

From Rural Systems to Rural Networks in Sustainable Development

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Abstract

Research on sustainable rural development is confronted by the dual problems of relating global to local processes and bio-physical to human phenomena. In addition, sustainable development of 'the rural' comprises complex interactions between economic, social and bio-physical elements. This paper reviews the argument for an actor-network approach in addressing these problems, with reference to the sustainable development of aggregates (sand, gravel and igneous rock) in a rural locale in the United Kingdom.

Keywords: sustainable rural development, actor network, aggregates (sand, gravel and igneous rock).

Résumé

La recherche du développement rural durable envisage deux problèmes : celui de mettre en relation le processus global avec le local et le phénomène biophysique avec l'humain. Le développement durable du «rural» comprend encore des interactions complexes entre éléments économiques, sociaux et biophysiques. Cet article en s'adressant à ceux problèmes met au point l'approche pour un réseau d'acteurs (actor-network approach) avec référence au développement durable d'inertes (sable, gravier et roches ignées) dans un endroit du Royaume Uni.

Mots-clés: développement rural durable, réseau d'acteurs (actor network), exploitation d'inertes.

Resumo

A investigação em torno do desenvolvimento rural sustentável confronta-se com os problemas duais de relacionar o processo global com o local e o fenómeno biofísico com o humano. Além disso, o desenvolvimento sustentável do “rural” compreende interações complexas entre elementos económicos, sociais e biofísicos. Este artigo, ao tratar estes problemas, traz em revista o argumento utilizado numa abordagem para uma rede de actores (actor network approach) tendo por base o desenvolvimento sustentável de inertes (areia, saibro e rochas ígneas) numa localidade do Reino Unido.

Palavras-chave: desenvolvimento rural sustentável, rede de actores (actor network), exploração de inertes.

Introduction

In many respects, sustainable development involves reconnecting society with natural resources and the bio-physical environment (hereafter termed ‘the environment’), connections that have been broken during the ‘modernisation’ of economy and society since the Enlightenment of the sixteenth and seventeenth centuries. Sustainable development also involves connecting ‘top-down’ (global) with ‘bottom-up’ (local) processes of social and economic change: the former are conditioned by national and international state policies through institutions/agencies; the latter draw local communities and the environment into relationships with those institutions. Whereas institutions are faced by the central problem of prioritising long-term policy aims for sustainable development in the face of short-term socio-economic and political pressures, communities are involved in short to medium-term capacity building of leadership, knowledge, skills and motivation so as to enable them to participate in sustainable development. How best to study these interactions between society and the environment (also termed ‘nature’ in some discourses) is open to debate: issues of both spatial scale and method of analysis remain unresolved.

Limiting discussion to sustainable *rural* development, and looking first at the issue of spatial scale, discourses vary in context from the global, through the national, to the local. Connecting research from these different spatial scales of analysis is problematic, since each study tends to take place on a bounded ‘surface’ (e.g. a global surface bounded by national administrative areas, or a national surface bounded by regional administrative areas). However, increasing recognition is being given to the way in which sustainable rural development is produced at the local rather than national or global scales, with local actions constrained by national and global socio-economic forces. In addition, recognition is increasingly given to how rural locales vary in their potential for making ‘sustainable’ reconnections between

society and the environment. On the one hand, locales vary in the strength of economic, social and political imperatives for the creation of jobs, housing and services at the expense of sustainable development; secondly, locales vary in the dynamic relationship between sustainable development and the parallel dynamic processes of urbanisation and globalisation. For example, sustainable rural development has sharply varying meanings and dynamics between peri-urban regions and economically or locationally peripheral regions.

Turning to method of analysis, research on sustainable rural development has to account for complex interactions between the economic, social, political and environmental elements that comprise economy and society. One conventional approach in the social sciences has been to adapt the scientific construct of 'systems analysis'; but recently the sociological construct of 'actor-network' has been advocated as a more suitable alternative. Taking a lead provided by Murdoch and Marsden (1995), this paper examines the contribution that an actor-network approach can make to our understanding of sustainable rural development, using as a context the extraction of aggregates (i.e. sand, gravel and igneous rock) within the county of Leicestershire in the United Kingdom.

'The rural' as a system

A wide range of contested, theoretical positions can be identified within the social science discourse on contemporary resource development, for example in General Systems Theory, Regulation Theory, Economic Theory, Social Theory and Political Science Theory (Clayton and Radcliffe 1996). To this number are being added studies that seek to resolve the tensions between competing theoretical positions, for example for agricultural and the environmental resources and for community and ecology. One widely adopted analytical approach within these theoretical positions, however, has been the natural sciences construct of 'systems analysis'. Indeed some years ago, Harvey (1969) was able to write that 'the concept of a system is not in any way new...(but)...the modern emphasis on systems...(is)...a part of a general change in emphasis.. to study situations in which there are interactions between very large numbers of variables'. In his view, a system comprises three sets: (1) elements - the basic unit of the system - identified with some variable attribute of objects; (2) relationships (links) between the attributes of objects; (3) relationships between the attributes of objects and the environment.

A number of problems have arisen when adopting systems analysis within a social science research design. The problems include: (i) defining the elements to be included in the system; (ii) defining the variable attribute to be measured; (iii) defining the relationships to be included in the system; (iv) defining the boundary of the system; and (v) defining the scale of the system (i.e. the resolution level, with systems embedded within systems). Consequently the concept of 'system' has been used mainly as a heuristic rather than

operational device. The term 'rural system', for example, has been applied as a descriptive, organising framework for research by the International Geographical Union's Commission on 'The Sustainability of Rural Systems' (Bowler *et al.* 1999), as a broad description of the complex interaction of multiple variables within a defined spatial context (e.g. Bowler 1995), and as a means of describing relations between rural space users, used space and space use (e.g. Veldman 1984).

Veldman's (1984) study of the Netherlands as a rural system is instructive on the advantages and disadvantages of systems analysis in the social sciences. On advantages, three main attributes of human and bio-physical objects with relationships between them can be defined: economic activities and dwellings (economic sub-system), resident population (social sub-system), and physical spatial structure (bio-physical or natural sub-system). In addition, the rural sub-systems can be examined individually or together using a variety of investigative methods; 'urban' and 'rural' elements can be combined; and variations in spatial scale can be accounted for by a 'nested' or hierarchical conceptualisation of the rural system. On disadvantages, Veldman's rural system is heuristic rather than operational (i.e. mathematical functional relationships between elements of the system cannot be specified), processes that link the nested surfaces are not defined, and power relations between defined human elements in the system and sub-systems are not considered.

'The rural' as an actor-network

Dissatisfaction with the mathematical, data-constrained and assumption-bound nature of systems analysis has caused social science researchers to explore alternative ways of investigating complex reality. Actor-network theory (ANT) is under contemporary scrutiny, but while there is a growing theoretical literature on actor-networks, there have been relatively few applications of the theory to empirical research contexts. Exceptions within the literature on rural development include Bowler (1999), Marsden *et al.* (1993), Murdoch and Marsden (1995), Whatmore (1997) and Woods (1997).

Bowler (1999) has summarised ANT for rural geography, and that analysis is not repeated here. Rather attention is drawn first of all to the advantages that ANT creates for research on sustainable rural development. First, and crucially, ANT allows the researcher to trace the significance of relations between actors *through* rather than across space. In other words, the actors (human and non-human) that comprise a network are not interpreted as being bound in their relations to any one spatial scale; indeed scale *per se* does not define the network. Rather the actors, and their interrelationships, define the network, with the capacity to 'act at a distance' in influencing the behaviour of other actors, for example in linking the local to the global. Thus, as a metaphor (Law 1992), ANT permits us to define the intersecting actor-networks that comprise a locality, with any network defined by its actors in interaction.

Next, actor-networks are heterogeneous or hybrid, comprising both human and nonhuman entities. While humans construct nonhuman entities, they in turn are defined by the nonhuman entities put into circulation (Callon 1986), including relations between themselves. In other words, material objects are active in defining human social actors and their relationships. In the present interpretation of ANT, and following the approach of other geographers (e.g. Murdoch 1995), ‘actors’ have been distinguished from ‘intermediaries’, so as to retain the difference between the ‘human’ and ‘nonhuman’ respectively, but together they have been termed ‘actants’ having equal status. This property of actor-networks (i.e. the equal status of human actors and nonhuman intermediaries) marks out the approach as different from any other. Thus ANT requires the researcher to identify the intermediaries within a particular network and account for the ways in which intermediaries are defined by and yet also define human actors.

Thirdly, ANT requires the power relations between actants in a network to be investigated. In effect, an ANT narrative focuses on the processes of construction, consolidation and stabilisation in the actor-network. Thus actor-networks are never ‘already constituted’ or static but ‘always in the making’ (Murdoch 1995), not least because the actors and intermediaries comprising a network change through processes such as enlisting and immobilising, while actors within a network contest and modify their relationships with each other over time. Here ‘acting at a distance’, together with the intermediaries that are mobilised by actors to extend their spatial reach, become useful spatial concepts for use in research on sustainable development.

The extraction of aggregates as a case study

Thus far we can conclude that, potentially, ANT offers a means of interpreting actants and their relations in sustainable rural development. To examine this proposition further, we turn to the extraction of aggregates in the county of Leicestershire, located in the East Midlands of the United Kingdom (UK).

The general character of the aggregates industry, and the framework of the controlling planning system, in the UK are well-known and are not repeated here (see Blowers 1987). However, the actants relevant to minerals extraction in the UK are listed in Table 1 and two intersecting actor-networks, based on ‘regulation’ and ‘environmental ethics’ as modes of ordering, can be identified. Following Murdoch and Marsden (1995), ‘regulation’ through the planning process forms the dominant mode of ordering, with demand forecasts (as texts) as the principal intermediary defining the linkages between actants. Summarising this actor-network, and using examples from the Leicestershire context, the Department of the Environment (DoE - Minerals Planning Division) makes forecasts of national demand for aggregates since 1988 using the services of a consultancy firm - ECOTEC. The dominating

argument is that meeting the demand for aggregates is a necessary and over-riding condition for the continued economic growth of the national economy. National (England and Wales) forecasts are translated into regional forecasts by ten Regional Aggregates Working Parties (RAWP). The East Midlands Aggregates Working Party, for example, comprises six officials drawn from the Mineral Planning Authorities (MPA) in the region - in effect five County Councils, including Leicestershire - seven representatives from the mineral development companies (e.g. from British Aggregates Construction Materials Industries - BACMI), and three representatives from the DoE.

Table 1. Actors and intermediaries (actants) in the actor-network for the extraction of aggregates in the UK

Actors	Intermediaries
Department of the Environment (DoE)	Minerals Legislation
ECOTEC Research & Consulting Ltd	National, Regional and County Demand Forecasts
Regional Aggregates Working Party (RAWP)	Minerals Local Plan (MLP)
Mineral Planning Authority (MPA)	Planning Process
British Aggregates Construction Materials Industries (BACMI)	Mining Sites (pits and quarries)
Sand and Gravel Association (SAGA)	Other texts (Minerals Planning- Guidance Note 6; research documents; letters)
Mineral Development Companies	
Land Owners (local)	
Politicians (local and national)	
Resident Groups (local)	
Environmental Groups (local and national)	

Source: author's survey

Regional forecasts are further distributed amongst the MPA (counties); Local Minerals Planning Officers within each MPA propose the release of specific sites for development so that production can meet the forecasted demand; and both aspects (forecasts and sites) are incorporated into Minerals Local Plans (MLP) which become further intermediaries. Planning applications on permitted sites by mining development companies (e.g. Ennemix Aggregates, Redland Aggregates, ARC, Tarmac Roadstones) are subjected to extensive negotiation between the companies and the MPA. The applications are then contested through the planning process - including Public Inquiries - by relevant land owners, local resident groups (e.g. The Croft Hill Action Group; The Great Bowden Society) and local environment groups (e.g. Friends of Chamwood Forest; the Leicestershire branch of the Council for the Protection of Rural England - CPRE). Once planning permission has been granted, Minerals Planning Officers lengthen the actor-network by establishing Local Liaison Committees for each site, comprising representatives of the mining company, the MPA, and elected local district and parish councillors. The Committees attempt to resolve problems between local residents and the mining company as the site is developed and subsequently restored to the permitted after-use.

In this interpretation, and as also identified by Murdoch and Marsden (1995), demand forecasts by region (texts as intermediaries) are passed down the planning hierarchy from the DoE and new actants and actor-spaces are constituted by the calculations of demand; actors who wish to contest the exploitation of a particular site are confronted by an already existing discourse of demand legitimated by a chain of actants extending from the national to the local. The calculations show that existing planning consents provide a land bank sufficient for thirty-six years of production of crushed igneous rock at current levels of demand; this has enabled planning officers to resist applications to release land for new igneous rock quarries in Leicestershire. However, much depends on the growth in demand for crushed rock in the construction industry (urban infrastructure and roads) outside the County.

A second actor network, based on 'environmental ethics' as the mode of ordering, has been developed to resist the logic of demand forecasting, but intersects with the 'regulatory' actor-network. At the national level, for example, CPRE has developed its own texts, notably in 1991 (CPRE 1993), as a means of challenging the DoE's demand forecasts. CPRE's research texts have enabled it to enrol other actors into its actor-network (e.g. other environment groups, such as Friends of the Earth and Transport 2000, and critical environmental journalists) and draw upon the growing discourse based on environmental sustainability and national Agenda 21 objectives. An examination of the DoE's revised Minerals Planning Guidance Note 6 (MPG6) shows that an alternative mode of ordering based on environmental (or sustainability) criteria is being developed within government policy, implying a reduction in the rate of depletion of land-won primary aggregate resources in England and Wales. For instance, the DoE represents its policy as limiting avoidable and irretrievable losses of natural resources, such as minerals, and meeting the demand for aggregates by developing new sources of supply (e.g. super quarries) or by using secondary materials (e.g. marine-dredged aggregates, colliery minestone, metallurgical slag and pulverised fuel ash). However, CPRE has argued that the DoE's policy is still too weak and claims that shifting the environmental burden to other locations or materials does not make a policy 'sustainable'. Nothing less than reducing demand through management will suffice (Plowden 1992). This would require national-level strategies to be agreed on matters such as: a reduced volume of road building (now under implementation by the present Labour government), the construction of flexible multiple-use buildings, re-cycling building materials, and the conservation of high grade materials.

As the 'environmental ethics' actor network has gained in strength, it has been able to intersect the 'regulatory' actor network at the point where statutory environmental agencies are situated - for example national bodies such as English Nature and English Heritage, and local bodies such as the Museums, Arts and Records Service of the Leicestershire County Council. The last named body, for instance, has brought potential mining sites into the 'environmental ethics' actor-network by designating many of them as 'Regionally Important

Geological Sites' (RIGS); at the same time, designation situates the sites within the 'regulatory' planning network. The MLP now reflects the effects of the intersection of the two actor-networks, since planning permission will only be granted where the need for the development is sufficient to justify its environmental impact'. However, one effect of successful local resistance to a proposal for aggregates extraction is to displace the proposal to other localities that are more weakly enrolled into the actor-network. For crushed rock, these localities include remote areas of Scotland, where a number of 'super quarries' have been proposed, and southern Norway, where such quarries are already in operation.

Local resident and environment groups have been enrolled into the 'environmental ethics' actor network, sometimes as a cover for local self-interest, and they represent mining sites as threats to the environment. Within Leicestershire, a case-by case study of these groups by the author has found a variety of 'strategies of translation', including representing potential sites of extraction as important national environmental resources (flora, fauna and landscape). Political actors with regional or national influence have been enrolled into the actor-network through sustained programmes of letter writing and informal lobbying, while the national or local press have been enrolled through covering direct-action/protest meetings and public debate meetings. The minerals development companies are usually excluded from such an actor-network. Considerable local rather than national effects on the outcome of the planning process can be observed, including refusals of planning applications on extraction sites, the attachment of restrictive environmental 'conditions' to site planning application permissions, and detailed negotiation of site planning applications to include 'planning gain' in after use.

Conclusion

From this analysis, actor-networks appear to reinterpret two features that have been recognised within geography, and also sociology, for many years, namely social 'actors' and 'networks' and they cannot be claimed as novel constructs in themselves. Similarly viewing the power relations between institutions or agencies in terms of a hierarchical network of actors is widely appreciated. Thus ANT appears capable of offering only increments to our existing understanding of sustainable development rather than providing a clearly differentiated or radically new interpretation.

Secondly, while the hybridity of actor-networks sets them aside from conventional accounts, it can be contended that nonhuman actants (intermediaries) are inert objects which achieve power only through human agency and are, therefore, subsidiary to them. In particular, only human actors are capable of intentionality. Thus it can be argued that a false metaphor is created by ascribing equal status to human and non-human actants, but by excluding nonhuman intermediaries as actants one of the distinguishing features of an ANT narrative is removed.

Thirdly, while ANT offers ‘structured coherence’ (i.e. structure and agency combined together and not one set above the other), placing the ‘boundary’ to an actor-network is problematic. Being holistic and heterogeneous, an actor-network is capable of being so extended to include further actors and intermediaries as to lose its capacity as a focused and incisive mode of narrative or analysis. Equally, as there are no theoretical limits to an actor-network, the definition of a particular actor-network becomes a matter of empirical determination and hence contestation, as does distinguishing between particular humans operating as ‘actors’ rather than ‘intermediaries’ within an actor-network.

Turning now to potentialities, ANT offers an holistic framework for research that seeks to understand the inter-relationships between the bio-physical environment and society. Hybrid descriptions and explanations through ANT can help overcome the binary divide in knowledge and understanding between the environment (nature) and society, or the nonhuman and human, and provide a means of integrating some of the recently developed nature-society literature.

ANT also offers a means of linking space in studies of sustainable rural development, for example linking the local to the national to the global. Rather than conceptualising scale as a number of ‘surfaces’ with boundaries, ANT offers the metaphor of ‘actor-network’ whereby the local is connected to the national or global through the connectivity, or ordering, of humans, organisations, texts and instruments. ANT focuses attention on points of connection and lines of flow in resource development.

With sustainable development viewed as a socially contested process, ANT offers a mode of describing and interpreting relations of power and modes of ordering, especially in respect of how intermediaries, particularly knowledge, are constituted and used to enrol and control spaces and communities. Here the multiple positioning of individual actants can be recognised, both human and nonhuman, together with the uneven patterns of power amongst networks of actants. In sum, ANT offers both a theory and a method for deriving hybrid interpretations which connect the human and nonhuman, and the local to the global, in sustainable rural development.

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