Environment and Planning D: Society and Space 2005, volume 23, pages 673 – 693

DOI:10.1068/d353t

Caught between the cartographic and the ethnographic imagination: the whereabouts of amateurs, professionals, and nature in knowing biodiversity

Rebecca Ellis, Claire Waterton
Institute for Environment, Philosophy and Public Policy, Furness College, Lancaster University, Lancaster LA1 4YG, England; e-mail: r.ellis@lancaster.ac.uk, c.waterton@lancaster.ac.uk
Received 6 October 2003; in revised form 22 December 2003

Abstract. In this paper we document current research into new forms of public engagement presently taking place in UK biodiversity policy. This involves locating the main participants in such patterns of engagement; namely nature, amateur naturalists, and professional biologists and conservationists. Two interwoven and mutually interdependent perspectives or 'imaginaries'—the 'cartographic' and the 'ethnographic'—are presented in the paper to explore the shaping and interpretation of such new forms of engagement. However, in this context the interest lies in the ways in which either perspective is foregrounded or backgrounded by the different parties involved. The described shifts and movements of a range of actors and processes being studied demonstrate the fluidity and instability of networks of 'knowing nature well', whose stability is often assumed. The tracing of two constants—expertise and exchange—within networks inhabited by nature and by amateur and professional naturalists allows for an exploration of ways in which social/natural inclusions and exclusions occur in new participatory practices designed as part of biodiversity action planning.

Introduction

> "Unlike the laboratories of physics or chemistry, the natural world appears to belong to everybody. At least in principle, anyone with normal capacities is supposed to be able to contribute to the advancement of natural history. Moreover since the field of investigation extends all over the world, professional naturalists have long been aware that they need the help of well-disposed volunteers to collect rocks and fossils, report on bird migrations, and similar phenomena. Despite—or perhaps because of—this need, cooperation between these groups generated increasing tensions. These are epitomized by the semantic switch—at least in the English language—in the term 'amateur' toward the end of the nineteenth century. The old positive meaning of 'connoisseur' has gradually been overthrown by the pejorative sense of 'dilettante' emphasising a lack of seriousness and reliability."
>
> Drouin and Bensaude-Vincent (1996, pages 417 – 418)

In this paper we look at a series of relationships that have developed and are being reforged in efforts to know the natural world. This is happening in a contemporary policy climate where the 'participation' of amateur naturalists is seen as key to 'knowing nature'. The study we report in this paper involves locating the main participants within such relationships: namely, nature, amateur naturalists, and professional biologists and conservationists. As with most networks, the global and the local, the historical and contemporary, dimensions are relational and mutually constitutive: boundaries between these categories are historically and culturally shaped, thus tending towards malleable rather than static structures. Although we are at pains in this paper to highlight continuities with *past* networks, what we describe is in many senses an observably *new* network-in-the-making, designed by professional conservationists to bring amateur naturalists into a closer relationship with a specific genre of conservation

policy—biodiversity action planning (BAP). In this paper we describe some observations made of new participatory processes taking place within BAP—an area of policymaking with which many British naturalists have only recently engaged.

BAP, of course, is a relatively recent phenomenon. It has existed as a concept since around 1992 when the UN Convention on Biological Diversity emerged as an outcome of the 'Rio Earth Summit'. As part of that international agreement over 150 national signatories were required to devise strategies, plans, or programmes for the conservation and sustainable use of 'biodiversity[1] within their territory. In January 1994 the British government published *Biodiversity: The UK Action Plan* (HMSO, 1994) and a good portion of statutory and nongovernmental (NGO) effort and activity was subsequently directed to the issue of *knowing* the distribution, health, and status of natural species and natural habitats found at large within the United Kingdom.

As professional conservationists and policymakers drew up both habitat lists and species lists for BAP in the early 1990s, knowledge gaps for both dimensions were quickly revealed. The majority of gaps related to groups of organisms that are unusually difficult to identify and thus 'underrecorded' in the United Kingdom. Conservationists urged an increased effort to monitor, record, and fill the gaps in knowledge. However, it was also known that this filling of gaps could not be achieved through the person power of the statutory and NGO agencies. The focus of our own enquiry relates directly to this deficit of actors within a contemporary knowing-nature network.

We are presently engaged in a multisited ethnographic study (Marcus, 1995) of an English Nature[2] – Natural History Museum initiative[3] which seeks to obtain data to fill these gaps by harnessing the knowledge of British amateur naturalists and other volunteers into a form usable by policy. In the design of this initiative, naturalists were known to be dispersed geographically throughout the country, already making observations of the natural world on a regular basis, and often engaging in interesting and sometimes obscure specialisms. Naturalists were therefore considered to be quite special. In addition they were becoming as rare and sought after as the organisms they were intent on studying—the harnessing of their knowledge and data was imagined in the context of a wider concern about a growing deficit of people who have the expertise to know nature well (*The Guardian* 2003).[4]

Multisited ethnographic methods (specifically participant observation and semi-structured interviews) take us within and between various sites within the newly extending participatory frameworks we have outlined above. As part of our 'fieldwork' we witness the different worlds of naturalists, as they share with us the intimacies of knowing nature: recording centres as locations where data are standardised and validated; museums where we observe taxonomists and curators working

[1] The genesis of the term 'biodiversity' has been explored by Takacs (1996). Its ability to straddle the affective and the scientific search for data is central to Takacs's analysis. Its hybrid biological – policy used has now become somewhat normalised, yet it is striking how little the term is used outside specific contexts and how, for example, naturalists rarely use the vocabulary of biodiversity.

[2] English Nature is the English statutory body for nature conservation.

[3] The research we refer to is an ESRC-funded study that began in 2002. The research focuses on an English Nature – Natural History Museum initiative (2001 – ongoing) which was designed as an exercise to harness the efforts of volunteer naturalists with the aim of enhancing BAP.

[4] A House of Lords Select Committee recently reflected on the fragility of scientific networks as an underpinning to nature conservation (House of Lords Select Committee on Science and Technology, 2002).

with quantities of voucher specimens;[5] and civil service offices where policy is in part drawn up, implemented, and assessed. Our access to multiple locations is important within the knowing-nature web we are studying; it provides us with a view of the connections and disconnections between different places and modes of engagement, a view which may well have been restricted if we had chosen to stick to a more conventional 'single-sited' form of ethnography. What we observe in the following pages are ways in which we have learnt about different ways of characterising the participatory initiative we are studying. We are presently trying to understand the different perspectives of those *orchestrating* the participatory exercise (the statutory agency civil servants and the Natural History Museum scientists) and those *taking part in it* (amateur naturalists and bits of nature). We are also affected in such a way that we absorb these perspectives, we become involved in them, we sometimes act according to them. We describe ourselves, thus, as being 'caught' between (at least) two strong imaginaries—the cartographic and the ethnographic—as we carry out our study. We explain this in more detail below.

Cartography and ethnography as ways of making sense of participation

In the course of our ethnography (which is ongoing at the time of writing) we have noted several things about the nature of the design of the English Nature – Natural History Museum participatory initiative: it is both potentially *complexifying* and simplifying. On the one hand, it is designed to bring in wider networks of previously excluded communities of knowers (Callon, 2002, page 192), whilst, on the other hand, it needs to discipline and streamline new inclusions in order to map onto existing frameworks (page 192). Complexification and simplification exist as a dynamic and make sense only if understood as forming a necessary tension.[6] But how do complexification and simplification, seen as the extension and restriction of boundaries of inclusion, actually take place in practice?

We suggest that the extension of networks of knowing nature—which is in principle a complexifying process—is informed by a cartographic imaginary that actually transforms and perhaps limits complexity. The notion of participation we hear about within the institutional-policy context tends to assume a 'regional' coherence, whereby "the world takes the form of a flat surface which then may be broken up into principalities of varying sizes" (Law and Mol, 2001, page 16). The imagined space of 'participation' in BAP planning thus seems to relate to what Law and Mol term 'Euclidian space'.[7] Such a flat topographical space is assumed by the very notion of obtaining centralisable, accurate records of the *distribution* of certain BAP species across the United Kingdom.

[5] Voucher specimens are the physical specimens of a species which accompany written species records. They provide a backup, a means of validating the written record. The bulk of museum collections 'behind the scenes' are made up of cabinets crammed full with drawers of arranged voucher specimens for amateur and professional perusal.

[6] To suggest a parallel, there is a growing literature on participation which examines the implicit promise of *symmetry* embedded in the process of inviting 'others' to participate in established social – epistemological networks. Much of this literature is increasingly critical of the depth of such a promise and looks at participatory practices to try to disentangle the knowledge politics and *asymmetries* embedded within participatory schemes (Agrawal, 1999; Goodwin, 1998; Kothari, 2001; Mosse, 2001).

[7] See also Anderson (1991), who writes about the role of maps in shaping the imagination with their depictions of flattened, continuous, and horizontal space. The dimensions of such maps cannot accommodate the nonsensical 3-dimensional to 4-dimensional 'cosmological' maps of participants dwelling and moving within the spaces displayed (page 173).

Another assumption which we perceive as being embedded within the (potentially complexifying) notion of participation in the UK BAP is the idea that "objects with three dimensions are imagined to exist precisely within a conformable three dimensional space" (Law and Mol, 2001, page 6). Such objects, within the participatory imaginary we describe, are records of species, made upon record cards, in topographical spaces. They are assumed, as Law and Mol describe, to be able to "be transported within that space without violence so long as they don't seek to occupy the position of some other object" (2001, page 6). In our research context, such records are supposed, of course, to be transported from amateur naturalists assumed to be dispersed throughout the United Kingdom, to people called 'lead partners'[8] who gather together once a year to centralise the data they have 'harvested' in BAP policy meetings. Thus within this potentially complex process a specific (and simplified or reductionist) spatiality is presented within the imaginary of participation sketched. This is a spatiality which posits a topographically knowable nature and an imagined centre, which itself contributes to a constellation of (nation-based) centres culminating in the global (symbolised by the events of the decennial Earth Summits).

Not only is there an implicit spatiality embedded within the English Nature – Natural History Museum initiative, but also an imagined temporality appears to be playing out within the participatory vision. As the quotation at the beginning of this paper implies, this is not the first time volunteer or 'amateur' naturalists have been enrolled into professional networks. We can only hint within the scope of this paper at the way in which the present fluxes and shifts of identity and knowledge-making within the English Nature – Natural History Museum participatory initiative are continuous with historical synchronicities and tensions between amateur and professional naturalists. The creators of this initiative, we suggest, are only selectively attentive to this history. Although keen to build on the alliances between the two communities, they tend to forget some of the evident historical tensions—thus selectively ahistoricising parts of the relationship in order to assume a fresh palette and build *new* alliances.

The English Nature – Natural History Museum cartographic vision, to add to this brief sketch, is above all else a stable vision. It is designed to motivate the different actors encompassed within it. At times, we find the English Nature – Natural History Museum cartographic narratives very persuasive ourselves. We, too, are interested in mapping the identities of and spaces occupied by amateur naturalists, on the one hand, by professional biologists and conservationists, on the other; but in our case this is in order to understand the basis of a new relationship that might develop between them. We recognise, in the first instance, that nature is of course integral to both the construction and the experience of the knowing-nature network. Our own 'mapping' is less stable as we document the selective inclusions and exclusions of mosses riverine insects, brambles, and elms mediated through the contingencies of naturalist – nature – professional encounters under the new participatory and policy-oriented rhetorics and practices. Second, and again relating to movement and fluidity rather than to stability, our analysis recognises that the discrete separation of professional and amateur domains is itself artificial. In a previous paper (Waterton and Ellis, 2004) we examined more closely the hybrid makeup of so-called amateur and professional domains, indicating the porosity of the boundaries between them. We observe here that

[8] Lead partners are designated individuals who assume responsibility for 'harvesting' data on selected species or groups of species.

those inside professional and amateur categories often seem to shift between them.[9] Identities seem to stabilise temporarily in some contexts, only to destabilise in others. What is of particular interest to us is that, in the light of this seeming instability of categories and even identities, the English Nature – Natural History Museum initiative is actually hard to 'map' in the cartographic sense. When we, or others, try to map out the relationships between amateur and experts, volunteers and professionals, and nonpolicy and policy recording it seems that we can do so only temporarily. The assumptions that we and sometimes others make about the stability of the relationships we try to map nearly always unravel.

But all this is to suggest that we are cartographers, when really we are ethnographers (and more comfortably so). Our multisited method privileges us with many encounters between people and nature: in arid arable fields depleted of bryophyte populations; in sodden woodland as we seek out moss species such as the rare *cryptothallus* which lurk below the blankets of sphagnum; on slippery stones in fast-running clear water, home to trout, salmon, caddis, may and stone flies; in stacks of mahogany cases full of systematically arranged voucher specimens; through the microscope as we grapple, together with amateur naturalists, to decipher the signals of identification keys; and in open-plan civil service offices of the conservation agencies who make use of some of the data produced in the aforementioned locations.

Tracing the connections between these sites and the series of meanings created and distributed along them is part of what we do as ethnographers. However, we cannot always do this without a prior cartographic imaginary. And we also realise that the cartographic and the ethnographic are not mutually exclusive in terms of methodology and the representations of 'reality' they produce. The cartographic imaginary of participation in the BAP, as we have presented it, assumes some of the connections we trace to be robust and noncontested. However, the cartographic imaginary also feeds into, or is necessary for the ethnographic perspective: an initial flattening out of connections is first necessary before meaning is teased out from a grid-like configuration of connections. To complete the circle back to the cartographic/ethnographic understanding of meaning subsequently provokes a reconfiguration of the (cartographically) displayed relationships, throwing up in the air the assumed stability of continuous and flattened connections.

And so discontinuous and fragmented sections of meaning gleaned from ethnographic encounters (Marcus, 1995, pages 202 – 203) grow from more continuous versions of reality. We circulate as researchers, viewing the world first from a cartographically assumed 'centre'—whence it is thought that a biological knowledge bank lies in semidormant state inside the conveniently scattered and divergent amateur-naturalist communities—only to refocus with a decentering ethnographic lens, which highlights the complexity of internal epistemological, ontological, and social relationships within the naturalist societies. The ethnographic focus helps us understand the different worlds we encounter. It may help us to understand, for example, something about the everambitious naturalist who seeks to fast-track to the top rungs of a tacit 'ladder of esteem'[10] and how she or he may choose to transfer from observing birds to studying more esoteric and difficult-to-identify species such as brambles, dandelions, or hawkweeds.

[9] A good example of this is the tendency for professional conservationists to 'moonlight' as naturalists during their spare time.

[10] We have been informed of an implicit 'ladder of esteem' existing within naturalist societies. This ladder is an incentive to learn, to gain more refined knowledge of species and their attributes. It appears to be an important ordering device within naturalist communities, dictating patterns of interaction and learning, as well as shaping relationships with both natural species and humans.

His or her decision to do so and the impact of such a decision upon the ways in which bits of UK nature are represented may be overlooked with a cartographic gaze which simultaneously fails to recognise the way in which it has deleted these more esoteric groups and their human counterparts from the aegis of BAP.

The ethnographic endeavour is aware and reflexive of its partial and discontinuous method and results; it thereby does not shy away from the contingencies inherent to data gathering and representation. The cartographic (in its most simplified form) appears less sensitive to contingency as it plots out the whereabouts of professions and amateurs and subsequently directs the direction of data flow and the forms of data representation deemed appropriate. The cartographic (if unmediated by the ethnographic) claims a slice of reality without peering into the ways in which this slice can be multiply constructed and laid bare to multiple interpretation. But, if such fragments of meaning, procured through ethnographic methods, are fed into (as well as being in part informed by) the cartographic, they may help to flesh out the constellation of human–natural relationships implicated in expanding BAP networks.

What we are trying to say here is that the cartographic and the ethnographic might mutually enrich each other; the one might not even make sense without the other. But we need also to give here a sense of the way in which the ethnographic is typically treated as marginal, presumptively known rather than respected for its complexities and situated nature, whereas the various arbitrarinesses and incoherences of the cartographic are often denied and backgrounded. We also perhaps need to highlight the implicit assumptions embedded and projected within the cartographic (and incidentally within many similar risk and environmental scientific discourses) and to question how these act to perform a version of participation which can be reexamined through the ethnographic findings. The next two sections of the paper immerse us in an imaginary informed by ethnographic detail and description in order to provide a glimpse of some of the inside workings of the contemporary 'participatory' knowing-nature network. We demonstrate ways in which this imaginary could contribute to and complexify a strategic, policy-oriented, and dominant discourse which tends naturally to stabilise in map-like form the relationships involved in the participatory endeavour of knowing nature.

Managing new networks of expertise

In this and the following section we narrate elements of what we are witnessing as a reconfiguration of old boundaries (of knowledge and community) set in train by participatory practices. Within this shifting scene we have identified the presence of two constants which are partly responsible (under participatory rhetoric and practices) for casting individuals inside or outside of professional–amateur networks. These two constants are notions of expertise (which we write about in this section) and exchange (which we explore in the subsequent section).

First, then, notions of expertise. In *Science in Action* Latour carefully delineates the way that those on the inside of fact-building networks believe their own fact building to be fundamentally different (more 'rational') to the fact building that goes on by everyone else (those on the outside or in the spaces between). Latour suggests that clashes, or breaching between the inside and the outside of networks occur only rarely (1987, page 206). But in a narrative of participation such clashes are designed implicitly into the participatory process, suggesting a kind of fact-building symmetry that needs to be negotiated.

The professional conservationists in our story—the archetypal scientist 'fact builders' in Latour's terms—are entering into what Latour calls the quandary of fact

builders: "They have to enrol many others so that they participate in the continuing construction of the fact (by turning the claims into black boxes) but they also have to control each of these people so that they pass the claim along without transforming it either into some other claim, or into someone's else's claim" (1987, pages 206 – 207). Such control is of course an evasion of the symmetry implicitly promised in inviting others to participate in that it dictates the terms upon which 'participants' in a network may contribute to that network. Referring to 19th-century naturalists as forming "an undisciplined crowd which the professionals would like to keep under their control" Drouin and Bensaude-Vincent remind us that these dynamics are not new (1996, page 419).

We suggest that expertise is an element that, somewhat ironically, has the ability to cast boundaries between professionals and amateurs in the participatory exercise that we are studying. The irony is there because, historically, expertise is one of the elements that seems to have held both professionals and amateurs together. As many historians of natural history have noted, the divide that now exists between what we might call amateur naturalists and professional biologists or conservationists arose not through a stratification of expertise, but rather through a more contingent historical process of specialisation twinned with professionalisation.[11] In fact, one of the continuities in the face of this apparent rift was an understanding of mutual respect based upon expertise with regards to knowing nature. Drouin and Bensaude-Vincent have characterised how, once a professional – volunteer boundary *was* established, a "division of labour" ensued (1996, page 419), whereby volunteer naturalists provided much-needed field data for the lab-bound academics. This pattern of interaction has remained uninterrupted through the 20th and 21st centuries, a relationship that is jointly enjoyed and respected by both parties and sometimes referred to as the 'vital contract'[12] between amateurs and professionals.

Nevertheless, in the light of the participatory initiative we have observed, where the professionals are conservationists as opposed to professors of biology, expertise in terms of having the ability to know nature well *does* seem to us to be a defining element—a concept that seeks to cast knowers of nature inside or outside of the community of participants involved in BAP. The following quotation from a policy actor provides a glimpse of the institutional family of expertise.

> "Some of the data are coming in from people that she [a coordinator of a particular underrecorded group of organisms] knows are very skilled and very able. Others she just cannot believe! Now this is information, which is held in good faith

[11] In Foucault's *Order of Things* (1970) he locates the invention of natural history as occurring in the mid-17th century, only to 'end' a century and a half later at the beginning of the 19th century when a new 'science of life' began to supersede. The protagonists of this new period (Charles Lyell, Charles Darwin, Georges Cuvier, amongst the most well known) were manifest hybrids, straddling the better-known identity of the natural historian with the newly emerging identity of the scientist. As Naylor (2001) suggests, the shift taking place was also an 'epistemological rupture' which brought along with it methodological and spatial shifts: "the pursuit of knowledge moved from the field site to the laboratory and the researcher chose the microscope and test tube over the shotgun and butterfly net" (Naylor, 2001, page 229; see also Allen, 1998; Foucault, 1970; Nyhart, 1996; Outram, 1996). From around the beginning of the 19th century the rise in the number of professional posts in subjects related to natural history (largely 'biology') in universities ensured the siphoning off of a number of naturalists into the academy, leaving greater numbers of naturalists with a more concretely defined 'amateur' status (Allen, 1976; Lowe, 1976; Merrill, 1989; Secord, 1996).

[12] We first came across the term 'vital contract' in a personal letter from an eminent British naturalist (7 March 2003). We describe it in greater detail in the following section.

> by the local record centre. But when it's passed on to a national-level scheme, somebody ... with a complete overview of what's going on in the rest of the British Isles as well, um, [ends up] saying, 'Well, these records are not worth the paper they are written on'" (English Nature, interview transcript 3, 2003, page 10).

What we can glean from this is that the design of the participatory exercise paradoxically underlines the indispensability (and stability) of professional networks to judge and validate contributions, even as amateur naturalists come forward to participate. The data being referred to in the quotation are being judged by a national-level coordinator, and are judged to be worthless (or only worth reconciling to the bin!). The 'participant' clearly does not make the grade. His or her data have no value in the context of the BAP participatory framework. This example illustrates to us that within the participatory framework judgments are made from a 'centre', yet it does not show us how notions of expertise are defined. The examples we provide below suggest a more subtle process of judgment from an imagined centre concerning the interpretation of who are considered desirable amateur naturalist participants. A particular notion of expertise consistent with the cartographic imaginary of participation in the BAP is mobilised through subtle social processes of validation and control.

Wanted participants and good records: the Kent question

As part of our fieldwork we attended a Spring Field Meeting of the British Bryological Society. On our first afternoon we left 'the field' to meet in a small village hall to listen to a selected committee of bryologists and conservationists. They had dragged themselves reluctantly away from an interesting-looking sphagnum patch in wet woodland to discuss matters of conservation and recording.

One of its items for discussion was a new nationwide survey of *arable* mosses, initiated in 2002 in the United Kingdom.[13] This survey was reported to be doing well. A summary of progress had identified that 144 fields overall had been surveyed, and 24 fields had been recorded since. This news was met with warm approval. It was suggested that, at present, the survey organisers were not worried about 'coverage'[14] and that, so far, most of the records had come from the Welsh borders and East Anglia. At first there was no talk of the quality of the records, or of the nature of the expertise that had been drawn upon to create them.

But, once the names of the areas where records had predominantly come from were uttered, it was obvious that these records had been created and contributed by the most well-known, enthusiastic, and 'expert' members of the British Bryological Society, who lived on the Welsh borders and in East Anglia. These, it could be implicitly understood, would be 'good records'. The donators of such records could be trusted as knowing nature well. They were ideal participants, as they combined the qualities of

[13] Arable bryophytes are notoriously difficult to identify. They are very small plants because the substrate on which they live (arable fields) is regularly ploughed: they are said to be well adapted to disturbance. Partly because of this and because at first appearance they look very similar, one to another, they are significantly 'underrecorded' compared with other mosses in the United Kingdom. Several of them are, however, on BAP lists and referred to as BAP species.

[14] In fact, the survey was designed on three levels, which means that any unevenness of coverage of records across the United Kingdom would, with time, be ironed out. The first level, random sampling, would ensure this,. The second level, which calls on participants to select fields in their own familiar patches for survey would also bring an element of randomness into the sample. The third tier—to look at especially interesting areas (such as fields that have been cultivated according to traditional methods since medieval times) would ensure that the really interesting, the rare, exotic, and the special would not be neglected in the survey.

being able to know nature well (not to mistake one similar-looking arable bryophyte with another) with a thorough knowledge of their recording 'patch'.

The discussion under this item began to peter away when someone said with more than a touch of irony, "There is a rumour that there are no arable bryophytes in Kent!" Again, this, we understood very quickly, was a reference not only to the issue of geographical coverage, but also to that of expertise and (in this case) to a specific bryologist living in that county. Another member of the committee immediately reported that Peter Jones, who lived in Kent, had been feeling under pressure to provide records for the survey, but was unable to come up with new records.[15] He was getting older and could no longer get down on his knees—an essential requirement, especially for arable mosses.[16] The news was met with sympathy, yet surely, it was suggested, there must be *someone* who could help. What about Helen Smith?[17] Another person on the committee filled in at this point. Helen had an elderly relative who lived in Somerset. She was going down from Kent every other weekend to help out. "But what about the weekends that she is *not* in Somerset? Surely, she could do some recording then!" was the (only half-tongue-in-cheek) response from another member of the committee.

This discussion indicated to us two things. First, there was an implicit understanding within the committee that records contained within them a 'signature' of expertise: certain people were known to embody bryological expertise, to have good bryological identification and recording skills. Second, there was an implicit knowledge of where such people lived, geographically, and where their 'patch' was. And, third, *these* people, who crucially combined place, or patch, with a kind of universally recognised expert status, were very much wanted as participants. Both Peter and Helen were wanted for their expertise. But, in cartographic terms, they were also wanted for the knowledge of their patch, and for their subsequent ability to contribute to 'coverage—the important spatial element embedded in BAP participatory initiatives such as the Arable Bryophyte Survey.[18]

The people who embody both geographical space and expertise in this entwined way not only are valued participants, but their input has a strong normative charge. The suggestion that it might be useful to produce a 'visible map of the underrecoded parts of the country' indicated this, particularly as this visible map was jokingly referred to as a 'name and shame' exercise! The spatial, the social, and the normative were here intertwined into an ideal cartographic and social space consisting of dispersed actors with varying levels of expertise and commitment who could be called upon to serve the BAP.

(Self-)exclusions

But the naturalists being referred to in this way were not representative of all the people we met on the British Bryological Survey spring field meeting or at the Arable Bryophyte survey meeting we had attended earlier in the year. We reflect on some of

[15] Peter was again implicitly understood by everyone present to be a skilled bryologist living in Kent. Peter is a pseudonym.

[16] At a previous Arable Bryophyte Workshop we had learnt that the method of identifying these organisms was to 'kneel, lie and peer!' rather than the more conventional 'stoop and pick' method generally pertaining to nonarable mosses (field notes, 16 November 2003).

[17] Helen Smith is a pseudonym.

[18] The random sampling method, dictated by a computer at the Centre for Ecology and Hydrology at Monkswood, Cambridgeshire, underlined the importance of representative coverage within the survey overall.

the conversations and talks we heard at the latter meeting to understand why some potential 'participants' do not fit into such an idealised cartographic and social space.

The Arable Bryophyte Survey meeting began with a morning of uplifting exhortations to take to the (arable) fields, to 'kneel, lie, and peer' at the mosses therein, to work together to get a 'good national coverage', to avoid 'wasting time' selecting suitable arable fields, and simply to select ordinary fields in which to survey and produce records. It was suggested to the group of people present: "If we all did one [square], that's two [arable fields] each!" The feeling of inclusion and of being needed for this collective effort was palpably exciting! But it was not so for all participants.

One potential participant explained her own interest in coming to this Arable Bryophyte Survey meeting.[19] She had undertaken a survey of her own, of the local churchyards in villages in the county in which she lived, and was interested in all mosses. She had carried out her survey alone, and, when asked what had motivated her to do this survey of mosses, and not of any other organism, she explained: "I couldn't have the same feeling for lichens as I do for mosses. I've always loved mosses. I think you have to think things are beautiful to learn about them, identify them, and record them." When asked if she would take part in the Arable Bryophyte Survey, she answered smiling, "oh no ... I don't think so". She kept her own records, not on computer (there was not enough room in her cottage for a computer) but on record cards, and was happy to keep in touch with the British Bryological Society community whilst undertaking her own survey of considerable scope and complexity on her own terms and at her own pace.

This type of potential participant had an intense local knowledge of mosses. But, in cartographic terms, the facts that this bryologist was familiar with and loved to create were, in a sense, too mutable (too intimately tied to place) and too immobile (Law and Mol, 2001, page 612). Consequently, this potential participant is not the kind of participant the BAP process or the Arable Bryophyte Survey are looking for. Her data were simply not of the 'right kind'. We know this from being at other meetings where, for example, we have heard that "recorders who are not electronic are a nightmare!" (field notes, 11 April 2003). But we are keen not to describe this as 'one-way traffic'. This participant is not necessarily excluded, she does not *want* to participate—she is happy to exclude herself from the participatory processes being envisaged. She demonstrates a kind of 'subversion'; her participation in nature is of another genre from that of the BAP process.

The insides and outsides of networks of expertise

Under the participatory vision of BAP, all are nominally invited, but what we have observed is a process whereby some amateurs are siphoned off and out of the participatory frame, leaving others who 'are good' being selected, encouraged, and even cajoled into contributing. As we engage fully with the ethnographic data, we find that the externally imposed and self-imposed exclusions reported above are not always defined as such by participants. The cartographic imaginary as encompassed by the somewhat jingoistic exhortations we have mentioned is gently rejected by many competent naturalists who engage with nature (and its spatialities) on different terms.

Expertise, as conceived within the BAP participatory context, is something that has an ability to cast amateur naturalists inside or outside of participatory frameworks, which also affects the inclusion or exclusion of records of nature. The following are lists of exclusions and inclusions taking place within the participatory networks.

[19] This participant was very selective of the British Bryological Society meetings she chose to attend.

The choice of the term 'exclusion' may be appropriate if we are using a cartographic perspective that implies a 'centre'. However, such choices may be 'contented decisions' and self-exclusions.

The kind of exclusions taking place are:

1. thousands of records and detailed inventories of plants in place, including plants that are not 'of interest', plants that are too 'complex' (brambles, dandelions, and hawkweeds), plants not deemed to be in need of protection at a national level, or plants that are not significantly underrecorded (such as the churchyards mosses of the bryologist described above);
2. nature that is loved and known but not recorded in the right way;
3. records that are mutable immobiles (that stay at home in a shoe box), rather than immutable mobiles (that are sent to vice county 'recorders' or to BAP lead partners);
4. practices that slow down or clog up the network (such as the use of hard-copy record cards when what are really needed are digitised data).

What we observe to be included, on the other hand, are:

1. people, who combine intimate local knowledge of species, hence contributing to geographical 'coverage', but who also, crucially, can combine this with expertise recognised by the wider scientific and policy community;
2. records in immutable, mobile, and combinable form (preferably computerised data);
3. anyone or anything that speeds up the network (for example, people who are recognised to be 'good' in their specialism, people who are prepared, or able, to get down on their knees and carry out some recording at weekends).

Participation in the BAP, according to the cartographic perspective, is not just about handing over data, it is about having the expertise to do so. And, of course, some naturalists, whose records 'are not worth the paper they are written on', will not make the grade. But what we can see from our more ethnographic perspective is that the kind of participation envisaged by its designers implies joining a normatively and spatially organised frame of reference which implies mobility, combinability, and a certain universality to ways of knowing nature. Expertise, seen in this framing, encompasses complex combinations of these elements. This is new to *some* naturalists, and overlays their conventional patterns of data creation and exchange. To *some* naturalists, participation in the BAP, conceived in this way, is a significant and exciting challenge. It is a challenge that *some* take up as an opportunity: they may imagine that their participation in BAP gives their hard-earned knowledge mobility and perhaps status. *Other* naturalists are happy to exclude themselves.

In the next section we explore ways in which relationships of *knowledge exchange*, and more specifically reciprocity, may also be read as a casting or defining element of amateur professional boundaries—defining what is maintained, what is rejected, and what is shared within and between these communities in the context of participation in the BAP.

The casting nature of knowledge exchange

As we suggested in the introduction to this paper, part of the rationale behind UK policy initiatives to harness amateur-naturalist knowledge for biodiversity policy implementation is the recognition of knowledge gaps about the state of biodiversity in the United Kingdom. The acquisition of knowledge from amateur naturalists is prized in that such naturalists are recognised as possessing a unique access to nature, they are conveniently scattered all over the country, and historically they have willingly and freely donated knowledge to professional communities, on the understanding of there being a long-standing 'vital contract' between the two communities. We explore ways

in which UK participatory policy initiatives have nested themselves firmly within these 'traditional' and expected forms of exchange whilst simultaneously providing fuel for their reconfiguration.

First, it may be useful to get a feel for the kind of objects that naturalists produce which then enter into circuits of exchange between them. Part of what naturalists do is to document observations of species and their location (usually within 10 km square tetrad areas) in their notebooks. These observations may be rendered in textual, anecdotal form as well as through ticks in boxes on cards designed for recording schemes. The record cards, rather than the anecdotally recorded data, are normally sent into a biological recording centre, and are channeled through a responsible expert (or lead partner under BAP). The accumulated result of these records constitutes a data set, which when 'complete' will be centralised and normally processed in the form of a dot distribution map[20] or similar representational product. For our purposes here, interpreting this would mean that we take the objects of exchange to be biological recording cards which are also objects of knowledge. Such objects can be interpreted as actually embodying a piece of nature mediated by the effort of human observation and are thus, following anthropological insights, invested with elements of the natural and the human (see Appadurai, 1986; Gregory, 1982; 1998; Kopytoff, 1986; Liep, 2001; Mauss, 1990 [1950]; Miller, 1987; 2003; Strathern 1988; 1991; 1999).[21] The highly contingent texture of nature representation through human mediation can be seen underlying this. Quite simply, dots on a distribution map represent human recording effort; different taxa obtain a voice through human mediation. Thus the tracing of the lives of pieces of knowledge materialised in the form of recording cards helps us to glean a more fine-grained understanding of knowledge accumulation, the choice involved regarding which species are afforded a dot, and the subsequent circulation and final representation of this initial encounter between a naturalist and his or her object of observation.

What we find interesting in the light of this exchange of knowledge objects is that knowledge circulation and representation both engender and are framed and enabled by a series of imagined contracts which are presently in a state of flux as amateurs and professionals negotiate their contours in a time of change and experiment introduced by participation.

The 'vital' and other contracts

Naturalists, since well before the 19th century, are most often recognised for dedication to their pursuit. The intensity of the naturalist encounter with nature is such that it pervades naturalists' lives and renders their activities more than hobbies (Allen, 1998; Jardine et al, 1996). An aspect we are exploring is the question of what naturalists expect to receive in return for all this effort. The existence of the vital contract has been brought to our attention by practising naturalists and is also alluded to in a variety of different ways by historians writing about natural history (see Allen, 1976; Drouin and Bensaude-Vincent, 1996; Secord, 1996). It has most graphically been expressed to us as consisting of an agreement about the terms upon which exchange of records takes place between amateur naturalists and professionals, within circles of natural history in the United Kingdom. Such exchange between naturalists of their hard-earned data,

[20] This would typically be a map of the United Kingdom, headed with a species name. Each dot on the map indicates the presence of that species within a defined area (for example, 10 km). Thus the distribution of a particular species can be seen.

[21] See Bridge and Smith (2003) for an overview of this literature and its connections with actor-network theory.

gleaned from painstaking observations of organisms in the natural world, is predicated upon an expectation of reciprocity traditionally sustained within a 'gift' economy (Gregory, 1982; Mauss, 1990 [1950]).

Exchanges of data, in other words, are traditionally given within the natural-history worlds with no expectations of financial or other commodified recompense. The reciprocation, rather, occurs through two alternative forms of recompense: first, through the idea that exchange of records will contribute to the advancement of a wider good, in the form of scientific knowledge; second, through the faith that such exchange will result in an accumulation of records providing a broader interpretive frame—for example, an 'atlas' [22] or database. Within this second form of reciprocation, acknowledgment of the source of data provision is particularly important.[23]

But the vital contract is, upon inspection, only one way through which the gift of data might be imagined to be reciprocated. Our research suggests that the vital contract seems to exist alongside a series of complementary and alternative 'imagined contracts' understood perhaps differentially by different amateurs and professionals. These contracts place nature, amateurs, and professionals in a series of delicate relationships underpinned by forms of reciprocity which have not all necessarily been presented as explicit in terms of the kinds of expectations held by exchanging parties. Some, but not all, of these contracts include money as an ingredient in the process of knowledge commodification. However, we begin our narrative with a rather different imagined contract of exchange between humans and nature.

One of the naturalists we have interviewed vividly portrays what we call the first contract: the amateur – nature contract.

> "You can look at one hair on a moss, just one hair on one moss leaf if you want and what you could talk about on that, about that one hair on one moss is one thing but then you go to a beetle or a, you know, a ... bud on a tree or something and you know that it's the same complexity for every single thing that you look at ... I mean just the whole thing is totally, totally beyond comprehension ... but if you look closely at something you get a thrill of, it's that thing about, isn't the world wonderful?" [Judith Wilson (pseudonym), interview, May 2003].

Such descriptions of a wondrous encounter with nature may be omitted from a cartographic vision of assumed exchange relationships. This, on the other hand, is where we begin to set out our ethnographically informed typology of contracts of exchange and where we can begin to specify what we described, at the end of the last section, as naturalists 'engaging with nature on different terms'. Presented as a simplified configuration, nature provides amateur naturalists with wonder and knowledge. But within the amateur – nature contract, data extracted from nature should properly be used towards its preservation. Thus the expectation of reciprocity, as narrated by naturalists, is one of respect and protection for the organisms and habitats studied in the natural world. The strength of this commitment informs the beginning of a contract with nature which then extends to include a series of offshooting contracts. Wonder is not enough and sometimes it may even be lost along the way, to be later refound. According to naturalists' biographical narratives, it rapidly transforms into a serious effort to know nature differently, to transform the affective into a systematic identification, naming, and recording of observations. It is this step taken and the effort involved which in part render the naturalist a 'complying' member of a naturalist community.

[22] An atlas consists primarily of a compilation of dot maps for a particular group of organisms (such as birds, flowering plants, mosses).

[23] Practically speaking, this would translate into the listing of the names of contributors of records to, say, a UK-scale atlas.

The second kind of contract we see in operation amongst amateur naturalists extends towards the human domain, where contracts exist between naturalists at different stages on the ladder of esteem within naturalist communities. Refining observational skills and systematising knowledge is a challenge for up-and-coming naturalists and for some more than others. Meeting the challenge involves hours poring over an identification key, with specimen in hand, or beneath a microscope, and such effort required to know nature rigorously is supported by the assistance of those naturalists in possession of more specialised knowledge in an apprentice-type relationship between novice and expert. The apprenticeship may take the form of physically experiencing and observing nature together, the expert verifying or altering the novice's identification attempts. But it is more commonly developed over time as a novice sends voucher specimens and records to an expert for verification.[24] The specimens and records of novices thus must be validated and commended by the 'real tigers' within the amateur circles. Such validation attributes credence to the initial novice recording of nature. The 'real tigers' invest their knowledge and assistance in novice naturalists with a nurturing hope in mind and this is part of the apprenticeship contract. It is hoped that such novices will grow, become able, in such a way as to contribute to future rigorous and systematic recording activities directed towards vice-county recording schemes.[25] The importance of these forms of knowledge exchange for the 'harnessing' of new naturalists cannot be overstated.

Third, further internal allegiances and related contracts also offshoot. Those 'real tigers', who are most knowledgeable about certain species and of their own patch, also exchange knowledge in the form of sightings of rare species, or the sending of difficult or unusual specimen samples to select others 'in the know'. This third form of exchange between expert amateurs takes the form of exchange of like-for-like and sustains the expert levels of amateur societies, members of which most fluidly shift into the professional domain and, more often than not, in fact maintain a foot in each camp. The circulation of meticulously folded newspaper pouches enclosing moss specimens exemplifies this form of exchange between experts. The newspaper envelopes are marked with the time, location, and possible identification of the moss sample. The sometimes-dog-eared parcels, engrained with mud and moisture, are particularly evocative of the intensity of the hunt for, and the observation and identification of, species. Before processing the observation as part of a digitised data set, the envelope may be passed around other experts present at a given event or circulated by post to other experts not present. Part of the exchange exercise is to invite alternative identification. But, most importantly, the circulation and exchange of the newspaper pouches allow for a translation of the moment of species collection in a physical form;[26] a circle of experts are thereby able to become witness to some of the steps made to document and represent nature.

Discontent as recasting

The participatory model has been carefully engineered without attending to this array of subtle exchange relationships and has used the first-mentioned vital contract as its template. It appears that an assumed, restricted, and stable vision of relationships predicated upon gift exchange has dominated the vision of the policy end of the

[24] Within the bryological community, this kind of knowledge-exchange relationship has recently been labeled 'bryophyte buddying'.

[25] This apprenticeship-like contract between naturalists, of course, may be ruptured upon the realisation by the 'real tiger' that the novice does not demonstrate the acute observational skills coupled with perseverance and dedication expected of him or her.

[26] See Latour (1995; 1999a) for further examples of these kinds of practices.

spectrum at the expense of attending to the natural and human relationships which become implied in varying forms of imagined contract. Within the participatory initiative we are witnessing there seems to be an element of reaction against this. As amateurs and professionals struggle to make sense of emerging configurations of social and epistemic relations introduced by participation, amateurs in particular are expressing their perceptions of possible incoherences latent in expected and practised forms of knowledge exchange.

We have noted rumblings of amateur discontent about the relatively recent commodification of what has traditionally been gifted knowledge, a process which has been described as violating the vital contract which has existed for centuries between amateurs and professionals.[27] This generally expressed discontent leads to differentiated reactions within amateur societies and thus serves to map a potential internal factionalism defined by the choice (or not) of allegiance to gift exchange as definitive of amateur identity. As we have already observed, participation offers a new layer of meaning to the issue of what it is to be a naturalist. It does so in a context in which the identity of the naturalist—for wider reasons including the commodification of knowledge and the digitisation of data frameworks—is already somewhat challenged. What appears problematic is the way in which commodification, a process which is now inevitably part-constitutive of data provision, seems to be being denied through the rhetoric of the supposedly symmetrical participatory context.

As one amateur naturalist has written to inform us,

> "an 'economic' resentment has lately begun to rear its head. Increasing numbers of freelance conservation consultants, usually with only a modicum of natural history competence and knowledge, are expecting to make use of the stores of local and national data accumulated by (in the main) amateur naturalists individually and collectively. Hitherto access to such data has been granted to all comers free of charge, as it has been perceived as having value purely as a disinterested contribution to scientific knowledge. But now that it is, in effect, being sold to clients, as an ingredient in consultants' report, [it] is causing natural history bodies to take the not unreasonable view that some of the money earned as a result ought to come back to them, hard-pressed financially as most of them are."[28]

Digitised databases and policy-commissioned consultancy reports are two specific contexts in which the policy world consumes amateur-produced data in a way which causes particular concern amongst amateur naturalists. In the words of one amateur, both involve the 'poaching' of donated amateur data and its recycling and subsequent selling off to the policy domain. It appears, then, that in more recent modes of data consumption the traditional vital contract does not remain intact. In addition, amateur naturalists feel that neither databases nor consultancy reports recognise the source of data production as being located in imagined amateur – amateur and amateur – nature contractual relationships (and the gift exchanges which are implied by these).

Increasing expectations of a financial recompense for (and hence commodification of) knowledge apply equally to the gift of data to BAP and to efforts to reproduce atlases (which may also be used to inform BAP). We have been informed through interview that one naturalist who recently contributed a dataset to be included in an

[27] Miller (1987; 2003), in particular, explores the way in which a layer of social relations is also generated by and invested in the commodification and consumption of things (and not only through gift exchange). Bridge and Smith (2003) have warned that this approach, although valid, also forgets the asymmetries (not recognising the producers) introduced by relations of commodification and consumption.

[28] This is extract from a letter from a British naturalist to the research team (22 March 2003).

atlas subsequently asked to be paid a substantial sum of money for his 'donation'. The recording centre ultimately responsible for publishing the atlas recognised that this particular naturalist's dataset constituted a segment of records vital to the completion of the atlas. However, the recording centre stated that it was unable to pay for this dataset. As a result of the centre's decision the naturalist decided to withdraw his data, making it impossible to represent them in the atlas!

This simple account narrates a spawning of apparently new complexity. The naturalist in question behaved unpredictably, thus unsettling the established relationship between amateurs and professionals thus far predicated upon an ethos of gift exchange. His contribution to science in the form of dots on a distribution map would previously have been recompense enough for his effort expended. But now financial recompense is deemed by him to be more appropriate in terms of expected return. This act places the naturalist at odds with his fellow society naturalists, some of whom voice disgruntlement but most of whom feel comfortable with gift exchange as emblematic and integral to their identity. It places him at odds with the professional domain of data processors and publishers who are presently at a loss regarding how they should respond. Finally, and perhaps most acutely felt by all, there are the implications for nature's voice and representation. A whole species is obsolete, not because of physical extinction but because the human mediator no longer agrees with the terms of contract which prescribe an expected form of data exchange and, with this, appropriate recompense.

This turn of events has caused some amateur naturalists to perceive a misalignment in terms of the relationship they have diligently fostered both with nature and with fellow members of naturalist societies. Some believe a new form of contract should be established to replace the gift ethos of the vital contract. This would involve financial recompense for amateurs and would appropriately *realign* knowers of nature with both the origins and the products of their knowledge. Others feel, however, that this would go against the grain of their own amateur – amateur and amateur – nature contracts which bind them to each other and to nature. The fact that only a few naturalists see this situation as an opportunity to commercialise their recording activities is an indication of the strength of the 'gift'-oriented ethos shared between naturalists and professionals to data. But perhaps a significant few will differ and this may set in train new patterns of identification within naturalist communities.

The amateur concern with commodification is not only a pecuniary one. There is evidence that many naturalists feel increasingly distantiated or alienated from the products of their labour. Part of the disgruntlement concerns the way in which data processed for policy decisionmaking are ultimately disembedded from their original source and the human – nature contractual relationships which are implied in their production. As one naturalist we interviewed expressed: "It's quite hurtful as an amateur to do a load of work and send in your records and then for some institution to take them off you and then that information comes out as the institution's records not as your records and that is quite offensive. You know, I think that that's hurtful. It really hurts" (Judith, interview, May 2003).

The worry of 'participating' amateur naturalists may also become a concern about the ends to which their data are put. Perhaps the ultimate violation both of the human – nature and of the amateur – professional contract is the use of data in 'improper' ways by institutions with responsibility for and control over wildlife.[29] Some naturalists feel that their data are manipulated so as to inform decisions which

[29] Some naturalists lament the fact that, during the process of collecting information to be used to inform land-management-policy and conservation-policy decisionmaking, they may actually be excluded from the consultation loop. So, in these cases, their knowledge is not even included or valued.

are beyond their control and which run contrary to the way in which they believe nature should be preserved. One naturalist described the way in which the local council's use of her data had resulted in detrimental management of an environment she had hoped her data would protect. She experienced an intense sense of disaffection;

> " We think it's a total farce. We can show you in their strategy, wildlife strategy for [place x] or something, cultural strategy for [place x], it talks about 'valuing volunteer groups'! And here we are a volunteer group, we are utterly community ... . But when it starts threatening their facade for wildlife they don't want it. They only want enough wildlife that enables them to say 'look at us we're doing the wildlife'. And they don't want anything more because anything more than that requires commitment" (Judith, interview, May 2003).

Such frustration suggests an expectation of reciprocity on the part of the amateur domain from the professional domain. This expectation is one of tangible positive effects upon nature as a result of the use of amateur data. If this use runs awry the contract is thus violated.

Related to the above sense of alienation is the sense that there is no way of seeing, no transparent vision, of what data are being donated to.[30] As such, the expectation of reciprocity is intangible. Amateur naturalists feel a deep loss of contractual satisfaction in being unable to imagine a destination for data. or a community or set of practices that data could contribute to. This was expressed with passion by one naturalist who we observed making records within her local 'patch': "Where does this data go, god only knows!" (Judith, interview, May 2003).

The understanding that things, the material substance of exchange, embody the power and personality of human transactors and are thus constitutive of social relationships takes on a particular relevance for our study as we chart the new patternings of exchange and reciprocation introduced through the participatory frameworks we are observing. Exchange, in this case of records of observations made of the natural world, allows for a flow of knowledge between natural and human domains and it creates and sustains the array of human social relationships within the diverse and overlapping amateur and professional spheres. These kinds of exchange are, of course, largely taken for granted as habituated practices within naturalist communities (amateur, professional, or hybrid amateur – professionals). However, we have become interested in various of these taken-for-granted exchanges, seeing them not only as being actual physical exchanges (in the form of record cards) but also as 'imagined contracts'.

We suggest that part of what is happening in the accounts represented above is a lament for the fact that persons (naturalists) and the subtleties of what is invested in knowledge objects of exchange cannot be traced through the transaction of things (records). In the previous section on expertise we noted ways in which data do in fact incorporate the person. But this incorporation was treated as implicitly held knowledge relating to the issue of records in Kent (Peter's records). What is of interest to us is the way in which the person-rich nature of knowledge and exchange is selectively brought to the fore (which tends to be the case when we adopt the ethnographic imaginary) or, conversely, rendered opaque (more often seen through cartographic perspectives). In the new participatory framework there seems to lurk a danger that human investment as well as the significance of organisms in place may be made invisible at the moment that data represented in a record card or a computerised data sheet (Bowker and Star, 2002).

[30] Here we draw upon Anderson's work on imagined communities as a way of understanding the relationship between the community of contributing citizens and the object, direction, and ultimate arrival of contributions (1991). See also Jasanoff (2004) on Anderson's imagined communities.

According to the traditional vital contract, naturalists knew 'where they stood' in relation to the professional world and in relation to the effort they were prepared to put in. Under the current BAP participatory framework there are significant ambiguities surrounding the recognition of amateur naturalists, the imaginary of what data are going into and how they will be represented and used, and finally what kinds of voice nature itself obtains. These ambiguities which are embodied within amateur naturalists themselves and within the representations of data appear to be provoking unease within the amateur communities.

Conclusion

In this paper we have looked at ways in which 'participation', as we have witnessed it through the English Nature – Natural History Museum initiative, affords new relationships between amateurs and professionals, adding new complexities to an already-existing intricate balance of roles assigned to the challenge of knowing nature. The relatively new context of biodiversity in which the participatory initiative has been set up signifies a change of emphasis and orientation for many naturalists. Naturalists are now being encouraged to contribute data to the BAP—perhaps something that many of them had not previously considered within their scope or capability. As we have suggested, some see this as a challenge and an exciting new opportunity; others decline to take part. This all, in effect, constitutes a subtle *change* in the way that amateur naturalists and professionals communicate and work together.

The role of certain *constants* in this reconfiguration has been illuminating to trace. Expertise seems to have the ability to cast new participants inside or outside of new knowledge networks. We identify the way in which expertise, in this context, is actually moulded to the participatory concept in normative and spatialised respects. This allows a politics of inclusion/exclusion to take place within the participatory call for data.

Notions of exchange are also moulded through a specifically 'participatory' vision. It is the traditional vital contract that is selected and built upon within the context of the participatory framework. But recognition of this fundamental vital contract does not necessarily take onboard some *new* variations in nature – amateur – professional contracts. The commodification of data as well as changes in the archiving of data (digitisation) mean that *new* imagined contracts associated with data exchange (for example, the idea that the offering of data implies respect of an amateur – nature relationship which encompasses protection) are perhaps becoming more important than has previously been the case.

In describing the constants, expertise and exchange (which are constant only in that they are present and definitive of inclusions and exclusions in the new networks but not in that they retain static qualities), we have indicated that two powerful perspectives hold our gaze: the cartographic with its ability to spread out the picture; and the ethnographic with its ability to decentre our observations, or to allow for a constellation of multiple centres. We describe in the paper the way in which we often temporarily use the cartographic perspective—using it, like the English Nature – Natural History Museum initiative itself, as a heuristic device which we understand to belie many more complex interactions. We use the cartographic vocabulary as a first step, to describe, or lay out, some of the spatialities we see within the initiative of the English Nature – Natural History Museum to bring amateur naturalists and their knowledges into a policy framework. We suggest that thinking about complexity in such spatial terms helps in one way: it helps us to see the patternings and points of interaction within the participatory initiative we describe.

But our use of cartographic metaphors is problematic in other ways. It tends to eclipse the 'Janus-like' complexities described by Latour (1987) of *all points* in all networks.

It tends also to eclipse the circulatory or oscillatory nature of what we are engaged upon in methodological terms: the use of spatial vocabularies makes us feel too much like cartographers, when our aim is to be ethnographers.[31]

Furthermore, the result of our own oscillations—between the cartographic, more centred perspective entailed as we see it within the participatory framework, and the ethnographic, more decentred, or multicentred, understandings we are uncovering through the research—is to make the 'meaning' of our 'data' rather unstable. On the one hand (cartographically speaking), one might convey a strong tendency towards exploitation and extraction or alienation of amateur naturalists from the products of their labour as operating within the new participatory BAP-oriented practices. On the other hand (ethnographically speaking) we may suggest it equally important to understand the subversive and enjoyed aspects of amateur naturalist identity.

Our final issue, given our close relationship with the Natural History Museum as partners in this research, is how any of these observations can be of any use to the participatory initiative and to policy. Something we maintain to remember is that what we have called the cartographic imaginary of participation, despite its reductionism by way of assuming specific representations of space and time within it, is understood by others in subtle and multifold ways. Policymakers, for example, know that knowing nature 'for the BAP' is more complex than the spatially and temporary reduced version we have rehearsed above! They know, for example, that they themselves are hybrid professionals/amateurs in many cases. They are fully aware of the contingencies involved in creating records, and of the new layers of complexity that the introduction of payment for data introduces to amateur/professional dynamics. These (often unspoken) understandings suggest, then, that the cartographic imaginary embedded within the English Nature–Natural History Museum participatory initiative is, in effect, a sophisticated and rather delicate heuristic which, for many reasons, has to be maintained.[32] Whilst recognising this, we are alert to the problems that assigning hybridity, contingency, or complexity to a kind of 'background' not represented on the participatory 'map' is producing amongst naturalists who need, amongst other things, to recognise themselves and the nature they work within in new and potentially alienating policy milieux.

And so although the flattening heuristic deployed by the biodiversity policy world is incredibly seductive we suggest that a real complexity lies below the surface of cartographic narratives about participation in the BAP, advocating that it is this complexity that the ethnographic method is good at unleashing. Pointing away from an imaginary of 'Euclidian space', towards one which is better understood by apprehending the circulatory and fluid nature of the components of networks, we worry that only certain things—bits of nature, volunteers, and records—will actually be visible through a predominantly cartographic perspective. Some things (mosses in churchyards, records lovingly garnered but not mobile enough, records for which payment is refused) will be invisible. Only by being attentive to the subtly shifting amateur–nature–policy relationships (including various historical and currently imagined contracts) can our colleagues in the Natural History Museum know what participation in the BAP can really afford.

[31] Latour describes well this tension between conceptualising the kind of research we do as 'topographical' or, on the other hand, conceptualising it as consisting of 'circulations; (1999b, page 20). Dugdale (1999) captures, in her use of the term 'oscillation', the movement that we encounter within the ethnography we describe.

[32] The research on global climate change to which Wynne (1996) refers explores the uses of heuristics in policy settings.

What we see is that participation offers much more than a leveling out of old asymmetries relating to previously excluded communities of naturalists. It instead affords *new* relationships, actually introducing new configurations, destabilisations, and complexity (Strathern, 1999). We are aware that the Natural History Museum and English Nature know this. What we are hoping for is the kind of exchange whereby the policy actors in the knowing-nature network might temporarily 'backstage' their cartographic perspective, just as we temporarily take it onboard. At the same time a foregrounding of the ethnographic perspective within policy participatory frameworks might offer the possibility of embracing some of the new configurations, disgruntlements, and energies found at multiple points throughout the network. Experiencing a degree of discomfort at being 'caught' between the cartographic imaginary and the ethnographic imaginary, we suggest, may be no bad thing. A willingness to switch perspectives in this way, we feel, may ultimately help to build a normatively diverse, multiply located, and more fully owned notion of UK biodiversity policy.

Acknowledgements. We would like to thank our co-'investigators' in the ESRC-funded study, Robin Grove-White (IEPPP) and Johannes Vogel, as well as Brian Wynne (IEPPP) for many discussions, many of which are reflected in the ideas of this paper.

References

Agrawal A, 1999, "On power and indigenous knowledge", in *Cultural and Spiritual Values of Biodiversity* Ed. D Addison Posey, United Nations Environment Program (Intermediate Technology Publications, London)

Allen D E, 1976 *The Naturalist in Britain: A Social History* (Allen Lane, London)

Allen D E, 1998, "On parallel lines: natural history and biology from the late Victorian period" *Archives of Natural History* **25** 361 – 371

Anderson B, 1991 *Imagined Communities: Reflections on the Origin and Spread of Nationalism* (Verso, London)

Appadurai A (Ed.), 1986 *The Social Life of Things: Commodities in Cultural Perspective* (Cambridge University Press, Cambridge)

Bowker G, Star S L, 2002 *Sorting Things Out: Classification and its Consequences* (MIT Press, Cambridge, MA)

Bridge G, Smith A, 2003, "Intimate encounters: culture – economy – commodity" *Environment and Planning D: Society and Space* **21** 257 – 268

Callon M, 2002, "Writing and (re)writing devices as tools for managing complexity", in J Law A M Mol, *Complexities: Social Studies of Knowledge Practices* (Duke University Press, Durham, NC) pp 191 – 217

Drouin J-M, Bensaude-Vincent B, 1996, "Nature for the people", in *Cultures of Natural History* Eds N Jardine, J A Secord E C Spary (Cambridge University Press, Cambridge) pp 408 – 425

Dugdale A, 1999, "Materiality: juggling sameness and difference", in *Actor Network Theory and After* Eds J Law, J Hassard (Blackwell, Oxford) pp 113 – 135

Foucault M, 1970 *The Order of Things: An Archaeology of the Human Sciences* (Tavistock Publications, London)

Goodwin P, 1998, " 'Hired hands' or 'local voice': understanding and experience of local participation in conversation" *Transactions of the Institute of British Geographers, New Series* **23**

Gregory C, 1982 *Gifts and Commodities* (Academic Press, London)

Gregory C, 1998 *Savage Money: The Anthropology and Politics of Commodity Exchange* (Harwood Academic, Amsterdam)

HMSO, 1994 *Biodiversity: The UK Action Plan* (HMSO, London)

House of Lords Select Committee on Science and Technology, 2002 *What on Earth? The Threat to the Science Under-pinning Conservation* 3rd report, paper 118(i) (The Stationery Office London)

Jardine N, Secord J A, Spary E C (Eds), 1996 *Cultures of Natural History* (Cambridge University Press, Cambridge)

Jasanoff S (Ed.), 2004 *States of Knowledge* (Routledge, London)

Kopytoff I, 1986, "The cultural biography of things: commoditization as process", in *The Social Life of Things* Ed. A Appadurai (Cambridge University Press, Cambridge) pp 64 – 91

Kothari U, 2001, "Power, knowledge and social control in participatory development", in *Participation: The New Tyranny?* Eds B Cooke, U Kothari (Zed Books, London) pp 139 – 152
Latour B, 1987 *Science in Action* (Harvard University Press, Cambridge MA)
Latour B, 1995, "The 'Pedofil' of Boavista: a photo-philosophical montage" *Common Knowledge* **4** 144 – 187
Latour B, 1999a *Pandora's Hope: Essays on the Reality of Science Studies* (Harvard University Press, Cambridge, MA)
Latour B, 1999b, "On recalling ANT", in *Actor Network Theory and After* Eds J Law, J Hassard (Blackwell, Oxford) pp 15 – 25
Law J, Hassard J (Eds), 1999 *Actor Network Theory and After* (Blackwell, Oxford)
Law J, Mol A, 2001, "Situating technoscience: an inquiry into spatialities" *Environment and Planning D: Society and Space* **19** 609 – 621
Liep J, 2001, "Airborne kula: the appropriation of birds by Danish ornithologists" *Anthropology Today* **17** (5) 10 – 15
Lowe P, 1976, "Amateurs and professionals: the institutional emergence of British plant ecology" *Journal of the Society for Bibliography of Natural History* **7** 517 – 535
Marcus G, 1995, "Ethnography of in/of the world system: the emergence of multisited ethnography" *Annual Review of Anthropology* number 24, 95 – 117
Mauss M, 1990 *The Gift: The Form and Reason for Exchange in Archaic Societies* (Routledge, London); first published in 1950
Merrill L, 1989 *The Romance of Victorian Natural History* (Oxford University Press, Oxford)
Miller D, 1987 *Material Culture and Mass Consumption* (Blackwell, Oxford)
Miller D, 2003, "Could the Internet defetishize the commodity?" *Environment and Planning D: Society and Space* **21** 359 – 372
Mosse D, 2001, " 'People's knowledge', participation and patronage: operations and representations in rural development", in *Participation: The New Tyranny?* Eds B Cooke, U Kothari (Zed Books, London) pp 16 – 35
Naylor S, 2001, "Discovering nature, rediscovering the self: natural historians and the landscapes of Argentina" *Environment and Planning D: Society and Space* **19** 227 – 247
Nyhart L, 1996, "Natural History and the 'new' biology", in *Cultures of Natural History* Eds N Jardine, J A Secord, E C Spary (Cambridge University Press, Cambridge) pp 426 – 443
Outram D, 1996, "New spaces in natural history", in *Cultures of Natural History* Eds N Jardine, J A Secord, E C Spary (Cambridge University Press, Cambridge) pp 249 – 265
Secord A, 1996, "Artisan botany", in *Cultures of Natural History* Eds N Jardine, J A Secord, E C Spary (Cambridge University Press, Cambridge) pp 378 – 394
Strathern M, 1988 *The Gender of the Gift: Problems with Women and Problems with Society in Melanesia* (University of California Press, Berkeley, CA)
Strathern M, 1991 *Partial Connections* (Rowman and Littlefield, Lanham, MD)
Strathern M, 1999, "What is intellectual property after?", in *Actor Network Theory and After* Eds J Law, J Hassard (Blackwell, Oxford) pp 156 – 180
Takacs D, 1996 *The Idea of Biodiversity: Philosophies of Paradise* (Johns Hopkins University Press, Baltimore, MD)
The Guardian 2003, "Identity crisis", 4 September
Waterton C, Ellis R, 2004, "Environmental citizenship in the making: the participation of volunteer naturalists in the UK biological recording and biodiversity policy" *Science and Public Policy* **31** (2) 95 – 105
Wynne B, 1996, "SSK's identity parade: signing-up, off-and-on" *Social Studies of Science* **26** 357 – 391