Engaging Cooperative Research[1]

Abstract

Cooperative research involves upstream engagement of practitioners, introducing diverse knowledges and expertise in ways that can, in theory at least, generate new knowledge that is socially robust and publically accountable. And yet, judging cooperative research solely in terms of accountability may underplay the transformative and non-accountable/ non-convergent nature of research – the production, in other words, of the new when collectives are drawn together. Using examples from research that sought to provide environmental civil society organisations (CSOs) with the resources to shape cooperative research, this paper argues that cooperative research may not simply mark an extension of public engagement with science but can also seed an anticipatory and thus creative research process. For cooperative research to play this role there is a need to highlight the human and nonhuman attachments that underpin cooperative research activity. We argue that such activity might best have as its aim the empowerment, not simply of participants, but of the political situations that CSOs can help to ferment (Stengers, 2010b).

Keywords: Cooperative research, public engagement, knowledge practices, knowledge economy, Europe

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Introduction

> "[T]here are everywhere in Europe and in numerous other places in the world, ongoing experiments ('novelties') and a re-development of knowledge networks that are exploring and responding to the trend data [in sustainability of resource systems]. Some… involve formal research partners and/or public or private organisations, others are embedded in civil society networks and movements of varying scale. They are creating and testing alternatives to business as usual in agricultural and food systems…" (Brunori et al., 2008: ii).

In their foresight document, Brunori and colleagues affirm the need to create novel and experimental approaches to resource questions in order to offer alternatives to 'business as usual'. Citing partnerships, public/private collaborations and civil society networks and movements, they lodge this novelty in new kinds of assemblage. In order to move beyond business as usual, they argue, there is a requirement to re-engage with a broader constituency.

In this paper we explore what is involved in 'ongoing experiments' and 'knowledge networks' by drawing on the experience of working as cooperative researchers. We reflect on the possibilities afforded in doing research cooperatively as well as the social science insights that can be produced on researching participation itself. Cooperative research was taken up as a European Union Framework 7 funding initiative following a series of workshops within the European Directorate-General for Research (Stirling, 2006). In the report from those workshops, cooperative research was defined as a "form of research process, which involves both researchers and non-researchers in close cooperative engagement" requiring "constant attention to

transdisciplinary engagement with stakeholders and public constituencies in order to explore the driving aims and purposes, the alternative orientations, and the wider social and environmental implications of research and innovation" (Stirling, 2006: 32).[2] Its aim was the co-building of knowledge, encouraging partnerships "on issues of common interest, in ways that entail mutual learning" (DG-Research, 2009: 10).

Cooperative research, even in these early and academy-led definitions, has at least two somewhat contrasting aims. The first is to foster and even elaborate upon 'alternative orientations' in order to generate new knowledge. Second, it is to produce knowledge in ways that are more publically accountable, more attendant to issues of 'common interest' and to the wider social and environmental implications of research. This second aim is more evident as a normative criterion in subsequent documentation wherein cooperative research is linked to a specifically European model for research and the generation of a European-style knowledge society. According to a green paper on the European Research Area, a knowledge based society "should experiment with new ways of involving society at large in the definition, implementation and evaluation of research agendas and of promoting responsible scientific and technological progress, within a framework of common basic ethical principles" (CEC, 2007: 10). Moreover, cooperative research processes are promoted as "the embryo of a specific European way to define and implement research priorities, *engaging citizens* and *respecting common ethical norms*" (CEC, 2007, Annex, emphasis added). There is then a recurring tension between the desire to generate knowledge differently, to produce new commons through more radical

[2] Far from being pre-ordained, these identities of non-researcher, researcher, stakeholder and public are all opened up to scrutiny in the cooperative research process and to varying extents in the paper. Many 'non-researchers' are in fact researchers but act outside the academy. Likewise there are activist researchers within the academy. Moreover, the notion of 'close' cooperative engagement hides a raft of tensions including pervasive epistemological hierarchies as well as more generative aspects of maintaining distance and the ability to generate one's own questions.

engagement practices, and the more conservative sense of public engagement that links knowledge to already established commons (Bogner, 2012, Barry et al., 2008, Born and Barry, 2010). If the former suggests a relational and generative sense of knowledge, the latter can conform to accumulative and merely connectionist understandings of knowledge premised on the 'sound science' principles of a knowledge economy (Irwin, 2006).

A key aim of this paper is to tease out these tensions between experimenting with alternatives (a divergent aim of knowledge generation) while making knowledge accountable to a wider set of concerns (a convergent aim). Using our experiences working within and co-organising cooperative research projects we do two things. First, we discuss the potential for cooperative research to generate new or divergent forms of alliance and knowledge. Second, and more tentatively, we emphasise the value of this generative aspect of cooperative research. We suggest that value lies not so much in the empowerment of people or in making knowledge more publically accountable. Rather, value lies in two, albeit fragile, potentials. They are, one, the ability of cooperative research to open up and thereby politicise knowledge and, two, its related capability to "bring nonhumans into the political fray" (Stengers, 2010b: 20) in ways that refuse to reduce them to mute and passive roles, or that see them pre-informed and regulated by prevailing expertise (Barry, 2013). Bringing nonhumans into the political fray is vital, we suggest, in order to explore "alternatives to business as usual in agricultural and food systems" (Brunori et al., 2008: ii).

In the following section we provide a brief background to the origins and rationales for cooperative research, before discussing a sample of project experiences in part 2,

and finally reflecting on both the achievements and challenges that the chosen cases reveal about doing cooperative research.

Public Engagement and Cooperative research

Cooperative research has its roots in a long debate on the role and place of science and knowledge within society. It is in many ways a logical extension of a social science and scientific response to a centralisation of expertise (what Hewitt called citadels of expertise) (Hewitt, 1983). Following the didactic and deficit-laden approaches to public understandings of science, engagement in knowledge production has now become a well-established desideratum as a means to improve the democratic accountability, substantive content and legitimacy of knowledge (Wynne, 2007, Jasanoff, 2003, Irwin, 1995, Whatmore, 2009). Engagement signals a re-distribution of expertise, and a widening of what are considered to be legitimate knowledge forms. In the process, tacit, practical and non-verbal knowledges are matters to be enlisted into substantively better knowledge processes. Idealised in this form, knowledge produced through a participatory process is more likely to be accepted by sceptical publics if the knowledge has already achieved some stamp of approval or sanction from members of those publics. Likewise, ideally, such knowledge processes will have managed to 'road test' associated innovations and products, in ways that make the knowledge not only more acceptable but also substantively better as a result of being produced with possible users and or commentators on board (Owen et al., 2013). The result is what Nowotny terms a more socially robust knowledge (Nowotny, 2003). In a related vein, others extol the civic, cognitive and governance virtues (Pellizzoni, 2001) of more participatory and deliberative forms of both knowledge production and decision making. Civic virtue stems from the generation

of research publics that are less alienated by and distant from techno-science. Cognitive virtue includes the generation of research-literate publics who are either directly or indirectly involved in the research process and the production of better knowledge. Finally, governance virtue might be said to reside in the degree to which civil society is empowered to take charge of its own affairs and/ or is more likely to consume, use and adopt a technology or practice. Knowledge and decisions around knowledge are therefore more likely to succeed, achieve take up or consent, and be cost effective, if that knowledge has been produced in ways that converge with public ideals and norms. Examples abound from Wynne's formative study of sheep-farming after Chernobyl (Wynne, 1996) where a broader body of social and practical expertise could lead to an exploration of the social commitments of scientific knowledge and more effective risk assessments, to more recent experiments in flood alleviation (Whatmore and Landstrom, 2011, Lane et al., 2011), where professional and lay expertise work together to generate potentially more effective forms of hydrological intervention.

Despite this promise, a concerning development is the degree to which the three main rationales for engagement (democratic accountability, substantive knowledge and legitimacy) are increasingly framed in instrumental terms and alongside what Owens called the desire to be seen to be following procedure (Owens, 2009). Bogner (2012) for example reports a tendency of organisations to build legitimacy through employing professional engagement practitioners who perform engagement in the laboratory with small and 'representative' publics rather than in field settings. Engagement in this sense becomes another expertise and publics become informed and regulated by such expertise. This is not the 'philosophy in the wild' that Callon

and colleagues extolled as a generative answer to knowledge controversies (Callon et al., 2009).

In contrast to this story of domestication, cooperative research might be said to offer three possibilities for re-wilding research: one, it can genuinely be co-productive; two, in engaging with civil society organisations it can access different kinds of publics, ones that are already engaged with and charged by the issues; three, in doing so it can draw in both publics and their things, or the nonhuman matters through which those publics are, in part, constituted. To illustrate, some time ago Callon (1999) made a clear distinction between consultative and co-productive models of public engagement. The latter, with patient groups in the production of therapy interventions as a key exemplar, involved new kinds of collectives called hybrid forums which would not simply debate knowledge but play a role in generating new science (Callon et al., 2009). This is not a representative public but a public sparked into being by the issues (Marres, 2005) and is intent on initiating and cogenerating research that matters to them. Significantly, the use of the term hybrid in hybrid forum also signals a shift in not only who but also what is engaged. These assemblies are more than human (Whatmore, 2006), where patients, lay-experts and so on don't simply assemble as citizens, they do so as people-with-medical conditions, as interested and interesting parties with all their concerns, bodily processes, and nonhuman companions alongside. As Marres and Lezaun put it (2011), this is not so much an agoristic assembly, where citizens leave their private concerns at home in order to become a responsible and rational public in the public space of the agora. It is rather a messy assembly of all the concerns, emotions and human as well as nonhuman attachments that make a controversy or issue potent in the first place

(Marres, 2005, see also Mol, 2008 for a feminist critique of citizenship and its exclusions).

Once an agoristic model of assembling a public has been surrendered and replaced by an interest in people *and* their socio-material obligations, then the convergence/ divergence tension takes on new significance. Knowledge is no longer simply or narrowly 'socially robust' or accountable to an extended social realm, but also socially *and* materially robust and therefore able to diverge and converge around people and those obligations. Moreover, in adopting divergent issue-publics, defined with and by their human and nonhuman attachments, cooperative research can potentially start to redefine what counts as common good, and provide the opportunity for opening up controversies or making sure that current predicaments are not closed down too quickly (Stirling, 2005). In this sense it is a political process – pursuing collective action and agreement but also opening up previous settlements to new interrogations.

A particular interest in this paper is the extent to which this politics of cooperation can move past a governance model wherein parties are drawn together as stakeholders and are expected to negotiate their stake in order to reach a solution. Rather, in maintaining the links between participants and their nonhuman 'obligations' (Stengers, 2010b), the forms of cooperative research undertaken here are more likely, we argue, to diverge from established norms, to focus on the arts of linking issues together and to a more speculative process wherein there is a possibility to empower a situation, to, as Barry suggests, generate links between specific issues and cases and more general conditions of operation (Barry, 2013). This divergent and generative aspect of cooperative research courses through the paper and we return to it in the

final section not only as a means to reflect on our own work but also to offer some normative guidelines for what counts as good cooperative research in future.

We now move to describing cooperative research in action. Our aim in doing so is to map out some of the contrasting *potentials* for cooperative forms of research to produce non-convergent knowledge and to change the questions regarding environmental issues.

Doing cooperative research

Following the definitions of cooperative research crafted by Stirling and colleagues, a project, entitled Cooperative Research on Environmental Problems in Europe, was funded under the Framework 7 Science in Society Programme of the Commission and involved Civil Society Organisations (CSOs)[3] acting as lead partners in the co-generation of environmental knowledge on various topics including biofuel expansion, agro-ecological innovation and water use. Table 1 summarises the studies, which were supplemented and linked by transversal analyses of sustainable agriculture. The involvement of CSOs served two main purposes. First, by having CSOs as research collaborators and leaders, the distinction between knowledge producers and users would be overcome. Rather than simply receive the results of research, CSOs shaped their own research questions and methods (DG-Research, 2009). Second, CSOs could take advantage of pre-existing or nascent networks in order to generate knowledge more effectively, allowing academic partners access to emerging publics that were otherwise inaccessible or time-consuming to generate.

[3] CSO can be used to describe a variety of organisations including so-called economic operators. Here we broadly follow the Commission's Science in Society definition of CSOs as organisations which are non-governmental, not for profit, not representing commercial interests and pursuing a common purpose for the public interest. However, we would question the notion that there can be a single 'common purpose' or 'public interest'. Indeed, we would go further and argue that many of the CSOs in this research would not consider themselves as 'representatives' of society – they were rather active and sometimes radical conduits for particular publics.

CSOs meanwhile would benefit, it was argued, through association and guidance from academic partners based at universities, as well as qualifying through this association as research organisations and recipients of research funding.

Table 1: Studies within the CREPE project (http://www.CREPEweb.net)

Lead partner organisation	**Title and description**
Transnational Institute (TNI-NL)	**1) Biofuel production in Europe and the global South** Investigated the social and environmental assumptions and consequences of recent EU policy promoting the expansion of biofuel crops, especially for energy export from the global South to Europe.
Fondazione dei Diritti Genetici (FDG-IT)	**2) CSO participation in community supported agriculture** Engaged in community-supported agriculture developing and evaluating alternative means of growing and distributing food in an urban context.
Food Ethics Council (FEC-UK) + Fundación Nueva Cultura del Agua (FNCA-ES)	**3) Water scarcity and its virtual export from Spain to the UK** Investigated the potential cross sector interventions that can address invisible water exports embedded in agri-food products.
Fédération Régionale des Centres d'Initiatives pour Valoriser l'Agriculture (FR)	**4) Local agri-food networks and their environmental effects in Brittany** Investigated the environmental impacts of agri-food networks and analyses related government policies and initiatives.
Radboud University Nijmegen (RU-NL)	**5) CSOs' interventions into agri-environmental issues** Analysed diverse experiences of CSOs' interventions into research, the key opportunities found and the difficulties encountered, as a basis to inform future efforts.
Fondation Sciences Citoyennes (FSC-FR)	**6) European Research Area (ERA): agri-environmental research priorities** Analysed how the ERA favours some research priorities for agri-environmental issues over others.
Open University (OU), UK	**7) Innovation narratives in European agricultural research** Analysed how research agendas define societal problems in ways justifying specific innovation pathways and research priorities.

Open University (OU), UK	**8) Cooperative research processes in CREPE** Analysed cooperative processes and relationships within the project.

In what follows we review two of the cases in the CREPE project (1 and 3 above) before returning to a broader discussion of the opportunities provided by working cooperatively. The first case was led by the Transnational Institute and involved an investigation into the socio-material commitments involved in biofuel development. The second was led jointly by the Food Ethics Council and the FNCA in order to interrogate the cooperative potential for reducing water extraction and virtual water exports (in the form of salad crops) from Spain to the UK. Each study had its own style of doing cooperative research, and so offered insights into the opportunities and difficulties of this style of research. The selection of the two cases for this paper has been made on the basis of the contrasting processes and productions that the two projects developed. While the TNI-led study evolved into the generation of a new, international agrofuels public, the FEC study was more conventionally concerned with generating new resource knowledge. Both in turn, one by design and the other despite their best intentions, opened up new kinds of social innovation. The cases therefore demonstrate the tensions between convergence and divergence and allow us to reflect on the challenges and opportunities that cooperative research generates.

All of the cases benefitted from a series of crosscutting project meetings at which CSOs commented on each other's research, and university academics contributed to issues of research design and analysis. As well as contributing to the research in terms of attending workshops and meetings with CSO research teams, the academic partners also studied the cooperative process itself. Each study submitted research diaries to the academic team in order for the latter to analyse the cooperative process at a distance, a method supplemented by project level meetings, telephone interviews

and workshop attendance. The following accounts of the cooperative research process are drawn from this partial inclusion and meta-study of the cooperative research process (Oreszczyn et al., 2010). It should be noted that in a study such as this, a major methodological challenge involved maintaining regular and in-depth contact with each case study. In most cases the accounts of the research processes have been assembled from diaries, from study reports and notes on the cross-project meetings and checked with personnel involved. The data was therefore dependent on the quality and quantity of information provided by the project partners (most of whom were not used to ethnographic styles of recording), and was derived from already-processed and reflexive accounts of events in a form that was necessarily one-step removed from some of the practices involved in generating knowledge. The following narrative is therefore reconstructed from these accounts and reports as well as the notes of the academics involved.

From Biofuels to agrofuels

In 2010 the European Industrial Bioenergy Initiative was announced with €9billion funding. The aim was to "ensure quick market uptake of sustainable second-generation biofuels" (ECC, 2010: 19). Conscious of the costs of fossil fuel dependency and of the requirement to ensure both securities of supply and the competitiveness of the European knowledge based bio-economy, the EIBI involved investment in innovation in plant-based biotechnologies and their subsequent uptake or entry into energy markets. The aim was large-scale sustainable biofuel production, much of it based on the utilisation of so-called marginal land for biofuel crop production in the Global South. While the ongoing review of the impacts of this expansion on what were called 'indirect land use change' (ECC, 2010: 19) were mentioned in the report, the tenor of this document was optimistic. Reiterating the

confidence and urgency of the 2009 Renewables Energy Directive and its 2011 successor, an acceleration of biofuel expansion was deemed achievable through the technical development of plant-based products and management of land resources to ensure both commercial success and environmental sustainability[4].

Meanwhile a much smaller study was exploring some assumptions that the EU expansion model took for granted. Funded through CREPE, it formed a different public, and proposed a different market for energy. Researchers at the Transnational Institute (TNI), a civil society organisation based in The Netherlands, led the study. In conjunction with academics and with non-researchers (in this case activists and farm workers), the study aimed to explore in detail the ecological and social effects of biofuel expansion.

TNI was able to draw on pre-established CSO networks including the Food First International Network (FIAN) in order to make contacts, initiate networks and/ or connect to movements in three case study countries (Germany, Brazil and Mozambique). The controversy surrounding biofuels had attracted activist-researchers from many backgrounds - including land rights, environmental justice, human rights and food sovereignty – so the study drew upon their reports, wider knowledge and international contacts. These knowledge networks helped the study to document the rural experiences of biofuel production, and in turn provided a challenge to the technical version of agro-industrial expansion.

[4] In contrasting the cooperative research processes in Crepe with more established or 'technical' solutions to resource issues we are conscious that we are being un-symmetrical in our treatment of knowledge practices. To be sure, there will have been cooperative elements to this knowledge too, but the conventions of a knowledge society, and the translation of that knowledge from the core to the periphery without adequate qualification 'on the ground' seems to mark out these forms of knowledge. We thank an anonymous referee for pointing out the asymmetry in our account.

So, for example, the Mozambique study involved establishing links with the National Peasant's Union (Uniao Nacional do Camponeses, UNAC), who hosted the research and facilitated interviews with peasant farmers. Obtaining national biofuel plans and interviewing government officials on the proposals, the lead researcher was subsequently able to analyse the development plans together with union members. In the analysis, this cooperation highlighted how expansion would continue a pattern of unjust and export-led development, with little obvious benefit to the rural population. Moreover, as became apparent during a workshop hosted by UNAC in Mozambique, there was already a general pattern for biofuel investment to focus on the most productive land, contravening the EU assumption that biofuel expansion would not displace food or threaten bio-diversity. As participants were keen to point out in the field, *Jatropha curcas* had been widely promoted as a 'miracle crop' because it needed little water, and produced oil-rich seeds that can be processed to produce biodiesel. On this basis, peasants in Mozambique had cultivated *Jatropha* on arid land, but with disappointing results unless the crop was irrigated. The farmers' investment of funds and labour gained no commercial return. At the same time, energy companies had selected sites for *Jatropha* that were on or close to food producing land. The result was crop displacement and / or a diversion of scarce water supplies from food production (Franco, 2009). In short, EU policy assumptions concerning positive sum biofuel cultivation (with no impact on already cultivated land, food crops or scarce water resource) were questioned from the experience of the farmers. The research had raised significant questions in terms of the status, amount, usability and location of marginal land and thereby the potential of biofuel to replace fossil fuels without significantly affecting food availability and ecological value. In

the terms used earlier, participation through the CSO networks had produced socially and materially robust knowledge concerning the cultivation of biofuels.

Potentially of more significance for this case in terms of the transformative capability of cooperative research, TNI had also started to form a new biofuel public. With extra funding they managed to link together research activity in Brazil, where there is a long and contested history of biofuel production, and Mozambique where biofuels were in the initial stages of production, through a participatory workshop attended by members of various CSOs linked to the biofuel issue. The international workshop in Maputo, Mozambique,

> "attempted to foster active participation and exchanges, particularly among and between grassroots activists from two broad areas – the environmental justice movement and the agrarian justice movement. The idea was to give space especially to those from social movements to learn, share and articulate their own points of view on the issue. The workshop also sought to deepen links between activists and researchers, including those from social movements. It aimed to analyze trade and investment links among countries, as a basis for joint research and advocacy across countries" (Franco, 2009: 3).

Attendees from southern African states focused on the role of European and Brazilian investment companies as well as local elites in the development of large-scale biofuel plantation at the expense of peasant livelihoods and ecological quality. The experience of Brazilian landless labourers as unpaid 'employees' of large Brazilian energy companies provided salient warnings of what can happen in globalised biofuel commodity networks (see also McGrath, 2012). But there were also examples from Brazil of alternative forms of agricultural production with small-farmer cooperatives

using agro-ecological methods in ways that allowed for a significant role for farmers in biofuel development and a share in its successes. A practical outcome of the research was the realisation that there was clear benefit in coordinating research and knowledge exchange between farmers and CSOs in Latin America, Africa and Europe as a means to share these experiences and foster mutual learning. Here the novelty of the research was the shift from technical to explicitly socio-technical forms of innovation, a pathway that could be generated through new and creative alliances.

Finally, and in relation to this shift to socio-technical innovation, the research highlighted and utilised the CSO-generated distinction between biofuels and what they called agrofuels (Transnational-Institute, 2007). The latter were clearly associated with monoculture production and the establishment of an integrated agro-industrial complex with land in the South acting as a fuel pump for an energy-demanding North. The agrofuel concept freed up further invention with respect to the development of biofuels in ways which were conscious of social conditions, and involved debate on the possibility for a different resource model. The latter might include not only the growth of biofuel crops as raw materials, but also the development of on site and cooperatively-run refining and generation capacity.

In analysing the achievements of this study within CREPE it is worth comparing the European Industrial Bioenergy Initiative (EIBI) with the TNI led approach to the agrofuel issue. Within the EIBI there was an assumption of an apolitical issue, requiring investment to speed up the technical development of resources (plants and growing technologies or land management), refinery processes and marketing. In contrast, the TNI study used cooperative processes to generate a transnational public and in doing so started to reconstitute not only the issue but also the materials and

economies onto which the issue is mapped. Whereas EIBI treated research as re-organising a largely passive social and material world into more productive forms, in the TNI led research, material and social processes emerged in new form. Here 'miracle crops' failed for lack of irrigation. Water was diverted from food production. Land was appropriated through deals that had few links to those living on the land and to those who knew how the land worked.

In short we would highlight two novelties. First the cellular structures, plants, soils and cropping systems *that are central to biofuel production were re-socialised, which means that they became more material, they mattered more, as a result*. Engaging farmers as knowledgeable producers rather than as labouring factors of production changed the knowledge base and opened up new opportunities for biofuels. Second, the development of international knowledge networks provided new possibilities for economic organising as experiences were shared. The novelty here was the possibility for social innovation and the generation of a new biofuel public that crossed continents, bridged divides between north and south, and between producers and consumers. As such, the TNI-led research illustrates what Born and Barry (2010) call a public experiment. This public is not interpellated to the innovation. Rather, it is performed or enacted through the research. It conformed we would argue to "an experiment through which public, knowledge, and their relation were expected to emerge in a different form" (Born and Barry, 2010: 115). This form included a re-socialised materiality, a re-configured network of actors and, subsequently, a potentially re-charged biofuel politics.

Water scarcity: Cooperation across states

Our second example from CREPE involved two CSOs, the Food Ethics Council in the UK and the Fundación Nueva Cultura del Agua (FNCA) in Spain, working together to lead a study on water scarcity. The two CSOs were based at two ends of a water-intensive salad crop food chain, linking production in southern Spain with consumption in the UK. They set out to investigate the extent to which water scarcity issues in Spain, which are linked to the irrigation of salad crops and the export of virtual or embodied water from Spain to the UK (Allan, 2003), could be solved through a cooperative effort to link producers, wholesalers, retailers and consumers along the chain.

The study was focused on Almeria in southern Spain, where hydrological expertise at FNCA had confirmed that a majority of aquifers within the region were over-exploited. Extraction was most marked in the agricultural produce sector, with the 'thirstiest' sub-sectors involving the vast acreage of greenhouse farming in the southwest and open-area irrigated farming in the northeast of Almeria. The extracted water was destined for overseas markets, embedded in salad crops and the study calculated the resulting virtual water flows from Almeria to the UK for two major crops: tomatoes, as the main horticultural export (produced mainly in greenhouses) and lettuce, as the most valuable export of the open-area irrigation. "In 2004 Andalucía exported 22 hm^3 of virtual water embedded in tomatoes, of which 19 hm^3 came from Almeria. In the case of lettuce, Andalucía exported 2 hm^3. (As a comparison, the whole city of Almeria used only 2 hm^3 in that same year)" (Ripoll, 2010: 2).

The study developed against a backdrop of a business as usual solution. Regional policy has traditionally favoured investment in developing water supplies through desalinisation plant. The plant, often co-funded by the European Union, have significant costs in the form of energy intensity, land take, carbon dioxide emissions and salt residue waste disposal. Moreover, they may not provide a sufficiently cheap supply of water to displace over-reliance on aquifers. The CREPE workshops, which were attended by farmers' groups, wholesalers, UK retailers as well as other CSOs in Spain concerned with ecology and environment, started with a review of the effectiveness of these supply-side solutions. The CSOs raised questions regarding their current, and medium to long-term, efficacy. Far from replacing groundwater abstraction, desalinised waters were currently used, they argued, to supplement water supplies, with farmers increasingly driven to use more water to meet the demands from competitive international commodity markets. Arguing that increasing water supply did not, on its own, guarantee ecological gains in terms of freshwater ecology or longer-term water security, workshop attendees agreed to explore alternative means of reducing aquifer use.

So, in contrast to capital-intensive, supply-side solutions, the CREPE study explored demand-side approaches to water management. The starting point was the concept of water stewardship, defined as a shared responsibility for water extraction across a range of actors and environments and the "objective [was] to create positive partnerships between water authorities, farmers, government, industry, civil society and retailers", with CSOs acting "in the interest of local water ecosystems" (Ripoll, 2010: 2). To this end, the researchers designed a two-stage workshop to focus on a specific case - leaf vegetables produced by *Primaflor* in northeastern Almeria to *Marks and Spencer's* shelves in the UK. The workshops used several techniques

including reflective deliberation and scenarios, and employed water flow calculations to develop debate. While the stewardship concept seemed to require a degree of mutual agreement, the FEC and FNCA researchers made it clear at the outset that the research process should be based on open discussion rather than assumed consensus and so participants were encouraged to raise any relevant concern. In this sense, while the language of stakeholders was used throughout the study, there was a clear steer for all of the participants to act as spokespeople (Latour, 2004, see later and Stengers, 2010b for the distinction between stakeholders and spokespeople). That is, rather than surrender their interests or obligations as they entered the workshop and assume a collective 'stake', they should maintain and speak of their entanglements with nonhumans as diverse as river ecologies, soils, profit margins and consumer prices (Stengers, 2010b, Marres and Lezaun, 2011). Consequently, and first, the workshops produced agreement over the requirement for collective stewardship to reduce water use, establishing that cooperation was necessary across the product chain if real water conservation gains were to be made. However, and second, the ability to act as spokespeople rather than stakeholders meant that narrowly-defined technical solutions to the issue were rejected and replaced by a more politically charged water situation.

In terms of the first issue, a regulatory response led by UK supermarkets, proposing water-management standards on food products, could be counter-productive in the absence of producer commitment or capacity. It could easily lead to large-scale disinvestment in Almeria's agriculture, with a disproportionate effect on smaller operations and with excess water capacity being taken up by leisure and tourism uses. Likewise, producer-led savings without consumer involvement might do little to reduce overall water use, as consumption could continue to rise with little overall

effect on total water abstraction. So some level of agreement to co-ordinate action would be necessary to safeguard rural income and aid water conservation.

The second issue came clearly into focus once farmer and retail-related participants agreed on a prospective solution, water use efficiency gains, through a reduction in water use per unit of product, which would lead to cost savings for farmers and subsequently retailers. This seemed to offer 'stakeholders' a useful compromise and way forward. For the environmental and ecological spokespeople, however, this solution offered little respite for the aquifers, no protection for freshwater ecologies and could not guarantee sustainability. Indeed, environmental CSOs involved in the research repeatedly raised the concern that greater water-use efficiency had already stimulated further aquifer depletion by expanding cultivation. Any gain in efficiency would thereby need more pro-active regulation in order to offset macro-economic incentives to increase production and water use.

This requirement for, and the difficulties of, water regulation were reinforced through an exercise designed to elucidate the power dynamics relevant to water use. Over two workshops, participants were asked to reflect on the constraints and opportunities for action, focusing on their ability to "influence or generate change in others, their capability to shape their own livelihood outcomes and their ability to mobilise with others to promote particular policy changes" (Ripoll, 2010: 24). It was clear from the resulting maps of responsibility and power that regulatory capacity was currently limited. So as UK supermarkets specified products and year round production, farmers and confederations of irrigated water users resisted changes to water pricing and regulation, in turn exerting political leverage by mobilising political sympathies in a region where agricultural production was widely viewed as central to socio-

economic well-being. Policy makers and authorities like the newly formed Andalusian Water Agency were seemingly caught in a web of resource over-use. Tracing these powers allowed the cooperative researchers to re-conceptualise the water use environment as embedded within a variety of political, social and ecological relations.

In analysing the processes and results of this cooperative endeavour we would highlight the following. In designing deliberation for water use, the aim and the result was not to produce consensus or agreement. Rather the study highlighted different logics and obligations amongst the participants. Unilateral action by retailers would have unintended consequences for producers, while the CSOs acting as spokespeople for water ecosystems highlighted tensions between efficiency-led and water conservation strategies. If efficiency made sense in terms of unit costs and sales, greater regulatory and water-related social reform would be necessary for aquifer replenishment and restoration of freshwater ecology. This divergence also illustrates the politics of CSO involvement in research. The study aimed to understand the practices, drivers and environments of water users, along the chain from farming to retailing, as a potential basis for addressing the water scarcity situation. As a result of its breadth, the study generated a range of matters (from farm gate prices to riparian ecology) that were not easily assimilated into a coherent, consensual strategy. The water ecosystems weren't easily incorporated into the commercial logics of retailers and suppliers, and so neither were those CSOs who were committed to understanding and acting for those ecosystems.

As an outcome of a cooperative process, divergent institutional logics highlighted *different* social and material norms around key areas of practical disagreement.

Parties could hold other participants accountable by being allowed to maintain their attachment to ecology, wholesale prices and so on. The subsequent exploration of the social and political embeddedness of water users highlighted the requirement for social, political as well as technical innovation in order to address water scarcity.

Discussion: Towards a politics of cooperative research

In this final section we reflect on the cases presented here as well as expand on the conceptual resources signalled earlier in the paper in order to discuss the characteristics of what makes for good cooperative research in the future. Our aim is both to provide further reflection on the empirical cases as well as offer lessons for doing cooperative research.

In both the agro-fuel and the water examples we have detailed the generative aspects of cooperative research. The agro-fuel study was more self-consciously transformative. Led by a CSO with an explicit objective to expose social injustice and to work towards more equitable forms of economic development, the research activity generated a new agrofuel public. The water case study was led by an organisation that was avowedly less oppositional, and more oriented to working with existing institutions and market arrangements in ways that produced more ethical and sustainable outcomes. The design of the research reflected this and was in that sense more oriented towards a convergent, common good. Nevertheless, once participants could act as spokespeople as well as people with a shared stake, then the troublesome human and nonhuman attachments (market margins, aquifers, voters) started to produce new knowledge outcomes. Rather than converging on a pre-existing common aim, or collectively establishing the right answer, the research process opened up water politics. The result was characterised not by agreement but by

antagonisms that were nevertheless recognised as legitimate by all parties. As radical democratic theorists would have it, the resulting agreement to differ allowed for a recognition that no one solution exists to the water scarcity issue (Mouffe, 2005). The result may be less comfortable for those who seek to govern water resources through quick fixes, but the value of this more agonistic mode of cooperation lies in the ability to navigate rather than deny or efface the socio-material complexity of the issue.

This assessment relates to a core aim of this paper, which was to emphasise the value of this generative aspect of cooperative research. We suggested at the outset that value lies in two, albeit fragile, potentials. First, the ability of cooperative research to open up and thereby politicise knowledge and, second, its related capability to "bring nonhumans into the political fray" (Stengers, 2010b: 20). We have already suggested the ability of the cooperative research process to generate new conditions for politics, either through the production of new resource publics or in the development of an agonistic space for water politics. But it is the role of spokespeople, their human and nonhuman attachments and the potential to transform political situations that requires further elaboration.

In the CREPE project and in the cases reviewed here, CSOs acted as spokespeople for diverse human and nonhuman collectives. This was, as we have noted, rather different than acting as stakeholders, or representatives of a public. For one thing, it can produce a public that is exercised by its attachments in ways that can make a difference. In the TNI led research, for example, plants, water and soils became re-entangled with labour and production systems in ways that differed from the conventional formatting of materials and social conditions. Rather than elements to be regulated and drawn into a value chain, they combined to trouble any simple

production model. For another, these attachments are not matters that are surrendered or willingly sacrificed as parties negotiate their differences and agree a shared stake. In cooperative research as opposed to democratic governance, the pressure to negotiate one's stake is potentially reduced. FEC researchers successfully involved participants in a deliberative research process, while disavowing any aim to achieve a narrowly defined consensus on water management. Any compromise on water use around the seemingly neutral notion of efficiency would produce a solution that for some participants would be unpalatable. In this sense the water situation was not resolved but was charged with the politics of water extraction and use.

So, cooperative research with CSOs points to the range of commitments that animate research situations. These may include commitments to social norms (justice for example) but also the ties to nonhumans of various kinds (ecologies, landscapes, soils and so on). Stengers uses the term obligations, the knotted ties that have evolved out of shared practices, to suggest the importance of nonhumans in a wide variety of knowledge practices (Stengers, 2010b, Stengers, 2010a). To be sure these are not ties that are unthinkingly followed, they are relationships that force people to think, create and invent. For Stengers, this focus on the obligations that force thought and hesitation leads to a junction. One 'realist' branch reduces obligations by turning spokespersons into stakeholders, with the latter ready to negotiate their stake and thus loosen the knot of relations that initiated their involvement. This is the threat of governance, which strips participants of their diversity and ties. "We deal no longer with politics but with governance - with situations deprived of the power to force thinking as they are defined by stakeholders' vested interests" (Stengers, 2010b: 20). The alternative branch is 'speculative'. Here the onus is on divergence and the subsequent, *careful* generation of links and allies, forming knowledge networks that

would demand only that practitioners present themselves in terms that are not pre-set by the majority or the norms of the day. In this speculative register, CSOs are not, as Foucault (1991) might have had it, irreparably subject to the civilising tendency of society, but can and should be encouraged to develop research that is obligated to the things that force them to think.

The drawing together of issues and concerns, without surrendering or being unfaithful to their provenance in particular obligations, requires specific skills. Latour and Stengers refer to this as diplomacy, an art of linking together that is cognisant of the heterogeneity of the 'social' and the violence that is committed when convergence is forced through a single mode of truth (Stengers, 2011, Latour, 2013). This is, to be sure, a speculative and experimental process, one in which those cooperating take risks. But it can allow particular issues and concerns to generate and /or facilitate a political situation. The latter involves the relation of an issue or matter to other similar cases and an ability to form alliances with those for whom the convergent (or majoritarian) solution endangers their commitment to the people, ecologies, objects and artefacts that motivate them. In linking the agrofuel research to issues of social justice, to the plight of workers in Brazil as well as to ecological issues, TNI researchers started to produce the kinds of configuration that could generate new knowledge and challenge business as usual biofuel politics. The grabbing of non-marginal land and water in Mozambique is related to the plight of landless and unwaged labourers in Brazil and to a wider critique of energy capitalism. Cooperative research, in this example, involved a linking together through what Barry (2013: 81) calls a logic of abduction, where individual disputes (like the Jatropha example) are related to an evolving political situation not through their specific detail but through their power to open up or suggest questions surrounding more general conditions of

operation (Barry, 2013: 81). To repeat, cooperative research in this sense provided an opportunity not so much to empower participants, but to assemble people and things in ways that might empower a situation. The study led by TNI certainly proceeded through this logic of abduction, using the agrofuel label to mark a broader political collective. The basis for generating a situated politics of water is less clear, but the opening up of issues around political power indicates a possible lever for a reanimated more agonistic water politics.

This transformative potential of cooperative research and an ability to generate knowledge that can empower situations suggests a need to relax the spatial coordinates of cooperation. Rather than assuming that cooperative research requires participants to work together in "*close* cooperative engagement" (Stirling, 2006: 32, emphasis added), it may involve the production of knowledge spaces that challenge conventional spatial formations (Amin and Roberts, 2008c, Amin and Roberts, 2008b). People and things are not necessarily brought into physical co-presence or rendered socially proximate in cooperative research. There are tensions and absences, things that don't fit and matters that require creative struggle (Featherstone, 2008). In short, co-operating is a struggle that may require forms of co-presence but ones that are both conscious of and can help to foster other spatial arrangements. As we have stated, cooperative research cannot assemble a public and simultaneously disengage them from the social and material conditions of their lives (Marres and Lezaun, 2011). 'Closeness' cannot come at a price of distancing participants from their obligations. A possible avenue for further research here is for geographers and others to develop a typology of the spatial practices that are involved in working together. Here the re-invigorated communities of practice literature wherein communities gain more from

their heterogeneity and creative struggles than from a closeness or conformity, would provide a useful resource (Amin and Roberts, 2008a)

Conclusions

We have explored what it means to engage with the kinds of knowledge practice that Brunori and colleagues, like many others, invest in as a means to generate novel approaches to current and shared predicaments. Cooperative research, and participatory methods in general, are characterised by both the will to converge and the potential to diverge from current practices or solutions. If cooperative research is to become established as an approach that can seriously offer novel forms of knowledge then its ability to generate socially robust or accountable knowledge *and* its capacity to generate novelty need to be nurtured. In the introduction we set out to do two things. First, we aimed to discuss the potential for cooperative research to generate new or divergent forms of alliance and knowledge. Second, we sought to emphasise the value of this generative activity. In our engagement with the cooperative process and using two cases we have noted how the generative and transformative elements of cooperation are best served when we shift register from a predominantly social reading of participation (empowering people) to one that involves socio-material knowledge practices and attends to the arts of relating those practices together (the empowerment of situations). Abandoning a vocabulary and spatial imagination of co-presence and social proximity, we need to explore the possibilities for and potential of a suite of spatial practices that make new knowledge possible. In this way cooperative research can realise its novelty.

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