COMMUNITY ACTION: A NEGLECTED SITE OF INNOVATION FOR SUSTAINABLE DEVELOPMENT?

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Abstract

Innovation and community action are two important areas of research and policy for sustainable development. Yet these two spheres of activity have not hitherto been linked. This paper builds a case for considering community action as a neglected, but potentially important, site of innovative activity. In so doing, the paper bridges a divide in a way that offers a novel theoretical approach to the study of community-level action for sustainability. It discusses some of the opportunities presented by grassroots innovation, and some of the challenges confronting activity at this level. By conceiving of the grassroots as a niche site for innovation a new agenda for community-level sustainable development research and policy support emerges.

Keywords: sustainable development, community action, innovation, social economy, sustainable consumption

1. INTRODUCTION

Everybody, it seems, is committed to sustainable development. But not everybody is practising or seeking sustainable development in the same way. Attempts to meet our needs and desires more sustainably are generating a variety of social innovations as well as innovative technologies - new organisational arrangements and new tools – in many different areas and at different scales of operation. Grassroots, niche innovations differ from mainstream, business reforms: they are practising quite different kinds of sustainable development. There is a qualitative difference between, for instance, a community-supported organic vegetable box scheme and the range of organic products sold at a supermarket; the social, economic and environmental dimensions of sustainable development are traded-off differently (Smith, 2006; Seyfang, 2006a).

Grassroots action for sustainable development takes many different forms, from furniture-recycling social enterprises to organic gardening cooperatives, low-impact housing developments, farmers' markets and community composting schemes. Since 1992, over 400 local authorities in the UK produced Local Agenda 21 strategies, and there has been a steady growth of independent, community-based work on 'local sustainability': for instance, Shell Better Britain's network of local community action groups working towards sustainable development grew from 10,000 in 1992 to 26,000 in 2002 (Church and Elster, 2002). To date, however, the innovativeness of this activity has not been considered. We use the term 'grassroots innovations' to describe innovative networks of activists and organisations that lead bottom-up solutions for sustainable development; solutions that respond to the local situation and the interests and values of the communities involved. In contrast to the greening of mainstream business, grassroots initiatives tend to operate in civil society arenas and involve committed activists who experiment with social innovations as well as using greener technologies and techniques.

Reflecting this disparity there are two parallel strands of policy identifiable within the UK's sustainable development strategy[1] (HM Government, 2005). These are, on the one hand, ecological modernisation and technological innovation (DEFRA, 2003, 2004, 2005c), and on the other, community action and the social economy (DEFRA, 2005a,b). These two strands of action for sustainable development have traditionally been studied in separate literatures on technological innovation for sustainable production and consumption (Alakeson and Sherwin, 2004; Fusslar and James, 1996; Murphy, 2000; Rip and Kemp, 1998; Smith *et al.*, 2005) and community and civil society activities (Young, 1997; Amin et al, 2002; Leyshon et al, 2003; Burgess et al, 2003; Seyfang, 2001a, 2006b,d).

We argue that such a division inhibits our understanding of the innovative potential of grassroots initiatives, and also prevents us from recognising a potentially powerful force for change, namely collective rather than individual action for sustainable consumption and production. In this paper, therefore, we bridge that divide and integrate these two previously unrelated areas of research and policy analysis, in order to offer an original theoretical approach to the analysis of community-level action for sustainability. This agenda is borne of a perspective that considers the grassroots a neglected *site of innovation* for sustainability, hitherto eclipsed by green reforms in more conventional business settings.

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[1] Whilst this paper focuses upon the UK in developing an agenda, it is nevertheless of relevance to other countries and contexts. The Plan of Implementation of the World Summit on Sustainable Development in Johannesburg in 2002 continues a long-standing acknowledgement of the importance of the local level in delivering sustainable development, and civil society groups were invited to take part as stakeholders, for the first time in the series of UN environmental mega-conferences (Seyfang and Jordan, 2002). At the same time, the Plan of Implementation announced a 10 year programme to promote a transition to more sustainable production and consumption systems.

We suggest that by viewing community-level activities as *innovative niches*, we gain a better understanding of the potential and developmental needs of grassroots innovations, as well as gaining insight into the nature of the challenges they face and their possible solutions. This is a timely conceptual contribution to the literature, as evidenced by the new policy initiatives above, and one which opens up a new research agenda, while potentially offering useful lessons for effective policy on sustainable development.

The paper begins with a discussion of the UK sustainable development strategy, outlining the role within it for technological innovation, and the traditional rationale for community action within sustainable development. We then examine the existing literature on socio-technical transitions and the role of innovative niches within transformation of mainstream, market-based production and consumption systems. We then develop and extend this theory by considering how it may be applied to innovations within the *social* economy, thereby viewing grassroots initiatives for sustainable development as innovative green niches. Having made this conceptual transition, we turn to the implications for theory and practice of this analytical approach. Drawing on the 'grey' literature associated with grassroots initiatives, and our own research, we discuss the potential benefits of grassroots innovations for sustainable development, the challenges these green niches face, and finally the policy and research agendas suggested by this new approach.

2. SUSTAINABLE DEVELOPMENT CONTEXTS: INNOVATION AND COMMUNITY ACTION

The UK government's strategy for sustainable development 'Securing The Future' states "The goal of sustainable development is to enable all people through out the world to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations" (HM Government, 2005: 16). It goes on to explain that this will be pursued "in an integrative way through a sustainable, innovative and productive economy that delivers high levels of employment; and a just society that promotes social inclusion, sustainable communities and personal wellbeing. This will be done in ways that protect and enhance the natural environment, and use energy and resources as efficiently as possible" (ibid).

Through this policy agenda, the government is pursuing an 'ecological modernisation' agenda (Murphy, 2000), principally through its strategy for Sustainable Production and Consumption. This demonstrates a keen interest in 'greening' markets using taxes, incentives and better information to account for the environmental costs of development activity, and so encouraging technological innovation to improve resource efficiency and decouple economic growth from environmental degradation (DEFRA 2003). The government defines innovation as "the successful exploitation of new ideas – incorporating new technologies, design and best practice [which] is the key business process that enables UK businesses to compete effectively in the global environment" (DTI, 2005). It also makes the link with sustainability in the 2003 Innovation Report, stating that innovation will be essential for meeting the environmental challenges of the future (DTI, 2003), and actively promotes 'sustainable innovation', "a product, technology or service that contributes to the achievement of sustainable development as defined by the UK sustainable development strategy" (DEFRA, 2005c). In this vein, 'eco-preneurship' is the term used to describe environmental entrepreneurs, in growing media attention on this business sphere (Beveridge and Guy, 2005). This is also the approach favoured by mainstream business reforms for eco-efficiency and innovation (Fussler and James, 1996), and espoused by business leaders in bodies such as the World Business Council for Sustainable Development (Holliday and Pepper, 2001:3). Alongside this emphasis on green innovations in production technologies, the government aims to promote sustainable consumption through 'market transformation',

and the development of more sustainable market choices for products and services (DEFRA, 2003). This strategy relies upon informed, motivated individual consumers to respond to information provided about social and environmental impacts, and make consumption choices accordingly.

However, this is not the whole story. The UK strategy also recognises the positive contribution made by small-scale local activities, and has a particular emphasis on *delivery* of sustainable development at all scales of governance, including the grassroots. Prime Minister Tony Blair has stated "Many local communities understand the links between the need to tackle national and global environmental challenges and everyday actions to improve our neighbourhoods and create better places to live… I want to reinvigorate community action for sustainable development" (cited in HM Government, 2005:29) and a new initiative 'Community Action 2020 – Together We Can' will implement this call to action. This programme builds on experience with Local Agenda 21, the commitment to sustainable development made by governments at the 1992 Rio Summit (UNCED, 1992), and aims to be "a catalyst for thinking globally and acting locally in communities across England [by] promoting new and existing opportunities to get involved in … community action to increase sustainability" (ibid). It highlights activities such as local food initiatives, community energy efficiency schemes, recycling projects and Fairtrade activities, as well as participation in decision-making, volunteering, capacity-building, information-sharing and community mentoring (DEFRA, 2005b). This represents a growing policy focus on the social economy – comprising social enterprise plus voluntary and community organisations – as a source of sustainability transformation, active citizenship, and public service delivery. Furthermore, it specifically highlights community engagement in governance as a key element of a sustainable society (HM Government, 2005; Seyfang, 2006c), and looks to community and voluntary groups to lead the way and generate the innovations in governance, behaviour and lifestyle changes – embedded and 'owned' in local communities – necessary for sustainable consumption and production (DEFRA 2005b; Rogers and Robinson, 2004). In addition, DEFRA is developing its own strategy to support social enterprise because of the ways the sector combines social, economic and increasingly environmental objectives, and contributes directly to its strategic goals of achieving sustainable rural communities, waste reduction, biodiversity enhancement, action on climate change, and so on (DEFRA, 2005a).

These elements of the strategy focus on 'quality of life' as a development goal and for the first time depart from the conventional wisdom of pursuing economic growth as a priority (Jackson, 2004). Furthermore, it addresses issues of social structures for the first time in UK policy, by acknowledging that "it can be relatively comfortable to talk about sustainable consumption in terms of switching off lights or recycling bottles. But our bigger, customary consumption habits [such as Western diets, energy and water use, air travel] pose more difficult issues… We need to understand more about the social and cultural influences which shape our consumption choices, habits and impacts" (HM Government, 2005:51-2). This statement clearly recognises the role of 'socio-technical regimes' which influence behaviour, constrain individual choice sets and limit the transformative potential of the market (Levett et al, 2003; Maniates, 2002; Jackson and Michaelis, 2003). Community Action 2020 lists actions – such as purchasing local food – which explicitly seek to reinvent social infrastructures of provision (DEFRA 2005b). For example, an individual consumer cannot choose to have litter-free streets, or an efficient, reliable and affordable public transport system. These are choices which can only be realised through collective action. By focusing on socio-technical regimes rather than individual decision-making, we can see that "in consciously exercising our individual, incremental choices, we have sleepwalked into some larger choices and foreclosed others without even realising it. The market can be an 'invisible elbow' shoving us into an unwanted corner, rather than Adam Smith's 'invisible hand'" (Levett et al, 2003:47).

Clearly, the language of community action and participation is becoming embedded in sustainability policymaking and development in the UK, for a variety of reasons (DEFRA, 2005a). Principal among these is the need for active citizens and strong local democratic institutions to 'own' and embody principles of sustainable development (Christie and Warburton 2001; Young, 1997), and the potential for locally-rooted action to generate socially-embedded changes in behaviour in keeping with sustainable production and consumption goals (Burgess et al, 2003). Overlapping with these objectives are government efforts to boost social capital through micro and meso-level activities (PIU, 2002) and the emerging policy agenda for decentralisation and the 'New Localism' which advocates devolving decision-making to the 'lowest sensible level' to boost service delivery and community engagement, but remains focussed on local government activities rather than grassroots initiatives (NLGN, 2005: 9).

In innovation policy for sustainable development, we can also find recent statements and initiatives from government which seeks to open innovation and technology development to wider stakeholder participation, including citizens and local communities. Policy-makers acknowledge 'increasing aspirations towards public accountability and democratic control of the direction of development of science and technology' (DEFRA, 2004: 16). Processes for public engagement attract interest (Stirling, 2004; Wilsdon and Willis, 2004). As such, threads within UK policy on innovation and sustainability appear to be converging in such a way as to provide renewed opportunities for endeavours of grassroots innovation. There appears to be an official recognition (rhetorically at least) of the importance of grassroots innovation that an earlier generation of citizen science (Irwin *et al*., 1994; Corborn, 2005) and alternative technology (Winner, 1979; Boyle and Harper, 1976; Smith, 2004) did not enjoy.

3.   UNDERSTANDING SUSTAINABLE INNOVATIONS

Having reviewed the policy contexts for both innovation and community action in sustainable development policy, attention now turns to recent ideas in the literature of innovation and sustainability. Radical innovations for sustainable production and consumption *systems* (e.g. 'factor 20' resource productivity improvements or large emissions cuts, like 60 per cent carbon dioxide reductions) imply a different kind of innovative activity to that traditionally associated with a single product or new business practice (Berkhout, 2002). Leading research on innovation and sustainability identifies how the innovation of individual products, processes and practices are embedded within large-scale 'socio-technical regimes'.

Studies into past transformations to systems of production and consumption suggest it can be difficult to break away from existing ways of doing things. The innovation studies literature identifies a variety of mutually reinforcing processes that channel the development of technologies along 'trajectories' (Nelson and Winter, 1982; Dosi *et al*., 1988; Russell and Williams, 2002). Changes tend to be incremental and path dependent owing to:

- the cognitive frameworks, routines, resources, capabilities, and knowledge of technology producers and users, and expectations about what kinds of knowledge etc will be profitable in the future (Nelson and Winter, 1982; Dosi, 1982);
- the way specific social and technical practices are embedded within wider, facilitating infrastructures, which subsequently restrict opportunities for alternatives (Jacobsson and Johnson, 2000);
- incumbent practices enjoy economies of scale (e.g. mass markets) and positive network externalities (i.e. it is easier and less risky to follow established practices than to invest in new practices with little institutional support) (Arthur, 1988; Dosi, 1982);
- the co-evolution of institutions like professional associations, government policies, and market rules reinforce existing trajectories (Hughes, 1983; Walker, 2000);

- prevailing market and social norms influence the kinds of performance in technologies and practices deemed satisfactory, and the lifestyle routines and norms that develop embed these practices further and resist alternatives (Yearley, 1988; Shove, 2003).

In short, entrenched cognitive, social, economic, institutional and technological processes lock us into existing trajectories of development. The term 'socio-technical regime' has been coined to capture this complex configuration of artefacts, institutions, and agents reproducing technological practices. The web of interactions can be extensive and the socio-technical 'adjective is used to stress the pervasive technological mediation of social relations, the inherently social nature of all technological entities, and indeed the arbitrary and misleading nature of distinctions between 'social' and 'technical' elements, institutions or spheres of activity' (Russell and Williams, 2002: 128). The development and co-ordination of the socio-technical is a highly social, collective process, and ultimately it is diverse social actors who negotiate innovation (Smith *et al*., 2005). Imposing a normative goal like sustainable development upon existing socio-technical regimes implies connecting and synchronising changes amongst actors, institutions and artefacts at many different points within and beyond the regime.

Historical experience suggests regimes can undergo radical change, and when transformation does happen, it tends to begin within a network of pioneering organisations, technologies and users that form a *niche* practice on the margins of the mainstream. Innovation studies suggest these 'niche' situations (e.g. niche applications, demonstration programmes, social movements) provide space for new ideas, artefacts, and practices to develop without being exposed to the full range of selection pressures bearing upon incumbent, mainstream regime (Schot, 1998; Geels, 2004; Rip and Kemp, 1998). According to Hoogma *et al* (2002:4): 'A niche can be defined as a discrete application domain ... where actors are prepared to work with specific functionalities, accept such teething problems as higher costs, and are willing to invest in improvements of new technology and the development of new markets.'

If successful, these alternatives become sufficiently robust to develop niche markets, branch out, and attract wider interest from the mainstream (Schot *et al*., 1994). Such insights have inspired an approach to sustainable development that studies the creation of strategic green niches in order to help inform possibilities for more sustainable systems of production and consumption (Kemp *et al*., 1998; Smith, 2004). Green niches are sustainability experiments in society (cf. in laboratory settings) in which participation is widespread[2] and the focus is on social learning. Ideally, niche-based approaches begin with situated problems with fulfilling existing social functions (e.g. mobility, food, energy services) and search for solutions– in contrast to technology demonstration projects that often begin with specific 'technical solutions' to ill-defined problems.

The basic model holds that niches pioneer new practices which, if resonant with a widespread public concern (e.g. we should do something about sustainability, or quality of life, for instance), catch on. These practices are copied and adapted and spread. However, it is important to stress how the literature on 'strategic niche management' is careful to qualify its interest in niches. Niches alone are unable to seed wider changes in mainstream production and consumption systems (Hoogma *et al*., 2002). More recent work on multi-level socio-technical change identifies tensions and contradictions within incumbent systems, exacerbated by pressures deriving from broader socio-economic dynamics, as being critical in driving the transformation of socio-technical regimes (Geels, 2004). In other words,

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[2] Kemp *et* al. (1998: 188) argue the niche-based approach is the 'collective endeavour' of 'state policy-makers, a regulatory agency, local authorities (e.g. a development agency), non-governmental organizations, a citizen group, a private company, an industry organization, a special interest group or an independent individual'.

change depends upon contingencies and processes beyond the unilateral control of niche actors (Berkhout *et al*., 2004). Niches still play a role in this broader 'transition' agenda. They are sites where alternative practices can be drawn upon in order to try and resolve the contradictions and tensions in incumbent regimes. When conditions are right niche actors can find opportunities for enhancing their influence and reach. Niches have potential as sources of innovative ideas, even if they do not become models or blueprints for wider transformation (Smith, 2006). Assisting this is the emergence of more pragmatic, intermediary initiatives that bring mainstream actors into play, and which require compromises and mutual adjustments in positions, but which nevertheless take important cues from original green niches. Entrepreneurial and professional 'system builders' (e.g. ecopreneurs) and intermediary organizations more attuned to market and commercial imperatives are needed in this bridging activity.

As a framework for analysis, the niche-based approach studies the processes in which niches emerge and develop. Analysis focuses upon the social networks, learning processes, expectations and enrolment of actors and resources in emerging niche practices. Armed with such analysis, advocates derive policy implications designed to improve the development and influence of niches. Policy recommendations subsequently include facilitating greater actor interaction, promoting social learning, and seeking institutional changes that will diffuse and embed lessons (Kemp *et al*, 1998). Policy for sustainable development should include initiatives that purposively create, protect and nurture green niches, where alternative, sustainable practices can be experimented and improved, and support enrolled around successful, promising aspects of the niche (Hoogma *et al*., 2002).

Learning plays a central in niche analysis and development. Lessons and pressures derived and applied from the niche need not be restricted to narrow, technical appraisals of socio-technical practice and improving performance. Such 'first-order' learning can be supplemented by 'second-order' learning (Hoogma *et al*., 2002). Second-order learning generate lessons about the alternative socio-cultural values underpinning and defining niche needs and practices; it renders them more explicit and reflects upon the implications for diffusing niche socio-technical practices beyond that context. There can be insights into deeper institutional changes that would help niche practices flourish. Or lessons can relate to the different constituencies, capabilities, contexts and markets that are more open and susceptible to appropriating aspects of the niche alternatives (Weber *et al*, 1999; Kemp *et al*., 1998; Hoogma *et al*., 2002). As such, niche-based approaches demand an interactive policy style, but also one mature enough to recognise the value in acknowledging and learning from failure as well as success. Elements of niche practice that do not 'work' can be just as informative for sustainable developments as those aspects that operate successfully.

Contrasts between green niches and mainstream regimes can already be drawn in many systems of production and consumption, such as housing, food, energy and banking. The question is, might this niche-based analytic and policy perspective provide a new way of thinking about grassroots initiatives in sustainable development? Can the grassroots be conceptualised as a site for innovative niches? Whilst the literature on green niches did not develop with an explicit focus on grassroots innovation in mind, we believe it may hold some relevance. Early case studies informing the approach did include green niches deriving from grassroots initiative (e.g. wind energy in Denmark, car clubs in Switzerland) though they were not categorised as such (Kemp *et al*., 1998; Hoogma *et al*., 2002).

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[4] This assumes perfect competition. In practice, market power can prevent such competition. The ability of competitors to 'catch-up' depends upon the resources they can devote to innovation and their ability to appropriate any benefits (Clark, 1985).

4.   SOME CHARACTERISTICS OF GRASSROOTS INNOVATIONS

We believe the niche framework provides a potentially fruitful bridge between analyses of grassroots initiatives as community or civil society activities and a role for the grassroots in innovation policy for more sustainable production and consumption systems. (However, it is important to qualify this potential. As with niches more generally, we do not consider grassroots innovations as the exclusive, powerful vanguard for more sustainable futures.)
In this section, therefore, we extend and translate the conceptual model of innovative niches from the market economy to the social economy, with sensitivity to the fundamental differences between the two sectors.

The technological innovations literature traditionally deals with niches within the market economy. Niches have been defined above as spaces where 'the rules are different', and conventionally the rules referred to are those of the market – greener practices in niches might be sheltered from the full extent of market competition through a system of tax breaks and subsidies, to allow the innovative niche to grow and mature until it can compete in the market. Grassroots innovations, in contrast, exist within the social economy of community and voluntary activities and social enterprise. An obvious difference between the social economy and the market economy is the way appropriation of profits by capital under the latter is suspended in favour of reinvestment of any surplus into the grassroots activity under the former (Amin et al, 1992). Particularly relevant to the development of our niche perspective, however, is the way grassroots initiatives in the social economy also exhibit different social, ethical and cultural rules. For example, community currencies are new forms of money which are designed to serve social, economic or environmental purposes which conventional money does not, and so reward specific types of behaviour. The NU Spaarpas green loyalty card scheme piloted in the Netherlands awards points for purchasing local, organic or fair trade products, or for recycling household waste; the points can be redeemed for public transport tickets, or more discounts off green services. In this way, it sets up different incentives to the mainstream economy, to encourage sustainable consumption (Seyfang, 2006d; van Sambeek and Kampers, 2004).

The institutional form and basis of conventional innovative niches appears relatively straightforward: the model deals with firms who generate financial income commercially, from selling the products they innovate. The driving force motivating conventional innovation is profit: firms seek to appropriate the benefits of innovation in order to move ahead of the competition and so capture market rents (i.e. above average profits) (Schumpeter, 1961). Competitors innovate too, and so rents are gradually eroded, and the search for innovation continues. Obviously, there are complexities and nuances associated with this basic logic,[4] but by situating itself within conventional market economies, the literature in the preceding section has to align with this innovation logic. Green niches will, ultimately, only prosper if they can attract significant investment and business commitments, which will only happen if the niche innovation can demonstrate a highly profitable potential compared to other opportunities for capital (opportunities which need not, indeed often are not, sustainable).

The institutional forms for grassroots innovative niches are also complex, but in ways whose difference is important. A diverse range of organisational forms are found within the social economy: cooperatives, voluntary associations, mutuals, informal community groups, social enterprise, etc. The resource base on which these institutions operate is similarly pluralistic, including financial income from grant funding, and from limited commercial activity, voluntary input and mutual exchanges. Within the voluntary and community sector, there is a spectrum of organisations exhibiting varying degrees of professionalisation, funding and official recognition, and Chanan (2004) finds that four out of five identifiable groups in the sector are likely to be small, low-profile, voluntary, citizen-led and community-driven groups rather than the more high-profile professionally-led voluntary organisations. There is no hard line between the two ends of the sector, but it is vital to recognise that the sector is not

homogenous, and that official and quasi-official groups exist alongside the informal, voluntary activities and that their relationship may be one of complementarity or competition.

We believe grassroots innovations, within the social economy, are motivated by two alternative prime forces that are more forgiving towards innovation for sustainability, compared to rent seeking firms: social need, and ideology. Meeting social (and environmental) needs is one of the key functions of the social economy. It provides flexible, localised services in situations which the market cannot, and so other initiatives are created because there is a lack of 'system' in such situations. Incumbent production and consumption systems fail to serve some communities, perhaps because groups are socially and economically disadvantaged, unable to access goods, service and markets; or because the choices on offer do not include a desired choice, such as fresh, local organic food in season, or autonomous housing, or community renewable energy (Maniates, 2002; Manno, 2002).

However, niche approaches must be careful not to condemn people to the margins if they do not wish to be there; participants in grassroots innovations might prefer to enter mainstream consumption, but for reasons of social and economic exclusion, find themselves in a consumption niche instead, e.g. furniture recycling. One of the claims for initiatives in excluded communities is that it provides people with the capabilities to later enter the mainstream. For example, Local Exchange Trading Schemes (LETS), a type of community currency, have been advocated as a tool to build the skills, confidence and social contacts of the poor and unemployed, to enable them to enter the formal employment market (Williams et al, 2001; Seyfang, 2001).

Nevertheless, meeting immediate social needs is not the sole factor driving grassroots innovations: in many instances an ideological commitment to a different way of doing things is a driving force, and niches are created in explicit opposition to mainstream markets. For example the organic movement began with a group of idealists committed to developing a new agricultural model based on ecologically viable farms embedded in local food economies. In addition, some grassroots innovations seek to develop practices based on reordered priorities according to alternative values to the mainstream, such as those put forward in the 'new economics' literature. This proposes a socio-economic system which is geared towards developing quality of life rather than economic growth per se, and which favours localised, decentralised, self-reliant economies as the basis of sustainable communities (Jackson, 2004; Douthwaite, 2002; Ekins and Max-Neef, 1993; Robertson, 1999; Schumacher, 1993). This can be expressed, for example, by choosing to consume organically and/or locally-produced food despite its higher price, or by recognising and rewarding types of socially reproductive labour which are not valued in the formal labour market (Seyfang, 2006b,c).

Finally, we must consider the kinds of socio-technical innovations which occur within these niches. In traditional market innovations, it is primarily technological innovation which occurs, as new techniques are brought to bear upon products and services, such that their functioning is improved or new functionalities open up. In the social economy, however, it is social innovation which comes to the fore. To illustrate this point, consider the co-housing model as an example of a grassroots innovation in housing. It is a model of community structure whereby residents live in a neighbourhood of houses (which happen to be designed to reduce environmental impact but this is not necessary) around a 'common house'. This common house usually contains a large kitchen and dining area for shared meals, and industrial-size shared washing machines, lawnmowers etc. Cars are usually kept to the perimeter of the area (and may be shared), allowing for open gardens and footpaths between houses. This structure enables and encourages some communal activities (planning meetings, weekly shared meals, easy conviviality, friendly supportive networks of neighbours etc), and simultaneously reduces the consumption needs of individual houses. It is

essentially a social innovation – a restructuring of the social institutions of housing – rather than a technological one (Hines, 2005; Meltzer, 2005). However, it is important to note that such social innovations open up terrain for being lead users of new, more sustainable technologies. Co-housing, for example, can pool resources and open up opportunities for the use of small-scale renewable energy technologies, rainwater harvesting, grey water recycling, and the use of more sustainable construction materials and designs that would not be open to the households individually. In short, social innovations and the diffusion of technological innovations can be intimately linked.

In summary, this section has transposed key elements of the innovations literature from niches in the market economy to the social economy, and has identified the ways in which the theory is adapted to apply to this fundamentally different setting. The key comparisons are shown in Table 1.

Table 1: Comparing the characteristics of market-based and grassroots innovations

	Market-based Innovations	Grassroots Innovations
Context	Market economy	Social economy
Niche	The rules are different: tax and subsidy environment, competition. Shelter from full forces of the market	The rules are different: social and cultural values are different, expression of different values enabled within niche
Institutional form	Firms	Diverse range of organisational types: voluntary associations, coops, informal community groups
Resource base	Income from commercial activity	Grant funding, voluntary input, mutual exchanges, limited commercial activity
Driving force	Profit: Schumpeterian rent	Social need; Ideological
Principal type of innovation	Technological	Social

5.   THE POTENTIAL BENEFITS OF GRASSROOTS INNOVATIONS

In this section we examine the range of potential benefits of grassroots innovations. The theory on transitions and innovation discussed above identifies two types of benefits from innovative niches. These are: first, the *intrinsic* benefits of the niche practices, and secondly the *diffusion* benefits of the niche, whereby it influences wider socio-technical processes - either through growing the niche and scaling up its activities, or by reproducing niches elsewhere. These categories are not mutually exclusive, and overlap in practice, however the distinction is a useful conceptual one to make in order to differentiate between valuing the niche for its own sake (intrinsic benefits), and valuing it as a means to an end (diffusion benefits). This distinction is vital, as it also delineates 'simple niches' (which do not seek to transform regimes) from 'strategic niche management' (niches are seeds of wider change).

5.1   Intrinsic Benefits

The principal intrinsic benefit of grassroots innovations relates to the social and environmental basis of the niche practices. But what can small-scale community action contribute to sustainable development? A review of the impacts of grassroots action for

sustainability by Church and Elster (2002) identified a range of direct environmental benefits such as reduced car-use, increased recycling, planting trees, etc. When assessing these impacts, they note "small local projects may seem almost irrelevant at city-scale or above, but if wider policies lead to larger numbers of them, there is every reason to expect them, in aggregate form, to have proportionate impact" (Church and Elster, 2002:25), citing the Community Recycling Network as an example of a significant collective organisation, comprising 350 community recycling initiatives. They also identified significant socio-economic impacts with widespread and potentially long-term benefits for sustainable communities. These were related to job creation, training and skills development, personal development (such as boosting self-esteem and confidence), building a sense of community and growing social capital, new or improved access to services and facilities, beneficial health improvements, and greater civic engagement and community participation (ibid). Integrating small-scale renewables into community projects has been shown to bring similar intrinsic benefits (Devine-Wright, 2006).

Many of these initiatives do not see themselves primarily as environmental organisations, but rather as initiatives and groups aiming to improve quality of life in local communities, and herein lies an important point about grassroots innovation. It is not necessary for grassroots initiatives to be consciously practising radical or 'strong' sustainability, for them to have an impact concordant with those objectives. Many groups do very simple activities such as furniture recycling, community composting, or running a volunteering project. Nevertheless they may be producing significant impacts in terms of developing sustainable social and environmental practices.

Furthermore, grassroots innovation delivers a number of important benefits for sustainability which mainstream, or top-down measures could not. This is because community action utilises contextualised knowledge and implies a better 'fit' of solution rather than imposing inflexible top-down targets and procedures (Burgess et al, 2003). Local action groups have experience and knowledge about what works in their localities, and what matters to local people. Consequently, they are often best-placed to present sustainability issues in a way which is more meaningful, personal and directly related to people's lives, and which "goes with the grain of people's lives" (Roberts, 2005). As a result, they can engage people with such issues and embed behaviour change far more effectively than a government-sponsored education campaign.

In addition to addressing needs which the mainstream cannot meet, the grassroots can also be a site where 'unpopular' or 'fringe' issues which are not taken up by mainstream actors and institutions are acted on. Wakeman (2005) uses the metaphor of a 'green conveyor belt' to express the notion that while some grassroots innovations begin in niches, then grow and are incorporated into mainstream regimes (such as organic food), a renewed radical niche is to be found at the grassroots (eg local food or biodynamic farming), where action on unfunded, less popular issues begins (Smith, 2006). In this way, the grassroots niche continuously regenerates in response to its dynamically changing relationship with the mainstream.

Finally, by being a 'world within a world', grassroots innovations are a demonstration that another way is possible, and are an expression of alternative values, building alternative infrastructures to the existing regime of market provision. However unlikely it is that the mainstream would ever become like the niche or that the general population would adopt its values, it nevertheless stands as an embodiment of an alternative way of being and holds symbolic importance for people (Amin et al, 2002; Leyshon et al, 2003).

5.2   Diffusion Benefits

Following on from the previous intrinsic benefit of demonstrating a world where 'the rules are different', this aspect of grassroots innovations can bring diffusion benefits too. In alternative green niches, people's motivations for action are based upon different values to the mainstream. This represents the bottom-up generation of new social and economic infrastructure, or 'systems of provision', operating according to different values and goals to the mainstream. 'Systems of provision' are vertical commodity chains (comprising production, marketing, distribution, retail and consumption in social and cultural context) which mediate between and link 'a particular pattern of production with a particular pattern of consumption' (Fine and Leopold, 1993:4). For example, Time Banks are community-building projects where participants give and receive services in exchange for time credits. Everyone's time is valued equally, and the skills and abilities of people on the margins of the economy (those normally considered to be passive recipients of social assistance) such as talking, companionship, doing someone's shopping, walking a dog, light gardening or home repairs, are recognised, valued and rewarded. The values expressed through this alternative time-based system of exchange are quite at odds with the conventional economy: they are egalitarian, and they value all productive labour as useful work, rather than merely that valued and paid for through formal employment (Cahn, 2000; Boyle, 2005). So while participants enjoy the social networking, sense of being useful, and opportunity to help others which the time bank affords, they are also imbued with alternative values relating to the nature of work, how people are valued as assets, and responding to incentives to perform the types of neighbourhood work needed to build healthy communities. The alternative metrics expressed in this niche are finding a wider audience as Time Banks expand and grow as a network of small-scale projects, and are a valuable demonstration that measuring 'wealth' and 'sustainability' is a matter of perspective. Indeed, this theme is taken up in the UK government's sustainable development strategy, with a call for new research to define 'wellbeing' as a development goal in place of economic growth (HM Government, 2005).

In these cases, we can say that grassroots activists seek to mobilise communities to create new 'systems of provision'. Therefore, grassroots innovations in community action for sustainability offer the potential to generate transformations in production-consumption systems in a way which individuals cannot (Levett et al, 2003; Maniates, 2002). Furthermore, it is evident that by making small, everyday consumption decisions about food, for a variety of reasons (taste, health concerns, food miles, supporting local growers etc) communities of citizens explicitly or inadvertently participate in that (radical) creative process (Dobson, 2003). As such, they represent collective, collaborative efforts to transform not simply the market choices available, but sometimes the entire market system itself. They are collaborative efforts to offer new solutions to the sustainable production and consumption imperative, which overcome the principle problem with an individualised approach to greening the market, namely that acting individually, consumers are powerless to change the rules of the game, they are stuck within current socio-technological regimes (Seyfang, 2005, 2006b,d). As such, we can see that grassroots innovations can have ambitions beyond the micro level. Rather, they aim to create new institutions based upon different values to the incumbent regime, and hence contribute towards the process of change at the regime level too.

Furthermore, perceived as niche initiatives in an alternative kind of sustainable development (cf. mainstream business reforms), grassroots innovations might also hold some comparative power. By looking at the kind of practical sustainability expressed in these niche initiatives, more mainstream green reformers, and their critics, might obtain a different perspective upon their own efforts at practising sustainable development. Such a phenomenon might be somewhat analogous to travelling through another country and culture, in which the experience causes us to reflect as much upon our home culture. The niche model might prove not only an effective way to understand grassroots initiatives but also, by drawing contrasts, could serve as a device for reflecting critically upon mainstream reforms. Thus the contrast between niche and mainstream, whilst making the translation of lessons from niche

to mainstream difficult (see the discussion of diffusion challenges below), can still provide a basis for critical reflection.

However, recent research has found that even quite radical green niches can eventually come to have some influence upon the mainstream, though not necessarily in forms anticipated by original niche idealists (Smith, 2005). Elements of radical niche practice that can be adapted and accommodated easily within mainstream practices are appropriated when the latter feels pressure for sustainable reforms. In this way, grassroots initiatives are a source of learning, offering social and technological solutions that may be adopted by the mainstream, even if it is only the more appropriable elements of niche practice. Grassroots innovations sometimes lead the way with sustainable development, providing lessons for government and other communities about best practice and what is possible.

For example East Anglia Food Link (EAFL), a small NGO which promotes sustainable food systems, began promoting the use of locally sourced organic food in local schools and hospitals in 1999. Small marginal successes ensued over the following years, but in 2005 the national agenda on public sector catering was rewritten after a high-profile TV series criticising the standard of food in schools galvanised public opinion. Government policy on school meals was changed to encourage local, freshly made organic food, and EAFL, along with other Food Link organisations across the country, were identified as pioneers and sources of good practice (Wakeman, 2005). This approach can be seen as a radical departure from mainstream food and farming policy, reflecting quite different sets of values, beliefs about the nature of the environment and the desirable outcomes of sustainable development (Seyfang, 2006a). For example, an organic farmers' cooperative supplying local markets and delivering direct to households, schools and hospitals is experimenting not only with food production techniques, but with the social infrastructure of food supply. It does this by offering an alternative to the mainstream supermarket system which responds to the logic of internalising the environmental and social costs associated with globalised food systems – transport costs, soil degradation, carbon emissions and effects on local economies and communities (Pretty, 2002; Seyfang, 2006b).

In niche terms, grassroots initiatives exhibit first- and second-order learning, building environmental support and capacity. Practices develop that provide services with reduced environmental impact whilst, at the same time, encouraging participants to reflect upon how their need for services is framed and developed and how they can respond to those needs. Church and Elster (2002) identify a wide set of indirect environmental and social impacts from grassroots innovations, for example environmental awareness-raising, education and promotion, changing the attitudes of local policymakers, engaging people in sustainability issues in their daily lives, and developing new ways of working towards sustainable development. As a result of niche practices, which are often participative, individuals and communities can benefit in terms of greater empowerment and confidence, skills and capacity for further community-based action.

6.   CHALLENGES FACED BY GRASSROOTS INNOVATIONS

Whilst grassroots innovations hold much normative promise as a niche site for sustainability, they are not a panacea, and it is important to analyse the challenges they face too. These can also be categorised into two groups: those challenges which are *intrinsic* to the niche's innovative operations, and those faced by the niche in its efforts to *diffuse* and influence wider socio-technical regimes.

6.1   Intrinsic Challenges

The set of challenges faced by grassroots innovations begin with their inception: establishing an initiative requires a particular combination of skills, key individuals and champions, resources and supportive contextual factors. After the start-up phase, the challenge is to survive and keep going, which requires additional skills and people, and which demands that initiatives develop resilience and a resource base. The specific resource base of grassroots innovations (grant funding and voluntary activity) is a significant source of intrinsic challenges. Activities need resources to survive, so their choices are either to become commercialised (presenting diffusion challenges, see below) or to engage with government programmes to attract funding. Grassroots experience with this latter option has faced the obstacles that funding programmes are short-term, frequently linked to constraining targets, bureaucracy and requirements, and leave little room for core development: requirements and uncertainties surrounding UK support programmes for community renewables being a prime example. Furthermore, as grassroots innovations commonly combine social, economic and environmental objectives, existing in the interstices between traditional issue boundaries, their 'institutional fit' with current government department-based funding regimes is poor, and they can experience difficulties engaging with (and meeting the criteria of) the single-issue goals of government funders. In addition, frameworks for funding are often imposed by the funders, rather than being user-led and responding to the development needs of recipients.

As a result, grassroots innovations spend about 90% of their time simply surviving, and only 10% developing the activity (Church, 2005; Wakeman, 2005). This has major implications for the survival of niches for the following reasons. First, there can be a failure to develop robustness and resilience to shocks. These shocks can come in the form of funding cuts, key people leaving, turnover of volunteers, burn-out of activists, shifts in government policy etc. Secondly, if grassroots innovations are short-lived – for any of these reasons and more – there is frequently no formally documented institutional learning. The skills and abilities gained, and the learning developed within the niche itself, are tacitly held within people, rather than being consolidated in a form accessible to others, and are easily lost through staff turnover.

A key resource challenge, alluded to when characterising grassroots innovation, is technological. Niches at the grassroots level rarely possess the wherewithal to develop technologies themselves. Rather, through their social innovation activities, they create sites where sustainable technologies emerging elsewhere (e.g. public research programmes) can find a real world site for application and development. As such, grassroots innovators, like many actors, are technology takers and can sometimes struggle to identify and obtain sustainable technologies appropriate to their situation. However, as we noted earlier, there does seem to be a policy appetite (rhetorically at least) to open up participation in technology development, and the challenge is to better articulate grassroots innovation with technology development. The challenge is considerable, especially where technology development is trans-national. Furniture recycling initiatives at the grassroots level, for example, may contain considerable insights into how appliances might be better designed for repairability and remanufacture; but this needs to be conveyed back into the design and product development decisions at appliance manufacturers, whose headquarters can be in a different country. An ability to engage with and influence product and service design is a key technological resource that eludes many grassroots innovations, even though its potential for sustainability is apparent. Not only would more appropriate technology assist the niche intrinsically (e.g. expanding the range of products that can be re-used locally), but it could also generate diffusion benefits.

6.2   Diffusion Challenges

The scope for grassroots innovations to influence the mainstream is limited by a number of factors. The first of these is its small scale and geographical rootedness, which can make scaling up difficult. Continuing our furniture recycling example,[5] reflecting upon the reasons why it is so difficult generally to recondition and remanufacture consumer goods can reveal some telling contextual factors around scale issues. In particular, it highlights the 'distance' between the grassroots and mainstream systems of provision; a dislocation across which the grassroots cannot articulate its needs and design lessons for manufacturers. To diffuse niche lessons, this gap must be bridged, either by policy interventions (see below), or by a system of infrastructure – networks, ecopreneurs, etc - which brings together niche and mainstream actors from a particular system of provision.

Scaling up is only one diffusion option; it can also be possible to reproduce initiatives elsewhere, and ensure the groups are well connected regionally and nationally. For instance, time banks appear to operate most successfully at quite a small scale, allowing participants to feel that they know most of the other members and that they live nearby. When time banks grow, therefore, they tend to 'bud off', to retain the sense of neighbourliness, and coordination of time bank networks is a major activity (Boyle, 2005).

Paradoxically, there can also be major diffusion challenges associated with one of the key benefits of grassroots innovations, namely the 'world within a world' notion of the niche. We have seen how one of the strengths of grassroots innovations is their ability to develop practices where 'the rules are different'. But how does diffusion occur when an ideological niche is established in opposition to the incumbent regime? In these instances, there is an important distinction to be made between communities of location (geographically-based grassroots groups meeting a social need) and communities of interest (ideologically-based initiatives). We cannot assume that grassroots innovations and local action is always socially cohesive. Ideological niches define themselves as 'other' or 'alternative' to the mainstream – an identification that makes outreach and diffusion difficult. This point contrasts with the niche literature, which argues that successful influence requires a degree of congruence with incumbent, regime practices if niches are to have a chance of catching on and diffusing (Hoogma *et al.*, 2002; Weber *et al.*, 1999). An unfortunate corollary is that this compatibility criterion can limit the degree to which strategic green niches diverge radically from the mainstream, thus blunting their radical innovativeness (Smith, 2006). In niches there can be a conflict between those who wish to maintain a 'purist' position, and others who seek wider influence and make links with system-builders and ecopreneurs, and are prepared to compromise in order to have wider influence.

Clearly, this bridging point is important for our focus on grassroots innovations. Some of the initiatives in this category are created in opposition to incumbent practices and so are, by definition, radically different. Interest from 'systems builders' might be welcomed as recognition of the worth of what the niche has been doing, but system building professionals may also be resented as signifying an unwelcome sell out to economic interests. Niche pioneers can be pushed aside by the entry of more powerful commercial interests practicing a more limited proxy to niche activities (e.g. large waste management companies developing kerb-side recycling activities to the detriment of earlier, less capitalized community-based operations).

A further challenge faced by grassroots innovations is that of the funding climate within which they operate. Innovation is an experimental process, and an important aspect of developing niche ideas is openness to failure, and learning from failure. However the policy and funding culture is not yet mature enough to accept this as a positive process, and funding constraints inhibit deliberate experimentation, and punish failure through withdrawal of resources. The challenge is to develop support mechanisms that provide the resources to revise grassroots

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[5] Some furniture recycling initiatives also repair and recondition electrical appliances and other consumer goods.

initiatives in the light of earlier difficulties and embed and diffuse positive lessons learnt from failure. Whilst it can be difficult to justify the continued funding of a failing initiative, it seems unreasonable to cut funding from initiatives willing to adapt activities, overcome earlier problems, and continue experimenting since this is the lifeblood of innovation.

Finally, there is a wider, institutional challenge faced by grassroots innovations. The niche literature recognises that change at higher levels – within incumbent regimes and overarching socio-economic processes – opens opportunities for niche diffusion. Sustainability pressures building in the regime can cause regime actors to turn their search to activities in niches and appropriate and adapt niche ideas and practices (see above). Similarly, Church (2005) argues that action at the local level needs to connect with activity at higher policy, capabilities and infrastructure levels. These higher-level processes are beyond the control (and sometimes even the influence) of grassroots innovators. In other words, they have to be sufficiently nimble to take advantage of windows of opportunity, such as new central funding programmes announced as part of shifts in higher-level policy agendas, and reposition and press for the wider adoption of their niche ideas as fitting this new opportunity. But grassroots innovators find it extremely challenging to influence when and what form those opportunities for diffusion take. A key challenge is to boost grassroots influence over higher-level processes. Opportunities must be sought in the opposite direction – local intelligence informing policy development in such a way that it further encourages grassroots innovation and diverse niches for sustainable development (Roberts, 2005). Indeed, the central thrust of this paper has been to argue for a reconsideration of grassroots initiatives in the development of sustainable production and consumption systems. In this way, the two strands in sustainable development policy (community action and sustainable innovation) can be brought together and thereby mutually reinforced.

7.   CONCLUSIONS

We began with the observation that technological innovation and community action are two important areas of research and policy for sustainable development, but they have until now not been theoretically linked. We contended that the grassroots is a neglected site of innovation for sustainable development. The innovation literature describes the important role of innovative niches in seeding transitions in wider socio-technological regimes, but is rooted in analysis of commercial activities in the market economy. We extended and adapted this literature to apply it to specifically grassroots activities for sustainable development in the social economy, and have discussed the implications of this conceptual development. The characteristics of grassroots innovations as green niches were described, and the benefits and challenges for these niches were described in terms of intrinsic and diffusion outcomes. In the limited evidence provided in this paper, there is a sense that grassroots innovations are good at creating alternatives for sustainable development, but that they do not connect forcefully with mainstream, incumbent socio-technical regimes. To address this conceptual and practical breach more robustly, we therefore identify the following new research and policy agendas.

If we see the grassroots as a site of innovation, and argue for the innovation agenda to be brought to the grassroots, then a number of governance issues are raised. Grassroots innovations will become boundary objects: they will be interpreted and used by many overlapping groups of actors, each with their own interests and commitments. Different government departments have their own objectives; technology developers will bring a different modus operandi to those involved in primarily social innovation; ecopreneurs and system builders seek commercialisation, moving innovations from social economy to market economy; and academics bring their own agendas to bear. Through niche engagement, and associated social learning, the positions and commitments of some of these actors will alter.

The need for greater research into the contexts, actors and processes under which niche lessons are able or unable to translate into mainstream situations (and transform them) through intermediaries will become even more pronounced (Smith, 2005). This aspect of the agenda raises important issues in research ethics, since it is vital to be respectful of the grassroots agenda and pioneering niche activists' work. This implies acknowledging both the intrinsic benefits of grassroots innovative niches, and also ensuring that these intrinsic purposes are not undermined during any diffusion process. Seeing the grassroots solely as business incubators, for example, would denude them of many of the social economy features that make them such an important source of diversity. Business spin-offs, and the wider diffusion of niche elements in more commercially oriented practices through the market, obviously is a welcome contribution to wider greening. But other, less immediately commercial elements of the grassroots niches remain potential sources of strategic diversity, important for living with the uncertainties associated with sustainable development (Stirling, 1998).

Therefore, policy and research into grassroots innovations needs to nurture mutually beneficial relationships with niche activists. First, the emergent policy agenda which advocates and supports local action for sustainability must be reinforced and deeply embedded within policy, to prevent its erosion as political priorities shift. Then policy interventions should consider how best to reward and encourage innovative behaviour at the grassroots – given that rent seeking behaviour is not the primary motivation. Fundamentally, this is a question of how one traverses the interfaces between the social economy and market economy. A twin track approach is needed. On the one hand, we need research and policy that contributes to the creation of diverse grassroots innovations and engenders a variety of sustainable practices. On the other hand, research and policy is needed that learns from this wealth of alternative means of provision and embeds that social learning into the market economy. Policy measures must put the incumbent socio-technical regime under tension and prompt wider searches for (grassroots) innovations for mainstream actors to adapt. How to create and capitalise on grassroots diversity and populate mainstream systems of production and consumption with transformative sustainability ideas and practices? This is the central research and policy question. Specific policy measures will emerge from further research into grassroots innovations.

Academics can also contribute by bringing a reciprocal learning approach to grassroots innovations, through an action research approach (Stringer, 1996). There is much that academics could offer to grassroots innovations in order to help them develop (thereby encouraging two-way learning), notably research services such as evaluations, policy analyses etc, which the initiatives themselves may not have the capacity to produce. This could prove an essential strategic response to the ethical dilemmas noted above. With these points in mind, we suggest the preceding discussion of grassroots innovation opens up the following research agenda.

First, the existing body of work and knowledge on community action in sustainable development needs reinterpreting through the lens of the grassroots innovation approach put forward here. Then new empirical work is needed to map grassroots innovations in terms of their extent and nature, specific characteristics, impacts and outcomes. Following this, an analysis is needed of how grassroots innovations are created and diffused, using in-depth qualitative work to understand the conditions for the germination of innovative processes at the grassroots, and the conditions for successful diffusion, examining the role of social networks and movements, commercialisation, scaling up and reproduction, and policy. Such analysis must be framed such that it can move across the blurred boundaries between the social and market economy. Finally a policy analysis of institutions that support grassroots innovations at present will aid our understanding of the ways in which innovation policy can be incorporated in current and future policy developments for sustainability. This agenda may not be exhaustive of all the possibilities, but it seems to us that these would be important

elements in any attempt to bridge the community-innovation divide that currently exists in sustainable development theory and practice, and harness the rich potential of grassroots innovation.

References

Alakeson, V. and Sherwin, C. (2004) *Innovation for Sustainable Development* (Forum for the Future, London)

Amin, A., Cameron, A. and Hudson, R. (2002) *Placing The Social Economy* (Routledge, London).

Arthur, B. W. 1988, 'Competing technologies: an overview' in Dosi, G., *et al*. (eds) *Technical Change and Economic Theory* Pinter, London.

Berkhout, F. (2002) Technological regimes, path dependency and the environment. *Global Environmental Change* 12(1): 1-4.

Berkhout, F., Smith, A. and A. Stirling 2004, 'Sociotechnical regimes and transition contexts' in Elzen, B. Geels, F.W. and K. Green (eds), *System Innovation and the Transition to Sustainability: Theory, Evidence and Policy* Edward Elgar, Camberley.

Beveridge, R. and Guy, S. (2005) 'The rise of the eco-preneur and the messy world of environmental innovation', *Local Environment* Vol 10 (6) pp.665-676

Boyle, D. (2005) 'Sustainability and Social Assets: The potential of time banks and co-production' paper presented at the Grassroots Innovations for Sustainable Development conference, UCL London, 10th June, 2005, <http://www.uea.ac.uk/env/cserge/events/2005/grassroots/index.htm>

Boyle, G. and P. Harper (1976) *Radical Technology*, Wildwood House, London.

Burgess, J., Bedford, T., Hobson, K., Davies, G. and Harrison, C. (2003) '(Un)sustainable Consumption' in F. Berkhout, M. Leach and I. Scoones (eds) *Negotiating Environmental Change: New Perspectives from social science* (Edward Elgar, Cheltenham), pp.261-291.

Cahn, E. (2000) *No More Throwaway People: The co-production imperative* (Washington, Essential Books)

Chanan, G. (2004) *Community Sector Anatomy* (Community Development Foundation, London)

Christie, I. and Warburton, D. (2001) *From Here To Sustainability: Politics in the real world* (Earthscan, London)

Church, C. and Elster, J. (2002) *The Quiet Revolution* (Shell Better Britain, Birmingham)

Church, C. (2005) 'Sustainability: The importance of grassroots initiatives' paper presented at the Grassroots Innovations for Sustainable Development conference, UCL London, 10th June, 2005, <http://www.uea.ac.uk/env/cserge/events/2005/grassroots/index.htm>

Clark, N. (1985) *The Political Economy of Science and Technology* Basil Blackwell, Oxford.

Corborn, J. (2005) *Street Science: Community Knowlegde and Environmental Health Justice* MIT Press, Cambridge, MA.

DEFRA (2003) *Changing Patterns: UK Government Framework for Sustainable Production and Consumption* (DEFRA, London)

DEFRA (2005a) *DEFRA And Social Enterprise: A position statement* (Defra, London)

DEFRA (2005b) *Delivering Sustainable Development At Community Level* www.sustainable-development.gov.uk/delivery/global-local/community.htm accessed 24 Oct 2005

DEFRA (2005c) *Sustainable Innovations* www.sustainable-development.gov.uk/what/SustainableInnovations.htm accessed 24 Oct 2005.

DEFRA, Department for Environment, Food and Rural Affairs (2004) *Evidence and Innovation: Defra's needs from the science over the next 10 years* Defra, London.

Devine-Wright, P. (2006) 'Citizenship, responsibility and the governance of sustainable energy systems' in Murphy, J. (ed) *Framing the Present, Shaping the Future: Contemporary Governance of Sustainable Technologies* Earthscan, London.

Dobson, A. (2003) *Citizenship and the Environment*, Oxford: Oxford University Press.

Dosi, G. 1982, 'Technological paradigms and technological trajectories' *Research Policy* 11: 147-162.

Dosi, G., Freeman, C., Nelson, R., Silverberg, G. and L. Soete (eds) 1988 *Technical Change and Economic Theory* Pinter, London.

Douthwaite, R. (1992) *The Growth Illusion*, Green Books, Bideford, UK

DTI (2003) *Innovation Report: Competing in the global economy, the innovation challenge* (DTI, London).

DTI (2005) *Innovation* www.innovation.gov.uk accessed 24 Oct 2005.

Ekins, P. and Max-Neef, M. (eds) (1993) *Real-Life Economics: understanding wealth creation*, Routledge, London.

Fine, B. and Leopold, E. (1993) *The World Of Consumption,* (Routledge, London)

Fusslar, C. and James, P. (1996) *Driving Eco-Innovation: A breakthrough discipline for innovation and sustainability* (Pitman, London)

Geels, F. W. 2004, 'From sectoral systems of innovation to sociotechnical systems. Insights about dynamics and change from sociology and institutional theory' *Research Policy* 33: 897-920.

Irwin, A., Georg, S. and P. Vergragt (1994) 'The social management of environmental change' *Futures* 26, 3: 323-334.

Hines, J. (2005) 'Grassroots Initiatives In Housing', paper presented at the Grassroots Innovations for Sustainable Development conference, UCL London, 10th June, 2005, <http://www.uea.ac.uk/env/cserge/events/2005/grassroots/index.htm>

HM Government (2005) *Securing The Future: Delivering UK Sustainable Development Strategy* (The Stationery Office, Norwich).

Holliday, C. and Pepper, J. (2001) *Sustainability Through The Market: Seven keys to success* (WBCSD, Geneva)

Hoogma, R., Kemp, R., Schot, J. and B. Truffer 2002, *Experimenting for Sustainable Transport: The Approach of Strategic Niche Management* Spon Press, London.

Hughes, T.P. 1983, *Networks of Power: Electrification in Western Society, 1880-1930* Johns Hopkins University Press, Baltimore.

Jackson, T. (2004) *Chasing Progress: Beyond Measuring Economic Growth*, (New Economics Foundation, London)

Jackson, T. and Michaelis, L. (2003) *Policies For Sustainable Consumption* (Sustainable Development Commission, Oxford).

Jacobsson, S. and A. Johnson 2000, 'The diffusion of renewable energy technology: an analytical framework and key issues for research' *Energy Policy* 28: 625-640.

Kemp, R., Schot, J. and R. Hoogma 1998, 'Regime shifts to sustainability through processes of niche formation: the approach of strategic niche management' *Technology Analysis and Strategic Management* 10, 2: 175-195.

Levett, R. with Christie, I., Jacobs, M. and Therivel, R. (2003) *A Better Choice Of Choice: Quality of life, consumption and economic growth* (Fabian Society, London).

Leyshon, A., Lee, R. and Williams, C. (eds) (2003) *Alternative Economic Spaces* (Sage, London)

Maniates, M. (2002) 'Individualization: Plant a tree, buy a bike, save the world?' in T. Princen, M. Maniates and K. Konca (eds) *Confronting Consumption* (MIT Press, London), pp.43-66

Manno, J. (2002) 'Commoditization: consumption efficiency and an economy of care and connection' in T. Princen, M. Maniates and K. Konca (eds) *Confronting Consumption* (MIT Press, London), pp.67-99

Meltzer, G. (2005) *Sustainable Community: Learning from the co-housing model* (Trafford, Crewe)

Murphy, J. (2000) 'Ecological Modernisation' *Geoforum* Vol 31 (1) pp.1-8.

Nelson, R.R. and S.G. Winter 1982, *An Evolutionary Theory of Economic Change* Bellknap Press, Cambridge, Mass.

NLGN (New Local Government Network) (2005) *New Localism In Action* (NLGN, London).

PIU (Performance and Innovation Unit) *Social Capital: A discussion paper* (PIU, London).

Pretty, J. (2002) *Agri-Culture: Reconnecting People, Land and Nature* (Earthscan, London)

Rip, A. and R. Kemp 1998, 'Technological change' in Rayner, S. and E.L. Malone (eds) *Human Choice and Climate Change, Volume 2* Battelle Press, Columbus.

Roberts, S. (2005) 'Grassroots Initiatives In Energy' paper presented at the Grassroots Innovations for Sustainable Development conference, UCL London, 10th June, 2005, <http://www.uea.ac.uk/env/cserge/events/2005/grassroots/index.htm>

Robertson, J. (1999) *The New Economics Of Sustainable Development: A briefing for policymakers* (Kogan Page, London)

Rogers, B. and Robinson, E. (2004) *The Benefits Of Community Engagement: A Review Of The Evidence* (Home Office, London).

Russell, S. and R. Williams (2002) 'Social shaping of technology: frameworks, findings and implications for policy with glossary of social shaping concepts' in Sørensen, K.H. and R. Williams (eds) *Shaping Technology, Guiding Policy: Concepts, Spaces and Tools* Edward Elgar, Cheltenham.

Schot, J. 1998, 'The usefulness of evolutionary models for explaining innovation: the case of the Netherlands in the 19th century' *History and Technology* 14: 173-200.

Schot, J., Hoogma, R. and B. Elzen 1994, 'Strategies for shifting technological systems: the case of the automobile system' *Futures* 26, 10: 1060-1076.

Schumacher, E. F. (1993) *Small Is Beautiful: A study of economics as if people mattered,* Vintage, London (first published 1973)

Schumpeter, J. (1961) *The Theory of Economic Development* Oxford University Press, Oxford.

Seyfang, G. (2001a) 'Community Currencies: Small Change for a Green Economy' *Environment and Planning A* Vol 33 (6), pp.975-996

Seyfang, G. (2001b) 'Working For The Fenland Dollar: An Evaluation Of Local Exchange Trading Schemes (LETS) As An Informal Employment Strategy To Tackle Social Exclusion' *Work, Employment and Society*, Vol 15 (3) pp.581-593

Seyfang, G. (2003) 'Growing Cohesive Communities, One Favour At A Time: Social exclusion, active citizenship and time banks', *International Journal of Urban and Regional Research*, Vol 27 (3) pp.699-706

Seyfang, G. (2005) 'Shopping for Sustainability: Can sustainable consumption promote ecological citizenship?', *Environmental Politics*, Vol 14(2) pp 290-306

Seyfang, G. (2006a) 'Cultivating Carrots and Community: Local organic food and sustainable consumption' forthcoming in *Environmental Values*

Seyfang, G. (2006b) 'Ecological Citizenship and Sustainable Consumption: Examining local food networks' forthcoming in *Journal of Rural Studies*

Seyfang, G. (2006c) 'Harnessing the Potential of the Social Economy? Time Banks and UK Public Policy' forthcoming in *International Journal of Sociology and Social Policy*

Seyfang, G. (2006d) 'New Institutions for Sustainable Consumption: An evaluation of community currencies' forthcoming in *Regional Studies*

Seyfang, G. and A. Jordan (2002) 'The Johannesburg Summit and Sustainable Development: How Effective are Mega Environmental Conferences?' In S. Stokke and O. Thommesen (eds.) *Yearbook of International Co-operation on Environment and Development, 2002-3.* (Earthscan: London). pp 19-26.

Shove, E. 2003, *Comfort, Cleanliness and Convenience: The Social Organisation of Normality* Berg, Oxford.

Smith, A. (2004) 'Alternative technology niches and sustainable development' *Innovation: Management, Policy and Practice* 6, 2: 220-235.

Smith, A. (2005) Supporting and Harnessing Diversity? Experiments in Alternative Technology *Final Report to the Economic and Social Research Council*, SPRU, Brighton and available at http://www.sussex.ac.uk/spru/1-4-7-1-4.html

Smith, A. (2006) 'Green niches in sustainable development: the case of organic food in the UK' *Environment and Planning C: Government and Policy* forthcoming.

Smith, A., Stirling, A. and F. Berkhout (2005) 'The governance of sustainable socio-technical transitions' *Research Policy*, 34: 1491-1510.

Stirling, A. (1998) 'On the economics and analysis of diversity' *SPRU ElectronicWorking Paper Series No. 28*(available at: http://www.sussex.ac.uk/spru/1-6-1-2-1.html)

Stirling, A. (2004) 'Opening up or closing down: analysis, participation and power in the social appraisal of technology' in Leach, M., Scoones, I. And B. Wynne (eds) *Science, Citizenship and Globalisation* Zed, London.

Stringer, E. (1996) *Action Research: A handbook for practitioners*, (Sage: London)

van Sambeek, P. and Kampers, E. (2004) *NU-Spaarpas: The sustainable incentive card* (Stichting Points, Amsterdam)

UNCED (United Nations Conference on Environment and Development) (1992) *Agenda 21: The United Nations Program Of Action From Rio*, U.N. Publications, New York

Wakeman, T. (2005) 'East Anglia Food Link: An NGO working on sustainable food', paper presented at the Grassroots Innovations for Sustainable Development conference, UCL London, 10th June, 2005, <http://www.uea.ac.uk/env/cserge/events/2005/grassroots/index.htm>

Walker, W 2000, 'Entrapment in large technology systems: institutional commitment and power relations', *Research Policy*, 29, 7-8: 833-846.

Weber, M, Hoogma, R, Lane, B and J Schot 1999, *Experimenting with Sustainable Transport Innovations: A Workbook for Strategic Niche Management* (University of Twente Press, Twente).

Williams, C. C., Aldridge, T., Tooke, J., Lee, R., Leyshon, A. and Thrift, N. (2001) *Bridges into Work: an evaluation of Local Exchange Trading Schemes (LETS)*. Policy Press: Bristol.

Wilsdon, J. and R. Willis (2004) *See-through Science: Why Public Engagement Needs to Move Upstream* Demos, London.

Winner, L. (1979) 'The political philosophy of alternative technology' *Technology in Society* 1: 75-86.

Yearley, S. 1988, *Science, technology and social change* Unwin Hyman, London.

Young, S. (1997) **'**Community-based partnerships and sustainable development: a third force in the social economy**'** in S. Baker, M. Kousis, D. Richardson and S. Young (eds)

The Politics of Sustainable Development: Theory, Policy and Practice Within the European Union, (Manchester University Press, Manchester) pp.   217-36