

Societal transformations in the face of climate change

Research priorities for the next decade

Peter P.J. Driessen, Utrecht University & Foundation Knowledge for Climate, The Netherlands, p.driessen@uu.nl
Jelle Behagel, Utrecht University, The Netherlands, j.h.behagel@uu.nl
Dries Hegger, Utrecht University, The Netherlands, d.l.t.hegger@uu.nl
Heleen Mees, Utrecht University, The Netherlands, h.l.p.mees@uu.nl
Lisa Almesjö, FORMAS, Sweden, lisa.almesjo@formas.se
Steinar Andresen, Fridtjof Nansen Institute, Norway, steinar.andresen@fni.no
Fabio Eboli, CMCC Venice, Italy, Fabio.eboli@cmcc.it
Sebastian Helgenberger, Climate Change Centre Austria, BOKU, Vienna, Sebastian.helgenberger@boku.ac.at
Kirsten Hollaender, DLR Bonn, Germany, Kirsten.hollaender@dlr.de
Linn Jacobsen, Climate and Pollution Agency, Norway, linn.bryhn.jacobsen@klif.no
Marja Järvelä, University of Jyväskylä, Finland, marja.jarvela@jyu.fi
Jeppe Laessoe, Aarhus University, Denmark, jep@dpu.dk
Sebastian Oberthür, Free University Brussels, Belgium, Sebastian.oberthur@vub.ac.be
David Avelar, Lisbon University, Portugal, david.a.avelar@gmail.com
Ulrich Brand, University of Vienna, Austria, Ulrich.brand@univie.ac.at
Achim Brunnengräber, Freie Universität Berlin, Germany, achim.brunnengraeber@tu-dresden.de
Harriet Bulkeley, Durham University, UK, h.a.bulkeley@durham.ac.uk
Daniel Compagnon, Sciences Po Bordeaux, France, d.compagnon@sciencespobordeaux.fr
Simin Davoudi, Newcastle University, UK, simin.davoudi@newcastle.ac.uk
Heide Hackmann, International Social Science Council, Paris, hh.issc@gmail.com
Jörg Knieling, Hafen City University Hamburg, Germany, joerg.knieling@hcu-hamburg.de
Corrine Larrue, Université Rabelais de Tours, France, Corinne.larrue@univ-tours.fr
Björn-Ola Linnér, Linköping University, Sweden, bjorn-ola.linner@liu.se
Orla Martin, International Social Science Council, Paris, orla@worldsocialscience.org
Karen O'Brien, University of Oslo, Norway, Karen.obrien@sosgeo.uio.no
Saffron O'Neill, University of Exeter, UK, s.o'neill@exeter.ac.uk
Marleen van Rijswijk, Utrecht University, The Netherlands, h.vanrijswijk@uu.nl
Bernd Siebenhuener, Carl von Ossietzky University, Oldenburg, Germany, bernd.siebenhuener@uni-oldenburg.de
Catrien Termeer, Wageningen University, The Netherlands, katrien.termeer@wur.nl
Aviel Verbruggen, University of Antwerp, Belgium, aviel.verbruggen@ua.ac.be.

Corresponding author

Prof. Peter P.J. Driessen

Copernicus Institute of Sustainable Development, Utrecht University, P.O. Box 80115, 3508 TC Utrecht, The Netherlands, Phone: 0031 30 2535771, Fax: 0031 30 2532746, e-mail: p.driessen@uu.nl

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Abstract

Climate change creates new challenges for the global society. Responding to climate change is a complex process of societal transformations that should be studied as such. The contribution of the social sciences is crucial to the understanding of these processes of change. The growing body of knowledge on the physics of climate change, its causes and consequences is not matched by an equivalent understanding of the societal challenges it poses. The Joint Programming Initiative on 'Connecting Climate Knowledge for Europe' (JPI Climate) identifies key topics for future social science research and grounds them in existing literature, distinguishing 'scientific analyses of societal transformations under climate change' from 'scientific analyses for societal transformations under climate change'.

Key words: climate change; societal transformations; social sciences; research agenda; JPI Climate

1. Introduction

There is an increasing social and political awareness of the scale and seriousness of climate change and its potentially devastating consequences (IPCC, 2007; EEA, 2012: 15). Insight has also gradually emerged which shows that fundamental changes have to take place at different scales and in different sectors of society in order to cope with this multi-faceted problem. Despite the growing scientific evidence, climate change, its causes, consequences and possible response options remain contested by different groups in society and are associated with different perceptions of uncertainty, risks and urgency (Oreskes 2004; Hulme, 2009; Jacques, 2012).

Responses to climate change are not only a matter of infrastructural adjustments, like building dikes, or technical innovations such as implementing renewable energies. They also include fundamental changes in our way of living, urban and regional planning, mobility patterns, land and water use, production processes, consumption patterns, nature conservation, and energy demand. Climate change responses also challenge the ways that humans think about and interact with the environment and each other. As such, all climate challenges are also societal challenges. Thus, it is fair to say that effective responses to climate change involve complex processes of societal transformations that should be studied as such (Van Nieuwaal et al. 2009: 7). The concept of 'societal transformation' refers to alterations of society's systemic characteristics and encompasses social, cultural, technological, political, economic and legal change.

In view of the societal changes that any response to climate change will inevitably entail, we argue that the social sciences should have a more prominent role in climate change research. According to Agrawal et al. (2012: 329), "social scientists can bring critical perspectives on cause, effect and controversy; they can engage with policy processes; and help solve the multi-faceted problems that climate change will inevitably make more visible, urgent, and complex". Given the broad impact that climate change is expected to have on societies and considering the scale of change needed, a social science perspective on the social, political, economic, and cultural dimensions of climate change is key to adaptation

and mitigation efforts. As Hackmann and St. Clair (2012: 4) state “(...) social science knowledge is an indispensable part of the global scientific, policy and social mobilisation effort required. Its importance grows as the effects of human actions on global conditions snowball and our understanding of these processes deepens”. In addition, we must point to the fact that the social sciences always perform a dual role, being a critical observer and independent messenger on the one hand (providing explanatory, evaluative and predictive knowledge) and, on the other hand, being a co-designer of relevant and effective solution strategies (providing prescriptive, strategic and instrumental knowledge). Therefore, there is a need to make a distinction between ‘scientific analyses *of* societal transformations under climate change’ (the analytical perspective; trying to understand societal changes) and ‘scientific analyses *for* societal transformations under climate change’ (the normative perspective; trying to contribute to successful societal changes). In practice, however, these two roles will be very much interconnected.

This paper is the result of intensive discussions about the social science research agenda which took place as part of the European ‘Joint Programming Initiative’ on *Connecting Climate Knowledge for Europe* (JPI Climate). This initiative, which has thirteen member countries (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Norway, Spain, Sweden, the Netherlands, and the United Kingdom), acts as a strategic platform for aligning national research priorities in the area of climate research and also for launching joint activities (www.jpi-climate.eu). Its aims are to contribute to coordinated knowledge development by improving the scientific expertise on climate change and connecting that knowledge to decision-making on climate change adaptation and mitigation (JPI Climate, 2011). A main research theme within JPI Climate is ‘the understanding of sustainable transformations of societies under climate change’. In order to identify the top priorities for future social science research, JPI Climate hosted a workshop in Brussels on 18-19 October 2012 with leading European researchers in social science climate research. This paper presents the outcome of the deliberations in the workshop and the participants pre-meeting inputs with regards to key topics for future research. These topics are grounded in the wider literature in the field to demonstrate that the relevance of these questions – without any prioritisation – is broadly recognised by the social scientific climate research communities. With this paper we aim to clarify what social sciences can contribute to the societal challenges that climate change imposes and to stimulate the scientific and societal debate about relevant directions for future research.

Text Box 1: Ten pressing social science research topics regarding climate change

1. What are the most likely socio-economic scenarios for societal transformations in response to climate change and what do these scenarios entail, for whom and with what consequences?
2. What are the processes through which societal transformations related to climate change may take place and to what extent can they be influenced?
3. How is the ability of societies to respond to climate change enabled and constrained by other social, ecological and political dynamics and what strategies are there to successfully deal with these interconnected dynamics?
4. What forms of social and cultural meanings is climate change taking, and what is the significance of these for understanding societal transformations in the face of climate change? How and in what direction can such meanings be reshaped?
5. What are the roles of specific concepts within the climate change debate, and what are their implicit and explicit normative connotations?

6. How are questions of social justice, participation, and the distributive effects of climate changes addressed in current societal debates, policies and legislation? How should they be addressed in transformative agendas?
7. What constitutes the governance of societal transformations in light of climate change? How is the governing of climate change at different levels being accomplished and contested, by whom and through what means, and with what consequences? What changes in modes of governance would be essential for transformative processes?
8. What is the role of economy and finance in climate change mitigation and adaptation? What new forms of climate finance and low carbon economies are necessary and feasible?
9. To what extent has the increased level and quality of climate science had an impact on policy and societal decision-making, and how can this be explained? What are the implications for organising effective science-policy interactions in the future?
10. What is needed for further integration of social science knowledge in agenda-setting and issue-framing in climate change research and policy-making?

2. Future social science climate research priorities

2.1 What are the most likely socio-economic scenarios for societal transformations in response to climate change and what do these scenarios entail, for whom and with what consequences?

Compared to modelling activities by natural scientists, the development of credible scenarios for societal changes in response to or because of climate change is relatively underexplored. There are many assumptions embedded in scenarios, which often ignore alternative paradigms, including those critical to mainstream approaches to development. Also, the integration with climate change impact scenarios is still in its infancy (Van Drunen et al., 2011). Social scientists need to find out what the socio-economic implications of transformations in response to climate change would be. What do responses to climate change mean for local, national and global dynamics in terms of: dominant modes of production and consumption; lifestyles and livelihoods; global trade and economic growth imperatives; migration; and socio-cultural orientations? Besides producing socio-economic scenarios, social scientists also need to reflect on how the scenarios may be used. Are they used to analyse and explain societal developments and to learn and develop insights about complex interrelations and unintended side-effects of measures? Or, could they also be used for pursuing political agendas? After all, by drafting scenarios about the future, social scientists may generate self-fulfilling or self-defeating visions. This may constitute a tension with the often-proclaimed ideal of a science distanced from the phenomena it studies. Social scientists need to make a purposeful decision as to whether and how they intend to act merely as analysts in the field of climate change and societal transformations and to what extent they also aspire to a role as a 'change agent' (Kemp and Martens, 2007).

2.2 What are the processes through which societal transformations related to climate change may take place and to what extent can they be influenced?

The mechanisms through which changes culminate in (planned or emerging) societal transformations are often intractable. More insight is needed into how transformations come about (WBGU, 2011). This may help to shed light on the unexpected or undesired (side)-effects of policy measures and it can create awareness of potential consequences of (responses to) climate change at different societal levels.

To better understand societal transformations as they actually are taking place we need to understand what kind of actors are active in climate policy as well as in what kind of arenas

societal transformations are enacted. There is a need for dialogue between the heterogeneous contributions of various scholars who vary in research approaches, in the factors they include in their analyses and the agency they attribute to specific actors. For instance, Biermann et al. (2012) consider national governments and supra-national organisations as the key actors, whereas Betsill and Bulkeley (2004) emphasise the role of transnational networks and Termeer et al. (2012) of regional authorities. In addition, Grin et al. (2011) point to the importance of interactions between dynamics at niche, regime and landscape level. Spaargaren (2000) portrays societal transformations in terms of a fit or misfit between the agency of citizen-consumers and the systems of provision serving them. The Social Learning Group (2001) focuses on the role of knowledge and learning in environment-related societal transformations. By establishing a dialogue between these and other perspectives, an encompassing and more balanced understanding will be gained of factors that may hinder or slow-down planned transformations. The path dependencies, lock-in, sunk costs and power relations associated with infrastructures such as the electricity supply systems, sewer systems, (rail)-roads and flood defence works as well as the potentially path-breaking (positive and negative) roles of shock events are cases in point. Attention to how different worldviews, mental models of action logics promote or impede change can also add to a better understanding of processes of transformation.

2.3 How is the ability of societies to respond to climate change enabled and constrained by other social, ecological and political dynamics and what strategies are there to successfully deal with these interconnected dynamics?

Climate change is not the only driver of change that impacts societies. Other important global environmental problems are biodiversity loss, freshwater scarcity, chemical pollution, land use change, ocean acidification, stratospheric ozone depletion, etc. (Global Environmental Outlook, 2012). A major challenge for social science research is to analyse the interconnectedness of the social causes of these problems, to explain the complex trajectories and policies that have led to unsustainable lifestyles, and to draw lessons from earlier processes of societal change (Hackmann and St. Clair, 2012: 16). Moreover, societies' ability to successfully respond to climate change can be influenced by social issues, like finance, food, health, education, migration, poverty and security. In addition, other processes of societal change, such as globalisation, urbanisation, demographic shifts, changes in world market structures, and changes in energy demand and supply affect societies' capacity to respond. Climate change cannot be seen in isolation from the challenges that these issues pose.

Climate policies will presumably not always be the main driver for societal change, but they can make crucial contributions. To be implemented, climate policies have to compete with a variety of societal issues that are often seen as more urgent. Also, other policies may possess scope for synergies or, more problematically, conflict with climate policy objectives. A way forward may be to embed adaptation and mitigation strategies in broader policy programmes and to connect them to other societal values (Termeer et al., 2011; Dworak et al., 2012), where they can be side effects of other sustainable development policies such as energy and food security (Román et al., 2012). However, the pros and cons of this strategy of 'mainstreaming' are not clear yet and how sufficient levels of 'climate policy integration' into other policy fields can be achieved requires further research.

2.4 What forms of social and cultural meanings is climate change taking and what is the significance of these for understanding societal transformations in the face of climate change? How and in what directions can such meanings be reshaped?

Culture has been shown to be an important but hitherto underexposed factor for explaining how societies deal with climate change (Adger et al., 2012). Climate change risks, impacts,

perceptions and responses do differ across regions and cultures of the world and across social classes. Communities value things differently (see also the next research topic), and these different interpretations must be taken into account if climate policies are to be effective and legitimate (O'Brien et al., 2007). Climate change related values and associated discourses differ, amongst other things, in terms of: (a) the normative expectations embodied in their implicit images of the future (alarmist, optimistic, business as usual); (b) the direction and degree to which they transform society (frugality, shifts to a greener economy, de-growth, de-modernisation, decoupling); (c) the degree to which action perspectives are created or blocked for different groups in society; and (d) the degree to which climate change is seen either as an isolated issue or as being connected to other value systems and associated discourses (e.g. religious or moral obligations; energy discourses etc.).

According to Hulme (2009), climate change is an environmental, cultural and political phenomenon which is reshaping the way we think about ourselves, our societies and humanity's place on Earth. Understanding social and cultural sense-making in relation to societal transformations requires a dialogue between the various scholars, in particular those analysing values (e.g. Howell, 2012), those analysing the role of discourse and ideas in decision-making (e.g. Hajer and Versteeg, 2005), and those pointing out the need for better understanding of the relationship between values, attitudes and behaviours (e.g. Shove, 2010). Studying social and cultural meanings of climate change is important in order to reach a deeper understanding of the perceived legitimacy of climate science and policy in different societies and to identify different ways in which societies may respond to climate change. Besides that, it is necessary to gain insight into the mechanisms through which socio-cultural meanings can be reshaped.

2.5 What are the roles of the specific concepts within the climate change debate, and what are their implicit and explicit normative connotations?

The concepts of resilience, vulnerability, adaptive capacity, (ir)reversibility, lock-in, adaptation and mitigation are playing an increasingly central role in the climate change debate, yet these concepts remain open to various interpretations that are subject to contestation. Adaptation goals and values vary across contexts. Moreover, it addresses multiple policy domains, including social geographies, risk governance, and food security, amongst others. Equally, vulnerability is subject to multiple interpretations, for example as an end point where it is a 'product' of the impacts of climate change minus adaptation, or as a starting point where vulnerability determines adaptive capacity. These different interpretations lead to different assessments of the scope and urgency of climate change (O'Brien et al., 2007) and therefore can be expected to directly impact on how policies are formulated and measures are chosen. A pertinent example is the concept of 'resilience' which although gaining increasing currency remains problematic in its translation from ecology to society (Davoudi, 2012). Several other concepts, such as 'tipping points', 'planetary boundaries', 'carbon space', and 'green economy', that have been forwarded into climate science and policy are also contested. To cope with the ambiguity and elasticity of these and other concepts that are associated with the impact of climate change on societies, they need to be clarified and re-conceptualised within the socio-economic sphere (Grothmann et al., 2011) and the normative goals and values that are ascribed to them should be made explicit (Driessen and Van Rijswijk, 2011). Doing so will not only bring conceptual clarity, but can also emphasise the social issues that climate change will bring about and intensify. Such re-conceptualisation will be instrumental to, for example, any effort for effective integration of climate policies in socio-economic policies.

2.6 How are questions of social justice, participation, and the distributive effects of climate change addressed in current societal debates, policies and legislation? How should they be addressed in transformative agendas?

The capacity of different types of societies and different groups within society to adapt is highly uncertain, and there is a growing interest in understanding the limits to adaptation. However, transformations to a low-carbon economy and adaptation to a changing climate (rising sea levels, warmer weather and an increase of extreme weather events) will also entail winners and losers at the more regional and local levels. Current research on the effects of climate change on vulnerable and disadvantaged populations is limited and social justice is mainly discussed in terms of intergenerational issues and relations between the global North and the South (e.g. Bell, 2010). We hold that the North-South divide has lost much of its significance through the role of emerging economies and that a more dynamic and detailed perspective is needed. Furthermore, attention should also be paid to social justice at regional and local levels. Specifically, the participation of societal groups in regional and local decision-making on climate change, or lack thereof, is in need of further inquiry, to identify both the scale in which these processes are taking place as well as their effectiveness and legitimacy in addressing social justice issues. Academic work undertaken in this field may serve as an example (Bulkeley and Mol, 2003; Davoudi and Brooks, 2012). Since the social effects of climate change continue to be primarily discussed in terms of tolerable risks for societies as a whole (Adger et al., 2009), it is also necessary to look at the more substantive aspects of social justice: what distributional effects will societal transformations have *within* societies? Research topics include access to water, food, and security for different groups in society, but also where adaptation benefits ultimately 'land' and how burdens are shared across different strata of society. As such, the focus on social justice in climate studies should be broadened to encompass regional and local distributional effects in addition to global ones and should include topics of economic redistribution, quality of life and wellbeing. Equally, transformative agendas should more explicitly integrate equity beyond formalistic notions of 'common but differentiated responsibilities' by mapping or modelling distributive effects and by including groups likely to receive high burdens in an early stage.

2.7 What constitutes the governance of societal transformations in light of climate change? How is the governing of climate change being accomplished and contested, by whom and through what means, and with what consequences? What changes in modes of governance would be essential for transformative processes?

The transformation into low carbon, sustainable and resilient societies cannot occur without some kind of governing to induce governments, businesses, NGOs and citizens to transform their practices. However, who exactly governs, who is being governed, for what reason and with what (intended and unintended) outcomes is subject to much societal debate and varies across national, regional, and local contexts (e.g. Mees et al., 2012; Knieling and Leal Filho, 2013; Bulkeley and Newell, 2011). Insights are needed into how and to what extent different governance modes are effective, efficient and legitimate in inducing societal transformations (Lemos and Agrawal, 2006). Although mainstream literature emphasises the need for collaborative and deliberative modes of environmental governance – in order to be able to deal with the complex, multi-scale, cross-sectoral and long-term aspects of environmental issues like climate change – there is still a special role to play for the state and international political institutions in creating legally binding rules (Brand et al., 2011). Moreover, questions related to the institutional capacities of domestic governance systems, questions related to the roles of governments, networks, markets and civil society, and questions related to the feasibility and effectiveness of different types of policy instruments and measures, are in need of answering. In addition, research should unravel how

governance processes are shaped, in particular in terms of inclusive participation, deliberation, legitimacy, efficiency and transparency, as well as the factors enabling and constraining these processes.

Another relevant scope of social-scientific research relates to the scale of operation. While many studies on global climate governance, inspired by the concept of earth system governance (Biermann, 2007), have focused on interactions between nation-states and global institutions and on global regime development or the lack thereof, more insights need to be gained on the role of cities, regional and transnational networks in achieving societal transformations on the ground (Betsill and Bulkeley, 2004; Ostrom, 2009) and on the interaction of different levels and different modes of governance (Biermann and Pattberg, 2012). In addition, we must also grasp the complexity of the climate change regime complex (Keohane and Victor, 2011). Particularly for adaptation governance insights are also needed at the socio-ecological system, regional and local level, as well as differentiated into various socio-economic sectors.

Finally, the issue of timing is important. This issue is not only related to matters of urgency (i.e. the severity of the climate change impacts and the necessity of taking measures), but also to cost-effectiveness, available budgets, lock-in (Verbruggen, 2013) and public support. Climate policy requires a constant interplay between long-term perspectives and short-term options for interventions aimed at societal transformations.

2.8 What is the role of economy and finance in climate change mitigation and adaptation? What new forms of climate finance and low carbon economies are necessary and feasible?

Climate change finance has played a dominant role in recent global climate mitigation negotiations, resulting in developed countries committing themselves to the increasing provision of resources to developing countries for addressing climate change. Sharing the burden of financing adaptation to climate change has become an important issue (Dellink et al., 2009), although there is a huge gap between pledges and realisations. Increasing emphasis is put on the role of private finance in mitigation and adaptation efforts. Of the funds that are committed in international arenas to climate mitigation and adaptation, private finance is almost three times greater than public finance; and carbon finance constitutes only a small portion of that (Newell and Paterson, 2010; Buchner et al., 2011). As such, it remains worrying that the financial sector is still largely uncommitted to climate change (Van Rensen, 2011), as the unlocking of private resources for mitigation and adaptation measures is considered one of the main challenges of the future. In addition to understanding how climate funds operate and the role of finance in relation to the cost and benefits of climate change measures, we need also to critically address the role of finance in fuelling unsustainable economic trends.

In recent years, policies that may spur co-benefits between climate and other policy goals have gained increasing attention. In the context of mitigation, win-win and cost-effective solutions are often praised, such as for policies Reducing Emissions from Deforestation and forest Degradation (REDD+), but these obscure trade-offs between for example carbon sequestration and biodiversity benefits (Phelps et al., 2012). To include in an international climate agreement development goals that have mitigation as an ancillary benefit has been forwarded by several analysts as a possible way to increase commitment and rally support (Román et al., 2012). Further, a crucial area for social science is how research, development, demonstration and diffusion of low-carbon energy technologies are to be incentivised by market mechanisms, public funding, and/or hybrid mechanisms such as co-operations (Azar and Sandén, 2011). In adaptation, finance issues that need to be addressed include the role of climate insurance, 'no-regret' measures, and evaluation tools by which cost-effective measures are selected. More fundamentally, the questions arise: who pays for adaptation

measures on national, regional and local levels, and are payments to be based on solidarity or on benefits and profits?

2.9 To what extent has the increased level and quality of climate science had an impact on policy and societal decision-making, how can this be explained, and what are the implications for organising effective science-policy interactions in the future?

Climate science-society relationships are often much less linear and predictable than actors involved tend to assume (e.g. Pielke, 2007). While there is a high degree of scientisation of the climate debate and politicisation of climate science, the role and actual significance of scientific knowledge in decision-making is not sufficiently understood yet. Because of this problematic relationship between climate science and society, it is necessary to analyse further how policy-relevant knowledge is co-produced rather than just delivered by scientists to society (c.f. Jasanoff, 2004). Besides that, recommendations for purposefully organising climate science-society relations are needed (e.g. Hegger et al., 2012). These can be derived from co-designed, transdisciplinary studies (Jahn et al., 2011; Hirsch-Hadorn, 2008; Walter et al., 2007) and from evaluations of situations in which new models were used, such as science brokers, the science policy interface and boundary organisations (Pielke, 2007). Reflections on how and when knowledge works should also lead to more attention on the factors that make knowledge credible, salient and legitimate (Cash, 2003) for a variety of users.

When making such analyses, social scientists need to address the question about their own role: to what extent should they be mere observers and to what extent should they be agents within the processes of societal transformation they study (Lövbrand, 2011)?

2.10 What is needed for further integration of social science knowledge in agenda-setting and issue-framing in climate change research and policy-making?

The complexities of social transformations call for a more diversified and coordinated research agenda. Topics to be addressed include the theory and practice of adaptation, mitigation and resilience; research methodologies; and the role of natural and social sciences and humanities (Patwardan et al., 2009). In addition, the engagement of users and stakeholders in processes of problem setting as well as problem solving, integration between different types of information that is available on climate change, and a more prominent role for social scientists in the setting of research agendas are required to address the complexities of societal transformations. There is a need to move beyond the notion that the role of social science is that of removing institutional and cultural barriers to the implementation of infrastructural and technological solutions or providing input to socio-economic scenarios. In addition, the social sciences can contribute to framing climate change as an issue of power, politics and interests; an issue of collective mobilisation and social change; and as a challenge to conventional ideas of development. To do so, social scientists should engage more directly with research programmes and policy initiatives, for instance by stimulating and informing broad societal debates (Agrawal et al., 2012). A more prominent role for social science in agenda-setting and issue-framing will be paramount to societal transformations that are both robust and adaptive.

3. Conclusion

Climate change creates new societal challenges, including the need to transform energy systems away from a dependence on fossil fuels and the need to protect citizens, business and nature from climate risks (JPI Climate, 2012: 7). Climate change is a complex reality, which affects society at large. Understanding and responding to climate change requires

coordinated and large-scale efforts – not only in Europe, but also across the globe – in research, knowledge dissemination, innovation and governance.

The above-mentioned research topics call for strengthening the role of the social sciences in climate research. Without wanting to engage in a discussion about the scope of the social sciences in general, we are convinced that the social sciences can make a crucial contribution to our understanding of the processes of societal transformation to come and how they relate – and can be related – to climate change.

Climate social science is a relatively new field encompassing both fundamental and applied research. Agrawal et al. (2012: 329) identify three major intertwining climate research areas in need of further development: theoretical advancement, empirical research, and policy engagements. Here again, we see the dual role of the social sciences: the analytical role (understanding societal change) and the normative role (contributing to societal change). The above-mentioned research topics have been developed with the aim of contributing to theoretical and empirical advancements as well as to policy engagements.

Finally, we wish to emphasise the need for integrative studies of societal transformations (including analyses of multiple drivers of change) and for multi-, inter- and trans-disciplinary research approaches. Intensive cooperation between different scientific disciplines and between science and society in this field is a key challenge. Connecting different disciplinary approaches in natural and social sciences will lead to research efforts of higher scientific quality and societal relevance (JPI Climate, 2011: 12). Furthermore, integrating science and society could increase the reflexivity and relevance of climate research and will contribute to a better application of knowledge and policy recommendations.

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