sustainability science, not least related to the importance of cross-disciplinary

approaches in order to understand complex issues. The researchers behind this book and the content of the book itself do justice to the high expectations of the university leadership within the field of sustainability science.

Dag Rune Olsen
Rector, University of Bergen

1 | DEVELOPMENT AND SUSTAINABILITY SCIENCE: TRANSDISCIPLINARY KNOWLEDGE FOR POSITIVE SOCIAL CHANGE

Alberto D. Cimadamore, Fungisai P. Gwanzura Ottemöller, Gro Therese Lie and Maurice B. Mittelmark

Introduction

This book interlinks four concepts: *development*, *sustainability science* and *transdisciplinarity*, all in the quest for positive *social change*. The editors have been working for years, mostly separately, with different notions of development. Our exposure to sustainability science and transdisciplinarity is of more recent vintage. Some of us approach development with a focus on poverty and international relations in order to understand the way in which development changes lives and societies; others have been more focused on health promotion in the global South.

We are all attracted by the addition of 'sustainable' to development, because the needs of present and future generations force us to have a long-term systemic view of the interactions between nature and society and the implications for the global system. Still, we appreciate the quandaries of perceived views on development, and the appeal of post-development alternative approaches and the critique of Western-initiated programmes aiming for sustainable development and poverty eradication[1] (Rahnema and Bawtree 1997; Escobar 2012; Rist 2014; Pogge et al. 2013; Cimadamore et al. 2013). The mainstream approach to sustainable development seems rightfully characterized as being more 'about sustaining [economic] development … than developing sustainability in the ecological sense' (Castro 2004: 220). Yet what approach to development will satisfy the critics, and the counter-critics, and still deliver on people's urgent need for schools, healthcare, sanitation and other essential components of a decent life?

It is no wonder that tensions and conflicts are components of any kind of development discussion. Our journey as social scientists

is influenced by diverse theoretical and methodological experiences, and we feel the need to take others' perspectives as a strategy for our individual and collective scientific growth. We are keenly aware of the limitations to our understanding resulting from the disciplinary perspectives of our respective educational paths. We do our modest best within our disciplinary territories, and strive to experience the richness of transdisciplinarity. In our understanding, transdisciplinarity is qualitatively different from multidisciplinarity (and interdisciplinarity). It denotes research conducted by investigators from different disciplines working *jointly* with relevant society actors to create conceptual, methodological and practical innovations that integrate and move beyond discipline-specific approaches *to confront vital social problems*. This is why we embraced a transdisciplinary ethic in developing the project leading to this book. Indeed, we could hardly have chosen otherwise, as transdisciplinarity seems so interlinked to sustainability science that it is almost impossible to contemplate the latter without referring to the former.

This chapter provides readers with the roadmap we use to move from our disciplinary and interdisciplinary activities towards transdisciplinarity and sustainability science. It introduces readers to the work of colleagues who participated in the journey, which started with a call for papers on 'Development and Sustainability Science – the Challenge of Transdisciplinary Knowledge for Social Change'[2] and continues with this book project. The book closes with the following question: How do the contributions in the foregoing chapters fit into the project as represented in the call for papers and how do they deal with development, sustainability science and transdisciplinarity?

Further setting the stage for the main set of chapters, we will continue to discuss how we have defined and understood development, sustainability science and transdisciplinarity. The material on development includes a description of development scholarship at the University of Bergen. This provides an important context, since all the editors are at the University of Bergen. This introductory chapter is logically linked to the concluding chapter, where we discuss how the following chapters address the original intention set in the call for papers. The book concludes by considering some of the challenges ahead, and how this book will add to our foundation for future progress in Bergen.

Development and the search for sustainability

This book has its genesis in a workshop conceived as a practical step to forge a new international collaboration on sustainable development between the University of Bergen (UiB) and other national and international institutions. Poverty and health were at the core of our preoccupations, whereby the goal was to work towards connecting social and environmental sciences for a definite purpose in an emerging collaborative effort: enhancing the well-being of people and their environments where it is most needed, namely the places where severe poverty stubbornly continues to hamper sustainable human development.

The concept 'development' is controversial and disputed. Development has been defined in different ways in different disciplines and has varied over time. We do not want to concentrate here on a theoretical discussion about this, but we are conscious of how certain interpretations of development have had hegemony in academic communities as well as in international agencies. Depending on how we understand development, different possibilities arise for integrating disciplinary views into transdisciplinary collaboration.

Historically, theories on development have roots in sociology, anthropology, economics and political science, but are not limited to these disciplines. Before the Second World War and in the years following the war, the so-called modernization theory dominated and created the intellectual roots of the field. Modernization theory looked at which aspects of countries were beneficial and which constituted obstacles for economic development with a distinct idea of progress. One of the main ideas that emerged from this was that development assistance targeted to overcome obstacles for economic growth could lead to the modernization of 'traditional' or 'backward' societies in the sense marked by the evolution of developed Western societies. The modernization and other mainstream approaches to development have been heavily criticized by scholars of diverse theoretical orientations (Peet and Hartwick 2009) and geopolitical contexts (Villareal 1979), ranging from structuralism (e.g. Raul Prebisch – see Love 1980; Furtado 1990), neo-Marxism (Amin 1978), dependency theory (Cardoso and Faletto 1979) to feminist approaches (Boserup 1970; Saunders 2002). In the 1980s and 1990s, post-development theory arose and questioned the idea of national economic development altogether. According to post-development

scholars, the goal of improving living standards leans on arbitrary claims as to the desirability and possibility of that goal. Wolfgang Sachs claims that development thinking has been dominated by the West in an ethnocentric (*contra* an eco-centric) fashion, and he and other authors argue that 'the idea of development stands like a ruin in the intellectual landscape' (Sachs 1992: 1). The Western lifestyle may be neither a realistic nor a desirable goal for many (we can even say the majority) of the world's population. Given the current global challenges (social, environmental, ethical) faced by humankind, alternative conceptions of development that go beyond modernization need to be considered by an emerging transdisciplinary field such as sustainable science.

Sustainable development is being seen by post-development scholars as a rubric for Western-style development, with loss of a country's own culture, people's perception of themselves and modes of life.

Without buying the entire post-development package, it seems reasonable to internalize the call for a broader cultural involvement in development thinking that accepts (or even promotes) diversity as part of a new global contract to 'ensure sustainable consumption and production patterns' (United Nations 2014a: Proposed Goal 12). Post-development thought holds a vision of society removed from the ideas which are currently dominant, and resisted not only in the South but also by critical academic communities in the North. Post-development argues for structural changes based on solidarity, reciprocity and a larger involvement of traditional and local knowledge. We can see clear points of contact between this line of thought and those sustained by contributors to this volume (Edwards and Delamonica). In any case, and despite criticisms, '"development" continues to survive even if, within the international institutions, its original aims have been whittled down to the struggle against poverty or the achievement of the Millennium Goals' (Rist 2014: 273). This might be changing given that the proposed SDGs consider that 'poverty eradication, changing unsustainable and promoting sustainable patterns of consumption and production and protecting and managing the natural resource base of economic and social development are the overarching objectives of and essential requirements for sustainable development' (United Nations 2014a: 3). However, the mainstream international debate is still far from questioning the basis of the capitalist mode of production and consumption (as discussed in Boltvinik and Damian 2016) and the

underlying power relations that support the unsustainability faced by our planetary society.

Human development is one of the labels we attached to the original call for papers. It is a more recent theoretical orientation that draws on ideas from different origins, such as sustainable development, feminism and welfare economics. It focuses on how social capital and instructional capital can be deployed to optimize the overall value of human capital in an economy. Amartya Sen's contributions have influenced contemporary notions of development focused on human capabilities. His ideas underlie the Human Development Index, a measure of development pioneered by the UNDP in its Human Development Reports. The economic side of Sen's work can best be categorized under welfare economics, which evaluates the effects of economic policies on the well-being of peoples. Sen's influential work highlights an important ethical side to development economics which centres on the human being. As important as this approach has been, we need to see the question of human development within a larger context. The post-humanist critique of international relations draws on the reworking of the concept of system in complexity theory as a way to overcome the 'enlightenment anthropocentric focus of most social and political theory' by fully incorporating the 'natural world' into the scope of its study (Cudworth and Hobden 2011: 3, 1).

There is ongoing debate on how desirable change in society is best achieved, in academic communities and in the international community. Development theories in recent years have not been limited to social science disciplines and approaches, but include health sciences, climate research, ecology and natural resource studies, to mention but a few of the more recent influences. Thus the concept 'development' will be defined differently in some traditions and even rejected as a concept in other traditions.

Development research at the University of Bergen

The notion of development was born in and influenced by historical and social context. We therefore wish to share with readers some background information about development at the University of Bergen, where the idea for this book was initiated and developed. At the University of Bergen, global and development-related research and competence-building have been a strategic priority area since the Brundtland Commission's report, *Our Common Future* (Brundtland Commission 1987).

The link between the understanding of development and the understanding of sustainability has been explicit at the university ever since. The emphasis on working across disciplines and faculties was also evident when development research was given inter-faculty strategic priority in the 1980s. Four cross-faculty centres were established: the Centre for Development Studies, the Centre for Health Promotion and Lifestyle Research, the Centre for International Health and the Centre for Environmental and Resource Studies. Since then, research has been supported more or less continuously by dedicated core funding and a strategic committee for global and development-related research.

While some consider development-related research to be focused in the South, at the University of Bergen it goes beyond the study of developing countries as a geographical category, and covers research on global challenges related to poverty, human rights, health, climate, consumption, sustainable development and ethics. The view is that all countries have room for development, and the preferred expression is 'development-related research', in contrast to the narrower and often disputed 'development research'. This is meant to bridge diverse interpretations and include the humanities, the social sciences and the natural sciences. The long-standing collaboration between the university and the International Social Science Council (ISSC) has contributed to the internationalization of this area of studies (the ISSC's globe-spanning Comparative Research Programme on Poverty is located at the University of Bergen).

The developments described above provide fruitful soil for transcending disciplinary silos in favour of collaboration across disciplines. This is perhaps best illustrated by the activities of the Bergen Summer Research School (BSRS), which was initiated in 2008 with clear reference to the strategic priority of global and development-related research at the university. The summer school is an integral part of the university's doctoral training. It is organized as an annual summer school with parallel PhD-level courses and joint lectures, and attracts doctoral students and junior researchers from all over the world (www.uib.no/en/rs/bsrs). The overarching main annual themes say much about the BSRS's development character:

- Global Poverty (2008)
- Climate, Environment and Energy (2009)
- Global Health in Biomedical, Social and Cultural Perspectives (2010)

- Norms, Values, Language and Culture: Resources and Limitations (2011)
- Transnational Migration and Global Development (2012)
- Food as a Global Development Challenge (2013)
- Governance to meet Global Development Challenges (2014)
- Sustainable Development Goals to meet Global Development Challenges (2015)

Under these themes, BSRS has offered a total of thirty-nine two-week PhD courses to 580 PhD students from more than seventy countries. Its activities have stimulated the creation of several new research networks across continents, bridging climate researchers, social scientists and humanities scholars.

Sustainability science and global challenges

Sustainability science is 'an emerging field of research dealing with the interactions between natural and social systems, and with how those interactions affect the challenge of sustainability: meeting the needs of present and future generations while substantially reducing poverty and conserving the planet's life support systems' (National Academy of Sciences 2015).

When we started planning the workshop that led to this book, none of us was connected to any recognized community of sustainability science, nor were we even fully conscious of the kind of science sustainability science represents. However, we were enthusiastic, feeling that this field had the potential to synthesize, catalyse and potentiate cross-disciplinary research on development and global challenges that would span the social and the natural sciences. Many of the university's researchers working on development and global challenges (such as social and environmental sustainability, climate change, etc.) were doing research that seemed close to sustainability science, even if the essential condition of *interaction between natural and social sciences* was mostly at the non-science level (committee work and other activities concerned with managing the university). A major and very happy exception was the Bergen Summer Research School.

Thus, when it came to sustainability science, the editors were 'subconscious thinkers' because we had not mastered the theories, methods and collaborations that could have transformed us into conscious sustainability science thinkers. Yet we were (and still are)

quite convinced about the need for integrated knowledge that goes beyond the traditionally established social science/natural science boundaries that reign in our universities. For us social scientists, sustainability science seems to fit well, even if the social sciences and the humanities do not yet have prominent places around the sustainability science table. Our understanding of sustainability science, the reader will realize, is the outsider's understanding. Sustainability science is a door we wish to open to ourselves.

We are given to understand by philosophy of science scholars (Ziegler and Ott 2011) that sustainability science cannot be fully appreciated, nor its quality judged, in the same manner as disciplinary science. It is not 'normal science'[3] even if many who are relatively close to the field are not fully aware of the features that make it unique. Those features are *normativity* (explicit acknowledgement of the normative context of sustainable development), the *inclusion of non-scientists*, a sense of *urgency* and *cooperation of natural and social scientists.* We are convinced that a fifth constitutive feature is *transdisciplinarity*, as we discuss below. These five features are our framework for appraising the contribution this book makes to the field and envisaging the road ahead. Part of this is done towards the end of this chapter, and in the concluding chapter, by addressing the following question:

With this book we aimed to move in the direction of sustainability science: in terms of these five features of sustainability science, how far did we succeed?

What is the 'direction of sustainability science'? For us it articulates the ideal of cross-disciplinary fertilization and transdisciplinary collaboration within *and* outside the university. We hope it provides a common toolkit to help us deal collectively with the research agendas we are working on individually. The promise of this ideal might be a reason why sustainability science has been growing explosively since the late 1980s. A sustainability science database assembled by Bettencourt and Kaur (2011) contains in the region of 20,000 papers produced by about 37,000 authors working in 174 countries. Analysis of the database shows a considerable range of contributing disciplines: social sciences (34 per cent of the total output in terms of total number of publications); biology (23 per cent); chemical, mechanical and civil engineering (22 per cent). This analysis seems perhaps contradictory to the judgement expressed above that the field is dominated by natural scientists. Yet the classification itself – social sciences, biology,

engineering – gives reason for reflection: to what degree are some if not all of the special features of sustainability science actually realized? Are the social and natural sciences working together or merely side by side? Kates (2011: 19449) addresses this, writing that although the study by Bettencourt and Kaur (2011) constitutes a major achievement, the database does not point to the kind of integrated research implicit in the previously mentioned National Academy of Sciences definition of sustainability science.

It may still be the case, as Clark suggested some time ago (Clark and Dickinson 2003), that 'sustainability science is not yet an autonomous field or discipline, but rather a vibrant arena that is bringing together scholarship and practice, global and local perspectives from north and south, and disciplines across the natural and social sciences, engineering, and medicine.' Others write about sustainability science not as a field, but as an emerging interdisciplinary alliance defined by the problems it addresses rather than by the disciplines it employs (Aronson 2011; Bettencourt and Kaur 2011; Clark 2007; Brand et al. 2013).

'Field' or 'alliance', sustainability science clearly moves beyond the limits of normal science, to address some of the most pressing global challenges of our time, such as poverty, global health, climate change and sustainability.

Sustainable science: a special case of transdisciplinary research

We understand sustainability science as a special case of transdisciplinary research (TDR). There is no clearly agreed definition of TDR, but there is wide consensus about essential characteristics that differentiate it from other forms of research collaboration. This general definition of TDR captures a good deal of that consensus: 'Transdisciplinary research is research that includes cooperation within the scientific community and a debate between research and the society at large. Transdisciplinary research therefore transgresses boundaries between scientific disciplines and between science and other societal fields and includes deliberation about facts, practices and values' (Wiesmann et al. 2008: 435).

TDR addresses thorny social issues and includes the participation of non-academic actors who wish to address a diverse range of relevant and urgent problems. It aims to integrate divergent disciplinary thinking and concepts to produce understanding that would not otherwise

emerge (Pohl 2011). Demand for TDR is growing ever stronger (Klein 2006, 2008; Stokols et al. 2008; Pohl 2008). Important funders of social research such as the MacArthur Foundation, the USA's National Institutes of Health and the recently completed European Union's Seventh Framework Programme (FP7) support, and even require, collaborative research located somewhere on the multi-TDR axis (Kessel and Rosenfield 2008).[4]

Despite the enthusiasm for TDR, there are many potential roadblocks to its successful implementation and execution (Stokols et al. 2008; Gray 2008; Wickson et al. 2006). A main point is that the more complex a TDR project, the more complex the contextual factors that influence its effectiveness. Stokols et al. (2008) conclude that investments in such initiatives should match the complexity of their structure and goals.

The quality and success of TDR requires a climate in which the TDR approach is valued and supported by leadership, in which barriers are minimized, and in which there is careful attention to implementation (Emmons et al. 2008; Wiesmann et al. 2008; Hall et al. 2008; Hunt and Thornsbury 2014). This may be easier said than achieved, particularly when we are dealing with the global level of analysis. As Emmons et al. (2008: S209) succinctly put it: 'Although there is currently much rhetoric in academic circles about transdisciplinary approaches, it is much easier to talk about these approaches than to implement them in a meaningful way.'

Thus, TDR is by its nature difficult to conduct and even more difficult to conduct with a high degree of quality. Sustainability science, as a TDR project, has its own special level of complexity, calling as it does not only for transdisciplinarity, but for synergy across the natural sciences, the environment *and* the social sciences. We confess to not having been keenly aware enough of this additional complexity as we set about planning the project that was the basis for this book.

The genesis of the book project

The genesis of this book is a project that started in spring 2012 at the University of Bergen. The project partners were the Department of Health Promotion and Development in the Faculty of Psychology, UiB Global, and the Comparative Research Programme on Poverty (CROP) of the International Social Science Council (ISSC). These

partners organized a new research network comprising researchers from World Universities Network (WUN) institutions. The name of the network clearly states its purpose: Bridging Health Promotion and Sustainability Science: Transition to the Green Economy. Many researchers at WUN member institutions work on various aspects of health promotion, poverty research, sustainability and the green economy concept, and the network aims to produce synergy by linking many of these key researchers.

The WUN research network was a timely development in 2013 and it remains so. The need for effective action towards poverty eradication and a greener and socially inclusive economy contributing to health and equitable development has long been evident, but the need is now urgent. Health promotion in the context of sustainable development has faltered, as attested by failure to reach Millennium Development Goals (United Nations 2014b). A critical evaluation of this initiative also shows a limited level of ambition that, as a result, accepted (among other things) keeping a huge proportion of the world's population living below the extreme poverty and hunger line (Cimadamore et al. 2013). This failure calls not for resignation, but for redoubled effort, and especially for innovative research at the crux of the many disciplines working on various aspects of human development and sustainability designed to contribute to the more ambitious proposal contained in the Sustainable Development Goals (SDGs) (United Nations 2014a).

The WUN network was established in three successive phases. The first was to systematically contact WUN researchers who, in 2013, were already working on some aspect of health promotion, sustainability, poverty alleviation or the green economy. Research into the activities of WUN members carried out by editor Dr Fungisai Gwanzura Ottemöller produced a comprehensive list of key researchers at WUN institutions with special expertise in various aspects of the problem to be addressed. We contacted all the scholars on the list and ascertained their interest in helping establish the research network. We also asked these researchers to nominate additional colleagues for us to contact. In the second phase of the project, we gathered selected representatives from WUN institutions in a Research Network International Workshop in May 2013. We also invited interested scholars to participate by sending an open call for papers to the global network of CROP and the International Social Science Council (ISSC). To set the stage for the

workshop, position papers were produced by WUN and other scholars, on topics related to the following and similar questions:

- The disciplines in environmental science have succeeded in forging a new discipline, 'sustainability science'. What lessons learned along the way should we take on board as we seek to forge broad-based and critical transdisciplinary research that supports transitions to green economies, or other social models conducive to social change towards sustainable and equitable development?
- How can poverty studies break out of the traditional disciplinary focus and limitations to embrace an expanded role for poverty researchers in transdisciplinary and critical research for social change towards sustainable and equitable development?
- The diverse cultures and traditions of the development-oriented academic communities – economics, sociology, psychology, social geography, applied anthropology, agriculture and land use, to name some – are barriers to achieving transdisciplinary research for the green economy or alternative socio-economic models. Which new arenas and ways of collaboration must be established in research environments to extract real synergy from the richness of the various disciplines?
- The study of factors that impede/foster transdisciplinary research is today a mature arena of research. What insights can be extracted from this knowledge base that can guide the way to the most innovative research for the green economy and alternative socio-economic models?

Our best attempts to answer these questions – or at least explain why they were not fully addressed in some cases – are presented in the final chapter of this book.

The May 2013 International Workshop had the title 'Development and Sustainability Science: the Challenge of Transdisciplinary Knowledge for Social Change'. The call for papers sent to WUN university researchers set the stage: the need for effective action for equitable development has long been evident! The 1992 Rio Declaration on Environment and Development states that 'Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.' Yet health promotion in the context of sustainable development has

faltered, especially in those parts of the global South where poverty is greatest, as attested by the failure to reach many of the MDGs.

The call for papers underlined the need for a new form of cooperation, which crosses traditional boundaries of human activities and scientific disciplines. Today, development is mostly compartmentalized, with economics, agriculture, health promotion, poverty elimination, human rights, environmental and other 'helping' communities working in parallel, despite the fact that the problems they seek to tackle are inextricably linked. This is also true of academia, with disciplines working mostly in isolation and ignorant of one another's potential to contribute solutions across the silos. It could be argued that compartmentalized sciences (and thus the inability to connect) are possible causes behind the failure to provide clear scientific responses to the question of (extreme) poverty eradication and sustainable and equitable development.

The workshop call for papers heralded this challenge: even if health promotion in its modern form is highly transdisciplinary, it has not yet managed to bridge the gap separating those working for health on the one hand, and those working for other aspects of a green economy. Poverty studies also fall short in producing the kind of transdisciplinary approach needed to capture the complexity of poverty and to achieve its eventual elimination.

The international workshop was also quite effective in broadening the reach of the emerging network based at UiB. It went beyond the traditional places where sustainability science has been flourishing, as we can see in Figures 1.1 and 1.2.

1.1 Moving beyond WUN: the enlargement of the network

1.2 Where is sustainability science concentrated? (*source*: Sustainable Science and Development, UiB, 2014, sustainabilityscience.b.uib.no, accessed 17 February 2015)

What does the book offer to this emerging field?

This book includes chapters representing authors from six countries on five continents: Asia, Australia, Europe, North and South America. The contents of these chapters range from theoretical perspectives on transdisciplinarity, sustainability and development (Edwards, Delamonica), practical applications of development and sustainability (Aringazina, Zanella) to research in health, sustainability and social equity (Chadborn and Springett, Springett). The chapters therefore cover transdisciplinarity, sustainability and development through the lens of theory, research and practice. In the summary below we touch on whether the five features of sustainability science described earlier are evident: normativity in the sense of addressing sustainable development, the inclusion of non-scientists, a sense of urgency, cooperation between natural and social sciences, and transdisciplinarity. When these features are obvious aspects of a chapter we let the writing speak for itself, while we try to point out instances where they are less obvious or not evident.

Mark G. Edwards presents the first of the two theoretical chapters. He considers how Indigenous Australians traditionally managed the land in a sustainable way that was in harmony with nature. Edwards presents the concept of the 'global *problématique*', claiming that the issue of sustainability is at the core of conflict between trying to reduce carbon pollution, build energy infrastructures, support international development, protect global ecosystems, grow economies and

alleviate poverty. Edwards then discusses 'planetary management', pointing out that in order to move to a planetary system that is sustainable, we must be organized at a global level to better manage the earth's physical, chemical, biological, ecological and social processes and systems. He identifies what he calls 'emerging shoots of planetary management' and describes how some international organizations have now begun to focus on trying to find solutions for dealing with the global *problématique*. His discussion then moves rather seamlessly on to transdisciplinarity, set up by the notion of the global *problématique*: how can transdisciplinarity help tackle this challenge? Answer: respect for indigenous knowledge, which is happily of growing interest to those working for the conservation of biodiversity. As a showcase for his ideas, he relates how Indigenous Australians managed, designed and shaped the ecosystem for tens of thousands of years. He highlights how the conception of Indigenous Australians as merely hunters and gatherers is mistaken, and writes that they actively managed and developed the country and its resources. This process extended over all of Australia, over a very long period of time, was conducted in a flexible way that was sensitive to the diversity of the environment, and the knowledge was passed on through many generations. Edwards clearly addresses two of the three overarching concepts in this book: sustainability and transdisciplinarity. He also touches on development when discussing the change of ownership of Australia from its indigenous custodians to the modernization form of development brought by the settlers.

The second theoretical chapter, by Enrique Delamonica, presents a different angle from the previous chapter. Delamonica deals with the issues of green economy, poverty reduction and equitable development. He writes that we humans have the power to transform nature to suit ourselves, and that the way we do this has the potential to destroy the environment. In concert with Edwards, he sounds a call to manage changes and developments so as to avoid the negative outcomes. He states early in the chapter the importance of transdisciplinarity – that different sectors and academic fields need to work together in order to maintain a balance and meet the challenges brought about by economic development and technological advances. Delamonica accepts the idea of sustainability as normative and examines how the transformational growth process can be environmentally sustainable. He addresses poverty and mentions the need to separate monetary poverty from non-monetary poverty. Delamonica links some aspects of poverty – lack of food, water,

housing – with human rights violations. He then discusses what he calls 'the many faces of inequity', outlining the differences between equity and inequality. Delamonica proceeds to present the notion of the green economy and discusses this in the light of Arne Næss' (1973) ideas of protecting the environment without undermining human societies. Moving on, Delamonica presents a theoretical model of the interactive relationship and feedback loops or synergy between economic growth, poverty reduction and social change. Delamonica is critical of the view that economic growth necessarily reduces monetary poverty and results in social development. He introduces the idea of synergy or feedback loops, and illustrates this with the example that good health and good nutrition have reciprocal influence. Urgency is sounded by Delamonica's argument that poverty reduction can lead to better environmental conditions. He posits that better policies and closing the feedback loops in the context of 'economic growth, poverty reduction, social development and environmental sustainability' will promote a Transformative Green Economy. Finally, Delamonica uses the city of Porto Alegre in Brazil as an example of how policies can contribute to a sustainable and equitable path that leads to the establishment of a Transformative Green Economy. Delamonica's thesis is that social development is inextricably linked to economic growth, sustainable development and monetary poverty reduction, and thus demands a transdisciplinary approach.

The following two chapters deal with practical challenges in achieving sustainable and equitable human development. Altyn Aringazina presents the case of the Republic of Kazakhstan, one of the recently independent former Soviet states. She discusses the challenges this young nation faces in terms of public health infrastructure, the social determinants of health and sustainable environment protection. Aringazina writes that Kazakhstan is one of the fastest-growing economies among the former Soviet states and that although it has shown some improvement with regard to population health indicators, there are still problems linked to rapid economic growth, corruption and persistent social inequalities. She highlights that Kazakhstan faces challenges with regard to several important health and environmental indicators, thus pointing to the urgency of dealing with these challenges in her country. She posits that these challenges cannot be solved by different disciplines working in isolation, but only through transdisciplinary and intersectoral collaboration across the various arenas: social policy, agriculture, employment, housing, transportation, etc. Aringazina's

central focus is to address how health promotion practices and policies can be created within a sustainable development context, taking into consideration the establishment of local transdisciplinary knowledge in order to stimulate social change. In contrast to the previous two chapters, which focus on theoretical aspects of sustainable development, Aringazina presents a concrete discussion of the case of Kazakhstan with a focus on health promotion. This focus is important and relevant because the Alma-Ata declaration was a historic declaration that led to health promotion as we know it today. The chapter presents examples of the ongoing efforts being undertaken in Kazakhstan by academics, the government and the private sector to meet the challenges of health promotion and to modernize the public health workforce. Aringazina focuses on the professional approach to solving some of the challenges Kazakhstan faces in developing its health promotion infrastructure, and she does not focus on the role of non-scientists.

The chapter by Cristine Koehler Zanella takes the reader from central Asia to Haiti, in the Caribbean. Whereas Aringazina presents a country case with a focus on health promotion, Zanella's chapter presents a case study of a project in an extremely poor community in Haiti. Zanella uses this project to analyse how lessons can be learnt by those working with transdisciplinarity to promote sustainable development. The project involved the development of a Solid Waste Collection and Treatment Centre in Carrefour Feuilles, Port-au-Prince. The project focuses on creating concrete opportunities for people in an extremely poor community through gathering, separating and recycling solid waste material collected in their own districts. The recycled waste is turned into briquettes to be used as fuel for heating and cooking, replacing coal and wood, which are time consuming to collect, more expensive and detrimental to the environment. Zanella sets the context for this project by describing the political, social and environmental challenges the Haitian population has faced. Her analysis is clearly sympathetic to the normative understanding of sustainability, as her chapter illuminates the importance of the project, not only in stimulating social change through empowerment of the population, but also in protecting the environment. This is in line with Delamonica's assessments that in order to bring about sustainability, it is important to work with poor communities, as they are likely to affect the environment in negative ways owing to environmentally detrimental practices resulting in deforestation and polluted water sources. Haiti is an extremely poor country subject to

natural disasters (hurricanes and earthquakes) as well as political and social unrest – promoting sustainability and development in this country is evidently urgent. Zanella illustrates the importance of the participation of non-scientists, in particular the people directly and most detrimentally affected by poverty and a degraded environment.

Two further contributions relate to bridging community, policy and research for well-being in the context of sustainable development. First, Neil Chadborn and Jane Springett bring a new dimension into this book by introducing the perspective of children in relation to health and sustainability. Whereas the other authors have addressed issues in developing and middle-income countries, Chadborn and Springett's work takes the reader into a developed country, the United Kingdom. Like Zanella's, this chapter presents a case study as the lens with which to examine sustainability, while, along the lines of Aringazina, the issue of sustainability is approached from a health promotion perspective. Unlike Aringazina's, however, the case here is on a micro scale, focused on a particular research project. Chadborn and Springett begin the chapter by discussing the issue of obesity in children and advocating a move from the narrow individualistic biomedical way of dealing with the problem to a broader focus that looks at all the different factors that can affect a person's health and behaviour – what they term a more ecological approach. They are critical of the lack of consultation with children by researchers and policy-makers regarding the issues that affect children's health. They go on to explain how obesity is linked to climate change, writing that the way the agriculture and food systems have been globally commoditized has led to the aggressive marketing of foods with low nutritional value, resulting in over-consumption of these foods. There is urgency in the tone of this chapter, as obesity is contributing ever more ominously to the global burden of disease. They present a study conducted in England, which included participants from socio-economically deprived neighbourhoods, promoting activities to mitigate climate change and simultaneously benefit health. The project was participatory, developed together with community organizations, and in partnership with schools. The authors interviewed children and adults to gain appreciation of views from the community. They found that the structure of the urban environment may be a barrier that leads to obesity as well as mitigating climate change. The authors suggest that enhancing children's literacy in both health and ecology may strengthen their agency in these issues.

The final contribution is by Jane Springett, who discusses how participatory research (PR) contributes to transdisciplinary enquiry. She deals with the important concept of participation in a way that was not done in the preceding chapters. Participation is touched upon in one way or another by Edwards, Delamonica, Zanella and Chadborn and Springett, but Springett goes farther by providing an in-depth discussion of the concept and relating it to ecosystems and health. She describes how PR includes beneficiaries, users and stakeholders at all stages of the research process, ensuring that knowledge is contextually relevant and appropriate. Springett's view of sustainability is normative and she writes how PR is in line with an ecosystems view of health, where health is an outcome of the interaction between humans and their environment. Similar to those of Aringazina and Chadborn and Springett, her discussion is grounded in a health promotion approach. She examines the issue of how transdisciplinarity is limited by the adherence to traditions within the different fields, which results in inflexibility when confronted with different epistemological and ontological standpoints. Springett, like the previous authors, encourages the inclusion of lay people in knowledge generation, and her presentation underlines urgency in the requirement for a participatory, transdisciplinary approach. This is in contrast to the dominant biomedical approach, where health is individualized, and separate from social and environmental contexts. Springett outlines what PR involves and the importance of such an approach for stimulating social change. As also highlighted by Zanella, Springett shows that involving people in the improvement of their lives and their environments may lead to social change. She argues that a cooperative process of knowledge development and the understanding of how others' perspectives have developed, as well as the inclusion of nature and culture, will help to reintegrate humans into their ecosystems. She provides an in-depth and comprehensive definition and discussion of the nature of PR and follows this with an ecosystems view of health and social equity. Springett concludes by discussing how PR as an ecological practice is underpinned by an integrative and transdisciplinary worldview.

Preliminary conclusions

The chapters of this book are linked by the degree to which features of sustainability science are evident: normativity of the

sustainable development concept, the inclusion of non-scientists, the urgency of the issue, interaction of natural and social scientists, and transdisciplinarity. We emphasize that this is a post hoc framework for considering the material in the chapters; when the contributing authors wrote their chapters they were not asked to take this focus. Yet on examination, we see that their work deals sufficiently with most of the features of sustainability science and we can conclude that the project was successful in attaining the intended focus. However, one feature in particular – the interaction of natural and social scientists – is elusive in the accounts presented in these chapters. We return to this issue as part of the general discussion in the final chapter. In closing here, we note our agreement with Cundill et al. (2015), that nurturing TDR calls for determined intervention on the social processes that foster opportunities *and* that create barriers. At the outset of the project that produced this volume, we editors were naive in expecting that a simple invitation to an exciting transdisciplinary project would bring natural and social scientists to the same table to produce the kind of integrated knowledge we were seeking. It became clear to us that the long-term challenge of achieving close cooperation between the natural and social sciences will require a sustained and focused effort to transgress established disciplinary boundaries.

Notes

1 Escobar (2012) argues that post-development, in its most succinct formulation, 'was meant to convey the sense of an era in which development would no longer be a central organizing principle of social life' (p. xiii). This school of thought was the object of criticisms that were summarized in three main points: (i) the focus on discourse resulted in the subordination of the real problems of poverty and capitalism; (ii) it presented an 'essentialised view of development overlooking noticeable variances'; (iii) it 'romanticized local traditions and movements', overlooking the fact that the local is also 'embedded in power relations' (p. xiv).

2 See the full call here: www.crop.org, accessed on 16 February 2015.

3 'Normal science is a highly determined activity' and 'an index to the nature of scientific research itself. The source of resistance is the assurance that the older paradigm will ultimately solve all its problems, that nature can be shoved into the box the paradigm provides' (Kuhn 1970: 42, 151, 152).

4 For insight into the forces that have brought TDR to its present prominence, we suggest the reading of Abrams (2006), Kessel and Rosenfield (2008) and Stokols et al. (2008).

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2 | SEEKING WISDOM: A TRANSDISCIPLINARY PERSPECTIVE ON AUSTRALIAN INDIGENOUS PRACTICES AND PLANETARY MANAGEMENT

Mark G. Edwards

Introduction

This chapter draws on scientific and Indigenous knowledge sources to rethink the crucial topics of intergenerational sustainability and planetary management. The powerful impact of Indigenous[1] societies on the landscapes they occupy (and once occupied) is being increasingly recognized. Indigenous peoples managed, designed, shaped and cared for their country in direct and intentional ways. Some of the results of this intensive process of management included sustainable and rich forms of communal, cultural and personal life and diverse and flourishing biological systems. Such achievements are similarly sought after by contemporary sustainability endeavours. While it may no longer be possible to widely enact the cultural practices that enabled these achievements, the values and worldviews that informed them offer crucial resources for global transformation. An illustrative analysis of Australian Indigenous approaches provides direction for how Indigenous practices might inform systems of planetary management. A transdisciplinary approach to this topic finds that it is not necessarily the qualities of planned change, technology, intensity of impact or time and space scales that are problematic. It is the values, cultural lenses and worldviews that underpin management which are crucial in achieving sustaining and sustainable communities. Implications of these findings for the development of planetary management are discussed.

A cautionary preamble Before presenting this chapter, I want to mention that it suffers from some substantial limitations. First, while I have relied on indirect Indigenous contributions from the scientific literature, there has been no direct input from Indigenous scholars in writing this chapter. I am not a member of the Indigenous peoples of Australia and have no formal qualifications in that discipline. Readers

should also be mindful that the following is subject to the same range of biases, cultural blind spots and lack of knowledge that applies when non-Indigenous researchers claim to present Indigenous perspectives. Secondly, the chapter does not background the issues it covers with information on the relationship between mainstream science and Indigenous knowledge, issues of neocolonialism, social justice, Indigenous disempowerment, or the appropriation of Indigenous knowledge. Without the context-setting of these issues the following discussion may well be flawed in important ways. Unfortunately space prevents me from including that kind of material. But I would argue that these limitations also enable a certain freeing up of possibility when tackled as a form of positive and imaginative scholarship (Cameron et al. 2003). From this positive perspective, the following ideas are offered in a spirit of learning and generosity and I hope they contribute to a greater appreciation of the possibilities for dialogue between Indigenous and non-Indigenous views on building sustainable and sustaining forms of environmental management.

'Here are managers'

> The land lived. Its face spoke. 'Here are managers', it said, 'caring, provident, hard-working'. This is possession in its most fundamental sense. (Gammage 2011: 323)

In recent years earth-system and environmental scientists have identified a number of 'planetary boundaries' (Steffen et al. 2015) that can be used to define the 'safe operating space for humanity' (Rockström et al. 2009). The research shows that several boundaries have already been exceeded (climate change, nitrogen loss, ocean acidification and biodiversity loss) and this 'could have disastrous consequences for humanity' (ibid.: 472). In response to the disturbing findings of earth-system research over recent decades, many authors are now calling for forms of planetary management (Newton 1999), global ecosystem stewardship (Chapin et al. 2010) and earth stewardship (Chapin et al. 2011; Krasny and Tidball 2012). This chapter contributes to this discussion by offering a transdisciplinary perspective on global sustainability management and stewardship.

Transdisciplinarity differs from other integrated approaches to values and knowledge, such as interdisciplinary research, in that it looks at the interfaces between scientific disciplines and their encounter with

society. Transdisciplinary studies utilize understandings that emerge from boundary-crossing research, from broad sources of cultural knowledge and from the problems, challenges and opportunities that confront communities. The aim here is to bring a transdisciplinary eye to perhaps the most important global issue of our times – the need for the development and management of globally sustaining and sustainable systems of living. The boundary-crossing I want to engage in aims to establish connections between scientific and Indigenous knowledge sources for sustainability management.

It is not a new idea to suggest that sustainability science might look to Indigenous values and cultural practices for some insights (see, for example, Knutdsen and Suzuki 1992). There has been a great deal of research in recent decades on how Indigenous ecological knowledge and Indigenous science can contribute to contemporary ecological sciences (Agrawal 1995; Huntington 2000). Here I look at the divergences and convergences between Indigenous and Western sciences of management as they might apply to planetary stewardship and the sustainable management of the earth's fundamental physical, biological and social planetary systems. The proposition is that Western management[2] perspectives are, of themselves, fundamentally incapable of fostering a sustaining planetary system. On the other hand there is strong evidence that Indigenous management and knowledge systems did produce sustaining systems over much of the earth for many thousands of years. From this, the question arises: How might Indigenous views inform the kinds of planetary stewardship that will be needed to meet global environmental challenges in the twenty-first century?

Clearly, there exist great differences between Western and Indigenous worldviews but the very breadth of that difference offers the possibility for learning. Tapio and Willamo point out that 'Environmental problems often originate from a too narrow scope in the fragmented fields of science, politics, administration, education, etc. If only a narrow view is adopted, the measures taken in order to solve the problems are probably too narrow as well' (Tapio and Willamo 2008: 130). Transdisciplinary perspectives are required if pathways to planetary sustainability are to be developed and Indigenous views offer unique contributions for achieving such perspectives. Both formal scientific and traditional bodies of knowledge are needed. Berkes and Berkes argue this in their article on traditional and scientific discourses

as co-producers of knowledge: 'Any insights from Indigenous wisdom in regard to ecosystems are of huge potential interest, given that modern society has not been particularly successful in managing ecosystems sustainably' (Berkes and Berkes 2009: 6).

The power of Indigenous societies to directly manage and shape the landscapes and natural ecosystems they occupy (and once occupied) is increasingly being recognized (Gammage 2011; Lynch et al. 2010). The results of this intense process of managing landscapes included intergenerationally sustainable forms of communal and personal life, diverse and flourishing biological systems, and complex and rich cultures. Many of these achievements are precisely the goals sought after by contemporary sustainability and development endeavours. While it may no longer be possible to widely enact the cultural practices that enabled these achievements, the values and worldviews that informed them offer crucial resources for transformation. How might Indigenous values inform contemporary mindsets? What similarities and differences mark out Indigenous and Western approaches to ecological management that have relevance for planetary stewardship? What cultural resources lie within contemporary scientific approaches to sustainability that could resonate with Indigenous lenses?

As mentioned in the introduction, I take a positive scholarship and transdisciplinary approach to the issue of planetary sustainability, but this does not need to result in a romanticization of indigenous cultures. Briggs (2005) has pointed out the problems associated with the uncritical over-romanticization and/or appropriation of indigenous knowledge. This chapter does not adopt a romantic view of indigenous knowledge or of indigenous relationships with the natural environment. On the contrary, the perspective adopted here places indigeneity within a context, not of passive hunter-gatherer, but of active manager and designer of ecological systems. This is a new perspective that rejects the romantic view of a passive indigenous culture that is in complete harmony with nature. Instead, I adopt a more contemporary view of Australian Indigenous culture as a highly advanced and hard-won integration of environmental management with human social sustainability. This is a crucial distinction that will be explored more fully as the discussion unfolds.

This chapter is structured as follows. I first set up some fundamental aspects of the global *problématique* – that is, the global convergence of crises that exist at multiple levels of human–planet involvement. I

then look at the issue of the current lack of planetary management and stewardship, and the paradoxical but fundamentally requisite task of developing management worldviews and structures for directing, nurturing, overseeing, caring for and monitoring the worldwide network of physical, biological and social systems. This is followed by the main thesis that Indigenous worldviews, values and practices offer a vital and, to this point, undervalued storehouse of management perspectives and knowledge. Finally, the implications of involving Indigenous views for managing sustainability at various levels of social organization are discussed.

The global *problématique*

The myriad global environmental, social, ethical, political and economic problems are increasingly presenting themselves as intractable. Together they form what has been called the 'global *problématique*' (Hodgson 2012; King and Schneider 1991). Examples abound where wicked global problems have become seemingly unsolvable paradoxes that evoke conflicting worldviews, values and social and economic policies. How do we, for example, radically reduce carbon pollution while trying to build the energy infrastructure of the future, support international development without threatening global ecological systems, grow economies when we know that economic growth is unsustainable, and alleviate poverty when this requires massive economic development? All these apparent paradoxes have sustainability issues at their core. But not only are we failing badly to develop anything remotely like a sustaining global system (Whiteman et al. 2013), we are only beginning to recognize our responsibility to govern and manage such a system.

The problematic nature of 'planetary management'

> It is now apparent that planned human intervention is urgently required to halt the accelerating rate of destabilisation in planetary systems. This calls for planned proactive forms of 'superordinate' management and governance. (Jahn et al. 2012)

Moving towards a planetary system that is sustaining and sustainable will necessarily involve some process for planetary management and governance (Newton 1999). Evans has emphasized the need for a global level of organizing to achieve the scale of transformation that

sustainability requires. He states that 'organizing at the global level must be a key part of any transformative project' (Evans 2008: 288). This organizing and management task has been called 'global governance', 'planetary stewardship' and 'world-wide management'. Each of these ideas has the shared recognition of the need for the intentional management and stewardship of the earth's physical, chemical, biological, ecological and social processes and systems. Currently, human activities are having significant deleterious impacts on global systems. The human population is so big and the processes that support the needs and desires of humans are so extensive that they are dramatically, invasively and rapidly destabilizing the fundamental planetary systems that support life (Rockström et al. 2009).

Intentional management systems and structures that aim for healthier and more sustaining economies and societal systems are needed. Some of the tasks that such a system will need to tackle include stabilizing planetary climatic conditions, protecting biodiversity, ensuring the viability and availability of natural water cycles, fertile soils, clean air and human economic and social well-being. The immense complexity and enormous scope of these tasks mean that planetary management may not actually be feasible but, as Table 2.1 shows, concerted efforts are being made in this direction, particularly as regards the management of data and research. Environmental scientist Vaclav Smil, while recognizing that planetary management 'may seem preposterous to many', nevertheless concludes that 'at this time in history there is no rational alternative' (Smil 2003: 26). Smil goes on further to point out that, in fact, planetary (mis)management is what we do already and that we do it very badly. He points out that 'planetary management is far beyond our intellectual and social capabilities – but that we are doing it anyway' (ibid.: 259). The notion of a planned management process seems impossible, if not absurd. The scale and complexities involved in planetary management are daunting enough but contemporary management practices already work at this scale and are notorious for the lack of environmental awareness and their inability to integrate biosphere considerations within businesses operations. Indeed, the history of business management has a disastrous environmental record.

The dark side of management Management, in simple terms, is the process of organizing people and social, technological and natural

resources to achieve specified goals and objectives. Management can occur in a planned or unplanned manner. It can be reactive to changing environments and it can be proactive in planning what should be done to achieve desired outcomes and organizing people and resources to that end. The dark history of management is associated with coercion, treating people as means for delivering some outcome and with the political and economic preference of some organizational stakeholders over others. Whatever form planetary management might take, it will need to address this issue of ethics, values and the instrumental treatment of people and resources. More specifically, it will need the broadest possible conceptualizations of stakeholders and include within that understanding all the physical, biological and social entities and dynamics that together form the planetary system.

The term management carries with it connotations of control, command and coercion. The alternative terms of stewardship, guidance, custodianship or leadership might be preferable options in that they avoid some of these negative associations. However, I retain the management term because the global *problématique* requires a significant capacity for planned organizing and coordination, characteristics that the alternatives do not emphasize. When managing is done well it includes capacities such as stewarding, guiding and visionary leadership. In retaining this notion, I recognize that the idea of planetary management should not be equated with a mainstream kind of commercial or bureaucratic management, but with a values-based management ideal that coordinates and organizes through service, integrity, responsibility and advanced forms of leadership (for discussion of these advanced forms of mangement, see Avolio et al. 2009; Dyck and Schroeder 2005; Fry et al. 2005; Küpers and Edwards 2007; Voegtlin et al. 2012).

The relationship between management and the current global situation is complex. The global *problématique* has arisen out of both intended and unintended consequences of economic and social activities across the planet. In the same way that climate change is a human-induced phenomenon, the global *problématique* is the result of human choices and practices that create and maintain the cocktail of problems we face. Management and governance systems and structures in all domains of society have largely ignored responsibility for causing this situation. But there are signs that this is changing.

The emerging shoots of planetary management Many international bodies, agencies, research centres and peak bodies now focus on the development and management of solutions for dealing with the global *problématique*. Table 2.1 includes several of these entities, and they are evidence of the need for the planned management of the planetary system in all its complexity. The purpose of these groups is to coordinate, foster, provide leadership, identify issues, develop and integrate, build capacity, move and motivate, organize, plan and facilitate, or, in other words, to manage the transition, the transformation to sustaining global futures. However, while much effort has been spent on resourcing the technological aspects, not enough work has been done on the values and worldviews that underpin the process of strategically transitioning to sustainable forms of economic and social activity.

One very noticeable feature of the organizations listed in Table 2.1 is the kind of worldview and core values that underpin their purpose. Management researchers have stressed the importance of worldviews and values in sustainable development (Kira and Eijnatten 2011; Matutinovic 2007a, 2007b; Ratner 2004; Shepherd et al. 2009). Values are also important in management and, in the key areas of decision-making, goal-setting and planning, policy development and leadership, values are crucial factors for understanding the decisions and behaviours of managers. What sorts of values might be important in developing systems of planetary management? And how might these values integrate different management capacities to support the transition to global sustainability? To answer these crucial questions, I look to a known cultural resource that has demonstrated both the capacity to manage extended environmental regions over extraordinarily long periods and to do that in sustainable ways, ones which generate natural and cultural diversity and well-being. That cultural resource is the world of Indigenous environmental values and knowledge.

Transdisciplinarity and Indigenous knowledge

Indigenous knowledge traditions have much to offer transdisciplinary science. Transdisciplinarity is about moving across knowledge divides and working with communities to address real problems and open up new opportunities. In so doing transdisciplinarity aims for 'a shift from disciplinary-based scientific to a more societal mode of knowledge production by integrating everything that is between, across and beyond disciplines' (Boillat 2007: 63). The values base behind

TABLE 2.1 Some global agencies responding to the 'global *problématique*'

International entity	Purpose
The International Group of Funding Agencies for Global Change Research (IGFA)	To foster global environmental change research. IGFA serves as a forum through which national agencies ... identify issues of mutual interest and ways to address these through national and, when appropriate, through coordinated international actions.
International Geosphere-Biosphere programme (IGBP)*	To coordinate international research on global-scale and regional-scale interactions between earth's biological, chemical and physical processes and their interactions with human systems.
International Human Dimensions Programme on Global Environmental Change (IHDP)*	To study the human and societal aspects of the phenomenon of global change. IHDP aims to frame, develop and integrate social science research on global change. ... [C]urrent global environmental problems as social and societal challenges. To provide leadership in the selection and development of themes for focused research and in stimulating scientific communities to coordinate their efforts on these.
Earth System Science Partnership (ESSP). Peak body for global science centres and initiatives	The ESSP is a partnership for the integrated study of the Earth System, the ways that it is changing, and the implications for global and regional sustainability. It guides and coordinates the activities of Diversitas, IGBP, WCRP and IHDP.
Diversitas: an international research programme integrating biodiversity science for human well-being*	To address the complex scientific questions posed by the loss in biodiversity and ecosystem services and to offer science-based solutions to this crisis.
Scientific Committee on Problems of the Environment (SCOPE): international association of national science academies and unions	To develop scientific reviews of key environmental issues around the themes of managing societal and natural resources, ecosystem processes and biodiversity, health and environment.
World Resources Institute (WRI): NGO focusing on the intersection of the environment and socio-economic development	The organization works globally with governments, business and civil society to build transformative solutions that protect the earth and improve people's lives. WRI's mission is to move human society to live in ways that protect earth's environment and its capacity to provide for the needs and aspirations of current and future generations.
Future Earth: a ten-year international programme on earth system research for global sustainability*	The goal of Future Earth is to develop the knowledge required for societies worldwide: to face challenges posed by global environmental change and to identify and implement solutions and opportunities for a transition to global sustainability.

* Diversitas, IGBP, IHDP were expected to merge into Future Earth by the middle of 2014

transdisciplinarity supports and encourages pluralism, diversity and respect for the contributions of multiple knowledge sources. At the same time, however, transdisciplinarity aims for a pluralistic integration of many voices and forms of knowledge into a coherent understanding of the issues.

Interest in Indigenous knowledge has been around for many years and is a growing field within interdisciplinary and transdisciplinary approaches to sustainability (Christie 2006; Hoppers 2002). There is a growing recognition that conventional science has much to learn from Indigenous knowledge in such areas as the conservation of biodiversity, the management of protected areas and rare species, and sustainable resource use in general (Berkes 2012). Interest has also grown in management practices of Indigenous cultures and the values, processes and worldviews that inform Indigenous perspectives on sustainability and natural systems (Berkes 2009; Berkes et al. 2000; Gopinath 1998). In the next section I bring these lines of the research together and identify some contributions that Indigenous management knowledge might bring to the issues of planetary environmental management.

Indigenous environmental management Research on Indigenous ecological knowledge and technologies is changing the way we understand the relationship between aboriginal cultures and the landscapes they occupy (Agee 1996; Bowman 1998; Hallam 1975; Hill et al. 2012; Marsden-Smedley and Kirkpatrick 2000; Williams 2003). As a guide into the vast territory of this topic, I draw on the recent work of Bill Gammage in his book *The Biggest Estate on Earth: How Aborigines Made Australia* (Gammage 2011). The book argues that the Indigenous peoples of Australia practised a system of sophisticated, interconnected and continent-wide land and sea management. This system was 'governed by a single religious philosophy … the Dreaming made the continent a single estate' (p. xix) and, although the peoples of the continent 'put the mark of humanity firmly on every place' (p. 323), they did so while utilizing their '[k]nowledge of how to sustain Australia' (p. 323). Archaeologist Sylvia Hallam says that this book 'ought to revolutionise the way we think about the primary makers and moulders of the continent' (Hallam 2011: 123). Though the impact on the Australian bush of Indigenous fire-stick practices has been known for some decades (see, for example, Jones 1969), this impact was far more planned and broad in scope than previously acknowledged.

The Indigenous peoples of Australia managed, selectively designed and shaped the Australian continent for a period of many tens of thousands of years to produce diverse and flourishing ecosystems that were sustaining across all human and biological and physical systems. This is a remarkable and, in many ways, unique achievement. While there are many features of the Indigenous cultures of Australia that are shared with other indigenous peoples, the scale and longevity of their management of the Australian continent are unmatched. In the following sections I look at these achievements in greater depth.

Land and resource management There are profound implications for sustainability science of this new understanding of the relationship between the Indigenous people of Australia and the continent they lived on. To explore these implications a number of key points need to be made. The first is that the Indigenous peoples of Australia actively managed and developed their country and its resources. The notion of the Australian Indigenous peoples as hunting and gathering food that naturally appeared in their environment is misguided. In some important ways, the activities that we conventionally associate with resource management in the business world – for example, administering, planning, coordinating, leading, developing, organizing, designing, consulting and controlling – are applicable to the manner in which Indigenous society managed the natural environments in which it lived and prospered. Indigenous communities and their leaders carried out all the functions of management and custodianship over the land and its resources. They were farmers and gardeners on a vast scale who chose to care for their lands by continually moving through them rather than settling in one place. They farmed the medicinal, food and material resources of the continent to secure health, nourishment and bounty for their land and their families.

Continental management The management process extended over the entire continent of Australia. Gammage refers to this vast territory, as managed by its Indigenous inhabitants, as the 'Australian estate'. He deliberately uses the term estate here to convey the idea of a managed and designed landscape that produces resources to be used as well as aesthetic qualities to be enjoyed. The Australian estate was vast in size: 'No estate on earth was on so much earth. Including Tasmania, Australia occupies 7.7 million square kilometres, and straddles great

diversity' (Gammage 2011: 1). Yet all of these areas were managed in such a way as to provide diverse sources of food, medicine and cultural activities to sustain the families, clans and tribes who inhabited them. The application of knowledge, techniques and practices to these many diverse terrains and ecosystems was immensely flexible and highly sensitive to the demands of local environments.

Intergenerational management This process of environmental management was developed and sustained for an immensely long period of time (perhaps over 50,000 years). The level of environmental management that Indigenous peoples exercised across a vast land mass for such a long period of time indicates a level of socio-environmental sustainability that is unmatched anywhere in the world. This was also accomplished on a continent that is the driest inhabited continent on earth and where human occupation may have been as high as 1 million people in the years prior to the first European migration to Australia in 1788. The outcome of the immensely long Indigenous management of the resources of the continent was a land of great natural beauty, biological diversity, sustaining ecosystems and rich, dynamic human cultures.

Management for aesthetics and harmony The designed landscapes and ecological environments that made up the Australian estate were not only functional in providing food and game but also aesthetically pleasing and diverse in beauty. Countless early explorers and settlers comment on and describe the remarkable beauty of landscapes they saw. Robert Hoddle, at one time the surveyor general of Victoria, said of the Melbourne region in the 1830s that 'it was picturesque and park like country, which the most fastidious observer of Nature's beauties cannot be insensible to' (Gammage 2011: 45). An officer on the first fleet said of the area around Sydney, 'I am at a loss to describe the face of the country otherwise than as a beautiful park'(ibid.: 281).

Process and design management An important feature of Indigenous management was the technical skill involved in designing, implementing and organizing flora and fauna and the habitats they occupied. The power to transform and maintain ecosystem designs and what Gammage calls 'templates', over such a vast area, was a remarkable achievement. The complex notion of a template refers to the designs and patterns that Indigenous peoples created to support life in a certain locality,

place, region or 'country'. These templates 'set land and life patterns for generations of people. They were the land's finishing touches, offering abundance, predictability, continuity and choice' (ibid.: 211). The Indigenous environmental management system used a number of designs and mosaic patterns that were laid across the landscape. The templates were used as guides to structure environments but were also flexible in responding to local variations and topographies. None of this use of design would be possible without technological capacity to implement it.

Technical management The use of fire technologies, as well as the control of watercourses and seeding and cultivation, enabled the implementation of many different templates. It would be wrong, however, to view this process as one where templates were created and then systematically used to structure and map out ecological details. The respect and sacredness of country meant that templates were developed in response to specific conditions of the animals and plants, the soil, land contour and the environmental characteristics of place as they related to the Dreaming – the song lines and the stories that guided how people saw and related to that place. However, templates were also imposed by Indigenous practices on landscapes, across different types of soil and terrain. Sophisticated fire and water technologies were the tools by which ecosystems were created and maintained. Such technologies were not limited to the Indigenous peoples of Australia. There is a large body of literature, for example, documenting the use of fire by aboriginal people from all parts of the globe to shape natural environments (see, for example, Pyne 1995).

Integrated systems management For all these specific management capacities there was an overarching ethic that integrated and balanced management processes into something that supported cultural life and which guided personal and collective practices. This is where the importance of 'The Dreaming' and 'The Law' become significant. The relationship between the Indigenous peoples of Australia and the land was and is one, not of hunter-gathers nomadically wandering amid natural abundance, but of active environmental stewards creating and shaping environments while responding to the dynamic impact of their activities. The rules of this interdependent relationship were and are established in 'The Dreaming' or 'The Dreamtime', the sacred stories, places and

times which create and uphold the structures of Indigenous society and the rules for ceremony and behaviour that ensure continuity of life and country. The Dreaming provided people with the Law, the customary laws and lore that guided all aspects of their lives. The most important laws were those that governed how to behave towards the land and other people. Keeping the Law meant administering fire, water and cultivation technologies to keep the land, the rivers and oceans clean, abundant, diverse and fertile. There was no natural environment that was not in some significant way designed, shaped or fashioned by human hand. 'There was no wilderness. The Law – an ecological philosophy enforced by religious sanction – compelled people to care for all their country. People lived and died to ensure this' (Gammage 2011: 2). The Law was passed down through the generations as a system of education. It acted as a meta-heuristic that connected and was intimately linked with ritual, art, knowledge, medicine, trade, justice and land management. The Law was also dynamic in that it responded to the demands of time, place, season and space. 'The Law prescribed that people leave the world as they found it … Management was active not passive, alert to season and circumstance, committed to a balance of life' (ibid.: 2).

To summarize, Indigenous people: (i) intensively managed their land and its resources, (ii) managed this process across an entire continent, (iii) for a vast period of time, (iv) with results of aesthetic beauty, habitat diversity and natural abundance, (v) through the creation and management of ecosystem designs and templates, (vi) through the use of powerful technologies, and (vii) integrated these management practices by a cultural system that placed custodial Law and sacredness at the centre of life. Together, these seven points provide a basis for building a transdisciplinary framework that connects non-Indigenous and Indigenous paradigms of management. In describing these aspects of Indigenous culture I do not want to minimize the existence of negative impacts, failed or harmful practices and local problems that may have occurred in the meeting between Indigenous people and Australian flora, fauna and natural ecosystems. It is, for example, highly likely that the hunting practices of Indigenous peoples contributed to the extinction of many species of macrofauna. Nonetheless, when Europeans arrived on the Australian continent in 1788, they stepped into a world of extreme diversity, biological vigour and environmental dynamism. It was on this immense richness that much of Australia's early economic and agricultural wealth was based. I now want to

explore the implication of these observations for sustainability science and planetary management.

Points of connection

There are both striking parallels and clear differences between the traditional Indigenous approaches and contemporary forms of business management[3] (see Table 2.2). While vastly different in worldview and practice, both are intensive processes of deliberative organizing. Both employ supervision, design, modularity and technology to create wealth for communities. Admittedly, Indigenous societies focus primarily on cultural wealth and Western management on material wealth. However, it can be argued that both are concerned with the creation of aspects of prosperity that are appreciated across different cultures.

TABLE 2.2 Contrasting perspectives on natural environments

Australian Indigenous relationship with the natural environment	Western management system's relationship with the natural environment
Convergent aspects	
Intensive management processes based on stewardship culture and grounded practices	Intensive management processes based on instrumentalist culture and analytical practices
Administered across huge land areas resulting in greatly altered natural landscapes	Administered across huge land areas resulting in greatly altered natural landscapes
Implemented through natural and manufactured technologies and tools	Implemented through natural and manufactured technologies and tools
Implemented through designs and templates based on Indigenous systems of learning and education	Implemented through designs and theories and practices based on Western industrial systems of learning and education
Divergent aspects	
Resulting in beautiful, diverse and biological rich ecosystems and cultures	Resulting in great material wealth but also environmental crises and degradations of many kinds
Practised for immensely long time periods and enacted via intergenerational perspectives on human and environmental well-being	Practised to maximize short-term outcomes and enacted via daily concern for the movement of market indicators
Held together by an integrative meta-heuristic and educational system – 'The Dreaming', 'The Law'	Loosely attached by a fragmented system of legal and espoused ethical obligations, codes and organizational and personal values

Both Indigenous and commercial forms of management have been administered over large portions of the globe. For the greater part of human existence, Indigenous systems were successfully employed to create environments conducive to human prosperity over all corners of the inhabited continents.[4] In current times, with the emergence of globalization and transnational corporations, it is Western management styles that hold sway across much of the planet's surface.

Stark differences also exist. Notably, in the process of hunting for material prosperity, contemporary management practices are contributing to the massive global degradation of essential planetary environmental systems and to extreme levels of social and economic inequality. There is also a clear difference in time frame perspectives. Where the Indigenous view is intergenerational and closely linked to the variation of environments over the short, medium and long term, Western management perspectives are typically short-term-focused and are dissociated from natural cycles of change.

Finally, there are differences in how aspects of the management process are tied together. The Indigenous Australian culture possesses a unifying and integrative meta-heuristic in the body of spiritual, ethical, behavioural and cultural practice guidelines known as The Law. Western management, on the other hand, is guided by a fragmented set of legal regulations, professional and corporate codes, espoused organizational obligations and personal values and responsibilities. No shared moral code, legal system, set of integrative values or overarching ethic offers guidance for how managers should deal with or balance the complexities of achieving desired social, economic and environmental outcomes.

In the absence of integrated systems of cultural values, sacred myths and other meta-heuristic systems of hyper-norms, the propensity is to fall back on the most basic of all shared purposes, which is to provide and, wherever possible, maximize material and financial security. Consequently, natural and human resources are instrumentally regarded as opportunities for creating material benefits and only incidentally as opportunities for creating other kinds of value. From this it follows that the job of management is to convert natural and human endowments, whether geological, atmospheric, hydrological, biological, psychological or cultural, into separate 'resources' for the creation of material wealth.

The amoral, analytical and instrumental reasoning of Western management perspectives has resulted in a fracturing of the

'environmental' from the 'social', and it is this disassociation which contributes to unsustainable economic activity. Learning from Indigenous understandings can do much to repair this wound. Taçon (2005) makes the important point that Indigenous peoples see land in terms of 'relationships and connections', which means that 'country' is seen more as part of culture than as a resource. Taçon goes on to comment that: 'This [Indigenous] understanding can be crucial for survival, especially in times of increased environmental or political change' (ibid.: 2). The practical wisdom of Indigenous understandings, particularly those concerning the management of ecosystems, such as the ethic of relationship and connection with land, may well play a central role in our ability to sustain long-term prosperity and survival.

Implications of the Indigenous management perspective

Global sustainability will require conceptualizations of planetary management that are requisite to this daunting task. Western management practices suffer from major shortcomings that currently render it unsuitable for application to the planetary level. These practices are compartmentalized (Starik 2004), inherently analytical, fragmentary and disciplinary-based (Hirsch-Hadorn et al. 2006), and underpinned by instrumentalist mindsets that focus on sustainable economic development rather than sustaining social and natural environments (Jickling and Wals 2008). Indigenous understandings offer lenses that address precisely these kinds of shortcomings. In a review of attempts to integrate Indigenous and scientific knowledge systems, Bohensky and Maru (2011) found that Indigenous and Western knowledge systems can be regarded as 'complementary or parallel rather than fundamentally incommensurable' and that they can both be 'enriched through interaction with each other'. With these thoughts in mind, what implications might Indigenous knowledge have for Western conceptualizations of management?

Employing a culture of intensive stewardship The first implication is that it is not the process of planned management itself that is necessarily the cause of the massive degradation of planetary systems. Some authors have proposed that the Western management philosophy of planned and controlled change may lie at the heart of the problem in ecosystem management. This may be true, but Indigenous systems of stewardship utilize some similarly intensive management practices. We

have seen that Indigenous management practices are intentional, intensive and actively administered and that their impact was significant on all aspects of the natural landscape and its biology. Using fire stick and other technologies, the Indigenous people of Australia farmed the land in that they shaped it, prepared it, maintained its soils, controlled the vegetation that grew on it and the animals that moved across it, and they cultivated it to provide a plentiful source of food and medicine production. They demonstrated that it is entirely possible, therefore, to adopt intensive forms of intergenerational management that build sustaining and sustainable environments and ways of life. The broad nature of intensive management is not the problem.

Managing over vast scales of space and time It is also possible to carry out intensive management over huge land areas for many thousands of years and in the process create fertile and diverse natural environments. This indicates that humanity can achieve global sustainability and develop planetary forms of management which enable us to live off nature's interest rather than her capital assets. The scale and complexity of the challenge, in either the size of the area to be managed or the intergenerational nature of the task, are not the problem. Indigenous methods of stewardship functioned over land areas that are comparable to other continental land masses. It provides a good case study for what is possible at the global level. There is no essential difference here between Indigenous and contemporary management processes in the scale of their spatial impact. Nor is the intergenerational nature of true sustainability the problem. The longevity of Australian Indigenous culture has shown that the creation and maintenance of continuously sustaining life systems is entirely possible.

Using technologies, designs and templates The implication here for planetary management is that it is not necessarily human technology, intentional planning practices, the imposition and standardization of modular designs that stop us from achieving sustainable global systems. While Indigenous peoples did use natural technologies that required no additional processing of resources, their use of fire stick farming, dam-building and watercourse management has had a massive impact on the landscape (Bowman 2003). Those impacts were designed, implemented and standardized through planned processes and targeted to meet a wide range of human and social needs. It might

even be argued that Indigenous forms of science resulted in the building of theoretical and conceptual designs and templates which were then used to shape natural environments for the purposes of families, clans, tribes and nations.

Producing ecological and cultural wealth Although Indigenous management processes were intensive, planned and used powerful technologies, they did not result in environmental degradation of the kind associated with contemporary forms of business management. And although these systems of environmental planning and ecosystem shaping were standardized to apply over large land areas, they did not result in monocultures that degraded landscapes and reduced biodiversity. Flexibility and responsiveness in ecosystem designs and adaptability in the templates that Indigenous managers used to shape ecosystems enabled diversity and flourishing networks of biological systems to proliferate. Their use of fire and water to shape landscapes encouraged greater diversity rather than reduced it. The Indigenous worldviews that underpinned the application of design templates encouraged sensitivity to the demands of location and place, season and time, water and earth and plant and animal life cycles. It was this sensitivity that allowed ecosystems to thrive through planned management rather than in spite of it.

Coordinating through ethical and spiritual values systems A feature of Indigenous culture is the presence of integrative worldviews that act as meta-heuristics guiding the expressions of these core values. This integrative, meta-level capacity has been identified as a fundamental aspect of wisdom by contemporary researchers (Baltes and Staudinger 2000; Edwards 2013; McKenna et al. 2009). A greater focus on the role that Indigenous cultural wisdom and values play in their ecological sustainability competencies may be vital in the development of the sustaining forms of global stewardship.

An integrative ethic that draws on core cultural values and principles will be important in the development of truly sustaining forms of global management. The management values and cultural mindsets that inform Indigenous environmental practices have a crucial role to play in informing requisite forms of planetary management. Some of these values and worldviews may have strong resonance with emerging aspects of management and organization science such as management

spirituality (Sheep 2006) and organizational wisdom (Küpers and Pauleen 2013). We know that core values are shared across different cultural, geographical and ethnic boundaries (Schwartz and Bardi 2001), so it is not surprising that values inherent in Indigenous ecological worldviews should have some commonality with those that inform the non-Indigenous study of ecological management. Gammage proposes that an Indigenous management worldview was based on three meta-rules that were followed across all corners of the Australian continent (Gammage 2011: 4): 'Ensure that all life flourishes. Make plants and animals abundant, convenient and predictable. Think universal, act local. These rules imposed a strict ecological discipline on every person.' These meta-heuristics sum up the ethical, conceptual and practical values that underpin Indigenous environmental management. They might also form the basis for a new ethic for planetary management.

Conclusion

This chapter has placed the current discussion on connections between Indigenous land stewardship and Western notions of environmental management within the context of planetary stewardship. It makes the relatively simple observation that Indigenous management practices successfully responded to the same sustainability challenges that we are currently failing to meet at every level from the local to the global. It proposes that the transdisciplinary study of similarities between Indigenous and Western management perspectives are noteworthy and that this means that the differences between the two are significant as opportunities for real learning. In particular, the integrative values that underpin Indigenous perspectives may need to be adopted at the global level if planetary sustainability is to be achieved. These integrative values connect people and communities to the country landscapes they inhabit through deeply held spiritual and ethical narratives and identities.

> Connection to country is fundamentally derived from the spiritual realm through an understanding of the ancestral origin, genesis and creation of features in the regional landscape. This spiritual connection with country underpins Indigenous belief systems and identity. It is not only relevant to the past, but also governs appropriate ways of being and operating in the present. (Choy et al. 2010: 182)

These kinds of connecting and integrated values have powerful similarities with concepts being studied in such areas as spirituality in management (Malloch 2010; Sheep 2006; Steingard 2005), organizational wisdom and wise leadership (Küpers and Weibler 2008; Nonaka and Takeuchi 2011; Scholte 2010; Spiller et al. 2011), authentic sustainability (Chiriac 2011; Starik and Rands 1995) and planetary management (Scholte 2010; Steffen et al. 2011). The transdisciplinary study of these convergences and divergences has much to offer the development of global sustainability science and forms of planetary governance.

Notes

1 The capitalized form of the word 'Indigenous' is a generic reference to all Australian Aboriginal and Torres Strait Island peoples. The non-capitalized form 'indigenous' refers to the original inhabitants of other countries in general.

2 The term 'Western management' refers to management systems that originated in western Europe and the USA but are now found in all parts of the world.

3 There are, of course, contemporary forms of Indigenous business management which employ aspects of both traditional and Western management systems. See Spiller et al. (2011) for a discussion of contemporary Indigenous management.

4 The notion of the Anthropocene needs to be revised to take this new understanding into account.

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3 | POLICIES FOR POVERTY REDUCTION IN A TRANSFORMATIVE GREEN ECONOMY

Enrique Delamonica

Introduction[1]

Economic growth and technological/scientific change have brought incredible progress for humans in the last two centuries. However, this progress is not evenly distributed. Economic growth is not linear, nor does it lead to an optimal equilibrium (Anderson et al. 1988; Lesourne and Orléan 1998). It constantly changes consumption patterns and income distribution in a process labelled Transformational Growth (Nell 1992). Economic growth also has costs, which are not distributed evenly either.

As humans have learned to transform and channel nature to improve their lives,[2] every technological advance has transformed society. Unfortunately, the improvement is not distributed equally or equitably and it comes at a cost: along with better living conditions there is always the possibility of using (purposefully or not) the power of technology to destroy us directly or through the contamination of our environment.

Thus, technological change and the concomitant economic growth need to be channelled, regulated, controlled and managed in order to ensure a fair distribution of costs and benefits as well as to minimize the costs. This is the crux of the policy challenges scholars and decision-makers face in an ever-changing, or Transformational Growth, context. The magnitude and characteristics of this challenge require approaching it from diverse fields of inquiry.

An attempt along these lines is made in this chapter. Drawing on concepts and ideas developed in physics, environmental science, sociology and economics, a combination of models showing the interaction (feedback loop or synergy) between environmental sustainability, monetary poverty reduction, economic growth and equitable development is presented.[3] A fundamental piece in this web of interactions is the creation of jobs that provide added value to society

(thus generating economic growth) in a way that protects, promotes and sustains environmental and social balance (i.e. equity) as well as providing jobs which fulfil workers' lives. This chapter shows that these jobs, which do not come about automatically but are fostered by policies, can contribute to make the Transformational Growth process environmentally sustainable, leading to a Transformative Green Economy.

This is undertaken in three sections. The first deals with some definitions and conceptual issues. In the second part there is a brief discussion of the interactive relationship and feedback loops (synergy) between economic growth, poverty reduction and social change in the context of Transformational Growth. This theoretical model also addresses the interaction between the environment and the economic–social synergy. The third section of the chapter describes some policies which might contribute to this sustainable and equitable development path. This is done through the concrete experiences of a particular case, the city of Porto Alegre in Brazil, where the city government took steps towards social change, reduction in inequality and sustainable development. The concluding comments summarize the argument and attempt to show its transdisciplinary nature.

Part 1: Conceptual issues

Understanding poverty In simple and lay terms – for instance, in any dictionary – poverty is defined as lacking or being deprived of resources (usually income is mentioned or given as an example). In this sense, it is easy to distinguish poverty from other problems humans face, such as sadness, violation of civil and political rights, environmental degradation, violence, etc. Nevertheless, social scientists need to be more precise in their definition in order to be able to understand and measure the causes and characteristics of poverty as well as devise policies to reduce/eliminate it – measuring it helps to find out whether we are making progress in this endeavour.

Thus, the concept of *monetary poverty* emerged from the work started by Booth (1892–97) in London and Rowntree (1901) in York at the turn of the nineteenth century and continued by Orshansky (1963, 1965) in the USA in the 1960s. Based on a calculation of the cost of the minimum basket of goods required for survival and participation in society (the poverty line), those individuals or families whose

consumption or income is below the poverty line are considered poor. The notion of poverty circumscribed to insufficient flow of monetary resources (income or consumption) was challenged and expanded in the latter quarter of the twentieth century. Some authors (Wolff 2007, 2010) have started to measure the insufficiency of assets. Other authors concentrated their efforts in incorporating other dimensions of deprivation (ILO 1976; Streeten et al. 1981; Townsend 1985; Sen 1982, 1985; Beccaria and Minujin 1988; Boltvinik 1998; Nussbaum 2001; Hunt et al. 2002). Their contributions have been categorized using various labels (such as capabilities approach, basic needs, human development, human-rights-based poverty, etc.).

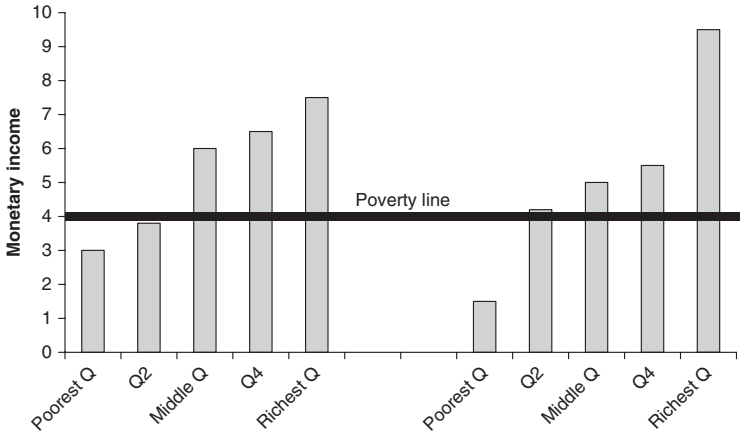
The important conceptual point for the purposes of this chapter is that there is now a wide and deep literature coming from across a variety of disciplines which stresses that poverty is multidimensional. These dimensions are not arbitrary and are all based on human rights. This does not imply that all human rights violations constitute poverty. Only some of them do – those which are most closely associated with material deprivations (such as lack of food, water or housing[4]). Thus there is a need to explicitly and clearly separate monetary poverty from non-monetary poverty. For ease of reading and to stress a positive element, the inverse of the latter will be used in this chapter and will be labelled 'social development' (it could also have been called expansion of capabilities or human development).

The many faces of inequity In recent years the international development discourse has rediscovered equity (World Bank 2006; ECLAC 2010; UNICEF 2010; UNDP 2011; and even some IMF staff papers 2014).[5] However, the bulk of the literature concentrates on income disparities. Like poverty, inequity has various dimensions. Consequently, it is important to distinguish between income inequality and the other dimensions of equity (social, cultural, political and legal). Also, a word is needed on the difference between equity and equality.

Simply stated, equality attempts to discern quantitative differences in outcomes (economic, social, etc.),[6] while equity incorporates issues of fairness and justice. In other words, some differences are natural, unavoidable and cause no major personal or social disruptions. For instance, there are tall and short people – this is not a social or policy problem. Equity comes into play when the quantitative differences are avoidable and unfair.[7]

The notion of equity can be applied to both income and social outcomes. It is usually clearer in the latter. Few people or policy-makers would explicitly and openly argue that social services such as education, health or access to sanitation should not be available for all members of society.[8] However, the concept of equity in terms of income distribution is less often made or widely accepted.

It should be clear that monetary poverty and income distribution could move in different directions, i.e. one could improve[9] while the other does not. This can be seen in the hypothetical case in Figure 3.1, where the vertical lines represent income by quintiles (measured on the vertical axis). While in the first case the monetary poverty rate is 40 per cent (two of the bars are shorter than the horizontal line, showing the poverty line at an income of 4), in the second case it is 20 per cent. However, for three of the five quintiles income has declined (and quite dramatically). For the second quintile income has barely changed. Although this is sufficient to surpass the poverty line, it would have absolutely no effect on real people's lives. Only the fifth and richest quintile enjoys a significant increase in income, resulting in the emergence of a less equitable situation with less monetary poverty. Thus, in this chapter reductions in monetary poverty as well as a more equitable income distribution will be part of the analysis. It should also be stressed that, as the economy grows, it proceeds along a transformative path, which constantly alters income distribution as well as the incidence of poverty.



3.1 Changes in income distribution and monetary poverty: hypothetical example

What is a 'Green' Economy? As is the case with poverty and equity, sustainable development is also multidimensional.[10] It is possible to interpret it merely as ensuring that natural resources should not be depleted.[11] This entails ensuring that resources directly used in production should not be exploited at a rate that prevents future production (e.g. over-exploitation of woods and fisheries). It also involves maintaining the quality of elements (e.g. air and water) which may be polluted by production or consumption. This is the approach labelled 'shallow' ecology by Arne Næss (1973) who contrasted it to his concept of Deep Ecology.

Næss (1986) posits that other elements should be part of the discussion about ensuring the health of the planet, not just of humans. In particular, he mentions the importance of 'bio-spherical egalitarianism', by which he means that the environment should be respected and protected because of its intrinsic value (including the value of the diversity of nature) and not just because doing so is 'useful' to humans. However, he also argues that efforts to protect the environment should not undermine human societies, in particular by making some products or patterns of consumption untenable to large sections of the population. Thus, he marries the ideas of protecting the environment while pursuing more egalitarian societies. One way to do so, in his view, is to promote a variety of ways to earn a living – ways which should buttress lives of good quality (which he calls 'dwelling in situations of inherent value'). In other words, accepting that the division of labour results in a complex interaction of activities performed by separate individuals does not imply their lives should be fragmented or dull and boring (ibid.).[12]

The latter point implies that specific policies are required to bring about and coordinate these actions as they will not appear spontaneously. However, in order to devise these policies, (multidisciplinary) research is needed. This research has to be grounded in the understanding that there are a myriad of interactions and complementarities which bring about complexity in the continuum (filled with feedback loops) from individual through society to ecosystem.

Interestingly, many of these ideas are similar to what emerges from the Latin American concept of Good Living.[13] While the language and philosophical basis may be different, in the concept of Good Living it is possible to find the importance of the connections among all forms of life. This goes beyond the simplistic notion that if we pollute the air

we will all die. The point is that life is meaningless if other creatures perish. Both Næss' and the Good Living approaches acknowledge that human survival (as a species, not individually) requires some utilization of natural resources, but this should be done in a harmonious way which respects the sanctity of the diversity of natural life. As a result, proponents of Good Living advocate not just a different way to articulate the connection between human societies and nature but, as a result of this necessary change, a different way to organize human societies themselves. In other words, they advocate engagement in different patterns of production, consumption and distribution that respect the environment and promote equality as well as better (more wholesome) ways of living (Acosta and Martinez 2009; Farah and Vasapollo 2011; Guendel 2012).

Thus, in this chapter, perhaps oversimplifying, a Green Economy is understood as one where policies are actively pursued to ensure alignment with the values of Deep Ecology and Good Living. Moreover, as the context in which these policies are envisioned is one of Transformational Growth (discussed in the next section), reference is made to a Transformative Green Economy.

Part 2: Synergies

Preliminaries The mainstream view of development is premised on the idea that economic growth reduces monetary poverty and results in social development in a more or less automatic fashion.[14] As a result macroeconomic policy is conceived to establish economic stability and economic growth, which is often misconceived as a result of stability itself. Social policy is left for later or, even worse, to address the social consequences (Atkinson 1999).[15]

A different methodological lens is used here; one based on the adaptation of the physical concept of synergy and explicitly recognizing that economic structures (their consumption and productive patterns) are constantly changing. A synergy or feedback loop can be succinctly expressed as the enhanced impact a change in an independent variable has on the growth rate of a dependent variable, given the presence of a third variable (Haken 1977).[16]

Among social interventions such as basic healthcare, reproductive healthcare, education, nutrition, water and sanitation, there are feedback loops. These interactions, in turn, constitute a mesh of

relations which curtail the notion of (single) causality – synergy arises. The positive effects of good health on nutrition are well known. It is also very well established that lack of good nutrition critically interacts with disease. For instance, control of diarrhoea and measles is very important not only for health outcomes but also in reducing malnutrition (by improving the capacity to absorb and retain caloric intake). By the same token, an insufficient intake of total calories, vitamins and proteins weakens individuals' immune systems. This makes people more vulnerable to the onset and consequences of infectious disease. Interventions in health promote good nutrition and interventions in nutrition promote good health.

Moreover, micronutrient deficiencies and illness can have devastating consequences for the cognitive development of a person. For instance, iron deficiency anaemia reduces cognitive functions, iodine deficiency causes irreversible mental retardation, and vitamin A deficiency is the primary cause of blindness among children. Girls are unfairly disadvantaged in many of these cases. For instance, boys are usually better fed and more likely to be taken to a health facility when ill. In addition, as children survive, families voluntarily curtail the numbers of children. It is clear that lower infant and child mortality plays a major role in reducing fertility rates. While it is clear that good health and nutrition have benefits which reinforce each other, the above examples also show that they impact positively on fertility control and education. However, it is also clear that good health, protection against disease and proper nourishment do not result only from interventions in the health or food sectors.

One of the most powerful contributors to reduced child mortality, for example, is the literacy of mothers, which is itself the result of an education system that ensures widespread access to education for the poor, including girls as well as boys. Education is also critical as parents, especially mothers, make better use of information and reproductive healthcare facilities if they are more educated. Thus, more widespread education is associated with lower fertility. Better nutrition and healthcare is provided by educated parents for themselves and their children. As a result, health investments are more efficient in the presence of a more literate population (Mehrotra and Jolly 1997).

Basic education also facilitates the rapid adoption of improved hygienic behaviour. This not only improves health outcomes but also enhances the impact of investments in water and sanitation systems.

Safe water and adequate sanitation also play a fundamental role in determining health conditions. Access to safe water and sanitation dramatically reduces the incidence of diarrhoea and many other diseases that kill millions of children and adults each year. Another effect of better access to water takes place through the reduced effort in carrying water, which is usually unduly borne by women and girls. This has several important implications, related to the additional time available to women and girls. Given the traditional roles they play in most societies, when women and girls have more time, they can apply it to better infant and child care. When girls need less time to help in household chores such as fetching water, they have more opportunities to attend school. They also have more time and energy to study and do well in school, avoiding repetition or dropping out. Finally, especially for women, more time is available for pecuniary productive activities (UNICEF 2000).[17]

There is an interaction between education on the one hand, and safe water and improved sanitation on the other hand, which results in better outcomes in each sector when they are together than when they are alone. Their benefits also spill over to other sectors. The presence of safe water and hygienic conditions at school can reduce some constraints on sending children, especially girls, to school. Backed by proper hygienic behaviour such as hand washing and the use of soap, access to safe water and adequate sanitation reduce morbidity from infectious diseases and increase the nutritional status of children, which furthers their learning abilities.

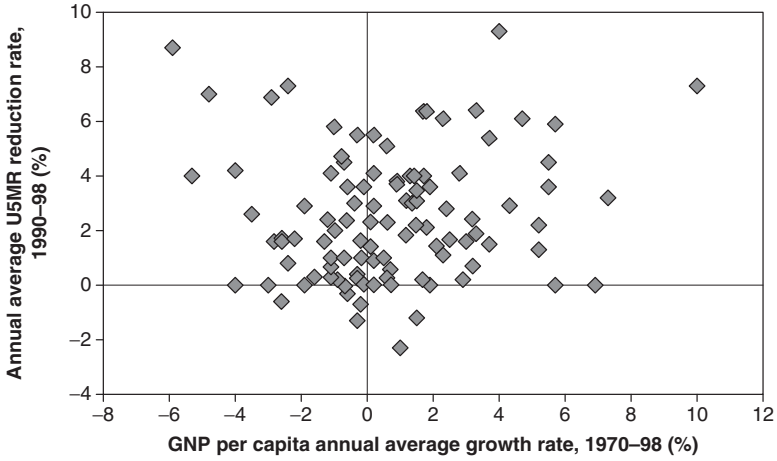
In summary, each intervention has ramifications which lie outside its 'sector' and contributes to a virtuous circle of social and economic development. This is different from the existence of an externality,[18] although they are of course present. Unlike the traditional treatment of externalities, which are usually exceptions and consequently can be dealt with (at least theoretically) by (re)specifying property rights,[19] these interactions are pervasive. Not only that, but they do not just affect another sector, they all impinge on each other, resulting in a mesh of interactions. In other words, it is a synergetic system.[20]

There is a second synergy. It links monetary poverty reduction, social development and economic growth. For synergies to be realized at this macro-societal level, actions on several fronts are needed: fiscal policies which promote full employment and provide sufficient funding for basic social services, monetary policy to promote investment and

full employment, regulation of the quality of basic social services, distributive policies to reduce poverty, etc. As the economic process will not naturally lead to full employment or poverty reduction, given its evolving and transformative nature, macroeconomic policies are needed. Similarly, there is a need to integrate social policies with macroeconomic ones in order to realize the social–economic–environmental synergies required for a Transformative Green Economy.

Given these complex interactions (synergy) it is difficult to establish causality. Figure 3.2 provides an example of the lack of association between economic growth and social development – in this case measured by improvements in Under 5 Mortality Rates, as suggested by Sen (1995).

This has policy implications when attempts are made to prioritize interventions. For example, despite widespread literacy, many countries have not achieved rapid growth, although education is purported to be a major determinant of economic growth.[21] Obviously, education advancement (part of social development) by itself is insufficient to spur growth in the absence of other policies (for instance, to promote technological change and productivity increases). There are also examples of countries with relatively rapid economic growth but persistent monetary poverty. Indeed, the relationship between



3.2 Lack of association between economic growth and social development (measured through U5MR – Under 5 Mortality Rate) (*source*: Own elaboration with data from UNICEF, *State of the World's Children* (various years))

economic growth, income poverty, environmental sustainability and social development is a complex one. A framework to describe these linkages is presented below.

The lingering question remains: If there are no sufficient or necessary conditions linking these elements, are they unrelated? The answer is that they are indeed related, but in a complex way. Although no particular element is necessary or sufficient for the advancement of the other, they help each other. Thus, for instance, the effectiveness of industrial policy in inducing economy-wide productivity growth or non-agricultural employment in rural areas will be enhanced in the widespread presence of social development, in turn resulting in higher rates of income growth (depending on the technology used as well as the type of value-adding activities) and the environment being protected.

Describing synergies and Transformational Growth[22] The existence of synergies leads to several important, and often overlooked, interrelated effects in terms of policy. The impact of a policy (e.g. redistribution to directly reduce monetary poverty) on another variable (say, economic growth) crucially depends on the level and rate of change of another variable (e.g. health and educational status). In other words, economic growth will be faster and more sustainable if monetary poverty is reduced simultaneously through direct polices and the health and educational status of the population is higher and increasing.

As mentioned above, the economy is an ever-changing system, not one that naturally tends towards equilibrium or where the main variables and indicators grow evenly. As a consequence, economic growth is irregular. However, economic cycles are not random. Since the Second World War (in rich, industrialized countries) economic cycles have been characterized by wider fluctuations in output than in prices. These stylized facts are in stark contrast to the typical business cycle of the late nineteenth century and up to the First World War, when employment was more stable than nominal prices (Nell 1992, 1998a, 1998b).

Several factors contribute to these variations. Different periods are characterized by different market structures, technology and institutions. For instance, oligopolies were more pervasive after the First World War than before, and mass production took hold over most industrial activities at this time too. These characteristics are not

independent of each other. For example, as mass production equipment and factories require large investments, they are easier to finance and support under oligopolies. Mass production also requires a steady stream of revenues, which is guaranteed with non-decreasing nominal prices in order to face the payment of loans (or cover the opportunity costs of own funds).[23]

These changes do not occur overnight. The gradual introduction of innovations and new forms of behaviour evolve into a new set of market characteristics that endogenously promote additional innovations and changes in market behaviour. Thus, as new technologies and institutional innovations are introduced, economic growth implies larger aggregate incomes and demand. This increased aggregate demand enables activities that are not practical (or profitable) to get off the ground or activities that play a minor role in the economy to become pervasive. There is a change in the productive structure. These changes are then reflected in different consumption patterns, which in turn propel further increases in income, its distribution and aggregate demand. The constantly evolving, structurally changing, irregular but not random economic growth is labelled Transformational Growth.

Moreover, per capita income growth is not chosen by governments, but is the result of public policies and private decisions. GNP per capita growth is influenced by various elements such as social development (Nell 2005), the pace of poverty reduction and macroeconomic policies. However, the most important one, in the medium to long term, is technological change (i.e. the introduction of value-adding activities and productivity increases through technological/structural change).[24]

As part of the synergetic effects, environmental sustainability policies can and should promote technological change and value-adding activities through various routes, as discussed below. This in turn will contribute to economic growth.

Low unemployment and high wages reduce monetary poverty, leading to higher levels of consumption, aggregate demand and economic growth. However, this does not mean that macroeconomic stability per se results in economic growth. Nor does this imply that a privately led boom will not result in social and income distribution imbalances.

The presence of synergies and the Transformational Growth process lead to various deviations from an orthodox understanding of

how the economy and markets work. This has policy implications. For instance, if markets are not always efficient and are in constant flux as firms try to alter the constraints they face through innovation, then the very notion that taxes or import restrictions introduce distortions lacks theoretical foundation. Taxes, however, play another important role that is usually unnoticed. They affect the distribution of income, which impacts on monetary poverty.

As with economic growth, the primary income distribution is not in the hands of government to decide. It emerges from market results and the relative bargaining power between the owners of production factors, both of which change through the Transformational Growth process. The distribution of income, in turn, affects the incidence of monetary poverty. At the same time, the government can influence income distribution, both through regulation and overall management of macroeconomic conditions (captured in the GNP per capita growth variable) (Rowthorn 1977; Nell 1992). It can also use fiscal policy to affect the after-tax income streams (secondary income distribution), correcting the excesses of the market and reducing monetary poverty.

Moreover, the distribution of assets can be altered in the course of the Transformational Growth process. However, these changes may or may not improve income distribution. Again, policies can be used to promote a fair distribution – for instance, through land reform, titling, distribution of shares, all of which will affect the primary income distribution. It has been argued that the single most important economic factor affecting women is the gender gap in command over property (Agarwal 1994).

Finally, a fundamental way in which the government can influence distribution is through the provision of services and transfers (the tertiary income distribution) – through social assistance and social insurance. This, in turn, builds and enhances social development, influencing another loop of the synergies.

Social development (education, health, sanitation; the elements which enable people to enjoy lives worth living) constitutes a myriad of interaction effects among the elements discussed above. Obviously, additional resources help (at the household level and nationally) through monetary poverty reduction and economic growth. However, as many country experiences show, relying on economic growth alone to improve people's lives is not sufficient. Public action in terms of social policy is fundamental in bringing about social development.

In addition, it is important to highlight that a healthier, safer and cleaner environment also improves enjoyment of life and makes studying easier. At least two elements contribute to this. Access to water releases time and energy (especially girls') which can be used to go to school and study.[25] In addition, as access to water is associated with better health and nutrition, the capacity to learn is enhanced.

Moreover, there are other environmental problems which affect social development.[26] Air pollution from industrial production promotes respiratory illnesses. The use of biomass in cooking, mainly in rural households in unventilated rooms, causes respiratory tract infections among women and children owing to the smoke from the ovens. Uncontrolled logging in forests (which increases GDP per capita) not only destroys the livelihoods of the poor who rely on the forests for non-timber products, but also causes soil erosion. Urban squalor and living conditions impact shelter and nutrition. Natural degradation through mining and of agricultural land (through inefficient irrigation practices) can impact economic growth, and through another feedback loop, indirectly, the potential for additional resources for social services. As this point shows, synergies appear almost everywhere. In order to complete the discussion, we proceed to the determinants of a clean and healthy environment.

Although GNP per capita growth is usually associated with environmental degradation (often leading to worsening environmental conditions), it depends on how growth is achieved. Hence, it is necessary to take into consideration the importance of the technological and structural changes that are driving the Transformational Growth process in assessing the impact of economic growth on the environment. Thus, GNP per capita growth, which is based on introducing and promoting environmentally sound activities, employment and industries, actually generates the synergy between economic growth and environmental health that gives meaning to 'sustainable development'.

There are various routes through which monetary poverty reduction leads to better environmental conditions. Some of the most widely known detrimental effects on the environment arise from poverty (at the individual or national level) – for instance, the use of inappropriate cooking materials by the income-poor who cannot afford better products or livelihoods or the over-exploitation of natural resources in countries where they may be the only currently available source of revenue.[27] Utilization of technologically and environmentally

appropriate activities at the household level and the promotion of employment in activities that protect and nurture nature require state policies. These policies may entail subsidies to certain goods, activities, employment or consumption. The likelihood that those at the bottom of the income distribution will be able to access these jobs would be higher if social development policies resulted in more widespread education and training.[28] These outcomes would contribute to income distribution improvements and monetary poverty reduction – closing another synergetic loop. Indeed, closing these various feedback loops among the four realms (economic growth, poverty reduction, social development and environmental sustainability) is what promotes a Transformative Green Economy. As mentioned throughout this section, this requires policies.

Part 3: Policies

Brief overview of policy guidelines A fundamental point of the notion of synergy between the four types of interventions is that in strategies where one is absent, the effect of interventions in the other three spheres is less than it would otherwise be. Policies which focus largely on economic growth, without much regard for monetary poverty reduction, social development or environmental sustainability, are doomed to unequal income distribution (and thus higher monetary poverty), lower levels of social development (than otherwise possible) or environmental decline, which will dampen economic prospects in the long run. This policy represents a failure in converting the benefits of output growth into social development, or poverty reduction (Vandemoortele 2009). Similarly, policies that focus only on social development but ignore economic growth, monetary poverty reduction and environmental concerns may lead to outcomes that are not sustainable in accordance with a Transformative Green Economy.

It is very common in the development literature to read about the importance of growth for reducing poverty. This is usually, but not always, accompanied by the qualifier 'pro-poor'. However, 'pro-poor' growth is ill defined and the centre of a burgeoning debate about what it means. The reason for the lack of clarity and consensus in this area is related to the insufficient focus on the determinants of both growth and monetary poverty reduction. As described in the previous subsection, these two processes are embedded in a series of feedback loops (that

we call synergies), which include environment and social development as well as the economic transformations associated with the economic growth process itself.[29]

For economic growth to be conducive to monetary poverty reduction, it has to generate new and more productive jobs. Moreover, these jobs have to be well paid. Economic growth is often focused on increases in income without regard to whether it is occurring in sectors which add value or if it is merely exploiting natural resources without generating jobs. Whether economic growth is import- or capital-intensive is also usually not considered when discussing its impact on monetary poverty. However, these different ways to generate economic growth can affect not only how much employment is generated, but other elements of the feedback loops described above, such as environmental sustainability and income distribution. The working conditions (not just remuneration, but also workers' rights, health and safety concerns, hours of work and rest, job security, social insurance) are indicative of whether or not increasing employment will reduce poverty (and feed into the other synergetic elements) and promote a Transformative Green Economy.

Each of these points merits further elaboration within the context of a Transformative Green Economy. Unemployment represents inefficiency (i.e. a waste of resources, in this case unemployed people), which results in less output than could have been obtained in the absence of unemployment. Nevertheless, in most debates about efficiency and stability, proper weight is not given to unemployment. If policies lead to lower inflation while increasing unemployment, they are said to contribute to economic stability. If trade reforms result in lower employment in previously protected industries (and concomitantly lower overall output), then efficiency is said to increase. However, these economic costs are not necessarily the worst aspect of unemployment.[30] There are also social implications – for instance, increased morbidity and mortality, family strife, substance abuse linked to depression, and so on.[31] From this perspective, besides the economic benefits, fighting unemployment is a crucial element of social policy.[32] Moreover, with so many unmet needs in most developing countries, it is immoral to keep workers idle.[33]

This leads straight into the second point: the need to channel resources, especially labour, into areas where they will promote a Transformative Green Economy. This has several components. One of them is the need to ensure that new jobs (and consequently economic

growth) are geared towards activities which conserve and restore the environment. These may range from building energy infrastructure in renewable resources to eco-tourism and the production of organic medicines. Another aspect is that many of the environmental issues faced by the poorest groups (e.g. lack of sewerage in shanty towns) require human effort (both in the production of capital goods and in their installation). Here again, employment, the promotion of basic social services and environmental protection go hand in hand if an economy is to be labelled a Transformative Green Economy. Finally, as mentioned above, economic growth requires involvement in the production of higher-value-added products. Not all of them are going to be 'green' or 'ecological' products like the ones mentioned above. Nevertheless, even if factories for traditional goods (cars, semiconductors, radios, textiles, etc.) are set up in the country, they can use environmentally sensitive construction and production methods. The important point is that there are many ways in which policies to promote employment in income-increasing jobs (i.e. economic growth) and protecting the environment can complement each other.

Thirdly, and partly related to the issue of 'Green' Economy, is the issue of working conditions. 'Green' production refers not only to the issues of recycling and preventing pollution of air, land and water. It is also crucially linked to the health and safety of workers at their job site. Moreover, 'green' production does not necessarily entail that workers will be free to join unions or allowed to participate in company decisions or production design. Nor does it mean that production lines are not filled with repetitive and boring jobs, or imply that workers will be well paid. All this indicates that additional measures and policies are required in order to ensure that humans can engage in productive activities that they enjoy and value (Næss 1973), i.e. to move from environmentally sound economic activities to a truly Transformative Green Economy.

There is an additional issue related to income distribution, economic growth, environmental conditions and social development. This is the role played by women in social reproduction (what some economists would tastelessly call the 'production of children'; Becker and Barro 1986). Not only is this role not valued economically, it is often assumed to be the 'natural' job of a woman. Not incorporating these activities, the differentially gendered roles played by women and men, and the concomitant topic of intra-household allocation in the analysis of the

impact of macroeconomic and environmental policies, for instance, has had pernicious effects both for women and the economy as a whole and misses an important dimension of discrimination, income distribution and sustainability.[34] These are related to the types of jobs (and their quality) that men and women perform. As shown in the following section, the types of jobs constitute a fundamental nexus between economic growth, social development and environmental protection.

A simple example linking the elements described in the previous section at the macro level, only for illustrative purposes, would work as follows. Both technological change and appropriate macroeconomic policies are needed for economic growth. Similarly, macroeconomic policies and social development through social policy should work together. Contrariwise, typical adjustment policies (which increase unemployment, reduce wages, force the misuse of natural resources, and cut the financing of water and sanitation) do not induce positive synergies. On the contrary, they reduce welfare and hinder social development, thus undermining the feedback loop.

Synergies in motion at the local level: the case of Porto Alegre (Brazil)[35] While the discussion in the preceding sections has been mainly about nationwide interventions, in this section a local experience – a large municipality in Brazil – is presented in order to show both the synergies between various types of policy intervention (including Næss' point (1986) about the importance of constructing equitable and sustainable policies and alternatives through local, in this case urban, planning) and the role of employment generation through jobs that provide satisfaction to the workers and protect the environment. Porto Alegre boasts a successful model of urban planning for sustainable development. Porto Alegre[36] is the capital of the state of Rio Grande do Sul in Brazil. During the 1970s it experienced very rapid growth rates. However, nearly one third of its population lacked access to clean water, adequate sewerage and other basic infrastructure, as economic growth was not being used to provide basic services, encourage policy reduction policies or promote environmental sustainability.

After Brazil regained democracy in 1984, there was a constitutional reform in 1988 that promoted, among many other issues, participation at the lowest levels of government. Municipalities were increasingly given non-traditional responsibilities and authority.

Among the changes derived from the constitutional reform, participatory budgets are usually highlighted (Baiocchi 2003; Fedozzi 2001). As Porto Alegre has been a leader in this area, it is not surprising that a lot of experience has accumulated in the promotion of urban planning, addressing both monetary poverty reduction and environmental sustainability. The former is achieved through better employment opportunities and public social services, the latter both through productive and employment-generating processes that take environmental impact into account and through improvements in infrastructure. This contributes to generating the mesh of synergies discussed in the previous section.[37]

Thus, for instance, while in 1989 only 46 per cent of the population was served by the sewerage system, currently 98 per cent of households are served. The garbage collection system reaches virtually all households and has included a separate collection of recyclables since the 1990s (Menegat 2002).

Through commissions and thematic groups, city planners gather information on what the population wants, focused mainly on investment projects accounting for roughly 15–20 per cent of the total budget (International Budget Project 2005). Table 3.1, for the period

TABLE 3.1 Evolution of priority themes in Porto Alegre's participatory budget, 1992–2004

	1st priority	2nd priority	3rd priority
2004	Housing	Social	Education
2003	Housing	Education	Roads
2002	Housing	Education	Roads
2001	Roads	Housing	Sewerage
2000	Housing policy	Roads	Health
1999	Sewerage	Roads	Housing policy
1998	Roads	Housing policy	Sewerage
1997	Housing policy	Roads	Sewerage
1996	Roads	Sewerage	Titling
1995	Roads	Titling	Sewerage
1994	Titling	Roads	Sewerage
1993	Sewerage	Roads	Titling

Source: Porto Alegre Municipality, www2.portoaleg re.rs.gov.br/op/default.php?p_seca0=27, accessed 1 December 2015

1992–2004, shows the evolution of the issues that were considered the top priorities. It is interesting to observe the evolution of these themes, as some problems were solved and the citizens focused on new areas for collective action.[38] Also, it should not be surprising to discover that 'differences in priorities between Porto Alegre's rich and poor were immediately clear: in the poorer sections, for example, residents identified a basic sewer system as their foremost priority, while the richer areas demanded cleaner streets and more parks' (Fricska 1996).

As mentioned above, the successful urban planning goes beyond (although it clearly builds upon) the participatory planning. The city government has also put in place programmes to enforce industrial pollution control (including special provisions for garages and petrol stations), keep down polluting motor vehicle emissions and ensure the reutilization of organic wastes from parks and restaurants. However, what makes the experience in Porto Alegre unique is the integrated way in which the city government pursues projects to promote employment and economic growth that also ensure monetary poverty reduction and environmental sustainability, i.e. the aim for a Transformative Green Economy.

For instance, there has been cooperation between city government and industry. This has allowed the creation of capital goods and electro-mechanic centres of excellence. This generates employment in high-paying/value-adding jobs. Also, modern technologies allow this production to be clean.[39]

Other, less traditional ventures have also been promoted, with positive employment impacts – employment that allows workers to earn a decent wage while contributing to protecting the environment. A Fishermen's Cooperative Collection Centre (located in the peri-urban area) allows fishermen to collect all the harvest in one location and to handle and clean the fish according to health regulations. A beekeepers' association received subsidies in order to install equipment that allows them to process honey bearing the federal health control seal (which also opened up an export market). An association of farmers combines agro-industry with tourism, as visits to farms generate two streams of income (tourism and selling locally made products to tourists). The Municipal Department of Urban Sanitation collaborates with the Pig Farmers' Association to sort organic waste at source and distribute it to producers. These, in turn, regularly supply day-care centres with non-perishable food (Menegat 2002).

This is not the only or the most important of the recycling projects. Since the early 1990s, the city has been steadily improving its garbage collection mechanism. Since the inception of the programme, the purpose has been to integrate mechanisms of disposal and collection in order to efficiently improve the quality of life of the population, in particular in lower-income areas, where infections and epidemics used to break out and spread owing to unsanitary conditions. Moreover, also from the beginning, the attempt was to integrate social objectives in these programmes (De Andrade and Guerrero 2001). Thus, formal employment was given to garbage collectors who had been socially marginalized and excluded from the labour market. Also, sanitary regulations were imposed on the various centralized collection and sorting centres. In addition, although these centres could be accused of reproducing gender stereotypes in terms of how the work is organized, it would not be appropriate to do so. Firstly, because the separation of tasks is not strict, it is almost voluntary. Secondly, and more importantly, because of the connection between the recycling centres and the centres to protect women against family violence, this allowed women to seek ways out of their situation by working and receiving an independent income as well as counselling, training and education about their rights.

Another way in which this programme highlights the way synergies and feedback loops can be achieved with integral planning is that workers in the recycling centre can receive further training which allows them to pursue other jobs. These jobs are related to the setting up of plastics and other technology-based sectors, where value added and wages are higher than at the recycling centres.

Buttressing the integrated view of social and sustainable development, the city has promoted changes in the school curricula. In addition, as part of the campaign to create and sustain support for these programmes and policies, a joint endeavour with the local university resulted in the 'Environmental Atlas of Porto Alegre'. It provides basic information for environmental policy, environmental discussion and environmental education. This was crucial not only for political purposes, but also because it was an important tool for planning and monitoring.

In summary, the city government has been able to achieve success in traditional municipal services (e.g. garbage collection) as well as in promoting broader sustainable development objectives. These include pollution control as well as the promotion of and engagement in

projects that exploit synergies between monetary poverty reduction, environmental sustainability and social development. As, in addition, jobs were adding more value and became more interesting, the overall experience could be considered an effort towards establishing a Transformative Green Economy.

Concluding comments

Although almost everyone would like to enjoy higher income, one's standard of living is also determined by access to basic social services, and the health and sustainability of the environment. Raising per capita income is insufficient or unnecessary (or both) to ensure the expansion of social development because social development, economic growth, sustainable development and monetary poverty reduction are interlinked through synergies. Thus, it is essential to devise policies that promote employment. However, not any type of work will do; the jobs should contribute to a satisfying life while protecting the environment in all of its diversity. Moreover, this new employment in value-adding activities will contribute to producing resources which can be used to provide equitable social services. Thus better lives, the availability of more resources, social development and less poverty will all be occurring and reinforcing each other through a synergetic process, leading to the realization of a Transformative Green Economy.

At the centre of these policies is the creation of certain types of jobs, not in just one sector but in a range of economic activities. This type of employment, as evidenced in the concrete example of urban development plans in Porto Alegre, fosters added value (leading to the possibility of better wages, lower monetary poverty, improved working conditions, decent employment, economic growth, etc.). These jobs clean and protect a healthy environment, promote social development, and provide fulfilling and rewarding hours of work for the people performing those activities.

These synergies can be interpreted as a concrete realization of a transdisciplinary approach. In order to understand, describe and implement policies that exploit the interlinkages between monetary poverty reduction, social development, economic growth and environmental protection, evidence from environmental science, economics, sociology, engineering, health sciences, etc., needs to be collated. This should be done in a way that not only integrates the views of various disciplines (interdisciplinary) but also goes beyond their

individual boundaries (transdisciplinary) in order to solve a concrete social problem: poverty reduction, eradication and prevention through job creation within the context of a Transformative Green Economy.

Notes

1 Thanks are due to Alberto Minujin and Santosh Mehrotra, with whom many of these issues were discussed and explored (including in previous publications) for many years. I also wish to thank Alberto Cimadamore and the other seminar participants for their useful comments. Unfortunately, I could not do justice to all of their valuable suggestions.

2 At least since our ancestors mastered the control and production of fire at will.

3 Lang et al. (2012) provide a good introduction to transdisciplinary research.

4 While each country should be able to set the thresholds used to characterize and measure poverty, there is substantial agreement about the dimensions that should be included. Although the lists of rights or basic needs may vary among the different sources of literature, there is a common set which is almost invariably present. As an example, at the 1995 World Summit for Social Development, governments agreed to include the following: education, information, water, sanitation, health, nutrition and housing. Monetary poverty can also be considered a human rights violation, as it is associated with the impossibility of maintaining a minimum standard of living.

5 The theme had always been there but not as prominently as in recent years.

6 In the legal realm equality often refers to the principle that we are 'all equal in the face of the law', meaning no individual should be treated differently from another at a trial or in other legal matters (e.g. a pauper and a president should be treated the same by the legal system).

7 For historical and conceptual reasons the term 'gender equality' is used instead of 'gender equity'. No substantive difference (e.g. in terms of pay, educational opportunities, etc.) between men and women could be considered fair, so equality between the sexes is the only fair outcome. In Beijing in 1995 attempts were made to insert the word 'equity' into the final document under the guise of accepting that some differences could be acceptable, but the motion was defeated.

8 This does not mean that sometimes it is made openly (e.g. certain groups do advocate for less education or political participation for girls and women) or covertly (by omission or negligence). Often, as in the aforementioned case of girls' education, it is the result of discrimination (i.e. differences between groups, not individuals, which a person cannot avoid without altering their identity (for instance, their sex, religion, race, etc.).

9 Given the concern with equitable development in this chapter, changes that lead to a more equal income distribution will be referred to as improvements, because they are more equitable outcomes. This is not the way technical texts 'should' be written; it is done here to stress that economics is not, cannot and should not be value-free (Myrdal 1953; Sen 1988).

10 The 'classical' definition says that sustainable development 'meets the needs of the present without compromising the ability of future generations to meet their own needs' (World Commission on Environment and Development 1987, also known as the Brundtland Report). Or, as stated in the

old saying: 'We do not inherit the earth from our ancestors, we borrow it from our children' (an expression attributed to different sources; see quoteinvestigator.com/2013/01/22/borrow-earth). Further definitions and additional references can be found in Kates et al. (2005) and UNDESA (2012) among many others.

11 In the pioneering Brundtland Report this was also conceived as a dimension of (intergenerational) equity. The relationship with broader issues of equity and equality was not stressed, although these issues have been increasingly incorporated into the concept of 'sustainable development' and 'Green Economy'. For instance, the definition by the United Nations Environment Programme (UNEP 2010) is 'A Green Economy can be defined as one that results in improved human wellbeing and social equity, while significantly reducing environmental risks and ecological scarcities.' However, in practice, in spite of the good efforts to explore links with social development and equity, the focus is often too technical and measurement limited to broad aggregates instead of disaggregating along socio-economic axes of disparity (UNEP 2014a, 2014b).

12 This was even recognized, and criticized, by Adam Smith: 'The man whose whole life is spent in performing a few simple operations … has no occasion to exert his understanding … and generally becomes as stupid and ignorant as it is possible for a human creature to become' (Smith 1776: Book V, ch. 1, part 3).

13 There are also similarities to the philosophical ideas behind Bhutan's Happiness Index.

14 In addition economic growth is supposed to be or to converge to a steady state of uniform growth (the equivalent, in dynamic terms, of equilibrium).

15 It should be noticed that this is a methodological issue and that methodologies need not pre-empt policy recommendations (Dow 1997).

16 Clearly, the notion of synergy is akin to the points made above about the complexity of the world and the interaction between all living elements. See also Osorio et al. (2009) for similar ideas in a different context.

17 This direct impact of water and sanitation improvements on monetary poverty reduction is less well publicized than the effect of more education and better health on productivity. This is an important direct link between social and economic development, which is described below.

18 I.e. the unintended positive or negative impact of consumption or production by a person or firm on another person or firm. As this impact is not counted either as a cost or a profit, it is called an externality.

19 There is no space here to deal with the practical problems relating to this statement and its theoretical foundation. For the former, calculating what the compensation to all concerned stakeholders should be when, for instance, a firm pollutes a river killing all of its fish and flora as well as rendering the water unhealthy for human drinking for miles downriver and for years to come. Even if participants were aware of all current and future prices that would prevail if property rights were established, this exercise would be daunting at best – it is actually impossible. Moreover, from a theoretical point of view, it is questionable to assume that all future prices exist, that these putative market prices do not include distortions, or that prices are not dependent on the institutional set-up in ways which render them incommensurable with prices under a different set of institutions.

20 It also becomes very difficult, in the presence of these synergistic interactions, to work out which

intervention to tackle first (sequencing) or to prioritize (allocation of resources).

21 It cannot but be remarked that in spite of ever wider access to education in most European countries and the United States during the last century, medium- and long-term average economic growth rates have remained relatively stable.

22 This section draws heavily on Taylor et al. (1997) and more specifically on Mehrotra and Delamonica (2006).

23 I.e. there are synergies among these elements.

24 See, among others, Abramovitz (1989); Chakravarty (1982); Pack (1992); Nell (1998b); Schumpeter (1934); Solow (1997); and Verspagen (1993). Inventing and adapting new technologies is a process of discovery characterized by uncertainty, rather than by probabilistic risk (Nelson and Winter 1982). This is in stark contrast to traditional models involving firms with absolute knowledge concerning static production functions.

25 Indirectly, as adult women in the household use less of their time to fetch water, their ability to earn incomes (and thus contribute to buying school supplies and books) or help children to study also increases.

26 For instance, unusable roads can limit access to services.

27 Limits of space prevent exploring further the relationship with, and implications of, these activities in terms of differential impact on indigenous groups, corruption and lack of bargaining power by poorer countries vis-à-vis multinational corporations.

28 Similar arguments are made by Ranis et al. (2000).

29 The Transformational Growth process also entails gradually and endogenously, but not mechanically, modifying the poverty line and thresholds for measuring multidimensional poverty.

30 'In our society, it is murder, psychologically, to deprive a man of his job ... You are in substance saying to that man that he has no right to exist' (King 1983).

31 The empirical evidence is varied and long-standing. Several decades ago, although using an orthodox conceptual framework, Hamermesh and Soss (1974) provided interesting quantitative analysis. Additional qualitative evidence was presented by Swinney (1983). Nichols et al. (2013) provide a very useful overview of more recent literature on these topics.

32 Implicitly, this assumes that any job is better than no job. Thus Keynes' famous quip about hiring people to dig holes to put money in bottles in the ground and then hire others to dig the bottles out. As we describe in the next section, though, better uses of labour can be found.

33 Of course, many of these needs are not expressed as effective demand providing prospective profits for prospective suppliers, which leads to the need for the state to engage in macroeconomic policy – for instance, following the Employment of Last Resort model (Nell 2001).

34 See, *inter alia*, the work by Beneria and Feldman (1992), Ferber and Nelson (1993), Nelson (1996), Budlender et al. (1998) and Elson and Catagay (2000).

35 This section is based on Mehrotra and Delamonica (2006).

36 It has a population of 1.5 million inhabitants, with a greater metropolitan area of 4 million.

37 Albeit the synergies were not consciously sought; policy-makers were 'muddling through' (Lindblom 1959), i.e. arriving at policy decisions through limited comparisons of alternatives without unrealistically separating means from ends rather than using a theory-led, rational-comprehensive approach.

38 This is another, though non-economic, implication of Transformational Growth.

39 Elements of this description may raise the question about the limits of reforming production and consumption patterns in current societies. While this is not the place to answer such a fundamental question, a brief reflection may be offered based on the evidence from this experience. Major and significant improvements in people's lives (including caring for the environment and the elimination of monetary poverty – which is not achieved once and for all, but requires constant monitoring of the evolution of income distribution as economies grow and are transformed) are possible in a system where means of production are owned privately by some members of society. However, this requires planning and control of economic activities, which can be done democratically and in a participatory way. That this is possible does not imply that it is easy, likely or a reason to avoid thinking of major structural changes which could also improve life in many other dimensions.

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4 | HEALTH PROMOTION AND SUSTAINABLE DEVELOPMENT IN KAZAKHSTAN

Altyn Aringazina

Introduction

The Republic of Kazakhstan has one of the largest and fastest-growing economies in the Commonwealth of Independent States (CIS), with a gross domestic product (GDP) that has grown more than sixty-two-fold over the past twenty years (1991–2011). Kazakhstan marked the twentieth anniversary of independence by introducing new social policies designed to strengthen its domestic socio-economic state and its political position in the international community. The government of Kazakhstan has prioritized several goals aimed at diversifying the economy beyond its reliance on oil, natural gas and other extractive industries, as well as increasing the competitiveness of the state as a whole. A key element of this is the improvement of population health.

Despite strong macroeconomic indicators and considerable progress in building civil society, efforts to democratize its system of higher education and related institutions, as well as to modernize infrastructure to support population health, numerous challenges remain in delivering public health services to a population of 17 million people, 59 per cent of whom now live in the two largest urban centres, Almaty, the nation's business centre, and Astana, its capital city. Although many health status measures show Kazakhstan to be ahead of most nations in the region, the country continues to lag behind others with similarly sized economies on several important health and environmental indicators (Aringazina et al. 2012).

The goal of achieving the World Health Organization's (WHO) Health for All by the Year 2000 was set during a WHO session in Alma-Ata, Kazakhstan – present-day Almaty – in 1978. This resulted in a historic accord that has come to be known as the Declaration of Alma-Ata, which is the precursor to today's United Nations Millennium Development Goals. Under the terms of the latest policy decrees in the Republic of Kazakhstan, the entire health structure of the country is

being analysed and reconsidered. Current reform efforts attempt to reorient public health, not only to reflect the principles put forth in the Declaration of Alma-Ata and the Health for All strategy, but also to fulfil the national government's desire to deliver a more effective and locally based health promotion programme (Akanov et al. 2012; Aringazina and Macdonald 2006).

This chapter describes some of the specific challenges that the Republic of Kazakhstan faces in acquiring transdisciplinary knowledge and applying it to foster social change and further development of civil society. The chapter reviews and describes efforts now under way, including those in the academic, government and private sectors, to meet the challenges of developing health promotion capacity in Kazakhstan and modernizing its public health workforce as part of broader sustainable public health policy, systems and environmental change. Furthermore, this chapter reports the results of an eight-dimension spidergram from a health promotion capacity mapping exercise, which suggests that policy-makers and public health specialists should work out a new vision and understanding of health promotion in the context of emerging sustainable development policies.

Health promotion and disease prevention policy efforts

Over the last few years, the government of the Republic of Kazakhstan has increasingly focused its attention on public health policy in an attempt to address many of the population health problems. A development strategy followed, including a series of important state programmes that identified health promotion and disease prevention as key elements in public health policy areas.

Disease prevention has always been the preferred option in promoting health and reducing disease rates. For many, this health argument is reason enough to invest in preventive economics. Others, citing scarce resources, advocate careful assessment of the costs and savings associated with prevention (Woolf 2009). Chronic disease functions as the 'litmus test' to inform the health practitioner and government whether or not a national health system is properly functioning (Samb et al. 2010).

Strengthening of population health in the context of contemporary political and social realities remains an urgent task of healthcare reform in the Republic of Kazakhstan. There are still high rates of disease, in particular cardiovascular diseases and tuberculosis, as well

as high maternal and infant mortality (Rechel et al. 2012; Akanov and Meimanaliev 2012; Kulzhanov and Rechel 2007). A study of smoking prevalence in eight countries of the former Soviet Union showed a number of changes between 2001 and 2010, most notably that smoking rates appear to have stabilized and may be declining among young groups, although they remain extremely high among men, particularly within lower socio-economic populations (Roberts et al. 2012).

In spite of continuing negative trends in most lifestyle data and an apparent lack of resources for health promotion, much has been achieved in a relatively short time. At present, there is a new programme, 'Kazakhstan 2050', with new tasks for future investment in sustainable health development. By establishing the Kazakhstan School of Public Health (KSPH) and the National Centre of Healthy Lifestyle Development (NCHLD) in 1997, the government created the essential infrastructure for the development of a public health movement in the country. However, the government still has difficulty in understanding some of the concepts underpinning health promotion and public health practice. Moreover, regional differences and a lack of resources make it difficult to address transnational causes of morbidity and premature mortality. Despite these problems, there is reason to be optimistic. For example, there is growing recognition that improving the health status of the Kazakhstani people will require an intersectoral approach; that the population must have a voice and be involved in the processes that promise to improve health; and that building social capital is critical to achieving national health improvement goals. As promising as these developments are, they point to the need for the KSPH faculty and other specialists to work on the development of new conceptual approaches to realize a new public health vision. The new approaches need to incorporate scientific evidence and new technology, in addition to political, social and economic action. Furthermore, the creation of the Unified Information System for healthcare made the need for development of managerial, financial and medical technologies manifestly evident, and should result in a cultural transition to a higher level of healthcare organization and capacity development. Important government initiatives in the Republic of Kazakhstan have sought to build public health capacity as one of the cornerstones of state policy to revitalize and strengthen the public health system and improve the lives of the population. These priorities, and the broad goals that accompanied them, reflect the principles of the WHO Health for

All strategy. Quantifiable targets have been set across a wide range of population health problems, though achieving many of them will require increased capacity of the public health system's behavioural medicine and health promotion workforce, as well as developing practice standards that are consistent with international ones (Aringazina and Allegrante 2011).

Healthy Lifestyle Development, a programme that is regulated by the interdepartmental project 'Healthy Lifestyle', and supported by various resolutions of the government, aims to create an effective system of medical services administration based on the principles of singular responsibility for health protection between the government and the population. The priority development of primary healthcare directed towards the improvement of basic population health status indices in Kazakhstan has created a unique and independent, government-mandated service whose activities have a legal basis in realizing national health promotion policy.

Despite the Healthy Lifestyle Development programme, the work of improving health promotion methods and healthy lifestyle development technology throughout the country is not based on international, evidence-based practice. There is adequate training of health promotion professionals as well as specialists in public health and disease prevention, but as regards practical activities, policy-makers underestimate the importance of the development of preventive practice. This oversight is reflected in reform and implementation at the local level of the public health service, in educational institutions, and in research activity. The key changes that are needed in the country to achieve advances in health promotion and disease prevention include: training of specialists on health promotion at all levels, from teachers to healthcare professionals themselves and even researchers; performing research based on international experience; developing intersectoral cooperation; and adapting and implementing effective technologies.

> The goal of enhancing population health is best addressed through systems and policies that integrate a range of investments in health. Within this context, a key feature of behavioural approaches is their parallel breadth, from population approaches for prevention to clinical and disease management interventions of established efficacy. (Fisher et al. 2011: 24)

The health promotion Capacity Mapping Initiative in Kazakhstan

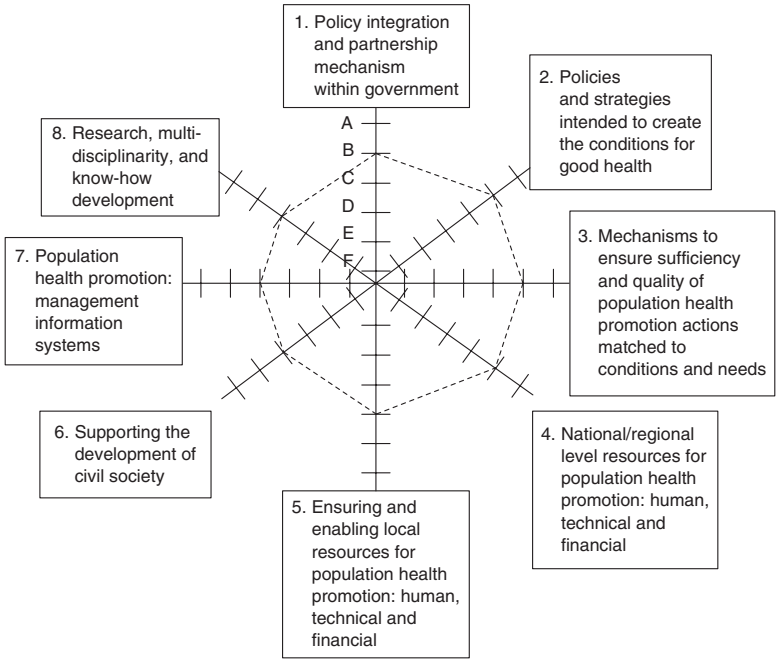
Access to information and education has long been recognized as a powerful determinant of health. Health education programmes must be carefully planned and managed if they are to meet their objectives and have a sustained impact on participants and communities. This suggests that it would be desirable to map our national capacity to engage in health promotion in order to assess the extent to which essential policies, institutions, programmes and practices are in place, as well as to guide recommendations about what measures are needed to improve existing practices.

A capacity mapping model developed by the WHO Regional Office for Europe, and used as part of its Investment for Health initiative (Ziglio et al. 2000a, 2000b: 149), has at its heart National Health Promotion Infrastructure Appraisals (Mittelmark et al. 2006: 92). A WHO Capacity Mapping Initiative (CMI), begun in 2005, had several purposes: to synthesize key social and economic trends in twenty countries across four subregions of Europe; to map the current capacity of health promotion systems, with particular emphasis on responsiveness to the broader determinants of health; and to highlight the implications for health promotion policy and infrastructure development (WHO 2005; Mittelmark et al. 2006).

The spidergram is used by hub members when collecting and analysing their data. Each of the eight dimensions in the spidergram represents a 'mechanism' known to be important for effective policy-making and decision-making across government at a national (and, where relevant, regional) level. In combination, these different elements form a system with the potential to ensure sustained and committed policy development, strategic direction and implementation of population health promotion. Examination and exploration of the content and functioning of each of the dimensions, and of the system as a whole, are used to discover how well the population health promotion system is functioning at national and regional levels, and to identify its deficiencies.

In CMI 2005, particular emphasis was placed on the broader determinants of health, such as its social, economic and environmental determinants. Many of the factors that create or influence the broader determinants, and thus the conditions necessary for good health, are clearly the result of the actions of policy sectors (also known as 'line ministries') and other actors (e.g. NGOs, private enterprises) outside the direct control of ministries of health (Ziglio et al. 2000a).

CMI 2005 was intended to gain insight and understanding of the mechanisms involved in macro-level decision-making, policy-making and investment in health and development, especially with respect to creating the conditions for good health. This involved examining and exploring the mechanisms that exist and how they function: (1) within ministries of health; (2) across government; and (3) between government and other sectors. The spidergram enables us to map the findings, hence the name 'Capacity Mapping Initiative' (WHO 2005). Using the Delphi method to undertake a similar health promotion capacity mapping exercise, we sent questionnaires to our panel of experts (consisting of twelve professionals) to gather data. Several rounds of questionnaires were distributed, and shared with a group of key stakeholders, with consensus to undertake this mapping of current health promotion activities, barriers and facilitators, as well as perceived needs.



4.1 Eight-dimension spidergram of health promotion capacity in the Republic of Kazakhstan

Dimension 1: Policy integration and partnership (B) There is an annual practice of reading the president's message to the people of the nation, in which objectives and top priorities for national improvements, inclusive of health factors, are outlined – for example, 'A competitive Kazakhstan, competitive economics, [and] a competitive nation'. In 2004 the minister of health developed a 'National Programme for Healthcare Reform and Development in the Republic of Kazakhstan for 2005–2010'. Within the programme, the National Coordination Council on Health Protection was created in 2005. The aim of the council is to regulate interaction between national and local executive bodies, as well as international and other organizations, in conducting activities on health protection according to state programmes. The coordination council, governed by the minister of health, is a consultative body comprising thirty-two representatives from various ministries and departments, as well as representatives from scientific non-governmental institutions and other groups. It meets quarterly. The main objectives of the council include the preparation of recommendations and suggestions on: (1) continued performance of actions, as outlined in the programmes; (2) improvement of state policy, as regards legislative normative documents on health protection; (3) coordination of central and local executive bodies' work and maintenance of interaction with international and other organizations aiming to conduct activities in the field of healthcare of Kazakhstani citizens; and (4) definition of the main guidelines on protection of Kazakhstani citizens' health (Ministry of Health of RK n.d.). The National Coordination Council is an example of innovations in the integration of state healthcare policy and the decision-making process orientation concerning the main determinants of health. There are certain difficulties in tracing input volume of resources in the health promotion of the population. Therefore, we consider that policy integration and partnership mechanisms within government are realized only partly, while the main problems are due to the absence of a clear system of process monitoring on strengthening intersectoral work. Parliamentary meetings on healthcare and development issues take place three to six times per year, in addition to the constant work on legislative and normative documents that occurs.

Dimension 2: Policies and strategies intended to create the conditions for good health (B) Healthy lifestyle reform and disease prevention are among the highest priorities according to the National Strategy

for Health Development. In order to realize strategic objectives, the Healthy Lifestyle Development Service was created in 1997, the activity of which is regulated by a complex programme known simply as 'Healthy Lifestyle', with quarterly reports on the implementation of activities made to the administration of the president. At present, this programme has been revised by the government to improve intersectoral collaboration. Financial and cadre support exists for effective and efficient implementation and monitoring of the programme, and more than 1,600 people now work as part of the team. There is state financing equal to about 0.5 per cent of the healthcare budget, as well as an equal amount provided by international organizations. There are a number of international WHO projects, such as 'Healthy Schools', 'Healthy Universities', 'Healthy Hospitals', 'Healthy Cities', 'Healthy Auls' (a pilot project in Almaty oblast) and 'Healthy Workplace'. Broad campaigns with a popular approach are typical in the work of the service. For example, 'Health Festival' – an hour of physical activity – took place in 2003, with the participation of 30 per cent of the Kazakhstani population, around 4.8 million people. This event is included in the *Guinness Book of World Records* (Tulebayev et al. 2004).

Dimension 3: Mechanisms to ensure sufficiency and quality of population health promotion actions matched to conditions and needs (B–C) Different programmes on high-priority socially determined diseases are being developed and implemented, such as one on prevention of drug addiction in the nation's regions, as well as another on tobacco control in Almaty. There is also a special programme on social rehabilitation of drug addicts in Almaty, one on tuberculosis, another on prevention of HIV/AIDS, and many others. A project named 'Clean Water' is being implemented with financing by NGOs. Furthermore, another project has been created to assist 360,000 pregnant women and those with newborns under one year of age with associated health issues. All of these and others are part of the 'Healthy Lifestyle' programme, and involve coordination of activities at the municipal level through local executive bodies – regional and urban councils and executive offices. The above-mentioned programmes prove the commitment to prioritize health problems and the needs of different parts of the country. Nonetheless, they all still need to be monitored and adjusted to include broader determinants for good health.

Dimension 4: National and regional-level resources for population health promotion: human, technical and financial (A–B) Resources for individual and macro-level projects are allocated with the support of the president, government and Ministry of Health, through a unique service created within the upper governmental structure. This service implements its activities on a legislative basis, and is devoted to developing the preventive direction in healthcare, establishing a healthy lifestyle through behaviour changes, developing a resource body, and supporting the cause through distribution of information on healthy lifestyles. There are financial allocations in the budget for preventive medical inspections, dynamic observation and sanitation for the population. Although a critical mass of specialists is involved in the network of healthy lifestyle development, there is a lack of those who are competent in different sectors, which decreases the effectiveness of such interventions.

Dimension 5: Ensuring and enabling local resources for population health promotion: human, technical and financial (B) Necessary resources are already partially in place. On the regional level there are functioning intersectoral boards, which facilitate the effective work on health promotion. Centres for health promotion, functional units of the HLD Service (Healthy Lifestyle Development Service), are financed on the local level as a component of PHC (Primary Health Care). There is interaction in financing on the national, regional and local levels – the National Centre for HLD receives financing through the national budget, whereas the local budget is used for oblast, urban and regional centres of the HLD. Currently, there is a problem of insufficient prophylactic work being undertaken by medical workers because of the absence of financial motivation to conduct such activity.

Dimension 6: Supporting the development of civil society (C) Civil society in the country is almost non-existent, so such activities are nascent, with the HLD Service attempting to interact with the population. The Law on Social Order (13.04.2005) stresses the role of NGO engagement in working with the population on healthy lifestyle popularization. However, it is still too early to assess the results. In general, the population is passive, which could be explained partially by the big gap in socio-economic distribution, with lower income levels being less likely to accept information on development of a healthy lifestyle.

Dimension 7: Population health promotion: management information systems (C) About 85 per cent of the population obtains information on health promotion from radio, TV and educational programmes on healthy lifestyles run in schools and colleges. TV and radio channels periodically raise health promotion issues off their own bat. During the periods of influenza epidemics in winter and acute intestinal infections during summer, informational and preventive work is conducted through local radio. Plans have been made to use radio communication on trains to facilitate prevention of disease. At the local level, there are programmes to inform the public on priority health problems. These health promotion activities are monitored once every three months, with information coming in from all district centres for HLD, which is then analysed at the National Centre, with further refinements undertaken for the Ministry of Health, the government and the president's administration. Nonetheless, there is still a need to strengthen the capacity of management information systems so as to monitor broader determinants of health and integrate them into the health and social development processes. The existing Unified Information System of healthcare provides key elements for improvement of management, budgeting and medical technologies. One of the main priorities is quality management, a very important issue, in that it includes issues of quality of education and healthcare delivery.

Dimension 8: Research, multidisciplinarity and know-how development (C) WHO and other international organizations support various research programmes (e.g. the 'Health Survey of the Population of the Republic of Kazakhstan', conducted by the staff of the Kazakhstan School of Public Health). The National Centre for HLD has conducted National Surveys, which have mostly studied health behaviour change. Additionally, many other institutions throughout the nation conduct their own research activities. Due to all of these activities, healthy lifestyle standards and screening programmes for targeted groups have been developed. Thus the process of building an evidence base for policy-making in population health promotion has already begun, though it is still too early to assess the outcomes.

We used the WHO tool to analyse national health promotion capacity in the country. The eight elements of this methodology create a system that assesses potential, allows for the responsible development of policies, points out strategic direction and suggests implementation

methods. Health promotion is effective if all these elements become part of an integral approach. When interpreting the results received, we found that only the first, second and fourth priorities in the diagram have been met in Kazakhstan, with the remainder in process. The first is policy integration and partnership, the second is policies and strategies intended to create the conditions for good health, and the fourth is national/regional-level resources for population health promotion. Such a method of mapping, and the structural description of the current situation, helps decision-makers develop the institutional potential to take on new challenges and account for further issues in the development of public healthcare in the country. In addition, it helps us to define weakness in the system, alongside the good conditions that are being created for moving from mapping to activity. This analytical tool has been invaluable for politicians and researchers to gain a better understanding of integration mechanisms. Certainly, the healthcare sector is a key player in overcoming problems relating to irregular distribution of services and access to them, because this is a social determinant of health. The concept of health determinants is a solid basis for clarifying the connection between population health, preventive medicine and intersectoral collaboration.

Health education intervention strategies

Health education intervention strategies must reflect the multilevel causality of chronic and communicable disease to ensure that root causes are targeted (McLeroy et al. 1988).

Delivery of individual-level strategies in health education is undertaken in a variety of delivery settings, including schools, workplaces and, of course, medical facilities themselves. In the last two decades, impressive evidence has been amassed to support the efficacy of interventions on the treatment and care of patients with chronic disease (Steckler et al. 1995; Livingood et al. 2011). Kazakhstan is seeking to achieve breakthroughs in the improvement of population health in a region where such needs are critical to advancing the goals of civil society, further economic development and regional security. The recent attention given to population health and evidence-based practice has catalysed interest in the region in building the necessary research culture and institutional infrastructure that can support multidisciplinary research to inform policies and practice, not only in Kazakhstan but also in institutions across the region. Such a culture

(and infrastructure) exists in western Europe and North America, where the benefits of robust national mechanisms for funding research and institutional infrastructure to support competitive procurement of funds are evident in the history of research discoveries that have altered the course of human history for the better. 'Over the past two decades a variety of national and international efforts has sought to bring together health and social scientists to address complex health issues' (Kessel and Rosenfield 2008: 225). Despite such challenges, the promise of transdisciplinary research flows from the recognition that 'health social science becomes most effective when the group engaged with the problem adopts transdisciplinary thinking. That is, they transcend disciplinary bounds to synthesize knowledge about the problem in the quest to understand it fully as a complex dynamic system' (Johnson et al. 2002).

Perhaps the most pressing challenges for public health are of an organizational, political and philosophical nature. According to the WHO, the biggest challenge of the country's health sector in the domain of public health lies in clarifying, coordinating and streamlining the roles and responsibilities of different agencies responsible for public health and health promotion activities (WHO 2007). Moreover, related to this is making the promotion of health a core responsibility for all government ministries (Aringazina 2007; Aringazina et al. 2012). The new policy argues for 'whole-of-government' and 'whole-of-society' approaches that will consolidate the ideas encompassed in Health for All policies. Recent attention to the social determinants of health has stimulated a renewed interest in Kazakhstan in improving the social circumstances that are necessary for improved health.

Consistent with the WHO's expectation that member states in the European region will focus on reducing health inequities that are socially determined, Kazakhstan is currently making progress to improve education, employment and housing conditions. Efforts to prevent diseases related to poor nutrition, poor sanitation and poor water supplies also continue to be a priority (Aringazina 2005). 'Reducing social inequalities in health is high on the political agenda in many European countries. Finding efficient policy strategies represents a challenge at national, European and global level. Over the last years, social inequality has been included in health impact assessment (HIA) processes' (Fosse 2006: 54). The use of HIA to inform policy and benchmark progress is one of the critical priorities for building

public health capacity in Kazakhstan. 'Yet, the lack of democracy has hindered the full-scale use of the method due to many of the same reasons as in other countries of the former Soviet bloc' (Gulis 2004: 169). Substantial changes are required in the organization, management and provision of health services, with the population involved in these crucial processes.

Conclusion

Kazakhstan has improved on some measures of population health, even though many environmental and public health challenges remain owing to problems associated with rapid economic growth, corruption and persistent inequities. It has become evident that these challenges will not be solved by single-discipline approaches, but rather by transdisciplinary and intersectoral collaboration across a wide range of social policy arenas, including agriculture, employment, housing and transportation. The results of the eight-dimension spidergram from a health promotion capacity mapping exercise that was facilitated by the author using the WHO tool suggest that policy-makers and public health specialists should work out a new vision for health promotion issues in the context of emerging sustainable development policies. This analytical instrument, monitoring public healthcare and responsibility oversight allows for better public healthcare and is a useful tool for politicians, stakeholders and researchers in better understanding integration mechanisms. The healthcare system in the country is based on the paradigm of public healthcare, with consideration of the roles of social determinants of health, and an intersectoral approach. The new public health model for Kazakhstan must move beyond its current medical orientation and embrace a social determinants model. Nonetheless, improving public health capacity is critical and will require new incentives and investments in the system of public health education and training, as well as associated research, if further improvement of population health in Kazakhstan is to be achieved. Issues such as gauging social and economic determinants, as well as poverty eradication, present an unprecedented challenge in the country, and indeed the region as a whole, owing to the way the government permeates every aspect of society. At the same time, we can only approach such issues with government help. Therefore, problems and developmental potential must appear on the social agenda radar of those key people who can really provide support. Furthermore,

special attention must be paid to diversity in socio-economic standing, geography, culture and psychology, as well as other key determinants that might be obstacles to achieving a transdisciplinary approach to the research. Today, poverty studies are taking increasing account of ecological factors, and such an approach needs to be supported by further innovative research, especially if the establishment of a green economy and other sustainable societal practices is to be incorporated into alternative socio-economic models in Kazakhstan.

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5 | CHILDREN'S LITERACY IN HEALTH AND SUSTAINABILITY

Neil Chadborn and Jane Springett[1]

Introduction

Obesity is currently characterized both in the popular media and the scientific literature as the next epidemic waiting to happen (Moffat 2010). This is because of the strong correlation between obesity and a number of chronic diseases such as heart disease, diabetes, stroke and musculoskeletal problems, and obesity is therefore identified as a risk factor in the development of such diseases. These diseases, which dominate in developed countries but are also associated with increasing affluence in some populations in developing countries, are creating pressures on healthcare service provision. A particular focus of concern is the rise in childhood obesity (Foresight 2008), seen as creating an overwhelming burden of disease in the future. The causative factors of increasing weight gain and obesity have been identified and form a complex web of direct and indirect causes, as described in a recent governmental review (ibid.). The Foresight review could be considered a turning point in obesity policy (in England), as it indicated a need to shift emphasis from a focus on individual behaviour alone being the cause of fatness to a consideration of what has come to be called the obesogenic environment (ibid.; Lake et al. 2010). This change in perspective of the obesity problem also needed, it was argued, a shift from the clinical or biomedical view, where the focus is on the individual's nutrition, physical activity and physiology, to a broader and more ecological perspective, seeing the individual as interacting with the environment (social and natural). This ecological lens in turn demands an ecological approach to change (Springett et al. 2010).

Causes of obesity can be linked with causes of climate change. Key causative factors of obesity are over-consumption, low-quality nutrition and low-energy expenditure through physical activity (Roberts and Edwards 2010). The agriculture and food system has become a

commoditized global system which has enabled a high production quantity at a very low price. However, the food products available, together with aggressive marketing, often lead to over-consumption of food of low nutritional value. This pattern of food production and availability has been termed malconsumption (Sage 2012). From an environmental perspective this food regime is highly resource intensive, wasteful and has high carbon footprint emissions (ibid.). Moreover the consumption of industrialized 'cheap' food is strongly associated with income level. Thus in developed countries, the poorer you are the more likely you are to consume poor nutritional foods and also the more likely you are to suffer food insecurity. The adoption of diets which reduce the carbon footprint is also limited by the availability of such foods and their affordability. Eating more locally grown fruit and vegetables, and less processed food, may lead to simultaneous improvements in nutrition and decrease in carbon footprint (Haines et al. 2009; Roberts 2009). This suggests a further connection between healthy lifestyles and mitigation of climate change. The connection between health and climate change, however, is rarely addressed (Springett et al. 2010). Critical transdisciplinary research is the most appropriate approach to address these complex and interacting challenges and may help to avoid the situation where solutions to one problem cause unintended consequences within another area.

This chapter reflects on the contribution that can be made by a transdisciplinary approach at the community level, one that includes the voices of children. A substantial body of evidence from a range of disciplines demonstrates that childhood is crucial in the socialization and reproduction of individual habits and attitudes, much of which come from a child's immediate environment (James and James 2004). Using a case study which explored children's attitudes and understandings of health and well-being in relation to the environment as a starting point, we will reflect on issues relating to a transdisciplinary approach to questions of health and the environment. While there is much educational material addressing sustainability and equivalent health improvement material addressing obesity, there is relatively little research literature exploring children's views of these issues or the implications of policy and interventions. Appropriate methods to enable children's voice within research are still being refined (Darbyshire 2005).

The context of the case study

In the following discussion we will reflect on some of the topics which need to be covered in order to understand how evidence from health promotion and sustainability science could be brought together to achieve the co-benefits to health at a local community level.

Recent developments in obesity research and policy As indicated in the introduction, only relatively recently has there been a turning point in obesity research towards acknowledging the strong influence of social environmental factors as well as individual choices[2] (Egger and Swinburn 1997).

The Foresight review (2008) was carried out by the Government Office for Science, UK, and was indicative of this turning point in the approach to obesity. A comprehensive review of research and policy, the report attempted to describe this complex network of interacting causative factors of obesity (ibid.). One of the publicly visible outcomes was a campaign called Change4Life. Change4Life's ultimate target was to 'reduce the percentage of obese children to 2000 levels by 2020' (Department of Health 2009: 5) and the stated means of achieving this were: 'inspire a societal movement through which government, the NHS, local authorities, businesses, charities, schools, families and community leaders can all play a part in improving children's diets and activity levels' (Department of Health 2010: 7).

Thus, in keeping with many aspects of the Foresight recommendations, Change4Life claimed to work on different levels: a publicity campaign, public membership to encourage long-term engagement, and also resources to increase availability of healthy food in shops and schools, hence attempting to influence the multifaceted aspects of the environment which influence obesity (Edwards 2010). In practice it was one of the many social marketing campaigns used by government that was vested in reframing health inequalities, financial problems and environmental crises as the personalized responsibility of citizens (Pykett et al. 2014). Implicit in social marketing campaigns is that people who do not adopt healthy lifestyles are doing so either because they are irrational, and therefore to be blamed for their behaviour, often leading to stigmatization, or because they do not have the right information and thus are health illiterate (Piggin and Lee 2011).

Considering the media attention and moral panic surrounding the increasing prevalence of obesity and overweight, it is important to remember that the obesity epidemic has been described as a socially constructed phenomenon (Moffat 2010). Obesity is categorized on the basis of physical measures rather than being a medical diagnosis following assessment of signs and symptoms. Obesity is determined by a weight-to-height ratio above a certain threshold (BMI >30). When considering causes or interventions, it is probably unhelpful to consider people with obesity as a distinct group from the rest of the population. It is probably more appropriate to consider obesity as one tail of a population distribution, with underweight at the other end of the distribution. Thus, rather than discussing an increasing rate of obesity, it would be more accurate to describe an increasing fatness across the population distribution, resulting in the distribution curve shifting to the right and more people crossing the threshold (BMI >30) and hence being labelled as obese (Roberts and Edwards 2010).

Obesity itself is not an illness but is a risk factor for a number of chronic diseases including heart disease, diabetes and musculoskeletal problems, and is interconnected with mental health problems. While genetic factors may have a role to play, these are not considered to play a strong role in the increasing international prevalence. The causative factors of increasing weight gain and obesity have been identified and form a complex web of direct and indirect causes (Foresight 2008). The Foresight governmental review in England may be considered a turning point in obesity policy as it indicated a need to shift emphasis from the many individual factors to a concept of the cumulative impact which can be described as the obesogenic environment (ibid.; Lake et al. 2010). This change in perspective of the obesity problem could be called a shift from the clinical or biomedical view, where the focus is on the individual's nutrition, physical activity and physiology, to a population (ecological) perspective needed to address the public health issue. The latter approach will lead to an emphasis on policy and infrastructure, rather than public campaigns aimed at changing individual behaviours.

The notion of an obesogenic environment, however, raises the issues that (a) health choices are not always available and (b) some environments actually encourage unhealthy behaviour. This manifests in a number of ways. For example, in many North American cities, new suburbs are developed which actively reduce walkability (Frank

et al. 2006). Town planning which has privileged the car, cul-de-sac housing and the absence of convenient public transportation systems have reduced the actual amount of physical activity children undertake and increased the use of the car in accessing supermarkets (Smoyer-Tomic et al. 2008). In Australia, North America and the UK, there is a strong correlation between the density of fast food outlets and poor neighbourhoods (ibid.).

Interaction between obesity and climate change Many of the causative factors of climate change are shared with those of obesity (Roberts 2009). Industrial food production and processes supported by large subsidies in some regions, and connected with international commodity markets and transportation, facilitate the easy availability and low cost of refined foodstuffs within every city. Readily available processed foods are considered to be a key causative factor for obesity (Foresight 2008). On the other hand the carbon footprint of the food supply chain is a substantial contribution to climate change. While agriculture's direct impact contributes 10–12 per cent of global emissions, if fuel use, fertilizer use and land use change (deforestation) are included this increases to 30 per cent of global emissions (Garnett 2011). In addition, food is processed, stored and transported and finally wasted, all of which add to the carbon footprint. Deep problems and fragility of the global food network have been identified, but vested economic interests may impede tackling these problems (Sage 2012).

Recently the term obesogenic has been coined to describe the sum total of the many aspects of our environment that could be described as causative factors for obesity (Lake et al. 2010). It is likely that the factors that lead to an environment being obesogenic are also the same factors that encourage behaviour that has a high carbon footprint. For example, as streets become busier with traffic, people are less likely to walk and more likely to drive a private car, hence reducing physical activity and increasing the time spent being sedentary.

Summary of case study: focus on achieving co-benefits

The focus of the case study was the opportunities to achieve co-benefits to health of mitigating climate change (reducing carbon footprint). We created the phrase Low Carbon Healthy Lifestyles to describe this. In terms of food production and consumption, key actions are summarized in the following table. We aimed to explore how

TABLE 5.1 Selected actions referred to in the case study which may lead to co-benefits to health and climate change

Local action for co-benefits	Comment
Reduce food waste	No direct impact on health, but may change attitudes to food; e.g. composting waste may raise awareness of nutrient cycle
Replace meat consumption with vegetarian diet	High consumption of red meat and processed meat is a risk factor for colorectal cancer. Meat production has a high carbon footprint
Reduce total food consumption	While maintaining fruit and vegetable consumption
Shop locally	May facilitate the above two
Choose seasonal vegetables and fruit	Reduce production carbon footprint or food miles
Cook at home	Reduce convenience foods which may be unhealthy
Support local food production	Physical activity and low carbon footprint of food

Note: References include Friel et al. 2009; Garnett 2011; Roberts and Edwards 2010; Sage 2012

participants engaged with the phrase 'Low Carbon Healthy Lifestyles', which we considered articulated a positive message, amenable to community involvement at a local level. In this chapter we will focus on food, whereas our previous publication investigated physical activity (Chadborn et al. 2012).

The case study was a short research project exploring children's views of the interactions between health and climate change. The project also investigated the potential of community organizations to provide opportunities for children to participate in healthy or sustainability activities. Such activities could be described as a new social model to enable improvements in health and ecological literacy and change local social norms. One aspect of this project has been published (Chadborn et al. 2012), and a report on the whole project is available online (Chadborn et al. 2011). The main focus of the case study was children's views and community leaders' views on the co-benefits to health of mitigating climate change (i.e. reducing carbon footprint). The study, based in inner-city areas, included some neighbourhoods with the worst socio-economic deprivation in England. The areas are diverse, with black and minority ethnic (BME) communities and also refugees and asylum seekers.

While the methods and analysis of the case study are described in detail elsewhere (ibid.), we will give a short summary as follows. The first part of the study was whole-class sessions with children of ages ten and eleven, in six inner-city primary schools in England. The sessions explored children's views on well-being and climate change using a draw-and-write method. Photographs were used to prompt discussion within small groups of participants. Also children were asked to draw their journey to school and comment on aspects relating to health and environment. The researcher facilitated discussion with groups of children as they carried out the draw-and-write activity, and these discussions were transcribed. Children's drawings, text and discussions were interpreted using structure and agency as key concepts. The study was given ethical approval by the host university.

The epistemology of the case study drew on a new paradigm of childhood research which was developed in the 1980s, where children are considered as agents in their own right, rather than subjects of adult socialization (O'Kane 2000). Children were now assumed to be social actors and participants in the construction of their experiences and society. This new perspective brought a new commitment, to include views of children in decisions which affect them, with important implications for research methods and policy-making (Christensen and James 2008).

The second part of the study investigated children's opportunities to participate in projects or activities within the school or community setting. Several projects were associated with the schools in the case study, which consisted of activities related to health or sustainability. We carried out semi-structured interviews with the leaders of these projects (referred to as community leaders) in order to understand their perspective on Low Carbon Healthy Lifestyles.

Key findings from the case study

Here we will describe a selection of findings from the case study which we will then discuss in the reflections section below. The findings from children's research sessions comprise comments and drawings from the draw-and-write method and also speech prompted by the facilitator (NC).

Consumer behaviour In England, supermarkets have become the dominant supplier of domestic food and home-grown food has become

a rarity. It is likely that shopping behaviour, including choice of outlet, will influence food selection, and hence carbon footprint. Therefore it is important to understand the social context of shopping. Within the case study research sessions, children responded to photograph prompts of people shopping. Children described shopping for food as a social activity. One child wrote 'People shopping for lovely food' and drew a head/face shape around it, which may indicate the personal and social aspect of shopping. At least two other comments from the draw-and-write sheets refer to shopping with family: 'I feel happy when I go with my brother' or 'shopping with my nephew' (comments from children's draw-and-write, Chadborn et al. 2011). Again this indicates that participants valued social and family aspects of shopping, possibly suggesting that visiting the supermarket has become part of the routine of family life. If sustainability science and health science indicate that local sourcing or home-grown food is advantageous, in designing messages to encourage this behaviour it would be important to acknowledge the social reward of shopping.

Awareness of health and well-being Within the case study, the research sessions with children did not focus directly on obesity, but rather on healthy lifestyles, which would be consistent with prevention of obesity. An ongoing health promotion programme across the city was centred on Five Ways to Well-being (a concept developed by the New Economics Foundation – Aked et al. 2008). Children were asked to consider what made them feel healthy and gave them a sense of well-being; their personal Five Ways to Well-being. Topics included public health concerns such as smoking and drugs, health service needs, such as doctors, and even concerns about the built environment – the impact of derelict housing. The following is a selection of statements from various children, relating to food or pollution (each statement within quotation marks is from a different child):

'Less junk food'

'Eat 5 a day'

'Eating healthy portions of food'

'5 a day; it is good to have your 5 a day

Food balance; it is very good to have your carbohydrate, protein and calcium balance a day

No pollution; it is very bad to pollute'

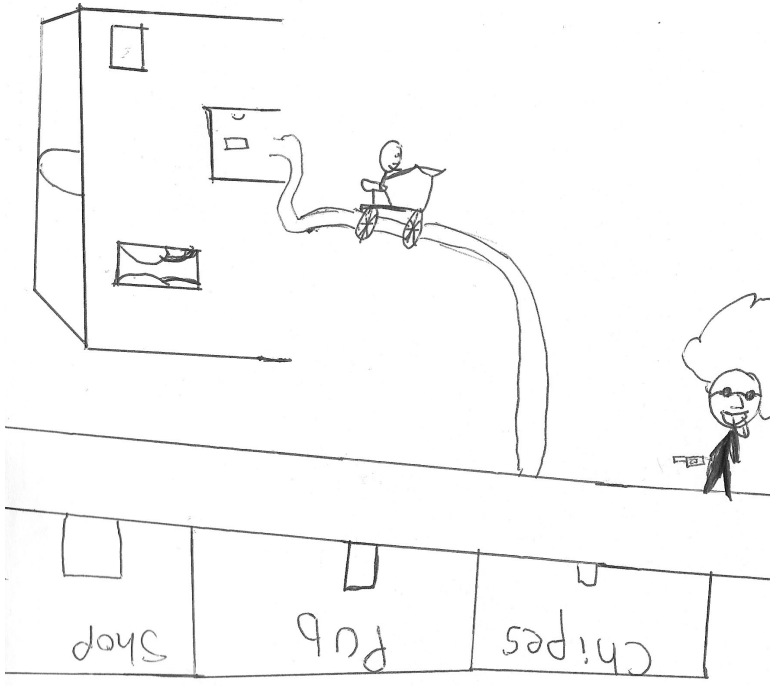
'Less littering (littering is killing our planet … stop it!) …
More trees for oxygen.' (Children's draw-and-write, Chadborn et al. 2011)

These quotes indicate that the children had a broad range of perspectives of contributory factors to health and well-being, rather than simply referring to a clinical concept of illness – doctors and hospitals, for example. Within this selection of quotes there are comments referring to healthy diet. Also there are comments referring to pollution, litter and trees. These comments suggest that messages about health that are environmentally constructed may resonate with these children. Furthermore, if these views are commonly held by children across the community, children may attend to health messages framed within community activities and projects that may have shared health and environmental goals.

Fast food and food deserts During some research sessions children were asked to draw their route to school. Several children drew maps showing fast food retailers and sweet shops in close proximity to the school (see Figure 5.1).

One of the community leaders interviewed in the case study described the situation as a food desert. Car ownership, in the city, is lower than the national average (Merseyside LTPSU 2010). Therefore people's choice of shop is limited by transport. Furthermore supermarkets have led to closure of smaller grocers. Therefore the community leader suggested that people's opportunities to choose healthy fresh food have been constrained, with less competition and higher prices: 'the supermarkets know it, that they can't move off that estate' (community leader, Chadborn et al. 2011).

The multifaceted term 'urbanization' describes many of the factors that can lead to obesity and, particularly when combined with socio-economic deprivation, there is a broad overlap with the description of the obesogenic environment. While the existence of food deserts is inconclusive, this term describes poor access to food of good nutritional value (Edwards 2010). The case study indicates that children participants were aware that takeaway food is readily available, while an adult participant voiced concern that the community had



5.1 Child's drawing: map of route to school showing proximity of fast food (chips) (*source*: Chadborn et al. 2011)

restricted access to affordable food of high nutritional value. These health concerns about food are interwoven with transport issues; while walking or cycling to school is of benefit for physical activity, it also may provide opportunities for children to access takeaway and snack food that wouldn't be accessible if the child was driven to school. On the other hand, the low accessibility of nutritional food was claimed, by the participant, to be due to the local infrastructure favouring car transport to the supermarket. The latter examples of emergent themes from the case study reflect the structure or environment of the obesity issue.

Children's sense of connection with the environment and sustainability
In our case study children had participated in local activities, such as growing fruit and vegetables in the school garden or community setting. Children appeared to have enjoyed the activity and described the

benefits to their health and the environment (participants were asked to annotate their comments as to whether it was positive, negative or interesting).

'Growing fruit and vegetables (positive)
Helps the environment (interesting)
Fresh vegetables (positive)'

'Lots of soil so that the fruit/veg grows (interesting)
Eco-friendly (interesting)
Allotment (dibbers) [children's gardening project] (positive).'
(Children's writing, Chadborn et al. 2011)

One of the schools had been using the school garden as a teaching setting or outdoor classroom. Many of the children in this research session included birds and squirrels in their drawings. For example, one child wrote: 'I love eating strawberries, I like watching birds in the sky, I love planting plants.' The influence of the gardening project on the environmental agenda could be described in three ways: (a) connection with the natural environment, (b) awareness of food production, (c) learning through the project about the need for sustainability. Richard Louv (2008) has proposed that in recent decades children have lost connection with the natural environment. He suggests that this not only risks the children's personal health and well-being, but also that there is a risk that a majority of citizens will not have a personal connection with nature, and therefore will not identify with the value of sustainability (ibid.).

How accessible is an 'environment friendly' lifestyle for diverse communities? The research study held sessions at schools in different neighbourhoods of an English city. During research sessions, participants were asked to complete a questionnaire which included a voluntary question on their ethnicity. In some schools all children reported being white British, whereas other schools had a great diversity of ethnicities.

To estimate the socio-economic status of the neighbourhoods, the census data for England was interrogated for data on neighbourhood deprivation relating to children – the 'Income Deprivation Affecting Children Index' (IDACI; see UK Data Service 2014). Some of the schools were located in areas where the deprivation measure was in the

highest 5 per cent in England. Other schools were in areas with less deprivation.

Despite these differences in the ethnicity of the participants and the deprivation measure of the geographical areas in which the schools were situated, analysis of the data failed to identify differences in children's use of speech or writing with respect to the issues of climate change. This indicates that, from this sample of children, there was no evidence that an interest in environmental sustainability or being environment friendly is middle-class behaviour, as has been suggested by some commentators.

An interesting perspective came to light from the case study. While an assumption may be made that sustainability is a middle-class attribute, within a poor area of the city there was an expressed desire to use the global perspective to encourage an appreciation of the diversity of the neighbourhood.

> Our biggest link in terms of climate change is with two schools in the city … as part of our community cohesion plan, and we're also linked with three schools in Nigeria and three schools in Zimbabwe and the whole point is learning from them, they have to recycle, they have to reduce their – well they don't have a choice. (Community leader, Chadborn et al. 2011)

Children's agency While children are educated about health and sustainability, they may have little freedom or control over decisions which affect them. In daily life, decisions will often be taken by a parent, caregiver or the school. In our case study this was demonstrated by the following quote from a community leader:

> I do find there [are] some Muslim families that don't, they're not that keen on their children doing manual stuff outside, I mean they've got a very high priority of the academic, so, I mean it's not happened that often but we've had a few children, whose parents have come in and said, 'I don't want them in this group' because it's not their main priority. (Community leader, Chadborn et al. 2011)

The community leader felt that these children were not given the opportunity to participate in the gardening project because their parents had different priorities for their children's education.

On the other hand, within the case study we found several opportunities for participation; school councils enable pupil representatives to raise issues or concerns, which may be acted upon by the school governors or staff. Some schools have 'Eco-reps' who help with sustainability tasks, e.g. recycling paper, and make representations to the school council. The city council held a Youth Parliament with representatives from all school councils (the UK Youth Parliament was established in 2000; James and James 2004). These formal structures may give children a voice, from the local level up to the regional and national.

During one research session, a group of children were discussing cycling and how the exercise burns calories. While this discussion could be interpreted as reproducing media messages about celebrity diets and lifestyles, it may also indicate that the girls were aware of the benefits of cycling to reduce weight and improve health (Chadborn et al. 2012). The talk between the girls may mean that they did actually go cycling in order to burn calories and, if so, suggests that they were agents in this activity.

A common criticism of childhood research is that children's speech may not match their intentions or actions. In a school environment this could be particularly problematic, because children are accustomed to repeating phrases heard from their teacher. While discussing growing and eating strawberries the researcher asked which were nicer: strawberries from the shop, or home-grown. If marketing and corporate-influenced media were pervasive, the girl may have been expected to prefer shop-bought fruit, but she reported preferring the home-grown strawberries. This small detail indicates that there is potential to engage children in a debate about local sourcing of food, and that these messages may resonate with children from this community.

Discussion

A key question of the short research project, presented as the case study, was whether messages about health and climate change resonated with children in city schools in England. From the findings quoted above, children had a broad interpretation of health and well-being. Within children's responses were comments relating to food and healthy diet. Also some children made note of environmental issues which may impact on health. Thus, from the participants included in the study, it seems that there was an awareness of some of the wider

determinants of health, which indicates some resonance with messages linking health and environmental sustainability.

Obesity and climate change are interrelated, wicked problems Both obesity and climate change are complex, or wicked, problems. Causative factors have been identified and studied by many different disciplines, generating a web of interlinked challenges. A transdisciplinary approach may be best suited to both of these issues. In particular, when it comes to implementing the evidence-base and related policies, a transdisciplinary approach will help in taking an overview of the complex issues and minimizing unintended consequences. Furthermore it can also reap benefits at the local level. A recent study of an initiative in schools in areas of high deprivation that used food sustainability as a vehicle for health education found that a transdisciplinary multi-component approach that combined food sustainability with health education resulted in not only a higher consumption of fruit and vegetables but also improved opportunities for stakeholder engagement in changes aimed at sustainability (Jones et al. 2012).

The core hypothesis of this chapter is that a healthy diet is also sustainable (low carbon). This is a considered assessment from a comparison of the carbon footprint and the nutritional value of various foods. For example, green vegetables can have a low carbon footprint, and increasing dietary intake is healthy, while red meat production has a high carbon footprint and over-consumption is unhealthy (Friel et al. 2009). However, this becomes more complex in practice, as a recent study of self-selected diets found. The investigation tested whether healthy diets had a lower carbon footprint than less healthy diets. A cross-sectional study of people's normal eating habits assessed food consumed for both nutritional quality and carbon footprint. The analysis found that there was no correlation between high-quality diets and carbon footprint (Vieux et al. 2013). This indicates that it is not sufficient to 'choose healthy' in order to also be 'environment friendly'. This may be partly because healthy constituents of our diet can also have a high carbon footprint – for example, fruit and vegetables which are air-freighted around the world. Also this study assumes that people are selecting food on the basis of nutritional quality, while labelling does not currently facilitate people selecting low-carbon food items.

Aspects of shopping were explored within the case study. Children's comments indicated how shopping was often a sociable, family

activity. While the above consideration of food choices might suggest, for example, that product labelling might help to change behaviours on the basis of rational choice, it will be important to understand the social context of shopping. Assuming children's behaviours are shaped by socialization, their subsequent choices of shop, products and brands will all be influenced by their older family members.

From a structural perspective, Garnett (2011) discusses the complexity of the global food chain, questioning some common assumptions about sustainability. To briefly discuss one example, life-cycle analysis of food chain emissions indicates that the contribution of transport to total carbon emissions is relatively small, whereas 'food miles' have received much media attention. Thus an overemphasis on reducing food miles may not be beneficial and could even have unintended consequences as trade-offs can occur in other stages of the food chain (ibid.). A key realization is how the global food chain becomes locked into high carbon supply, which is maintained by consumer demand (ibid.). Another barrier to sustainability is that while we may improve efficiency, reduce waste or reduce food miles, these actions are unlikely to make much impression on the baseline of growing consumption. In order to make substantial reductions in food carbon footprint, developed countries need to reduce consumption of out-of-season produce (ibid.). However, proposals which include reducing consumption are anathema to market-led neoliberal policy and therefore strong vested interests are likely to oppose any change in policy (Sage 2012). Many of these aspects relate to structural constraints on food choice. Although individuals can select food products which may be healthy or have a low carbon footprint, their choices are constrained by availability and accessibility. As profitability for the trader is dependent on policies such as taxation and global trade agreements, to an extent these policies will shape which foods individuals purchase and consume.

Structural constraints of obesogenic environments The Foresight review of obesity called for English policy and implementation to acknowledge the important aspects of the environment, rather than just the individual (Foresight 2008). The Foresight obesity report showed leadership in calling for parallels between obesity and climate change to be recognized and addressed in policy (ibid.). Unfortunately the subsequent Foresight report on climate change did not outline the

same concern and failed to mention obesity as a key associated health concern (Foresight 2011).

One aspect of the obesogenic environment is motorized private transport. Car ownership has been used as an indicator of child affluence (UNICEF Office of Research 2013). The city in the case study has been shown to have low car ownership compared to the English average, which is consistent with the relative poverty of many neighbourhoods within the city (Merseyside LTPSU 2010). From the perspective of health and obesity, car ownership may be beneficial, as access to food of higher nutritional content may be improved, but it may also be detrimental, as it may increase the quantity of food consumed (Roberts and Edwards 2010) and reduce physical activity (if children are driven to school rather than walking or cycling). Published data indicate that obesity is linked to low affluence; hence, if this argument is consistent, it would suggest that car ownership is associated with a lower risk of obesity.

One of the community leaders interviewed agreed with this perspective, commenting that the residents had very little shopping choice owing to not having a car. He explained that his opinion was that the local supermarket could increase their prices, and hence reduce affordability, owing to this lack of competition. The term 'food deserts' describes the situation in which fresh or healthy food availability is low. While this is a contested term with inconclusive evidence, it relates closely to the obesogenic environment (Edwards 2010). The Department of Health campaign Change4Life aimed to tackle this problem by supporting local shops in providing fresh fruit at a reasonable cost, along with social marketing. While the impact of such an intervention would be difficult to quantitate, the evaluation indicated that the campaign was of low value, as the marketing was often misplaced and the price of the fruit was, on average, 10 per cent higher than supermarket prices (Adams et al. 2012). Although this was an ambitious but time-limited programme, it indicated the possibility of adjusting the obesogenic environment by using the appropriate incentives for shop-owners.

From a sustainability perspective, car ownership would be very likely to lead to a higher carbon footprint of the family, thus there are some apparent conflicts between health and sustainability. For these structural issues, two approaches are available to satisfy improving health and sustainability. Local and regional politicians and strategic

stakeholders could address these issues through local planning guidance and incentives. Secondly, consistent with our case study, we would advocate for community organizations, working in partnership with other stakeholders, creating greater opportunities for local food production and supply. Either of these approaches could address inequality by improving food quality for the poorest neighbourhoods, hence reducing their susceptibility to obesity and consequential health risks.

This discussion indicates that children experience several aspects of obesogenic environments living in urban neighbourhoods in England. Low car ownership may exacerbate the health risks, but constrain environmental impacts. Obesogenic environments often lead to less sustainable behaviour, because, for example, they tend to also have high car use owing to low walkability. Also inequality is linked to obesogenic environments (Smoyer-Tomic et al. 2008).

Children's agency and literacy in health and sustainability Our research sessions explored sustainability in an open, loosely defined format. By reflecting on photo prompts and discussing local activities (e.g. gardening), children were able to engage with the issues and local opportunities, without being overly concerned with the technological aspects of sustainability (Chadborn et al. 2011, 2012). Development of methods to explore people's behaviours and attitudes towards sustainability, within their community and daily lives, will be increasingly important in addressing the major challenge of sustainability – adaptation of lifestyles.

From the case study some examples were found of children's agency, whether choosing to cycle to avoid weight gain or participating in a gardening project and enjoying eating produce. On the other hand one community leader stated that some children were prevented from joining a gardening activity by their parents. While we do not know whether these children wished to participate or not and hence cannot claim that their agency was constrained, we assume that parental concerns do constrain children's agency from time to time.

Children reflected enthusiastically on their involvement in projects in the natural environment. Many children indicated a sense of connection to nature and enjoyed their experience. A lack of connection to the environment has been hypothesized as a cause of people's lack of interest in sustainability issues (Louv 2008).

While children reported a sense of well-being and described which activities contributed to health and well-being, we did not investigate their knowledge of health and well-being in depth. The notion of health literacy has recently been mooted in the health sector. Health literacy has been defined as the ability to read and understand health information but the term has developed a much wider scope, and is now defined as the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health. Using methods that go beyond imparting information but entail interaction, participation and critical analysis, health literacy aims to support the agency of people to make their own decisions. This may include developing the skills, knowledge and efficacy to act on their knowledge to improve their health. Health literacy may also include becoming empowered to change the societal constraints on opportunities to improve or protect health (Nutbeam 2008). A possible parallel approach in ecology is the notion of eco-literacy and education for sustainability.

Education for sustainable development (ESD) has largely focused on the technical aspects of adapting to the threats of environmental and resource constraints. A political, economic or sociological analysis of the causes and solutions of climate change is rarely debated (Tsevreni 2011). Tsevreni postulates that when ESD students are set problems, they are frequently framed within a scientific and engineering context, which biases the responses towards technical solutions that leave the socio-political structures unexamined and unthreatened. Evans and Honeyford (2011) also arrive at a similar position from a critical geography analysis of child-oriented policy in England. As with other pre-emptive policies, children are a focus for sustainable development policy as they are seen as the embodiment of the future generation. For Evans and Honeyford, sustainable development is a complex subject with a paradox at its core – the conflict between human development and the finite resources that the earth can provide. While the subject continues to develop within the current policy context of neoliberalism, there will be continued tension, as the economic development aspect of sustainable development will favour the continuation of free-market-driven capitalism. Within these constraints participation of children through ESD will encourage replication of existing values which is likely to limit the ability of children to imagine alternate futures. Furthermore, the limited participation that ESD invites from children may carry an extra risk; that by becoming

involved in the project, children share the burden of responsibility for the success or failure of achieving a sustainable future (ibid. 2011).

To address the technological bias of ESD, Tsevreni examined a case study in which school students were set a task without prior scientific briefing. The responses were more varied and creative, which may in turn lead to a greater engagement in the topic as there is more freedom in the process (Tsevreni 2011). Similarly our case study explored issues with the children in an open way.

While the terms health literacy and eco-literacy have recently been established, we may consider coining a new term – eco-health literacy. This term would describe engagement in and learning about the complex interactions between health and sustainability, with obesity and climate change being one example. A necessary third issue in the transdisciplinary programme of eco-health literacy is equality and poverty. Inasmuch as the causative factors for both climate change and obesity lie in global trade, facilitating literacy that enables communities to challenge these factors will necessarily challenge the corporate power structure and hence be emancipatory.

Children's views may be excluded from anticipatory policies Climate change and the obesity epidemic are both areas of anticipatory policies in that policy-makers attempt to pre-empt a future catastrophe (Evans 2010). Within these constructs, children's bodies play a role in bridging the ontologies of the predicted future and the lived present (Anderson 2010). Anderson describes this approach as 'future geographies', whereby the future is problematized and anticipatory action is legitimized through practices which render the future present (ibid.). This can be problematic because it leads to policy-makers viewing children as vulnerable to future threats and in need of protection, which tends to result in exclusion of participation of children in development of policy (Evans and Honeyford 2011). The perspective of the vulnerable child therefore conflicts with notions of participation.

Acknowledging children's agency may address the problem of the concept of the passive child in pre-emptive policy. This would lead to policy-makers acknowledging children as stakeholders rather than beneficiaries of a future legacy. Secondly, if children's agency is supported by literacy (eco and health), they may have the opportunity to directly address policy-makers, particularly through mechanisms such as Youth Parliament.

Community-based projects may be optimal for facilitating children's eco-health literacy Previous studies have shown successful outcomes of community organizations facilitating behaviour change of individuals for sustainability (Middlemiss 2011). In our case study, we found a number of community organizations supporting 'grow-cook-eat' projects. Children who participated in research sessions indicated that they valued these projects and had learnt from them. While these projects could convey messages about joint benefits to health or climate change, representatives of the organizations were frequently unaware of the association, and hence children may have engaged with one message but not both. We would advocate specialist organizations working in partnership to convey consistent messages to children which include both health and climate change.

Obesity in developing countries The literature indicates that while obesity has been recognized as a public health issue in developed countries, it is now becoming a substantial issue in developing countries (James et al. 2001; Kelishadi 2007). While the context of urbanization in developing countries is often different, the two main causes of increasing prevalence of obesity are thought to be similar – increasing use of the car and the increase in industrially produced low-quality food (called the nutrition transition) (Roberts and Edwards 2010; Sage 2012). Thus, as countries become increasingly urbanized, undernutrition and obesity can exist side by side within the same country, community or household.

Increasing prevalence of non-communicable diseases is a particular challenge for health systems with limited resources. Efficient healthcare services can treat and manage many of the disease states which are a consequence of obesity, such as diabetes and heart disease. Thus good management of these conditions can mitigate the worst impacts of obesity, in terms of quality of life and disability. However, pressures created within the healthcare system are of increased concern globally, whether health services are funded by state or privately, are universal or not (Cecchini et al. 2010; Sturm et al. n.d.). In the developing world, such health services may not be available or accessible for the majority of people at risk of obesity and associated disease.

On the other hand, health promotion has historically recognized that health is created in everyday life and that the promotion of health is best achieved outside the healthcare sector. This applies to both developed and developing worlds. Ecological, ethical and welfare aspects of food

have increasingly come to the foreground as part of a global debate about food security and the environmental impacts of an industrialized food system. Climate change, biodiversity, animal welfare, local economic development, social justice and cultural regeneration aspects of food all impact on health, whether in terms of adopting low-carbon lifestyles or reducing obesogenic environments. Furthermore, food sustainability, as an overarching theme, may offer the opportunity to re-energize multi-component local health programmes as a conceptually coherent set of practices in many different contexts globally. Traditional approaches to health education, driven by concerns initiated by the health sector, often mask or diminish local understandings of the interrelationship between environment and health (Ledwith and Springett 2010). Such colonization of indigenous, often intimate, knowledge, of local environments, suggests there is much to be learnt from reversed learning, as reported by the schools in this study.

We propose that a productive way forward, whether in the developed or developing world, would be an emancipatory approach to eco-health literacy. This emancipatory approach should ensure the incorporation of all forms of knowing, local as well as expert, and the engagement of many different stakeholders. Eco-health literacy should have explicit aims to address local inequality, such as ensuring access to the diversity within communities, ensuring cost is not a barrier for participation, and planning that the outcomes, or rewards, of projects should lead to benefits for members of the community in terms of the triple bottom line of sustainability (economic, social and environmental capital). These high demands will not easily be fulfilled, but where there are constraints or barriers, these issues should be addressed to people with political or corporate power. A potential secondary impact of such action will be to educate these power-brokers on the issues, and to inform them of the voice from community groups, and hence influence political will and corporate interests.

Conclusions

Wicked problems transcend disciplinary boundaries. Obesity has traditionally been seen as an issue whose solution lies either in medicine, through pharmaceutical solutions, or in health promotion, through behavioural change. Engaging with the complex issues of obesity, however, requires engaging in issues of sustainability in the wider context of climate change using a more ecological perspective,

both in terms of policy and in terms of local action. Until policy-makers address these issues, the costs of healthcare will continue to rise, creating difficult choices for public expenditure in those countries that still have some form of publicly funded health services and inevitably leading to health inequalities in both rich and poor countries alike. We developed a transdisciplinary approach to researching and implementing the complex interacting areas of obesity, climate change and inequality at the local level. We invited children to share their views because, despite being the beneficiaries of policies aimed at addressing obesity and climate change, they are often excluded from policy-making.

The obesogenic environment is present in urban settings through food choices, transport options and walkability or open space. While English policy now attempts to address these issues, one national programme, Change4Life, was shown to be ineffective. It is likely that local stakeholders will be required to participate in shaping healthy neighbourhoods. Addressing the structural issues of the obesogenic environment is also likely to reduce the carbon footprint of residents, as many of these causative factors are overlapping.

However, what this small project showed is that although children's agency in healthy and low-carbon lifestyles may be constrained by their family, school or peers, opportunities for children to learn health literacy and also eco-literacy may facilitate their agency whatever their socio-economic background and that understanding issues of food sustainability and health is not only an issue for the privileged.

Projects which involve the school and other community organizations are proposed as the most suitable setting in which children can learn eco-health literacy in a neutral environment. Working in a project which benefits health and the environment can enable rehearsing of praxis in a supportive setting.

Notes

1 The project team also included Dr Jude Robinson, Reader in Poverty and Health, School of Law and Social Justice, University of Liverpool, Dr Neil Gavin, Senior Lecturer, Department of Politics, University of Liverpool, and Sarah Dewar, Third Sector & Environmental Sustainability Lead, Liverpool Primary Care Trust. The study was funded by Liverpool Primary Care Trust.

2 Within the discipline of epidemiology, studying causes of disease at the level of the wider population and context, rather than concentrating on individual people, is called the ecological approach. As the word ecological in most disciplines refers to the natural environment, this could be a point of misunderstanding for transdisciplinary projects.

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6 | PARTICIPATORY RESEARCH AS A TOOL FOR CHANGE IN ECOSYSTEM APPROACHES TO HEALTH AND SOCIAL EQUITY

Jane Springett

> We can only understand the world as a whole if we are part of it; as soon as we attempt to stand outside, we divide and separate. In contrast, making whole [health] necessarily implies participation. (Reason 1994)

Introduction

This chapter presents the contribution of participatory research (PR) as an approach to transdisciplinary inquiry. PR is as much a research attitude as it is a family of methodologies. It aims to engage intended beneficiaries, users and stakeholders in all stages of the research process. This ensures knowledge is contextually relevant and appropriate. PR aligns with an ecosystems view of health whereby health is an outcome of the interaction between humans and their environment, including community and society. The philosophical underpinnings of an ecosystem's approach to health are explored and distinguished from current mainstream approaches to health. These are dominated by a concept of health derived from medicine which sees health as located in the individual and divorced from social and environmental contexts. PR offers an alternative approach. Through a co-creative process of knowledge development, different ways of knowing are directly confronted, understanding of others' perspectives is built, and nature and culture are brought back together to reintegrate humans into the ecosystems.

In *The Participatory Mind*, Skolimowski (1994) cogently argues that in order to change the world we have to change the way we think about it and the way we view it. The nature of our mind is the nature of our knowledge and the nature of our reality. In other words, he argues, ontology, a theory of being, and epistemology, a theory of knowledge, are intimately related; the way we see the world affects the way we act in

it. Indeed, Einstein (1934) is reported as suggesting that the problems we have created are the consequences of certain ways of thinking and that we need a new and alternative way of thinking about problems, not so bounded with dominant modes of thought. The challenge of seeing things differently lies at the heart of any attempt to work transdisciplinarily. In doing so, we are engaged in the co-production of knowledge but through lenses of different epistemic communities. Within those separate communities, knowledge is relative to the perspectives of those making knowledge claims, i.e. it conforms to the meanings and traditions of thought, habits and norms that have grown up over time about how good research should be conducted. Tradition determines our institutions and attitudes, our scholarly practices and standards of evidence, while the cultural practices and linguistic structures of the epistemic community both imprison and enable us, delimiting what is feasible, what is possible and what is pertinent (Miller and Fox 2001). The process of science is one of social negotiation (Nygren 1999; Ellen 2004). Science is socially constructed and affected by power (Van Kerkhoff and Lebel 2006) and is less distinct from other forms of knowledge (local, indigenous) than is often believed (Nygren 1999). Sustainability, ecosystems, health, inequity and health promotion are all terms that do not have set meanings but are often contingent and open to interpretation, and are underpinned by values that may not always be shared and understood. For example, sustainability assumptions found in indigenous ways of knowing reflect very different ontological and epistemological assumptions from the technocratic and technocorporatist forms found in such documents as the Brundtland Report (World Commission on Environment and Development 1987; Meppem and Bourke 1999). Moreover, certain discourses often dominate because of the domination of certain elites: the domination of the Western biomedical discourse within the health sciences, for example. Alternative conceptions of nature and science, of evidence, of the role of the non-material and of capitalism are marginalized, as are the people who hold these perspectives.

Changing the way we think in order to resolve the problems of the planet is not just a matter of bringing different academic traditions together; it is also a matter of involving citizens in the knowledge creation process, thus democratizing the knowledge production process. This can involve bringing the Western scientific tradition, itself a social construct, alongside indigenous knowledge in all its diversity,

to achieve what some Canadian aboriginals call *two eyed seeing* (Vukic et al. 2012). It may also be about putting together lay knowledge with epidemiological data to better understand health and the social experiences that underpin it. There is a moral and ethical imperative here. As Heron (1996: 21) said, 'To generate knowledge about persons without their full participation in deciding how to generate it is to misrepresent their personhood and to abuse by neglect their capacity for autonomous intentionality. It is fundamentally unethical.' Thus, as Connell et al. (1982: 216) argue: 'Marginalized people can be made more marginalized by the way some research is done, and we have to reflect deeply on the role we play ourselves in generating inequality. Ideally, research embodies a relationship where expertise is available to all rather than a form of power for the few.' Beyond the ethical imperative, there is a growing evidence base that such involvement is crucial to encouraging action on scientific findings, but also ensures that knowledge is contextually relevant and appropriate (Jagosh et al. 2011; Trickett 2009). This chapter argues that participatory (action) research in its emancipatory form provides an approach to research and action that transcends some of the boundaries created by epistemic territories and seeks a third epistemic way to transdisciplinary research. Moreover, underpinning participatory research is an epistemology and ontology that reconnects humans and nature to create a post-positivist human ecology and which sees health as an integral part of ecological thinking. Further, PR is not only underpinned by a theoretical and empirical understanding for working for change in ecosystems approaches to health equity; the practice has also generated a range of valuable tried and tested tools for the co-production of knowledge. Through a process of social learning, shared meanings are developed, which are culturally derived and context dependent through communicative practices (Meppem and Bourke 1999). Reflexive processes are critically central, through these processes' critical questioning of surface value-based positions.

What is participatory research?

Participatory research (PR) is an umbrella term for a school of approaches that share a core philosophy of inclusivity. These approaches recognize the value of engaging in the research process (rather than including people only as subjects of the research) those who are intended to be the beneficiaries, users and stakeholders of the research.

Among PR approaches included within this rubric are community-based participatory research (CBPR), participatory rural appraisal (PRA), empowerment evaluation, participatory action research (PAR), community-partnered PR, cooperative inquiry, dialectical inquiry and participatory health research (PHR). These different labels reflect differing cultural and political contexts and the disciplines in which they were first used and named. Whatever the origin, PR is part of a family of relatively new types of collective inquiry research approaches, the popularity of which coincides with challenges to Cartesian-based philosophy in science. It is also associated with the rise of systems thinking within the scientific disciplines and an acknowledgement that the observer affects and is affected by the observed. It also reflects the recent conceptualization of sustainability issues such as climate change as 'wicked problems' (Kreuter et al. 2004). PR's core concern is to develop practical as well as conceptual contributions by doing research *with* rather than *on* people. At its most idealistic, PR sees participants being involved in all stages of the research process: from defining the research problem through to development of the methodology, its implementation and analysis, and the use of the research findings. Cornwall and Jewkes argued that 'the key element of PR lies not in methods but in the attitudes of the researchers, which in turn determine how, by and for whom research is conceptualized and conducted' (1995: 1667). PR is particularly favoured by health promotion researchers as the values are in accord with the underpinning values of health promotion. However, while PR has gained acceptance in some health research arenas, the health sciences as a whole remain largely tethered to the biomedical paradigm.

PR is also gaining popularity in sustainability science (Blackstock et al. 2007) and ecological resource management, where the term transdisciplinary research is often used, the characteristics of which in terms of processes and challenges are similar (Lang et al. 2012), if talked about in a different language. One explanation offered for this increased interest is the critical questioning, by both ecologists themselves and indigenous populations with whom they have worked, of past use of utilitarian top-down approaches to environmental resource management without consideration of local environment knowledge and spiritual and cultural concerns (Berkes 2012).

PR is usually described as a cyclical process of planning, observation, reflection and action. Although one can differentiate conceptually the

different elements of participation, research and action, within PR, these differences begin to dissolve in practice. Instead, there are countless tiny cycles of participatory reflection on action, learning about action and then new informed action, which is in turn the subject of further reflection. The spiral of self-reflective cycles interweaves repetitive collaborative cycles of planning, acting/observing and reflecting (Kemmis and McTaggart 2000). Thus, in participatory research social learning (learning together and from each other) is a fundamental element that underpins the dynamics of developing a connected knowing (Isaacs 1999). This means trying to understand the other person or idea through dialogue from relations of trust and empathy (Goldberger et al. 1996: 209). In turn, this generates an intention of being able to act based on the research findings. The nature of that action and how the consequential impact of social change is defined are largely determined by whether the approach is pragmatic (that is, focused on issues of practical utilization) or emancipatory (where the focus is on changing the way people think and act in their world) (Johansson and Lindhult 2008). The former can become technocratic, the latter can be transformational. Both depend on the extent to which the process is genuinely participatory.

Non-participatory health research is often concerned with improving the health and well-being of the general population or of a specific group of people affected by a particular health or disease issue from the position from which the health issue is previously defined, usually according to a medical model. By contrast, PR goes a step farther to directly promote human agency for change: it takes the position that people are better able to act on their own behalf when they can systematically learn more about a topic of common interest and when they have become empowered to take action based on that knowledge. PR also provides an opportunity for people to systematically articulate and investigate their strengths and to apply these to issues of common concern.

One of the great challenges in addressing the large 'wicked problems' associated with environmental change is that until people take the time to work through the issues they cannot see how they are able to act with agency individually and collectively. They also need to do this in the context of their everyday lives to find workable solutions. Moreover, very rarely do people explore their own assumptions in a critically reflexive way. This is also the case with researchers from

different epistemic communities who rarely engage in this type of reflexivity, taking for granted their predispositions as they have been socialized into particular approaches to science and knowledge creation. Transformative learning (Mezirow and Associates 1990; Grabov 1997) can take place as a result of the actions and deliberations undertaken during or directly consequent to the research. Reason and Rowan (1981) have highlighted that four different types of knowledge are accessed, integrated and developed during the research process: experiential, presentational, propositional and practical knowledge.[1] Ownership of the knowledge generated as valid and of the action that arises from the knowledge is ensured by the active participation of people in the knowledge creation process (Breu and Peppard 2003). This makes it a very powerful process of research-based social change.

Extensive examples of the power of participatory practice in sustainability science and health promotion research such as that provided by Breu and Peppard (ibid.) in an information systems context lie hidden in the many master's, PhD theses and grey literature and go unreported in systematic reviews. A rare published example of a class of PAR that is often hidden from scholastic view on the pragmatic end of the spectrum is reported by Minkler and Wallerstein (2008). Their work draws on research undertaken by the grassroots organization Concerned Citizens of Tillery, based in North Carolina, USA. This group was concerned with the impact of industrial pig farming practices on the local environment in terms of environmental degradation, poor health and the livelihood of local people. Their perception was that the industrial pig farming units were located in poor and disadvantaged areas because the owners believed there would be less opposition to their practices. In 1996, a partnership between the local community and researchers from the local university received money to quantify the problem using the expertise of an epidemiologist alongside the community members, who evaluated the data quality using their local knowledge. The research questions originated from the communities and decisions on the research process were made with the community members. The results were put together in a press release that was mutually compiled, and the groups were eventually invited to present their findings to the Agricultural Committee. Although they were met with some opposition from the Pork Council, the study ultimately had a positive influence on the region as results have been considered by health departments, the US Environmental Protection

Agency's National Environmental Justice Advisory Council and the US Department of Agriculture, and they have been used by plaintiffs as evidence of impact on health and quality of life of neighbours in civil suits against industrial hog operations.

An example on the emancipatory end of the spectrum is reported by the urban planner Forester (1999). While not directly related to sustainability science, it provides a useful insight into what happens when you work with a community to develop a community-led project. In a master's project, Cornell researcher activist Mary Jo Dudley worked with a group of domestic workers. It started as a video training project in which the workers exchanged stories of sexual harassment and abuse that they had never told before. They decided to get the views of the general public, and chose to interview men and women about their perceptions of domestic workers' situations. The solidarity and trust they had developed in telling each other stories encouraged them to research other views, and share their experiences with a wider audience. The reciprocity of telling their stories to each other, and then researching others' views, meant that they not only worked through their trauma, they also understood those experiences in a broader context. The final outcome was not the video presenting their analysis of their situation – the original aim – but the development of political awareness and the confidence to argue their case in other settings. A similar story of change comes from Kenya, where community-led action changed the focus of a project (Ledwith and Springett 2010: 75). In this instance the original research was supposed to have been on HIV/AIDS education, but the community was far more concerned with the lack of trees. A project was developed to connect each child with a newly planted tree, whereby they took responsibility for that tree until it was fully established. Although eventually this led to health education classes around the trees that had been planted, the project spawned a much larger project on water management and sustainable agricultural management.

Participatory research can have a profound impact on all participants, whether seasoned expert researchers or community members. This can range from the realization that their survey instruments are asking the wrong questions about the wrong things, to an emotional and political awakening about the purpose of the research. As Maguire (1993: 189) elegantly wrote,

> The participatory research process is invigorating, and likewise exhausting. But then that is the beauty of it. You will not be detached. You too, not merely the participants, will be rehumanised. Participatory research is not only about trying to transform social structures 'out there' and 'the people'; it is about being open to transforming ourselves and our relationship to others. Just as I examined the dilemmas and contradictions in participatory research, I was challenged daily to consider the dilemmas and contradictions of my own life choices. I was forced to question my part in the social construction and maintenance of large social structures, systems and relationships. And, relentlessly, I found myself asking, how I am choosing to be in the world.

These approaches to research, like other participatory practices, have been brought to the North from the South. There, they have proved useful and effective in addressing the previous failure of the development industry to consult local people (Cornwall and Coelho 2007), resulting in a plethora of high-cost and inappropriate technologies and ineffective actions. However, they have also been much criticized for becoming a new form of colonialism whereby Western perspectives and priorities are imposed on oppressed groups (Jackson and Kassam 1998). This critique is valid where the core principles are not followed (Kesby 2005; Buhler 2004) and the result becomes a technocratic exercise rather than a transformational one. This scenario has been called the tyranny of participation (Hickey and Mohan 2004). However, in countries stripped of the institutions of Western bureaucracy, with cultural traditions that support collective action, albeit not founded on values of difference and diversity, such PR approaches have provided great potential for participating in a culturally sensitive way. In Kyrgyzstan, the entire rural healthcare system is being developed using participatory approaches to inquiry (Schüth 2014). Significantly, in its early manifestation, local villagers took a very ecological approach to their local health problems, which they themselves defined. The challenge came later, when specific donor agencies with a particular agenda, e.g. malaria, sought to impose those issues as primary ones instead of those locally defined (Ledwith and Springett 2010).

The values and principles underpinning participatory research practice

PR is an approach to research, not a particular technique or method. Ethics and values are interwoven into the very practice of the approach. There have been various attempts to clarify the core principles of PR for health (Springett et al. 2011), and currently an international project is focused on this issue (www.icphr.org). Certain themes are emerging, particularly how the primacy of the democratic principle underpins all the other principles (Springett et al. 2011). This means thinking about optimum participation in terms of what makes sense for different purposes and contexts, and adapting research tools and methods so they support the participatory principle. The core values involve nurturing attitudes and behaviour that mirror the fundamental human values of dignity, respect, mutuality and reciprocity. It also means explicitly paying attention to power issues in terms of how each voice is heard, how the dialogue is encouraged and how joint ownership is created. The path to participation is a fine line between the interface of liberation and domination (Cooke and Kothari 2001). Without a critical understanding of such processes, there is a danger of misappropriation (Barnes 2007).

A second element of PR is an emphasis on collective co-created dialogical knowledge incorporating multiple perspectives. This is achieved by the opening up of communicative spaces in the research process for this to take place (Kemmis 2006). It also involves the recognition that knowledge is always in a process of becoming; it is never fixed; it is forever dialectic.

A third key facet of PR is its explicit intention of bringing about social change. As Wadsworth (2008: 1) puts it, 'participatory action research sets out to explicitly study something in order to change and improve it'. Meanwhile, a fourth facet is the centrality of local knowledge and context. In other words, the goal of PR is about creating change or taking action for a specific time and place. Transfer of the change processes from one locality to the next is about understanding the contextual conditions in the new setting, how they differ from the setting in which the knowledge was produced and reflection on the consequences.

A final principle is critical reflexivity, the continual questioning of the 'taken for granteds' within the knowledge creation process. All these principles are interrelated and require consistent application in

the practice of PR. It is not an intellectual exercise, it has to become embodied. Indeed, taking a partial approach can undermine the purpose (Frisby et al. 2005).

A whole range of tools and techniques has been developed beneath the participatory umbrella to encourage and enhance the social learning process inherent in participatory research practice. These tools for deliberative democracy within the research process have been adapted for a wide range of contexts to encourage dialogue and reflection through different ways of knowing. Open space, world café, forum theatre, photo voice, story dialogue, participatory rapid appraisal and appreciative inquiry, to name just a few of the variety of the tools, require good-quality facilitation sensitive to cultural diversity and equity in participation.

An ecosystems view of health

The example from Kyrgyzstan illustrated how thinking ecologically about health comes naturally in the context of people's everyday lives, particularly among many globally who still have direct contact with nature. Thinking ecologically about health means seeing health as a product of an organism's dynamic relationship with the environment and one in which all its aspects are fully integrated and functioning at individual and collective potential. An organism is functioning optimally when 'its capacity for interaction with its world is actualized and practised' (Murphy 1999).

Mirroring the ecology movement of the 1960s, there has been a push, both directly and indirectly, for this alternative, more ecological perspective on health underpinned by salutogenesis (Antonovsky 1979) – that is, focusing on what makes you well rather than what makes you sick, and on the concept of balance. This push has come from two quarters: one, the alternative/complementary healthcare movement, particularly Chinese and Ayuverdic medicine, which are systems of understanding with regard to health that have been practised for thousands of years; the other, health promotion, a social movement within public health, albeit in bureaucratic clothing (Stevenson and Burke 1991). Just before the publication of the Ottawa Charter on Health Promotion, Hancock and Perkins (1985) developed a model, the 'mandala of health', emphasizing the interrelationships that characterize health. The model incorporated the notions of health found in many native cultures around the world, those of body, mind and spirit, but also notions of ecology: human beings' relationships with

their environment, including community and society. Hancock (1993) further developed the model, characterizing a healthy community as one that balanced health, environment and the economy in a way that was viable, equitable and sustainable. A holistic and socio-ecological view of health also meant a commitment to issues of equity and social justice. Labonte (1994) went on to expand these ideas of health as wholeness, characterizing health as: feeling vital, full of energy, having good social relationships, experiencing a sense of control over one's life and one's living conditions, having a sense of purpose, being able to do things one enjoys, and experiencing a sense of connectedness, taking an ecological perspective developed in parallel with a focus on social justice and the social determinants of health. Thus, if health was a matter of balance or wholeness, as characterized by the Anglo-Saxon root of the word health – *hal* – then inequality, in social and economic terms, represented a lack of balance, not only in inequalities in health, but in the health of humanity as a whole. In this way, one can see unemployment as a lack of balance in the distribution of work, current economic difficulties as a lack of balance between short-term profit and long-term gain, or between wealth and poverty, the market and the common good, or between the global market and the local economy. The solution is a focus on the whole system, beginning with the balance of a healthy city or community. Internationally, this thinking led to the development of the Healthy City and Community movement, although the socio-ecological model, as it came to be known, tended to abandon the ecological dimension along the way and transmogrified into what came to be known as the settings approach to health promotion (Dooris 2006; Mittelmark 2014). Meanwhile, within public health, the environmental component retracted to a focus on risk of exposure to specific pathogens.

With or without the ecosystem component, the call for an ecological approach to health shared the same fate as the deep ecology movement after the publication of the Blueprint for Survival (Goldsmith and Allen 1972), when it was left to those working outside the mainstream to develop thinking and advocate for change. Integrative approaches were subsequently developed by a whole range of writers from many of the life and social sciences in fields such as psychology (Heron 2005), management science (Reason 2005; Shotter 2006), sociology (Habermas 1984–87) and physics, biology, chemistry (Bortoft 1996; Tiller 1997; Capra 2003), and form the basis of complexity

science (Stacey 1996) and systems theory (Meadows and Lokey 2009). In particular, Bateson (1972) had a crucial influence in that he encouraged us to move our focus from seeing 'things' to seeing patterns, to recognize that we are part of any field we study and, to understand the field, we must also reflect on ourselves as part of that world – what Capra (1996) calls the 'web of life'. In discussing this further, Capra (2003) describes the fundamental characteristics of the organization of ecosystems that are necessary to develop sustainable human communities: interdependence, cyclical processes, cooperation, partnership, diversity, flexibility and co-evolution.

The domination of a Western worldview in public health research and its impact

Although in recent years there has been a call within public health for a more systems and integrative perspective (Hanlon and Carlisle 2010), mainstream public health remains significantly shaped by a concept of health and science derived from medicine. This is a predominantly Western view of health, and as such differs from the view of health found in other cultures such as India, China or the Aboriginal peoples of New Zealand, Canada and the States. These approaches to health adopt a more holistic perspective. Western medicine sees health as located physically within the individual body divorced from the social or environmental context. Yet the crucial relationship between humans and their environment as a factor in the creation of health has a long legacy. In a range of essays and books in the late 1950s, Dubos (1959) forwarded the notion of 'thinking globally and acting locally', arguing that living organisms adapt to their environment and that states of health (and ill health) are reflections of that adaptation. He believed that environments and institutions can never be better or worse than the individuals who shape them and, as such, ecological thinking must be supplemented by humanistic value judgements concerning the effect of our choices and actions on the quality of the relationship between humankind and earth. This connection between values and how we view the earth and our relationship to it lies at the centre of the debate about health and the environment. As long as people and their health are seen as dislocated from their context, they will continue to act as if their actions are disconnected from others and their natural environment. In many ways, those working in health are relatively out of step with ordinary people's intuitive and experiential understanding

of reality as a complex adaptive system, which is often revealed in their 'knowledgeable narratives' (Popay et al. 2003). People tend not to separate their lives into individual lifestyle issues such as alcohol abuse, physical activity or diseases such as heart disease, diabetes and cancer. In this sense public health, constrained as it is within the straitjacket of medical hegemony (Scott-Samuel and Springett 2007), is unlikely to achieve its aims of improving general health and well-being or to see health as having any connection with the ecosystem. Professional practice is dominated by linear thinking and an attempt to reduce complexity through simple measurement. Fragmentation is further enhanced by the nature of funding streams that emphasize individual problems and the constant reorganization of the healthcare sector, which, because of media focus, is seen as what equals health. While the rhetoric of whole-system thinking has become pervasive, indicating a shift towards recognizing the need for a more holistic perspective, the reality is that action remains constrained by institutional systems and professional practices, with many public services continuing to offer services aligned more to individualistic orientations within conservative professional boundaries than to client needs or complex social problems (Springett et al. 2010). So as a community of practice, health promoters find themselves paying lip-service to an ecological worldview, subsumed under medical hegemony (Scott-Samuel and Springett 2007) and linear or Cartesian thinking.

Projects directed at promoting health and well-being have to demonstrate that they are directed at heart disease, diabetes, specific cancers or suicide. The current focus is on individual lifestyles, teenage pregnancy, drug or alcohol abuse, smoking, physical activity or weight control, or lifestyle diseases such as obesity or alcoholism. Where well-being is considered, it is differentiated as mental health promotion, tying it closely to mental illness. There is also the downgrading of the emotive, value-based aspects of thinking processes by privileging the rational and ignoring the meaning systems people share as a result of sharing the same social world (Bolan et al. 2003). In fact, the failure to understand and value different knowledge systems and cultures in a broader context has led to the differential impact of public health interventions, increasing the very health inequalities that they are trying to address (Jarvis and Wardle 1999). The dominant approach continues to objectify people into categories such as class, socio-economic, gender or ethnic group, labelling them as target groups, ignoring the relational

aspects of their lives. The everyday practices that create health and well-being are embedded in a co-creation process involving both the individual and the collective.

Despite the use of techniques such as participatory rapid appraisal in needs assessment (Cornwall and Jewkes 1995), on the whole such 'lay expertise' is seen as a means by which health promotion interventions are contextualized, as the delivery point for pre-formulated health packages by 'external experts'. Local knowledge is not given any value as a source of experiential practical knowledge for developing the interventions themselves (Lacey et al. 1991). External interventions reflect the approach to practice that pervades health systems, and which privileges expert or scientific, generalizable knowledge as the only source for deciding what to do. Thus, knowledge creation is inherently top-down, emphasizing experimental knowledge, i.e. that which is tested through engaging in a rational experiment and then disseminated through systematic review to a largely health professional audience in keeping with a medical episteme. A culture in which professionals do not accord value to the skills and experience of community members is thus enhanced (Green and Mercer 2001; Ansari et al. 2002). There are many parallels here with experiences in the area of ecology, whereby scientists have taken for granted the primacy of their scientific knowledge at the expense of local knowledge. One example is the way the scientific community ignored Cumbrian farmers' specific soil knowledge in the aftermath of Chernobyl, with major consequences for sheep farming (Wynne 1998).

In essence, the practical reality of the way people act in relation to specific issues in the health establishment, and those institutions that contribute to health, has not fundamentally changed. People were attracted to the idea of creating healthy communities and cities but have found this difficult to implement in practice owing to strong institutional barriers and constraints (Berkeley and Springett 2006). Why? Because the majority of us still think and act in the world in a dualist and non-participatory way, and because the whole concept challenges existing power structures that are themselves the consequence of thinking dualistically. Even those of us who think we have moved towards a participatory and therefore ecological view of the world are often not aware how the Western ideological perspectives pervade the very essence of our existence. It is the form-shaping ideology (Bahktin 1984) that Shotter (2003) calls a monological approach to the world.

Towards thinking integratively as a challenge to prevailing worldviews

Public health as a science and a practice is not alone in that its mainstream has failed to move away from a Cartesian or dualist perspective. Thinking ecologically (integratively) is based on a very different paradigmatic position from positivism and also a very different value system. Such thinking challenges many of our existing organizational structures and educational practices, not just those in health, which continue to reflect the form-shaping ideology of the prevailing worldview. The 2009 Copenhagen Summit encapsulates many of the challenges facing those who might want to embrace an ecological ethic, with the very separation out of 'climate' as a distinct issue representing an expression of reductionism. Climate change is not an issue in itself, but rather the symptom of globalization and the imbalance in humanity's relationship with its environment which has historically led to the destruction of civilization (Springett et al. 2010). Similarly, an issue such as health inequity can be considered as a surface symptom of deeper underlying problems, which unless tackled will continue to resurface in different forms.

In his book *Experience and Nature*, Dewey (1958 [1925]) argues that in a dualistic perspective or Cartesian view of science, experience is dismissed as irrational and that nature becomes defined as separate from experience. However, to really understand nature, we need to look at the world in an integrative way, combining different perspectives and knowledge. For Dewey (ibid.), knowledge is derived from embodied intelligence, not from mind alone, and in this sense it could be argued that we have become decontextualized from the natural world, creating individual alienation and wider ecological problems (Heron 1996). These circumstances point to the need for a Goethean approach to science, whereby 'the organizing idea in cognition comes from the phenomenon itself, instead of from the self-assertive thinking of the scientist … it is not imposed on nature but received from nature' (Bortoft 1996: 240).

The Cartesian worldview argues that reality can ultimately be explained in terms of basic laws, discovered only through precise measurement. In other words, there are objective facts about the world that do not depend on interpretation, and it is improved forms of measurement which will lead us to the real 'truth'. However, in adhering to this worldview, are you also stripping away the essential

nature of things and their meaning? There is a failure to acknowledge humans as whole beings that not only think but feel, and need to experience meaning.

The phenomenologists Husserl (1989) and Merleau-Ponty (1962) were also highly critical of the dualist perspective. They view subject/object and world/nature as internally related: human consciousness and nature mutually constitute each other. They argue that the abstract models for the supposedly hidden reality behind experienced phenomenon that scientists have used have taken on a higher ontological status than the experiences themselves. Merleau-Ponty (ibid.) talks about the primacy of perception, that the experience of perception is our presence in a moment when things, truths, values are constituted for us. For him, perception is a *nascent logo*; it teaches us outside all dogmatism and, in his sense, 'perception' is knowledge being born. Such perception is holistic and almost pre-thought. Heron (1996) sees it as a process of engaging all the senses, visual, auditory, tactile, kinaesthetic, and anything we experience is interrelated, interdependent and correlative. As soon as we try to describe an experience in words, which themselves are abstractions, we often lose its essence. Even when we tell the story, the telling in itself changes the perception of the experience, and is limited by the very nature of language. This is why images are so powerful and account for the success of communicating through multisensory media, such as Facebook. Senge et al. (2005), in *Presence*, see this participative experience as that point before which transformation takes place, and draw on the analogy of the experience as of being at one with nature. Much of the time, we do not engage in such 'perception' of the world: perception in everyday life is second-order perception (Merleau-Ponty 1962). In other words, we look at the world through a prism of habitually established meanings rather than engaging with the experience itself. However, when our experience creates meaning, this results in a more participative mode of experience.

Further, the mind is not separate from the world; rather reality is always in subjective–objective relation. According to Maturana and Varela (1987), cognition is not a representation of an independently existing world, but a continual bringing forth of the world through the process of living. Consciousness, it is argued, creates physical reality. So, although there is a widely held belief that there is a separation between inner and outer worlds, there is a growing body of thought that sees both as part of an underlying, unseen energy system, what

Bohm (1980) has called the implicate order. Einstein himself argued: 'A human being is part of a whole, called by us the Universe, a part limited in time and space. He [sic] experiences himself, his thoughts and feelings as something separate from the rest, a kind of optical delusion of consciousness' (1934). When we start to think in these terms, we see how important patterns of thinking are in creating the world around us, and vice versa. In seeking to understand reality, the mind actively transforms reality. It also puts a new slant on the feminist adage that the personal is political. We are sentient beings, however, and thinking is only one of the 'many threads with which the tapestry of our sensitivities is woven' (Skolimowski 1994: 46). All the senses and the emotions are part of the process. Things become what our consciousness makes them. We make sense of reality by filtering it through our minds and our emotions, constantly processing and transforming what we experience, and, in doing so, co-create our reality. Skolimowski (1994) argues that our Western traditions have locked us into language: perception and thinking that create a bias towards being rather than becoming. However, to understand the world is to understand this process of change, for every act of reality-making is an act of change, part of the process of transformation. Within this view, any of us working with or in communities or groups are co-creating realities through our thoughts and beliefs, conscious and unconscious. It requires us to be critically conscious, i.e. not only to be self-aware, but also to realize that in any transformation process we are part of that transformation and that it needs to proceed both within ourselves and in the outer world. Everyone thinks about changing humanity out there, but few think about changing themselves (Murphy 1999; Maiteny 2000). Hence the emphasis on learning to question as a route to changing consciousness; by so doing, we create an upward spiral of understanding. Just as in complex adaptive systems, this encourages regeneration within the system; in other words, learning and new information introduce a new energy. In this way consciousness is expanded and the world changes.

Participatory research as an ecological practice underpinned by an integrative and transdisciplinary worldview

Lessons from traditional (i.e. indigenous) knowledge demonstrate that worldviews and beliefs do matter. The utilitarianism of reductionist science in the service of colonialism and neoliberalism

is ill suited to an ecosystem approach to health. This does not mean rejecting reductionism, which has served humanity well in terms of technological development. However, we now need to integrate other ways of knowing to allow for a different type of knowledge production. An ecological, integrative and participatory worldview leads to a different way of conceptualizing our relationship with the natural world, one in which human and environmental well-being are seen as intimately connected (Ledwith and Springett 2010). As Kuhn (1996) has shown, fundamental changes in dominant mindsets are not easy within a scientific field, particularly as greening public health involves a challenge to hegemonic discourses and values broadly associated with various aspects of 'neoliberal' values. While Lukes (1974) views the ultimate power as an ability to keep an issue off the agenda, Gramsci (1971) and Foucault (1980) note the possibility of dominant hegemonic systems appropriating, reconfiguring and stifling challenges to their interests. The very fact that ecological issues are now accepted as a legitimate element in contemporary political debate suggests that a change has taken place and that there is room for optimism.

PR practised according to the core principles outlined earlier is consistent with ecological and participatory approaches to health. It provides a vehicle for emergent inquiry, the potential for developing new concepts and 'for valuing not reducing diversity, accepting not eliminating uncertainty and a respecting of all the knowledge cultures involved' (Brown et al. 2010). Its practice reinforces the practice of thinking and acting from an ecosystems perspective and incorporates all ways of knowing: intuitive, experiential and emotional (Burns 2007). It changes the way we conceptualize interventions, seeing them rather as an interruption to an existing dynamic flow, activity or pattern. Inquiry and action for change take on a different feel, particularly when internally rather than externally determined. Through reflection and then action on those reflections, the social norms that have been taken for granted can be interrupted and diverted by actions at a community level. So when we talk about social action in system terms, we are talking about what can be called *appropriately deliberate interruptions*. These are much more likely to be introducing new energy or to change existing energy flows to the benefit of the whole. Critical questioning and inquiry into a living system (Wadsworth 2008) is social learning for change, what Brown calls collective inquiry (Brown et al. 2010). It moves such social learning from single-loop to triple-loop understanding and

solutions (Hawkins 1992). Brown (Brown et al. 2010) suggests that we explore the spiral of understanding through a series of open critical questionings – what should be, what is, what can be – arguing that the answers give us the ideals, facts, ideas and actions required to interpret and act on wicked problems. The process involves accepting ignorance and uncertainty, or messiness as Cook (2012) calls it, as a natural part of the process of imaginative transdisciplinary inquiry. Whether it is called transdisciplinary inquiry or PR, it is a research approach that is the key to addressing the wicked problem of ecosystem approaches to health in a non-participatory world dominated by a biomedical model of health. It directly confronts different ways of knowing in a co-creative process of knowledge development. If underpinned by a participatory worldview, nature and culture are brought back together to reintegrate humans back into the ecosystems through a unity of mind and nature (Berkes 2012). But perhaps just as importantly it builds understanding of others' perspectives through relationship. This is what participation really means: putting the humanity back into health and health back into ecology.

Note

1 'Experiential': knowledge created by a conscious being, fully aware of and grounded in the immediacy of the direct sensory environment, while mindful of the duality of our mental imagery and the real world. 'Presentational': knowledge generated by and communicated through a variety of mediums, including art. 'Propositional': formal theoretical, conceptual knowledge, usually encoded in language, including maths. 'Practical': knowledge created through action (Reason and Rowan 1981).

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7 | CONNECTING DEVELOPMENT AND SUSTAINABILITY: EMPOWERING PEOPLE TO EFFECTIVE INTERNATIONAL COOPERATION

Cristine Koehler Zanella

Introduction

The greatest challenge when dealing with extremely poor communities is to escape the vicious and cumulative circle of poverty by creating concrete opportunities to promote development. Through analysis of the case of the Solid Waste Collection and Treatment Centre in Carrefour Feuilles (Port-au-Prince, Haiti) this chapter presents some lessons that can be learnt by transdisciplinary studies for the promotion of sustainability and development. The results address some important orientations regarding the challenges faced: (i) innovative research on the promotion of green economy must consider less obvious economic variables to investigate changes that will matter to humankind in environmental and individual terms; (ii) the path to the construction of a green economy that improves well-being must consider the empowerment of the population to whom the local development programmes are directed; and (iii) the obstacles from different development-oriented academic communities may be overcome if the focus of the analysis breaks with adhesion to specific models and concentrates on goals defined in the particular context of each community.

An ancient Latin American story tells that there used to be a man who kept walking on and on, trying to reach the sun. Every day, at around midday, and having eaten some simple food, he began walking towards the sun, the great celestial orb. In a little while, the crazy story of a man who spent his life in vain walking towards the sun spread to villages, cities and all inhabited parts of the continent. Then one day a young man met the walker. Full of superiority, he approached the walker and patronizingly told him that his journey was foolish and useless as it was impossible to get to the sun. To the young man's surprise the walker remained calm and answered that it was not important to reach the

sun and stay there, but having the sun as his horizon made his walking meaningful.

Just as the walker was not so concerned about reaching the sun and remaining there, development is more concerned with the means of travelling and the knowledge acquired than the final destination. Nevertheless, whereas there is a relative consensus nowadays about the importance of development, there are many different models through which to understand it. As the understanding of development is transformed, the variables and indicators used for measuring it are altered. Since 1950, major macroeconomic indicators such as GDP, unemployment and inflation rate have been used every year to rank each nation's level of development. On one hand, these indicators are useful for revealing structural advances and economic recessions in a comparative way. On the other, when it comes to measuring the impact of development on living standards in small segments of society, these major indicators hide some factors or dimensions, which should not be ignored if we want to think of development as an improvement in the quality of life.[1]

This understanding of development has been pursued by the well-known pioneering work of Amartya Sen (2000), once more placing the individual as the main focus of development studies. This chapter considers (section 1) the research results obtained from a case study undertaken at the Carrefour Feuilles community, in Port-au-Prince, capital of Haiti, and discusses in a more concrete way what it means to consider people in the development process. It also considers (section 2) what conclusions can be inferred from this experience, thereby enlightening new development projects and guiding the parameters of international aid for extremely poor communities. A transdisciplinary approach will guide this study, with the introduction and discussion of guidelines for action (instead of models) to orient individual and collective action (Wiesmann 1998).

Development in extremely poor regions: the case of Carrefour Feuilles

Despite its poverty, it is clear that Haiti is not in a civil war situation.[2,3] Neither the 2010 earthquake, which killed an estimated 300,000 people (about 3 per cent of the population), nor the cholera epidemic – with over 8,200 official deaths registered on 17 August 2013 (PAHO 2013) – have succeeded in causing violent unrest in the country. The

United Nations Stabilization Mission in Haiti (MINUSTAH) has been in the country since 2004 and has contributed to the maintenance of institutional structures. However, it is also widely considered that the best peace missions are those that have an ending. It was noted a few years ago that 'Haiti is not a country at war or in a post-conflict situation' (Castor 2009: 3). The UN's goal in these lands of Hispaniola is, therefore, to reduce the size of its military presence while leaving space (and resources) for development projects that reinforce social cohesion and sustain and develop the economy.

One of the few development projects introduced by the international community in Haiti is the Carrefour Feuilles Solid Waste Collection and Treatment Centre (SWCTC) project. The project is located in the Carrefour Feuilles district. Carrefour Feuilles is one of the poorest districts in the capital of the poorest country in the American continent. Activities in the SWCTC started in 2006 and were supported by the Brazil, India and South Africa Dialogue Forum (IBSA). It is essentially a project that operates in a big factory without any electrical machines where more than two hundred people from the community are involved in gathering, separating and recycling solid waste material collected in their own district. The main products of the recycling process are the briquettes, tablets made of paper and similar waste, used as fuel to heat and cook food. Seemingly worthless to the external observer, the briquette replaces charcoal and wood, which are used daily by Haitians in preparing food and normally have to be carried long distances to their homes.

The commercialization of briquettes produced by the SWCTC began in June 2009. One gourde (the Haitian currency unit equivalent to US$0.024) will purchase two briquettes. In order to cook a pan of rice and half a pan of peas (an everyday meal for most Haitian families), one needs two pans of charcoal (the usual energy source) at a total cost of 50 gourdes. The same amount of energy required for cooking this meal is produced by twenty-two recycled paper briquettes worth eleven gourdes. This means that the daily cost of energy for cooking food was reduced by almost four-fifths (80 per cent) owing to the use of briquettes. This is not to mention the reduction in the cutting of trees for charcoal production (UNDP 2009a).

The following specific objectives were defined for the SWCTC project: (a) to implement a durable solid waste management system appropriate for the community; (b) to improve public sanitation and

the environmental conditions of the district; (c) to create jobs and income-generating activities; (d) to consolidate the achievements in pacification and stabilization; (e) to raise the awareness of the local population regarding citizen responsibility, citizenship and tolerance (UNDP 2009b: 1).

In these goals one can see reflected a number of concerns of the green economy field, such as environmental justice and sustainability,[4] as well as the empowerment of the community.

This chapter analyses the development impact of the project through an '*in loco*' visit made in 2008 and, subsequently, empirical research through guided interviews and data analysis concluded in 2011. The guided interviews were carried out randomly with a sample group of workers employed by the initiative (56 of 202 workers), and the study focused mainly on investigating the following variables: workers' average income before and after taking part in the initiative; workers' average expenses (and their nature) before and after taking part in the initiative; workers' perceptions of the impact of the initiative on their individual living conditions and on the conditions of the region (various aspects); main energy sources used before and after taking part in the SWCTC project.[5] Data obtained contributes to the objective reflections set out here. It is hoped it will serve as a guide for the promotion of development in least developed countries within the boundaries of sustainability and the horizons envisioned by the green economy.

Lessons from Haiti for development studies

Taking into consideration less obvious economic variables Haitian history tells us that the increasing intensity of stress on the environment originated from different causes. In developed countries, stress on the environment is often linked to the industrial process that generated economic and social benefits, but also produced some externalities such as risks to health and an inferior quality of life triggered by pollution, especially around industrial zones. In less developed countries environmental degradation is not necessarily linked so closely to a process of industrialization. In the case of Haiti, the large concentration of people in the capital, Port-au-Prince, which lacks developed infrastructure, is related to the urbanization programme fostered by the ex-president and dictator Jean-Claude Duvalier (known as 'Baby Doc' because he succeeded his father, François Duvalier, who

was known as 'Papa Doc'). Jean 'Baby Doc' Duvalier also encouraged liberalization of the Haitian economy in order to increase international economic assistance to the country. These initiatives led to significant migration from rural to urban areas, without the correlated expansion of the cities' infrastructures (especially in the capital, Port-au-Prince). This process, ongoing since the 1970s, gradually emptied the fields, reducing agricultural production, and thereby leading to the swelling of the towns and an increasing demand for cheaper food. This demand has been met by importing food (made possible with the increased international aid for Haiti), but has resulted in a profound dependence on international markets. FAO's data reveal that in 2008, in only four months, food prices rose 70 per cent in Haiti. This price rise had an immediate effect on the food supply of the Haitian population, for whom 54 per cent of available food comes from abroad (FAO 2010). This affected the country to the extent that in the 2008 food price crisis some Haitians could eat only one meal a day, instead of the two they were used to before the crisis.

Haitian history thus tells us that the risks to the quality of life and health, to which people in poverty are exposed, arise not only from mechanical causes, linked to a specific kind of pollution or industrial exploitation, but have their origin in different historical, social and economic causes. Consideration of these elements is crucial for international cooperation to be effective.

Taking into account historical and social conditions means recognizing that human groups share living spaces, languages, religions, cultures and common institutions. Over time these dimensions of life create links between human beings which shape their individual existence and the characteristics of a specific community. Consideration of these specificities is critical to development – it is necessary to understand the human being as a social being who is part of a larger process that involves and transcends the individual.

Accordingly, for international development cooperation to be effective, there should be an understanding of the distinctive characteristics of communities who share territories, histories, institutions and common values. A Haitian example can be used to demonstrate how these structures – which are often presented as the reality of only one community – can have a dimension ignored by someone who is not part of the same dynamic. Few people realize that in Haiti just a small fraction of the population has access to natural

gas or electricity at home. The majority of the population obtains light through combustion of waste materials and heat for cooking food by burning wood or charcoal. In the case of Haitians who took part in the SWCTC project, before having the briquettes, 100 per cent were using firewood or charcoal, which, as stated earlier, had to be obtained daily in places far away from their homes. For the Carrefour Feuilles workers involved in the SWCTC project, the distance travelled to purchase fuel for cooking food was reduced from 1.13 kilometres to 150 metres – the distance between their homes and SWCTC, next to which was the briquettes marketplace (90 per cent began to make use of the briquettes) (Zanella 2012: 285). The reduction in daily travel distance by more than a mile (in terms of the round trip) increased the time available for other activities. It is not essential to ascertain whether individuals started to use the extra time for leisure activities or working. The point is that individuals were freed from this specific travel time constraint that conditioned their survival. This increases the options in terms of what to do with one's day and one's life and signifies well-being gains. It represents the development and expansion of personal freedoms (Sen 2000).

There is also an important gender issue to be highlighted here. Research has shown that, in most societies, men and women are exposed to different detriments or restrictions because of specific duties allocated to them on account of their gender (UNDP 2010). If we consider that in Haiti women are primarily responsible for ensuring the supply of water, food and fuel for cooking, it is clear that the impact of the reduced distance to reach an energy source for cooking goes beyond the increased time available to them every day. It contributes especially to the well-being gains of a more vulnerable group within the Carrefour Feuilles community.

Despite several studies about development, it is clear that our understanding of these specific dynamics in particular communities is not sufficient or given. In terms of the research we refer to here it is also important to highlight that different communities have different understandings of the processes in which they are involved.

The SWCTC project workers were asked which factors they would emphasize as more or less important regarding their participation in the project. The respondents were asked to rank in order of importance the following factors: care for the environment, respect, income, improvement of the community's living conditions.

Unexpectedly, workers mentioned improvement of the community's living conditions as the most important factor of their participation in the project (Table 7.1). This means that 65 per cent of respondents consider the positive impacts of the project on their community more beneficial than the individual income earned for participating in the project. This was one of the surprising results of the research. We expected to find that income was the most significant aspect of worker participation in the project, especially because this is a project that was implemented in a poor community in the poorest country in the Americas. This result clearly underlines that to understand what development means we should consider criteria that are not freely interchangeable between peoples. It means considering local voices, necessities and perspectives in international cooperation projects.

The subjectivity that surrounds the meaning of development for different communities can be understood by studying the responses given to the open question: 'What does it mean for you to work in the classification and recycling of waste?'

Here too the increased income was not ranked first in order of importance, but rather the words '*liberté*' or '*c'est la liberté*' were those that appeared most frequently in answers to the question (Zanella 2012: 289). The objective of presenting these results is not to diminish the importance of increased income to the development process, but rather to demonstrate objectively that the measurement of development is not limited to the extent of increased income. To understand well-being improvements it is necessary to take into account the social, cultural, historic and economic dynamics experienced by individuals, e.g. having to walk more than a kilometre daily just to purchase fuel for domestic use.

These initial data reveal the importance of considering less obvious economic variables when measuring development, if we are to understand it as a complex process with specificities regarding each community. This does not mean that there is no starting point. Rather, the starting point is to understand the human being as an individual in his/her social dimension and increasing his/her well-being in the development process. Therefore, sciences in this context are no longer silos with processes and conclusions making sense only to themselves. Instead, they work to coordinate their analytic tools with others for the purpose of expanding well-being. Thus, for example, ethno-sciences began to significantly extend the analysis of the most vulnerable

TABLE 7.1 Aspects of workers' participation in the project considered by order of importance*

	Order of importance							
	1st		2nd		3rd		4th	
	Number**	%	Number**	%	Number**	%	Number**	%
Respect	2	3.6	25	45.5	15	27.3	13	23.6
Income	16	29.1	17	30.9	19	34.5	3	5.5
Environmental protection	1	1.8	9	16.4	15	27.3	30	54.5
Improvement of the community's living conditions	36	65.5	5	9.1	7	12.7	7	12.7

Notes: * Only one person did not answer the question; ** Number of people who chose the item in the order indicated

Source: Zanella (2012: 288)

communities (Rist and Dahdouh-Guebas 2006; Bell 2013), while other development studies include measuring the gender impact of development projects (Kukarenko 2011). The impact of development projects on men and women varies according to their different social roles. When sciences are closed in on themselves they are at risk of producing a sterile discourse. Therefore, it is essential to establish a dialogue with the community and, in the process, understand its members as participants in their own development.

Empowering the population In Haiti there are many stories about foreigners, thus reflecting their significant presence on Haitian soil.[6] I was told one of these stories while I was visiting the Carrefour Feuilles Solid Waste Collection and Treatment Centre. It involved the donation of an urban waste recycling machine. The machine, with the capacity to process tons of paper and other waste in a fast and efficient way, was donated to a Haitian community. Because it required electric power, it was never turned on. According to the UNDP, in Haiti, access to electricity between 2000 and 2005 was 36 per cent and the number of people without access to electric power was 5.5 million (more than half of the country's population). In 2004, electricity consumption per capita was 61 kilowatts/hour and there was a –17.6 per cent variation in electricity consumption per capita between 1990 and 2004 (UNDP 2008). Thus, in Haiti, electric power is a scarce resource to which only a privileged few have access.

The story of the recycling machine gives rise to some words of caution. It is necessary to accept and understand that local factors will determine the effectiveness of actions in a certain environment. This is not about mystifying the importance of local factors. Rather it is a question of balance between different perspectives. This means that instead of ignoring local practices and conditions or taking them as immutable, all participants involved in a development project should interact to initiate a more effective line of action. For this interaction to happen in international development cooperation it is necessary to abandon the perspective that there exists an ideal meta-narrative for development and recognize the importance of intercultural dialogue.

Each culture sees its own human relations through the lens of its own particular conditions and potential. Our understanding of space, time and scales, and of different structures and processes, exists in a concrete way within the limits of each cultural narrative. The problem

of prejudice against intercultural dialogue is that, if we think and reflect inside the same system, we entail the risk of never understanding the mistakes of our own reasoning. This means that if we always present our arguments to people with the same beliefs, expectations and theories as our own, we will never test our arguments, only confirm our convictions, including the erroneous ones – so-called confirmation bias:

> When one is alone or with people who hold similar views, one's arguments will not be critically evaluated. This is when confirmation bias is most likely to lead to poor outcomes. However, when reasoning is used in a more felicitous context – that is, in arguments among people who disagree but have a common interest in the truth – the confirmation bias contributes to an efficient form of division of cognitive labor. (Mercier and Sperber 2011: 65)

The importance of intercultural dialogue is not related to the acceptance of one's point of view, but rather the awareness of diverse possible alternatives for a given situation and the recognition that the existence of these different points of view allows us to test the validity of our own. 'The point here is not that voices and views elsewhere have to be taken into account just because they exist […] but that objectivity demands serious scrutiny and taking note of different viewpoints from elsewhere, reflecting the influence of other empirical experiences' (Sen 2009: 130). If we accept development as an alternative broadening, as suggested by Sen, this intercultural dialogue is, in itself, the beginning of the development process, since it leads to an awareness of different proposed solutions to the problems presented. Intercultural dialogue recognizes the importance of the involvement of a population in planning its own development. We insist on the importance of the participation of the population in understanding and planning its own development.

Rationality, as a social tool for development, is allowed to operate when donors establish a horizontal dialogue with the population to whom development projects are addressed. Thus the community is accepted as a valid interlocutor.

To recognize the input of the local population in development project planning is to open up space and allow the knowledge and aspirations

of the community to be laid on the table of intercultural dialogue. This is the double dimension of the empowerment of the population: the population is empowered when the values, knowledge and practices of the community are recognized and enabled to the extent that it, the community, exercises its own will to choose its own path.

In the Carrefour Feuilles case, the outcome of horizontal interaction with the community resulted in better use of local knowledge when the exploitation of a well-known product by the community was decided before the construction and development of the project. Small compressed handmade bricks made of combustible material were already used as a source of energy, especially for cooking. The project task consisted of organizing the collection, transportation and processing of solid materials in order to maximize results in each phase. The Carrefour Feuilles Solid Waste Management Project successfully integrated human capital and community knowledge through organized systematization supported by foreign countries.

Empowerment is understood here as recognition of the native practices, knowledge and autonomy of the local population. Thus, the local population takes an active part in development planning in a permanent way. International cooperation funds allowed the local Haitian practice of compressing materials for combustion to become systematized, thereby transforming the production of briquettes in an efficient way, with gains for all those involved.

Overcoming barriers from different development-oriented academic communities Overcoming communication barriers and sharing knowledge between different scientific communities involved in development studies are tasks that should be prioritized. This means overcoming the theoretical, conceptual and relational hermeticism of academic communities with constructive dialogue and initiatives that promote sustainable development. Such dialogue and initiatives require the active participation of the local community in a process where everyone has sustainable development as their goal.

With so many different theoretical perspectives on development, hermeticism, whether cultural or scientific, poses the risk of parochialism (to use an expression of Amartya Sen, 2011) that obliterates our view of the problem and imposes a price: 'Western science came to be defined as a universal, autonomous, value-free knowledge system, but its imposition without proper attention to local knowledge and wisdom

has led to considerable disappointment' (Rist and Dahdouh-Guebas 2006: 472).

The supremacy of fragmented knowledge between cultures and between scientific communities, with their exclusive hierarchies and prejudices, inhibits (if not blocks) the task of placing theories, values and practices into complex but dynamic sets, where we can intervene to stimulate development cooperation in one direction or another. The path to this multidimensional goal is complex, as complex as sustainable development itself. It involves the practice of transdisciplinarity. That means it involves dialogue between the natural, social and human sciences, and between those sciences and traditional knowledge, to understand reciprocal influences and mutual relations between the various actors and the environment within which they work.

In order to allow a dialogue between cultures and scientific studies whose aim is sustainable development it is important to recognize the fundamental premise that

> no scientific theory is forever immune to error. [...] Knowledge in the form of words, ideas and theories is the fruit of translation/reconstruction by way of language and thought and, as such, subject to error. This knowledge, being translation and reconstruction, involves interpretation, introducing the risk of error within the subjectivity of the knower, his world view, his principles of knowledge. (Morin 1999: 5)

The acceptance that there is no immunity from error allows us to define the main rule for activating transdisciplinarity: 'I accept the possibility that the other may be right.' It allows a 'shift from competition and the imposition of uniformity to the search for complementarities and cooperation between different forms of cultural knowledge aiming for mutual learning and adaptation in the light of obtaining new insights rather than just confirming existing ones' (Rist and Dahdouh-Guebas 2006: 473).

Transdisciplinarity is the way we can overcome parochialism: 'A different viewpoint poses a question. [...] If we live in a local world of fixed beliefs and specific practices, parochialism may be an unrecognized and unquestioned result' (Sen 2009: 130). Within the same set of beliefs, values and rules of inference, i.e. within the same cultural or

scientific unit, there is no effective test for arguments and positions. In such a situation we risk error, cultural or theoretical. Not accepting the considerations of a different cultural or theoretical perspective, prior to the strengthening of scientificism, is practically the celebration of irrationality, since it removes the criticism of other scientific or cultural rationalities from specific circles of knowledge, values and rules. With the exclusion of some arguments from tests, the conclusions that can be reached are less secure and more susceptible to mistakes than if the process had been subjected to greater scrutiny.

If we recognize that no scientific theory is immune to error it is fundamental to accept and operationalize transdisciplinarity. In order to ensure that this practice of transdisciplinarity serves the studies of sustainable development and the green economy it is necessary to add a normative content, an ought-to, a goal to be reached that takes into account the particular context of each community. Thus, studies of sustainable development and the green economy should pursue the improvement of well-being in balance with the environment through a dialogue between cultures and sciences made possible by the initial acceptance of the rule that there is the potential for misconceptions in one's view. In this way the path opens up space for the consideration of local specificities in the pursuit of sustainable development.

In the Carrefour Feuilles example, a fragmented approach to analysing the production of briquettes for cooking food could argue that the project is not environmentally oriented since the briquette is not as clean an energy source as natural gas. However, in the context of the Carrefour Feuilles community, the choice is not between briquette and gas – which is entirely imported and very expensive – but between firewood and charcoal, both taken from Haitian land, which has been deeply affected by environmental deterioration.[7] This is a sustainable relationship that is full of meaning in the Haitian context, although it may not be elsewhere.

An efficient design of international cooperation for development therefore demands scientific and cultural knowledge mobilization around the goal of development through interdisciplinary dialogue and taking into account local specificities.

Conclusions

As argued earlier in the chapter, the results of the research in Carrefour Feuilles raise some important issues regarding the challenges

faced by transdisciplinarity studies when considering the promotion of sustainability and development:

1 Innovative research on the promotion of the green economy should contemplate less obvious economic variables when investigating material changes for humans in environmental and individual terms (taking into consideration individual respect and the distinctive dimension of man as a social being).
2 The path to the construction of the green economy, which improves well-being, must take into consideration the empowerment of the population at whom the local development programmes are directed. In other words the community must play an active part in the definition of production, distribution and consumption of the goods produced.
3 Last, but not least, the barriers and obstacles from different development-oriented academic communities may be overcome if analysis in green economy studies concentrates less on certain specific models and more on goals defined in the particular context of each community, taking into consideration specific conditions and needs.

As this chapter deals with the positive contributions of a specific international cooperation project, it is important to note the negative aspects of the initiative as well. Recent news from Carrefour Feuilles confirms a perverse international system logic. In a recent study, Lee et al. (2012) revealed the reasons for inefficiencies with regard to resource allocation from the Development Assistance Committee for Latin America and the Caribbean. They pointed out that donor countries become involved in cooperation projects according to their own interests and not according to the needs of the populations at which projects (donor funds/resources) are directed. This operating logic is currently affecting Carrefour Feuilles (the project facility is closed and there does not appear to be any movement from the IBSA forum to reactivate it). As long as this logic prevails in the system of international cooperation there is no prospect of international aid becoming an engine for poverty alleviation and sustainable development in poor countries. Studies and practices of sustainable development need to overcome this donor-unilateral logic in order to remodel themselves and perceive people's needs from a horizontal perspective. This is an

essential requirement to bring about substantial improvements in the quality of life of the people for whom these programmes are intended.

Notes

1 This is what is taken into consideration when evaluating only growth in GDP, e.g. when development is considered regardless of the impact of industrial pollution on the environment. Consider, on a smaller scale, the situation of a household in which one of the parents stays at home cooking and cleaning for the family. If we suppose that this parent enters the formal workforce, for the evaluation of rising family incomes it means he/she earns a salary and pays taxes. Thereby the official statistics record family incomes and the economy as growing. However, as the family has to buy processed food, the quality of the children's nutrition is not as it used to be (Rapley 2007: 188). This may be an extreme example but it reflects the need to introduce more subjective variables into development analysis.

2 Haiti is considered the poorest country in the Americas – 76 per cent of the population live below the poverty line (less than two dollars a day) and 56 per cent of Haitians live below the extreme poverty line (less than one dollar per day) (UNDP 2012). Even so, since the first elections after the departure of Jean-Bertrand Aristide, the country has already had its second fully elected president and even dramatic episodes such as the 2010 earthquake did not politically convulse the country.

3 Here civil war is understood as Gaston Bouthoul's concept: 'war [as] armed and bloody struggle between organized groups' within the same state (Charles-Philippe 2011: 2726).

4 The basic ideas of the green economy were launched by the book *Blueprint for a Green Economy*, written by David Pearce, Anil Markandya and Edward Barbier (1989). The authors' main argument is that the current pricing system results in an allocation of economic resources that is biased against the environment. To change this situation in favour of a 'green economy' it is important to improve the scientific and economic analysis of ecological scarcity, valuing the losses in benefits and converting the results into policies.

5 The complete methodology used in the research case study is described in Annexe A in Zanella 2012: 303–8.

6 The land occupied by Haiti on the island of Hispaniola was first colonized by the Spanish and, soon afterwards, it came under French rule. After independence (Haiti was the second country in the Americas to achieve its independence, but it was the first to create an independent country with the concomitant release of its slaves), at the beginning of the twentieth century, the United States occupied Haiti (1915–34). In 1994 the United States organized a coalition multinational force (MNF) to restore President Jean-Bertrand Aristide to power. In 1995, the responsibility for the MNF was transferred to the United Nations. With growing political instability during Aristide's second term, President Boniface Alexander, who succeeded Aristide after his departure from the country, called for United Nations intervention to calm the level of political violence that had arisen. Since 2004 the UN has been in Haiti through the United Nations Mission for the Stabilization of Haiti (MINUSTAH), and there is no provision for withdrawal (Fishel 2008: 159–61).

7 Haiti's forest-covered land surface – already small during the 1990s,

considering the geographic location and natural characteristics of the Hispaniola island, shared by Haiti and the Dominican Republic – continues to be scarce. From 1990 to 2005, the proportion of total forest-covered surface decreased from 4.2 to 3.8 per cent, presenting an average annual variation rate of –0.6 per cent for the said period (ECLAC 2009).

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8 | SUSTAINABILITY AND TRANSDISCIPLINARY KNOWLEDGE: EXPERIENCE GAINED AND CHALLENGES AHEAD

Gro Therese Lie, Alberto D. Cimadamore, Maurice B. Mittelmark and Fungisai P. Gwanzura Ottemöller

Revisiting what we wanted to achieve with this book

When taking the initiative and planning for the workshop that led to this book, we intended to take practical steps to forge a new international collaboration between the University of Bergen and other national and international institutions. The goal we set was to work towards connecting social and environmental sciences for a definite purpose: enhancing the well-being of people and their environments where it is most needed, namely the places where severe poverty stubbornly continues to hamper sustainable human development.

The workshop intended to bring together a maximum of fifteen participants from across university disciplines. The call for papers was open, although preference, as indicated in the call for papers, was to be given to researchers based in Africa, Asia, Latin America and the Caribbean (see Chapter 1). Those presenting workshop papers were expected to actively participate with presentations and in discussions of all the papers. A book would then be developed based on the written and revised paper contributions to the workshop.

What did we manage in view of our plans?

We did manage to bring together researchers from Africa, Asia, Latin America, the Caribbean, North America and Europe. We also managed to bring together people from diverse disciplinary backgrounds with a variety of theoretical, methodological and empirical backgrounds – people who, we discovered, shared similar ethical concerns and a sense of urgency in enhancing the well-being of people and their environments where it is most needed.

The process of selecting the chapters, grouping the chapters and reflecting on differences as well as interlinkages stimulated a

transformative process in our search for an overarching theoretical and conceptual framework, a process in which we were all learners. This process is reflected in Chapter 1, which includes a section on sustainability science and global challenges as well as a section on sustainability science as a special case of transdisciplinary research (TDR). Sustainability science is complex and calls not only for transdisciplinarity, but for synergy across the natural sciences, the environment *and* the social sciences. In spite of an increased international interest in and concern for the future of the globe and for human well-being, the challenges remain complex and call for unconventional alliances. The reflections on these complexities and the urgency to move forward led us into a search for the next practical steps to be taken in future joint efforts for sustainable development.

Let us revisit the plans for the content of this initiative. In the call for the workshop, the plans were formulated in four bullet points that we intended to focus on, but not be limited to.

The first bullet point reads:

- The disciplines in environmental science have succeeded in forging a new discipline, 'sustainability science'. What lessons learned along the way should we take on board as we seek to forge broad-based and critical transdisciplinary research that supports transitions to green economies or other social models conducive to social change towards sustainable and equitable development?

Perhaps the most enlightening experience with regard to this issue is that we were able to efficiently create an arena – the workshop and this book – for social scientists from diverse disciplines and corners of the world to engage in a concentrated way on a discussion about social models for sustainable development. Creating such an arena is akin to creating any type of partnership, usually a time-consuming and often halting task of seeking the right people with the right motivation, skills and resources, all brought together at the right time. As we commenced, we were not fully aware of how important the existing network – the World Universities Network (WUN) – would prove to be. As described in Chapter 1, WUN was the infrastructure we turned to at the outset, because (a) the University of Bergen is a member, (b) the top leadership at the university is actively involved in WUN and therefore generally supportive of its activities, and (c) the WUN structure made

it (relatively) easy to recruit partners. Having spawned many research networks previously, WUN made our overtures to the WUN universities an easy task. The WUN environment is a trusting one, and gaining the commitment of enthusiastic partners was swiftly accomplished. This included co-financing from all partner institutions, agreed to almost as a matter of course; that is a defining feature of the WUN.

We were not limited to WUN universities in our efforts to recruit participants. In addition to the WUN network, we used the network of the International Social Science Council (ISSC) – a natural and functional alliance because CROP is part of ISSC.

Yet we cannot claim unmitigated success. At each WUN university, we had to investigate which faculty members we wanted to recruit, and that was extremely time-consuming. There was no catalogue or index that helped us search the faculties and departments for the 'right' people. As social scientists ourselves, we were most comfortable looking into the social sciences departments, and without realizing it we got ourselves into a 'selection corner'. Only after the project partners were recruited and the project was well under way did we realize that we had somehow managed to 'forget' the environmental sciences, and in particular sustainability scientists. In truth, we were not even aware of whether sustainability science enclaves existed at the WUN universities; they were not particularly visible on the web pages of the institutions (including our own university).

Today we understand that the failure to include sustainability scientists from the environmental sciences was our own – we know that because diligent follow-up at the University of Bergen *after* the workshop revealed important and willing partners of that ilk. For example, scientists from the Bjerknes Centre for Climate Research are now involved in our continuing activities. This represents a significant advance in forging the broad alliance we have aimed for, since the Bjerknes Centre is the largest climate research group in the Nordic countries and among the leading centres in Europe. This may hopefully also be an advance for the Bjerknes Centre.

The second bullet point in our call reads:

- How can poverty studies break out of the traditional disciplinary focus and limitations to embrace an expanded role for poverty researchers in transdisciplinary and critical research for social change towards sustainable and equitable development?

Contributors to this book had different levels of ambition when moving beyond the comfort zone of their disciplines to address poverty and questions related to social transformations. Most of them explicitly tried to adopt multidisciplinary or cross-disciplinary approaches in order to grasp the complexity of their topics and enter into the new field of sustainability science, hereby defined as a special case of TDR.

It appears that different ways of going beyond disciplines were understood as a matter of degrees. This is perhaps rooted in a notion of 'cross-disciplinary work' that involves 'multidisciplinarity', in the sense that arguments from different disciplines are set side by side, or through more rigorous interdisciplinary exercises that attempt to integrate the theoretical and methodological frameworks of different disciplines (Harriss 2002: 2).

These types of strategies and understandings are quite usual in fields such as poverty research, where there is broad consensus about the multiple socio-economic and cultural dimensions involved in the phenomenon (i.e. the multidimensionality of poverty). A broad notion of TDR highlights the integration of the natural, social and health sciences in a humanities context, and in so doing it transcends each of their traditional boundaries (Choi et al. 2006). For these authors – and perhaps for some of the contributors to this book – the terms multidisciplinary, interdisciplinary and transdisciplinary refer to the involvement of multiple disciplines to varying degrees on the same continuum in order to grasp the multidimensionality of poverty. However, according to the definitions we adopted and as presented in the introductory chapter of this book, these terms should not be used interchangeably, nor should they be confused with one another (ibid.: 351).

The aim of a transdisciplinary effort is the development of an overarching framework from which a particular societal problem – and similar problems – may be approached (Kockelmans 1979: 128). It was in this sense that we understood the idea of sustainability science: a search for an integrative theoretical framework, with the participation of societal actors, which can help us to understand the complexity of phenomena such as climate change, poverty and sustainable development. This aim of transcending and integrating disciplinary paradigms is a constitutive element of TDR generally and of sustainability science in particular. Even though this aim is part of the ambition of many poverty researchers – including Delamonica

(Chapter 3) and his contribution to this volume – it appears that poverty scholarship is still far from the consolidation of theoretical frameworks based on the premises of sustainability science, with the ability to describe, explain, interpret and provide guidance for the solution of contemporary global poverty.

Social change, perhaps better formulated as *social transformation*, seems to be the obvious response to the persistence of poverty and the lack of a sustainable path towards global development. In this sense, social transformation refers to a significant alteration over time in structures, behaviour patterns and rules aimed at producing a particular social result: poverty eradication and sustainable development. In this description, poverty is seen as a persisting structural problem inseparable from overarching systemic power relations that have defined the making and remaking of political economy and society over the last four centuries, and have been magnified during the past century. Our current socio-economic systems are the results of the long evolution of patterns forged by the industrial, the democratic and information revolutions at work during the past centuries. These systems have produced unprecedented quantities of resources and a high standard of living for just a portion of the world population, while keeping the vast majority in poverty. Arguably, poverty is thus functional to the existing patterns of accumulation and distribution of wealth and power. Therefore, poverty eradication could be a quite difficult objective to attain without altering the ideological, material and institutional basis of the current social systems, as well as the global patterns of production, circulation and consumption. This is a level of critical post-development thinking that did not enter in a significant way into the deliberations and discussions that produced this book.

The workshop and this book project aimed to conceive sustainability science as a transdisciplinary strategy towards integrated knowledge for sustainable development *and* for poverty eradication. Goals shared by our workshop participants and chapter authors – and most of humankind – are included in the recent Sustainable Development Goals proposal (UN 2014): end poverty in all of its forms everywhere, end hunger, reduce inequality, ensure sustainable production and consumption patterns, and protect the ecosystems, etc. The scarcity of integrated theories and methodologies able to capture the enormous complexity of the interaction between poverty, sustainability and social transformation is a major stumbling block to achieving those goals.

Our awareness of this fact was precisely what gave meaning to this book. We are pleased to have started on this path.

The third bullet point in our call reads:

- The diverse cultures and traditions of the development-oriented academic communities – economics, sociology, psychology, social geography, applied anthropology, agriculture and land use, to name some – are barriers to achieving transdisciplinary research for the green economy or alternative socio-economic models. Which new arenas and ways of collaboration must be established in research environments to extract real synergy from the richness of the various disciplines?

We certainly managed to bring together people from diverse cultures and traditions of development-oriented academic communities. This is also illustrated in our comments under the first bullet point. Even if the workshop and book project participants were predominantly social scientists, they and the chapter authors represent a range of disciplinary backgrounds and thematic research orientations. To illustrate some of the diversity, our group represented health promotion and public health, social and community psychology, ethics, urban and human geography, micro- and macroeconomics, policy studies, political science, organizational studies, management studies, and welfare and poverty studies. All the workshop participants were characterized not only by their disciplinary backgrounds but by a keen and genuine wish to move beyond these backgrounds, to listen to and learn from one another, to better address the global challenge of achieving a sustainable future. Indeed, several of the participants already had experience of working across disciplines. We, the organizers of the workshop, also had some experience working across the academic silos and all that entails: developing joint understanding and definitions of key concepts, and exploring joint understanding of diverse theoretical and methodological approaches – indeed a time-consuming process.

We also found that the workshop participants shared ethical considerations and care for the global future and humankind, as is reflected throughout the chapters in the book. Academic colleagues from diverse disciplines, geopolitical and cultural contexts met with an openness and willingness to learn from one another in order to move forward. We did not address the issue of *urgency* in our call to potential

participants, but we had argued that compartmentalized sciences are possible causes behind the failure to provide clear scientific responses to the question of poverty eradication and sustainable and equitable development. Inherent in such a statement is a normative, value-based stand. We found in our working process that the *normative* issues were of joint concern to us across the disciplinary diversity, and the sense of *urgency* became evident when analysing data on the current status of (lack of) sustainable human well-being.

As summed up in connection with the first bullet point, we did manage to create an arena, although with constraints, for research collaboration. The experience of the University of Bergen, with a long history of prioritizing global and development-related research, provided us with the necessary platform for our initiative. The platform was (is) a fragile one, based on a few pillars. A platform is necessary, but far from sufficient for meeting the complexities of the global challenges. We need to expand the platform and make it more robust, make it rest on several more pillars. We also need additional arenas, we need incentives; we need to open up the disciplinary silo walls to extract real synergy from the richness of the various disciplines. We also urgently need to find new ways of collaborating with civil society in meeting the global challenges.

The fourth bullet point in our call reads:

- The study of factors that impede/foster transdisciplinary research (TDR) is today a mature arena of research. What insights can be extracted from this knowledge base that can guide the way to the most innovative research for the green economy and alternative socio-economic models?

Unmentioned in this book up to now is that we had planned to study TDR processes in our WUN network, and we even have a protocol for collecting data at each participating university (Chapter 1 describes our understanding of TDR, generally and within the context of this project). The objects of study were to be existing sustainability science groups at the participating WUN institutions, and we planned to use a state-of-the-art evaluation model to document the inputs, throughputs and outputs of such groups, to understand collaboration processes leading to synergy (2 + 2 = 5) and also resulting in antagony (2 + 2 = 3) (Corbin and Mittelmark 2007). We hoped, therefore, not only to

extract existing knowledge from the TDR evaluation literature, but to add to knowledge about innovative TDR for the green economy and alternative socio-economic models.

Yet our plans proved to be too ambitious, given the limited resources we commanded for the project. Our network partners were enthusiastic about the planned study, but lacked the resources needed to undertake the required data collection. In the end, the TDR research element of the project was judged to be infeasible and dropped. We conclude that the TDR knowledge base certainly provided insight that helped us develop and guide this project, but our hopes for adding formally to that knowledge base were too ambitious. The most important lesson from this experience may be that if a TDR group intends to conduct evaluation research on its own activities – obviously a good idea – this must be planned for in a serious and formal way, with a complete research design and a reasonable research budget at hand.

Five features of sustainability science

In Chapter 1 we provided the following definition: Sustainability science is 'an emerging field of research dealing with the interactions between natural and social systems, and with how those interactions affect the challenge of sustainability: meeting the needs of present and future generations while substantially reducing poverty and conserving the planet's life support systems' (National Academy of Sciences 2015). We also stressed that our understanding of sustainability science is the outsiders' understanding. Sustainability science is a door we wish to open to ourselves. We were given to understand by philosophy of science scholars (Ziegler and Ott 2011) that sustainability science cannot be fully appreciated, nor its quality judged, in the same manner as disciplinary science … even if many who are relatively close to the field are not fully aware of the features that make it unique. Those features are normativity (explicit acknowledgement of ethical considerations in science and recognition of the value-based context of sustainable development, e.g. the importance of values like equity, dignity, human well-being and joint concern for the global future), the inclusion of non-scientists, a sense of urgency, and cooperation between natural and social scientists. We are convinced that a fifth constitutive feature is transdisciplinarity. We want to repeat that we understand sustainability science as a special case of TDR. Even if there is no clearly agreed definition of TDR, there is wide consensus about

essential characteristics that differentiate it from other forms of research collaboration, and, as pointed out in Chapter 1, this general definition of TDR captures a good deal of that consensus: 'Transdisciplinary research is research that includes cooperation within the scientific community and a debate between research and the society at large. Transdisciplinary research therefore transgresses boundaries between scientific disciplines and between science and other societal fields and includes deliberation about facts, practices and values' (Wiesmann et al. 2008: 435).

These five features – normativity, the inclusion of non-scientists, a sense of urgency, cooperation between natural and social scientists, and transdisciplinarity – have been our framework for appraising the contribution this book makes to sustainability science and envisaging the road ahead. Part of this appraisal was done in Chapter 1, but now that the reader has read the intervening chapters, we return to the question: How far did we reach into the realm of sustainability science?

None of the chapters read separately can be said to be characterized by all the five features. However, **normativity** (an ethical and value-based stand) and a sense of **urgency** seem to characterize virtually all the chapters, as we have already pointed out in Chapter 1. Ethical concerns and the sense of urgency provide an important value base and give motivation and energy for cooperation across disciplinary silos in the way forward.

All the chapters address the importance of collaborating across **social and natural science**. However, not all chapters can be said explicitly to represent work based on **cooperation between natural and social scientists**. When seen together, the chapters represent multilevel analyses, both in terms of theoretical reflections (including meta-theoretical reflections) and empirical research or socio-political analyses. For instance, Edwards' chapter (Chapter 2) deals with the 'global *problématique*', the planetary and global levels, and the need to understand the earth's physical, chemical, biological, ecological and social processes and systems. Edwards clearly addresses the concepts of sustainability and transdisciplinarity in his chapter. Delamonica's chapter (Chapter 3) deals with the issues of green economy, poverty reduction and equitable development, and it addresses how humans have the power to transform nature (for better and for worse). In concert with the previous author, Delamonica sounds a call to manage

changes and development so as to avoid the negative outcomes; different sectors and economic fields need to work together in order to maintain a balance to meet the challenges brought about by economic development and technological advances. Delamonica's chapter presents a theoretical model of the interactive relationship and feedback loops or synergy between economic growth, poverty reduction and social change.

The chapters of Edwards and Delamonica are mainly theoretical contributions, while the chapters by Aringazina (Chapter 4) and Zanella (Chapter 7) focus on practical challenges in achieving sustainable and equitable development. Aringazina's chapter deals with the national and institutional levels and represents a socio- and geopolitical analysis addressing multi-sectorial practical challenges in achieving sustainable and equitable human development and health. Zanella's chapter presents a project in an extremely poor community (local community-level analysis) and the challenges of grounding international assistance (outside approaches) in true participation with people who are directly and most detrimentally affected by poverty and a degraded environment. Two further chapters relate to bridging the gap between communities and policies with research on well-being in the context of sustainable development. The chapter by Chadborn and Springett (Chapter 5) introduces the perspective of children in relation to health and sustainability and represents an analysis that moves from the narrow individualistic biomedical method of dealing with the problem of obesity to a broader focus on different factors that can affect a person's health and behaviour (for instance, the way the agriculture and food systems have been globally commoditized and the aggressive marketing of foods with low nutritional value, resulting in over-consumption of such food products). Chadborn and Springett thus move across levels and introduce a more ecological approach to health and well-being. In the chapter by Springett (Chapter 6), the author discusses how participatory research (PR) contributes to transdisciplinary inquiry. The chapter describes how PR includes beneficiaries, users and stakeholders at all stages of the research process, ensuring that knowledge is contextually relevant and appropriate. The author argues that a cooperative process of knowledge development and the understanding of how others' perspectives have developed, as well as the inclusion of nature and culture, will help to reintegrate humans in their ecosystems.

All the chapters address complex real-life challenges for humankind, but only a few of the chapters explicitly include empirical work involving non-scientists. However, some of the chapters present such work in an illustrative way, e.g. the chapters by Zanella, Springett, and Chadborn and Springett. The inclusion of non-scientists and civil society is a central characteristic of transdisciplinarity. Clearly, some of the challenges for the future will be to strengthen research that transgresses boundaries between scientific disciplines and between science and other societal fields and includes deliberation about facts, practices and values.

In order to achieve this, a roadmap can help us to move forward. We hope this book can serve as a tool to help in the process of making such a map. At this stage we may already have a first rough draft of the map. The chapters can be said to represent pieces in a bigger multidimensional puzzle. We need these pieces to grasp a larger picture; we need both details and an overview to manoeuvre in a multidimensional and complex ever-changing reality, and we need to put together more pieces in the picture. We also need a stronger analytic and theoretical foundation to carry the weight of the complexity and create an improved multidimensional map for action.

Challenges ahead

What are the next practical steps to be taken in future joint efforts for sustainable development; steps for which this book might be a launching point?

As we did not sufficiently succeed in connecting the *social and environmental sciences*, this remains a clear challenge and a priority. Stimulated by the workshop and book experience, a new collaboration has started at the University of Bergen coordinated by the Comparative Research Programme on Poverty (CROP). This collaboration includes climate researchers, ecologists and other participants from the natural sciences, as well as researchers from the humanities, health and social sciences. At the time of writing and as a first step in moving forward, CROP has planned and is organizing a seminar series. The thesis behind the series of seminars is that the emerging field of sustainability science has the potential to increase the quality of research on complex global challenges and, at the same time, to respond to our societies' needs in a meaningful way.

The main purpose of these seminars in 2015 is twofold:

1 to discuss the impact of sustainability science in research and policies addressing global problems; and
2 to identify and articulate research efforts at the University of Bergen around cutting-edge scientific approaches and methodologies particularly suitable for collaboration in the fields of poverty, development, climate and environmental studies.

The central themes of the first three seminars of the 2015 series are:

1 Bridging natural and social sciences research on global problems: what can sustainability science offer?
2 Sustainability science and transdisciplinary approaches: a good marriage to address complex global challenges?
3 Sustainability science at UiB. A way to promote meaningful scientific collaboration on societal challenges?

The idea is to expand the sustainability science network to promote collaborative research on poverty and other relevant related issues. Natural and physical scientists currently represent around a third of the participants in the new initiative. New partners from the Bjerknes Centre for Climate Research, the Centre for the Study of the Sciences and the Humanities, the Geophysical Institute and the Department of Social Anthropology, to mention some, are now active participants in the initiative. We are thus making progress in integrating different disciplines.

We have become keenly aware of the differences between multidisciplinarity, interdisciplinarity, cross-disciplinarity (Harriss 2002) and transdisciplinarity (Wiesmann et al. 2008). We bring with us the knowledge and experiences from the process of making this book. We have a fragile network that can be strengthened and expanded to include more international partners; and we utilize the critical, conceptual and theoretical exploratory work that is presented in this book as one of several building blocks for meeting the current and future challenges of social change towards sustainable and equitable development.

In the process of moving forward in developing new TDR projects, hopefully stimulated by the new seminar series, we are keenly aware of many difficulties and challenges. Despite the enthusiasm for TDR,

there are many potential roadblocks to its successful implementation and execution (Stokols et al. 2008; Gray 2008; Wickson et al. 2006). A main point is that the more complex a TDR project, the more complex the contextual factors that influence its effectiveness. Investments in such initiatives should match the complexity of their structure and goals. Stokols et al. (2008) reviewed literature on collaboration effectiveness from the fields of social psychology and organizational behaviour, cyber infrastructure, community psychology and evaluation of transdisciplinary research, and synthesized the findings in a typology with six elements. These are:

1 intrapersonal factors (e.g. members' attitudes towards collaboration, leadership style);
2 interpersonal factors (e.g. members' familiarity with one another and diversity of perspectives);
3 organizational factors (e.g. organizational incentives for collaboration and organizational working climate);
4 technological factors (e.g. infrastructure to support collaboration and members' ability and willingness to use it);
5 social and political factors (e.g. policies that facilitate collaboration); and
6 physical and environmental factors (e.g. spatial proximity and facilities to facilitate collaboration).

We see clearly that the steps we have taken so far are small and fragile indeed – even if they are important steps! We have made progress in terms of meeting points (1) and (2) above. We may have succeeded in getting together some researchers characterized by a sufficient level of necessary intrapersonal factors (e.g. the right kind of attitudes, sense of urgency); we may also have reached a minimum level of interpersonal relationship (e.g. researchers sharing important values with a minimum level of familiarity with one another and diversity of perspectives). But in terms of meeting the criteria or elements listed in points (3) to (6) above, there are many obstacles and roadblocks. The tasks ahead are complex and in order to make progress we need long-term commitment from our universities and collaborating institutions with regard to organizational incentives for collaboration and a positive organizational working climate. Infrastructure and finances to support collaboration must be provided by our institutions (far beyond the level

of support that we received for our workshop and book project). There is also a need to mobilize social and political factors that can facilitate collaboration. The physical and environmental factors (e.g. spatial proximity and facilities to facilitate collaboration) must be enabled and stimulated on a much larger scale with commitment in terms of time and space.

At the time of writing the conclusion for this book, the University of Bergen has decided to strengthen the arenas and possibilities for working across disciplines and faculties in order to meet global and development challenges. The university's role as one of several actors in society also calls for new ways of collaborating with civil society and opens up renewed possibilities for participatory research. We interpret the strategic priority of the University of Bergen as conducive for overcoming some of the roadblocks we can see ahead.

CROP and researchers at the University of Bergen will continue to seek to forge broad-based and critical transdisciplinary research that supports transitions to green economies or other social models conducive to sustainable and equitable development. This is indeed a challenge for the compartmentalized world of academia, but at the same time it is an ethical obligation and an urgent issue for current and future generations.

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While the need for effective action toward a greener and socially inclusive economy has long been evident, health promotion in the context of sustainable development has faltered. Arguing that human health is the key factor to sustainable development, *Development and Sustainability* promotes a fresh, transdisciplinary approach to the eradication of extreme poverty.

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John Crowley, UNESCO

'As a climate scientist with an interest in global problems, I found this book highly stimulating. It provides insights into practising sustainability science and transdisciplinary research that have made me even more interested to enter these new fields.'

Noel Keenlyside, University of Bergen and Bjerknes Centre for Climate Research

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