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PART V

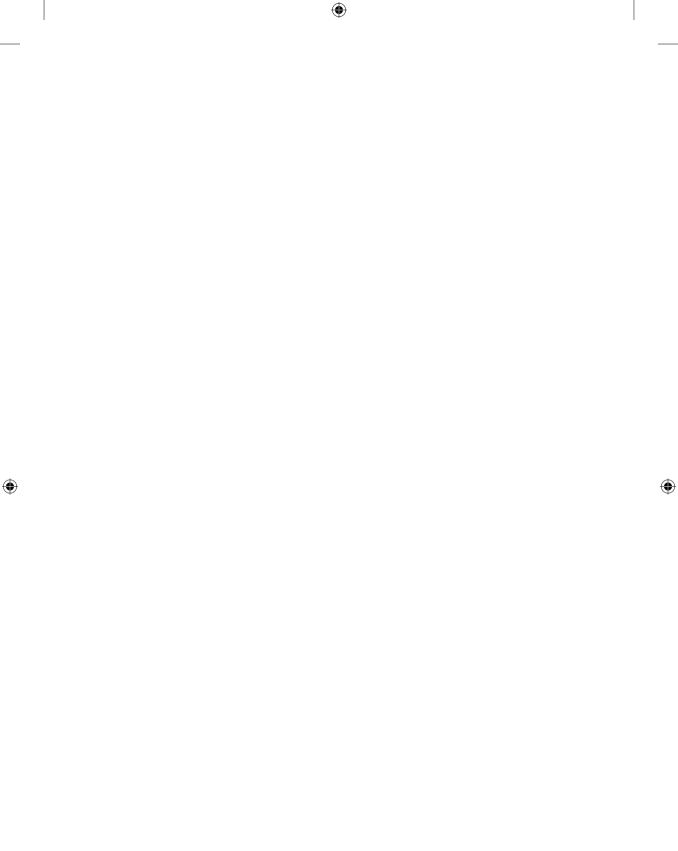## Current Developments and Future Trends

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Researching Complex Sustainability Issues: Reflections on current challenges and future developments

Frances Fahy and Henrike Rau

Undoubtedly, sustainability research has gained considerable momentum in recent times in both the natural and social sciences, partly because academics, policy makers and the public have grown increasingly aware of pressing social and environmental problems. This rapid transformation of the research landscape has coincided with significant changes in institutional structures, funding opportunities and research training. As detailed in our introductory chapter, whether or not one agrees with the dominant sustainable development agenda, it is evident that its adoption has promoted the social-scientific investigation of human development and its environmental causes and consequences.

Arguments for and against empirically researching human social life and related methodological questions concerning the 'what' and 'how' are central to the development of the social sciences more generally, and social-scientific sustainability research in particular. This suggests that questions of methodology not only relate to practical matters, i.e. how to best carry out a specific project, but also reflect broader questions about the logic of research per se. As outlined by the various authors throughout this volume, one encounters *specific* challenges that go beyond discussions about the nature of social research. These emerge whenever attempts are made to investigate people, societies *and* their biophysical and material environments through tailored social-scientific or interdisciplinary approaches. Efforts to integrate indicators of human development and

measures of resource use discussed in Part III of this collection, emphasise the difficulties of capturing economic, social and environmental trends in an integrated manner.

But what makes sustainability research different from other types of social research? And what might the future of the field look like, given current developments outlined both in the introduction and in various contributions to this book? This concluding chapter critically examines the distinctive position of sustainability research at the interface between academic inquiry and policy. Drawing on all contributions to the collection, the remainder of this chapter will focus on three key aspects of the research process which are directly shaped by this position: (1) the development of a theoretical framework and its translation into research questions, (2) methodological choices, and (3) the production and dissemination of research findings.

Initially, we will critically discuss conceptual opportunities and challenges that arise from a commitment to policy-relevant research that aims to provide concrete solutions to real-world sustainability problems. Social scientists working on sustainability issues are frequently required to engage in debates on the role, purpose and nature of (social) science and its ontological and epistemological foundations and to defend their own position against those in more established fields of research. Similarly, limitations exist with regard to the introduction and adoption of new terminology and concepts, partly because diverse audiences have very different communication cultures, needs and expectations that may or may not be open to change. We consider to what extent the desire to be policy-relevant requires researchers to compromise in terms of both their theoretical outlook and their conceptual orientations.

Subsequently, we will consider how some new and innovative methodological approaches to sustainability research can challenge common perceptions of what constitutes 'proper science' that exist among fellow academics, policy makers, sustainability practitioners and members of the public. Here we will draw on our own experiences conducting research on sustainable consumption as well as those detailed in this collection.

Balancing the need to produce scientific knowledge with the increasing demands for evidence-based policy presents major opportunities and challenges for those engaged in sustainability research, particularly in relation to how results are generated and distributed. The need to appeal to diverse audiences requires sustainability researchers to develop innovative and sophisticated dissemination strategies that may or may not fit within established work practices in a university context. In this

section we question the nature of knowledge and its transmission in society.

The concluding section summarises possible directions for the conceptual and methodological development of social-scientific sustainability research in the future.

Reflections on the opportunities and challenges of policy-relevant sustainability research

Over the past two decades there has been increasing pressure on academics to demonstrate the value and impact of what they do. Importantly, there has been a marked shift towards policy-relevant research that meets the expectations of various policy actors and communities. It is increasingly expected that academic research must produce concrete and directly implementable answers to 'real-world problems' such as over- and under-development and environmental degradation. National governments across Europe, for example, have set ambitious targets for public research funding bodies to demonstrate the impact or application of their research (see Gibbons et al., 1994; EEA, 2005). While this emphasis on policy relevance has proven beneficial in many respects, including increased awareness of and funding for sustainability research that engages with relevant policy communities, significant drawbacks have emerged at the same time. As academics actively involved in the field of sustainability research, all authors in this volume are acutely aware of the demands for, as well as of, policy-relevant work. In this section we will critically reflect on some of the opportunities and challenges that they face in their research.

Contributions to this book more or less explicitly point towards three key aspects of the research process that are impacted by the desire to produce findings that are relevant to policy makers and other non-academic audiences: (1) the formulation of research questions and their theoretical underpinnings, (2) the methodological design of a study, and (3) research outputs and their dissemination. Drawing on our experience of working for the Irish Environmental Protection Agency on a project investigating sustainable consumption in households across the island of Ireland (see Box 10.1) as well as on the various chapters in this edited collection, the following subsections aim to present some critical reflections on the implications of embarking on policy-relevant research for these three aspects. Where appropriate, we will connect our own observations to points made elsewhere in this collection.

Box 10.1   Undertaking policy-relevant sustainability research for Ireland's EPA: Introducing the ConsEnSus project

The ConsEnSus (Consumption, Environment and Sustainability) project is a four-year large-scale project (2009–2013) and it is the first of its kind to explore at sustainable consumption on the island of Ireland; in both Northern Ireland and the Republic of Ireland. The project involves eight researchers with expertise in the fields of geography, information technology, political science, psychology and sociology. Research is divided between two leading universities in the Republic of Ireland, Trinity College Dublin and National University of Ireland, Galway. The project was awarded as part of the Science, Technology, Research and Innovation for the Environment (STRIVE) Programme 2007–2013, which is financed by the Irish Government under the National Development Plan. It is administered on behalf of the Department of the Environment, Heritage and Local Government by the Environmental Protection Agency (EPA) which has the statutory function of coordinating and promoting environmental research.

The research proposal for ConsEnSus project was submitted in 2008 in response to a socio-environmental call from the EPA to investigate household sustainable consumption in Ireland. There was no prescriptive research design outlined by the funding agency. However, given the urgent need for research in this topical field, one of the key outputs of this research was to make recommendations for local and national sustainable consumption policies. Other key aims of the ConsEnSus Project include:

- gathering of baseline data for Ireland in the areas of transport, energy, water and food
- reviewing of key issues for sustainable consumption of measurement, evaluation, behavioural analysis, quality of life and governance
- facilitating cooperation between stakeholders involved in consumption practices (e.g., regulators, businesses, consumers, civil society organisations); and
- establishing an international Sustainable Consumption Research Network.

The interdisciplinary approach adopted for the ConsEnSus Project draws on a mixture of conventional and innovative research methodologies, including surveys, interviews, participatory action research and visioning techniques.*

The advisory board for the project is composed of international researchers in the field of sustainable consumption as well as representatives of state and semi-state agencies responsible for policy development in the fields of energy, food, water and transport (www.consensus.ie)

*For a detailed description of these methods see Davies et al. (2011) and for an overview of the overall project see www.consensus.ie

Theoretical and conceptual challenges: Developing research questions for policy-relevant research

The merits of conducting policy-relevant research have been well catalogued over the past decade (for good reviews see Ward, 2005 or Pain, 2006). Similarly, there is an extensive body of literature extolling researchers' hostility towards policy research (see Allen and Imrie, 2010 for a review). While it is clearly beyond the remit of this chapter to reiterate these debates, it is nevertheless useful to critically assess some of the conceptual implications of a commitment to policy relevance. To what extent is there a reduction in conceptual complexity that affects what kind of questions can be explored in the context of research? What are the effects of policy-relevant expectations on academic freedom and integrity? These and related considerations clearly point towards the *need for compromise* when undertaking such research, a topic which has hitherto been noticeably absent from discussions in the field. Contributions to this collection point, more or less explicitly, to the tensions between what kinds of questions sustainability researchers can meaningfully ask and their attempts to contribute to policy development.

Existing debates about the merits and demerits of policy-relevant research frequently remain rather narrow and one-sided. According to Woods and Gardner (2011), many discussions to date regarding policy relevance have tended to either imply, more or less explicitly, that being policy-relevant and maintaining critical integrity is relatively unproblematic (see Murphy, 2006), or else have emphasised the value of alternative forms of policy making, for example, participatory research and activism outside of academia (see Pain and Francis, 2003). More nuanced debates are needed that address the role of power and participation in social-scientific sustainability research and decision making.

To what extent does an (over)emphasis on policy relevance bring about a *reduction in complexity* with regard to choice of research topics and their conceptual and theoretical underpinnings? As Sharp et al. note, there has been a trend towards claims to know the world and to provide 'reliable rules of thumb through which policy makers can see what is important' (2011: 505). When designing the research questions for ConsEnSus (see Box 10.1), the researchers had to debate and discuss the framing of the concept of sustainable consumption. This occurred in the context of a funding organisation that traditionally supported natural science research and had limited experience in supporting and managing large-scale social-science projects. Faced with the issue of responding to what is widely perceived to be a pressing policy problem caused by individuals' unsustainable material practices, one of the primary aims of the project is to explore how a shift towards more sustainable consumption might be encouraged, measured and governed. In this respect, the remit of this project reflects the traditional patterns in policy-relevant research that prioritise the issue of measurement over theory

building and conceptual explorations. The ConsEnSus project addresses issues in household consumption that emerged from recent national and international policy documents (European Commission, 2004; EPA, 2006) as well as international research (see Seyfang, 2006 for a review).

In this context it was essential to balance commonly-held notions of consumption as an economically necessary, but environmentally problematic, activity carried out by individual householders, with concepts that emphasised its wider social and cultural significance, its multiscalar effects and its structural root causes. The resulting challenges of integrating conflicting conceptual and theoretical frameworks within a single research project are also dealt within a number of chapters in this book. Khoo's account in Chapter 5 of the evolution of development indicators, away from narrow economistic measures towards more inclusive indices that integrate economic, social and environmental dimensions, exemplifies this. Her chapter demonstrates how hegemonic conceptual and methodological frameworks can be highly resistant to change, partly because they are firmly embedded in policy and decision-making arenas. The danger of perpetuating, rather than challenging, established ways of thinking about and measuring sustainability remains a critical issue for sustainability researchers and their audiences (cf. Cohen 2006).[1]

Between convention and innovation: Combining methodological approaches

Regarding the key methodological implications of undertaking policy-relevant sustainability research, we reflected in the opening chapter on the persistent dominance of quantitative approaches to data collection and analysis in this field. In fact, numerous authors have highlighted that policy actors tend to prefer large-scale quantitative studies based on representative samples, that is, work that is easy to replicate, over qualitative approaches which are often perceived as 'soft' and 'not rigorous'. This emphasis on quantification is also mirrored in public debates and policy discourses that prioritise *directly measurable aspects of resource efficiency, material consumption and environmental degradation* such as noise pollution (cf. Murphy and King, Chapter 7 in this volume), water and air quality, energy use in the home, or fuel consumption in the transport sector. In Chapter 2 of this volume Barr and Prillwitz clearly show the merits and drawbacks of quantitatively measuring individual pro-environmental behaviour, the promotion of which forms a central pillar of many sustainability efforts today. They are particularly concerned about the potential decontextualisation of these measurements whereby social and environmental drivers of human behaviour are largely ignored and individuals are studied in isolation from the wider sociocultural, political and material context they find themselves in.

While critiquing the bias towards quantification in sustainability research, it is nevertheless important to recognise the significance of large data sets

for a critically inspired, progressively orientated research agenda. For example, the ConsEnSus project introduced earlier in this chapter rests on a large-scale survey of 1500 households on the island of Ireland that explores lifestyles and everyday consumption practices. This was done with a view to recording baseline behavioural data in key areas of consumption that impact directly on the environment (see Pape et al. 2011). This survey was complemented with a review of international good practice for governing sustainable consumption as well as a critical assessment of Ireland's performance in this area. Both the large-scale ConsEnSus survey and the cataloguing of good practice examples serve to accommodate policy actors' requirements for – 'solid' data. However, combining these rather conventional approaches to data collection and analysis with four exploratory studies that deployed novel participatory methods ensured a balance between methodological innovation and funders' requirements.

Many complex socio-ecological phenomena such as linkages between place, landscape and identity or cultural meanings of consumption practices frequently occupy a much less prominent position in public debate, policy making and on research programmes such as the European Union's Framework Programme, partly because they tend to resist immediate testing and quantification. Moreover, it is often the case that social relations are crucial to the formation, perpetuation and decay of such linkages between society and the physical environment. These and related issues have significant consequences for the choice of methodology as well as decisions regarding research design. It is argued here that many sustainability-related research questions could best be answered by looking at groups and networks rather than individuals. This, however, requires particular types of methodologies that are able to capture social linkages and synergy effects. Anna Davies' contribution (Chapter 3) on focus group research clearly demonstrates the importance of social interaction and types of engagement for the formation and development of sustainability thinking, discourse and practices.

Breaking down complex problems into smaller, more manageable sub-problems also remains a strong trend in many areas of sustainability research. Even though one of the goals of sustainability research is to promote integrated thinking and a holistic perspective, the realities of designing projects adheres to the convention of breaking them down into discrete 'work packages' that may or may not be (re-)integrated during the research. The creation of sectoral 'silos' within sustainability projects, whereby different dimensions of human resource use such as energy and water consumption are dealt with separately, exemplifies a dominant trend. In the context of ConsEnSus this is certainly discernable; mechanisms to link and integrate different work packages have been incorporated into its design. For example, the collection of baseline consumption data for four key sectors (water, food, energy and transport) that are subsequently fed into the different work packages has been one of the cornerstones of the project.

Innovative relational analyses of qualitative findings from different work packages feature strongly in ConsEnSus project plan.

Another key issue to consider in the initial stages of project planning is the time frame of the study, with cross-sectional designs favoured over longitudinal designs because the former are perceived to pose fewer practical and financial problems. In addition, given the limited time frame adopted for many of these projects and, indeed, the topical nature of the subject under investigation, policy makers often indicate a clear preference for research designs that deliver results quickly. Researchers can have a difficult time attempting to balance the demands of a rapid turnaround of results with the growing workloads of academics in university environments. Academics are often accused of offering 'too-complex views, too-time-consuming methods, too-contingent conclusions' (Bell 2011: 217).

Given the *centrality of time* in sustainability thinking, policy and research that has been detailed in Chapter 9 in this collection, this emphasis on short-term fact delivery of research results appears to undermine efforts to mitigate short-termism in research policy and practice. Rau and Edmondson argue that growing engagement with the topic of time among those interested in sustainability questions has yet to be matched by more time-sensitive designs and research methods. This is particularly relevant in relation to impact assessment studies which have to deal with the fact that the economic, social and environmental consequences of today's policy decisions may only become visible many years from now. Similarly, it seems difficult to adequately evaluate the effectiveness (or otherwise) of sustainability programmes such as information campaigns to promote sustainable consumption without adopting a long-term view. In Chapter 8 of this collection Melanie Jaeger-Erben clearly demonstrates some of these time-related issues which affect the investigation of daily practices around food preparation and mobility and their potential transformation towards sustainability. Nevertheless, much policy-relevant research in the area of sustainable consumption remains firmly wedded to cross-sectional designs that yield large amounts of data in a short space of time.

More generally, a key dilemma inherent in the arguments made for policy-relevant research is that there is an assumption that the relevance (or otherwise) of the work is known from the very inception of the project – and this is often not the case. The trajectory of a research project is contingent upon historical conditions and contemporary events, including learning processes among all relevant parties. As noted by Ward (2005: 315), while 'a commissioned piece of work might not end up being relevant in the sense that it was envisaged', another piece of research that initially appeared unlikely to generate relevant findings might end up being used in the most unlikely of circumstances.

Another methodological issue that deserves attention in this context is the question of scale. Barr and Prillwitz's plea for survey-based sustainability assessment to move beyond the household level and to explore 'alternative

sites of practice' reveal the importance of different socio-geographical scales (Chapter 2). Here, conventional distinctions in the social science literature between micro-, meso- and macro-level social phenomena (and associated concepts and theories) offer a point for discussion. Traditionally, work on meso-level phenomena has been overshadowed by research focusing on both the micro and macro level. Organisation and community studies remain on the margins of sustainability research in the social sciences, with work on individual attitudes, motives and behaviour and studies of national and international sustainability performance dominating the field. A strong focus on institutions and organisations such as large employers (meso-scale) formed a central element of the transport and mobilities sub-project within ConsEnSus (see Chapter 9 for details).

Detailed case studies are an increasingly popular choice of research design because they can shed light on social structures, processes and inter-relations between different social groups that would otherwise remain invisible (cf. Flyvbjerg, 2004). This is particularly evident in the context of social and environmental protests where individual cases can reveal specific conditions that influence their outcomes, at least to some degree. In Chapter 4 Mark Garavan offers some reflections on how best to investigate a specific case of local resistance to a socially and ecologically disruptive gas project. His contribution to this collection clearly shows the merits and demerits of case study research for both participants and researcher.

On the other hand, as detailed throughout this book, opportunities for multi-method research and methodological innovation have been a key feature of sustainability research. In fact, many of the contributions to this volume have highlighted the benefits of developing and deploying innovative methodological approaches, partly because they may challenge expectations among many policy makers about *how* research should be conducted. Similarly, serious gaps remain between verbal commitments to inter- or transdisciplinarity as part of funding applications and actual evidence of successful disciplinary integration, for example through relational data analysis and innovative presentation of findings (cf. Hirsch Hadorn et al., 2008; also Chapters 1 and 6 in this collection). This reflects an ongoing commitment among policy makers and researchers to established ways of conducting research and implementing findings through policy. Backcasting workshops conducted in the ConsEnSus project to develop verbal and visual scenarios for heating, washing and eating in 2050 and to find ways to achieve them illustrate the potential benefits, as well as drawbacks, of adopting such innovative methods. It remains to be seen whether policy makers in Ireland and internationally will be prepared to accept both qualitative and quantitative data that are collected using novel cross-disciplinary methodologies such as backcasting and visioning.

Many researchers have expounded the challenges of persuading policy makers of the value of particular techniques (for a good review see Burgess,

2005). As Burgess (2005: 277) reflects on 30 years of policy-relevant research, 'persuading them [policy makers] to contemplate the idea of qualitative research and then, even more riskily from their perspectives, to use the evidence from qualitative research studies in decision making has been a real challenge'. Overall, the need to bridge the gap in expectations with regard to suitable methodologies between those who research sustainability issues and those who are tasked with developing sustainable development policies remains a considerable challenge (cf. Cohen 2006).

Making an impact? Sustainability-research outputs and dissemination of results

The expectation to produce research outputs that are relevant to those who draft and implement policy responses is another inherent feature of much sustainability research in the social sciences. Indeed the European Commission's (2006a) White Paper on Communication states that the scientific community has a duty to share its newfound knowledge with a broader public. However, this raises pressing questions about academic freedom and professional integrity, the distribution of power in the realms of science and policy making as well as about the nature of knowledge itself. Who decides what counts as acceptable evidence? Are actors in the policy-making arena really willing to either radically reform existing policy if evidence is produced that these measures are either ineffective or counterproductive? After all, social scientists may only be willing to compromise on aspects of their academic freedom and voluntarily limit their conceptual and methodological choices if they are able to see a real, tangible impact of their work on relevant policy fields.

Interestingly, demands with regard to research outcomes often emerge *during* a project rather than being set out explicitly at the beginning (Ward, 2005). It may be very difficult to gauge or anticipate an audience's interest in the research findings and subsequently incorporate enough time into the project design for appropriate dissemination. In the same vein, anticipatory budgeting for extensive dissemination of research results at the project's inception may prove problematic.

Occasionally, emerging tensions between those who produce the findings and those who are expected to implement them force all involved to clearly spell out their expectations and reservations, which may or may not occur in a constructive and amicable atmosphere. As Rau and Edmondson illustrate in Chapter 9 in this volume, there are often divergent views among interested parties involved in sustainability projects regarding how much time it takes to bring about change that is beneficial for local people and the environment.

The need to reach a wide and varied audience and related demands to meet a number of divergent goals, can present a daunting task. For example,

the European Commission's recent publication *Communicating research for evidence-based policymaking* (2010) outlines five key priorities that socio-economic sciences policy makers expect to have met. These range from the provision of valid and timely evidence and the identification of major trends and potential challenges to improved measurement capabilities and evaluation of policy effectiveness (European Commission, 2010: 20). Researchers frequently encounter challenges when attempting to coordinate the dissemination of research findings among audiences with different skill sets and degrees of engagement. The need to appeal to policy makers, practitioners, publics and academic audiences can create tensions over terminology used, visual representation of results, or the choice of media used to publicise data.

The most traditional method of research dissemination is via peer-reviewed publishing, and academics in the field of sustainability acknowledge that this is a critical outlet and an essential demand on active researchers. These publications enable sustainability researchers to share experiences, success and approaches to sustainability research and problem solving (Wiek et al., 2011). However, increasing pressure on researchers to demonstrate the value of what they do in terms of contributions to public policy is juxtaposed with the growing recognition of the relative inaccessibility of this traditional research outlet (scientific journals) to wider audiences. The ongoing dominance of relatively conventional forms of presentation in the sustainability literature, including the rather uncritical incentivisation of single-authored, peer-reviewed articles in discipline-specific, high-ranking journals fuelled by academic performance metrics illustrates this disjuncture between vision and practice.

This said, the availability of more innovative and accessible communication tools such as online fora and social media has opened new and fruitful avenues for effective dissemination of research findings to audiences outside the realm of academia. In addition to international peer-reviewed journal articles, ConsEnSus team members presented at academic and practitioner workshops and conferences, delivered oral and poster presentations and produced policy reports and factsheets. Public dissemination of research findings to date include the production of press releases, monthly online newsletters, interviews with local and national radio stations, public seminars, on-street research stands, as well as an interactive exhibition in a national science gallery. Such dissemination, while time-consuming and challenging, can clearly provide opportunities by opening up spaces for communication.

Increasingly, state bodies and other research funders require detailed dissemination plans and actors like the European Commission have published a plethora of guidelines for disseminating research, including *Communicating science – a scientist's survival kit* (2006b) and *Communicating research for evidence-based policymaking – a practical guide for researchers in*

socio-economic sciences and humanities (2010). National funding agencies, such as the Irish EPA (2011) are encouraging the production of short synthesis reports and practitioners' guides or policy briefs, in addition to the traditional extended end-of-project reports. The rationale behind the call for accessible summary statements rather than lengthly reports implies consideration of policy makers' limited time. The suggestion regarding brevity outlined in the European Commission guidance document illustrates this: 'Bear in mind the possibility that some members of your policymaking audience may skim the brief or read only the first page before delegating the task of detailed examination' (European Commission, 2010: 16).

Some academic literature in the field of sustainability research examines the virtues of undertaking wide dissemination of research results, and a large number of studies focus on attempts to measure the impact of research (for a good review see Bell et al., 2011). Yet others warn of the limitations of linear dissemination (see Scott, 2000) and stress the need to engender interest and trust (see for example Tydén and Nordfors, 2000). Comparatively few researchers appear to reflect critically on the practical constraints when disseminating sustainability research results, such as the large amount of the researcher's time which can be consumed by these innovative dissemination activities. This is further exacerbated by the contingent nature of sustainability research and the unpredictability of research outcomes. Reiterating Ward's (2005) sentiment, when one embarks on a policy-relevant research study; one may end up generating findings that are quite unexpected. In the context of the ConsEnSus project, it was interesting to observe the broadening of the research dissemination remit as the project progressed. From the initial research design stage, the key research objectives included production of recommendations for local authorities and national decision makers concerning sustainable consumption policies. However, funder requests for wider dissemination increased dramatically in the third year of the project, perhaps reflecting the importance of increasing accountability for public funds in a changing economic climate. This further highlights how the timing and context of a project can be vital in sculpting the research process.

Undoubtedly, debates around sustainability have opened up spaces for diverse academic and non-academic contributors to exchange ideas and to communicate their visions of sustainability. It is important to exercise caution, however, when judging the apparent success or failure of any extensive and innovative dissemination strategy. While intensive and indeed extensive dissemination of results to targeted communities (e.g., policy makers, practitioners) may or may not affect change (see Lyall et al., 2004 for an in-depth discussion), there are often unintended benefits of policy-relevant research which may never enter academic assessment models. For example, the use of the research by local networks of NGOs or campaign groups and

community projects (see Walter et al., 2007 for a comprehensive review of direct impacts, e.g. new knowledge, and other relevant impacts, for example capacity building). Students and scholars of sustainability research will be aware that current and traditional academic reward systems are based on peer review publication records and, indeed, specific objectives of individual disciplines. This echoes our opening arguments in Chapter 1 on the unique challenges of working in the distinctly interdisciplinary field that is sustainability research. The under appreciation of user-valued research is evident in, for example, the Research Assessment Exercise (RAE) in the UK (Woods and Gardner, 2011). As funding agencies appear to follow a similar system, sustainability researchers have begun to call for a research agenda that looks beyond the acquisition of research funding and publishing to value all activities related to developing and implementing solution strategies for solving and mitigating sustainability problems.

Concluding reflections and key considerations for future sustainability research

Commonly-held ideas among policy makers and members of the public about *what social scientists actually do* frequently remain wedded to traditional images of social research that incorporate taken-for-granted assumptions about the nature of science. As a result, conventional methodologies continue to dominate the field of sustainability research. Recent trends towards more integrated, innovative approaches, such as those examined in this collection, including participatory and action research, technology-aided forms of inquiry such as the use of GIS in the production and dissemination of socio-environmental maps, or inter- and transdisciplinary designs have not yet entered the public's imagination to the same extent. These disparities between images of social research and actual research practice impact on social-scientific sustainability research in a multitude of ways, including decisions about what types of research projects do and do not receive funding.

Illustrating the variety of insights and approaches to sustainability research, this book has demonstrated the enormous contribution made by social scientists to the investigation of sustainability problems. Importantly for students and scholars of social-scientific sustainability research, each chapter has focused on the application of these methodological approaches and tools in actual empirical projects, providing practical advice as well as theoretical guidance for those embarking on research in this field.

The challenges of sustainability research continue to be significant, and require concerted efforts and creative and innovative solutions by the social science community. Reflecting on all the contributions to this

collection, a number of key considerations for future sustainability research emerge. First and foremost, it seems important to move sustainability questions to the centre of social-scientific theorising, research and debate. Second, there needs to be a much more nuanced debate around issues of inter- and transdisciplinarity that focuses on conceptual, methodological as well as practical issues. Tensions clearly remain, and perhaps will become further exacerbated, between traditional orientations towards discipline-specific specialisation and emerging discourses of interdisciplinarity. These tensions cannot be resolved easily and require a much more thorough engagement with ontological and epistemological dimensions of social research as well as examining their practical implications. Finally, as highlighted in this concluding chapter, there is a clear need to reconsider the channels and mechanisms for supporting sustainability research and to strive for more inclusive ways of measuring the impacts of social-scientific research efforts in this field.

Overall, the collection we have assembled here offers a diversity of methods from a variety of perspectives and provides a practical and informative guide for students and scholars in the field of sustainability research. We hope that this collection will consolidate some of the research done to date and, furthermore, we anticipate that it will inform and inspire future researchers to investigate and explore this critical area of social scientific research.

Note

1   For example, Cohen (2006: 68) observes that 'The last decade has seen considerable progress in the development of an expansive technical repertoire with which to [*diagnose*] currently unsustainable consumption patterns. [...] These developments, however, have not been matched by commensurate progress devising actual policy initiatives to foster more socially and ecologically benign provisioning practices.'

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