

Grassroots Innovations for Sustainable Development: Towards a New Research and Policy Agenda

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ABSTRACT Innovation and community action are two important strands for sustainable development. Yet they have not hitherto been linked. Community action is a neglected, but potentially important, site of innovative activity. Bridging this divide offers a novel theoretical approach to the study of community-level action for sustainability. The opportunities presented by grassroots innovation are discussed, as are the challenges confronting activity at this level, and a new agenda for community-level sustainable development research and policy.

Introduction

Everybody, it appears, is committed to sustainable development. But not everybody is seeking sustainable development in the same way. Moves towards sustainability are generating a variety of social innovations as well as innovative technologies – new organisational arrangements and new tools – in different arenas and at different scales. Grassroots, niche innovations differ from mainstream, business reforms; they practise quite different kinds of sustainable development. There is a qualitative difference between, for instance, a community-supported organic vegetable box scheme and the range

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of organic products sold at a supermarket; the social, economic and environmental dimensions of sustainable development are traded off differently (Smith, 2006; Seyfang, 2007).

Grassroots action for sustainable development takes 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, alongside growth of independent, community-based work on 'local sustainability'; Shell Better Britain's network of groups, for instance, grew from 10,000 in 1992 to 26,000 in 2002 (Church & Elster, 2002). Rarely has the innovativeness of this activity been acknowledged. We use the term 'grassroots innovations' to describe networks of activists and organisations generating novel 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 mainstream business greening, grassroots initiatives operate in civil society arenas and involve committed activists experimenting with social innovations as well as using greener technologies.

Reflecting this disparity are two parallel policy strands within the UK's sustainable development strategy (HM Government, 2005). These strands are (a) ecological modernisation and technological innovation (DEFRA, 2003, 2004, 2005c), and (b) community action and the social economy (DEFRA, 2005a, 2005b). Each strand has traditionally been studied in separate literatures (Fussler & James, 1996; Rip & Kemp, 1998; Murphy, 2000; Alakeson & Sherwin, 2004; Smith *et al.*, 2005; cf. Young, 1997; Seyfang, 2001a, 2006a, 2006c; Amin *et al.*, 2002; Burgess *et al.*, 2003; Leyshon *et al.*, 2003). We argue this division inhibits understanding of the innovative potential of grassroots initiatives, and prevents us appreciating its full potential for change. Here, therefore, we bridge that divide and integrate these two previously unrelated areas, in order to offer an original theoretical approach to the analysis of community-level action for sustainability. This new agenda considers the grassroots a neglected *site of innovation* for sustainability, hitherto eclipsed by green reforms in more conventional business settings. By viewing community-level activities as *innovative niches*, we gain a better understanding of the potential and needs of grassroots initiatives, as well as insights into the challenges they face and their possible solutions.

Sustainable Development Contexts: Innovation and Community Action

The UK strategy for sustainable development *Securing the Future* states, 'The goal of sustainable development is to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations', and this will be pursued 'through a sustainable, innovative and productive economy' (HM Government, 2005: 16). The government pursues an 'ecological modernisation' agenda (Murphy, 2000)

through its strategy for Sustainable Production and Consumption, seeking 'greener' markets using taxes, incentives and better information, and so encouraging technological innovation to improve resource efficiency and decouple economic growth from environmental degradation (DEFRA, 2003). Innovation is defined 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). Government makes the link with sustainability in the 2003 *Innovation Report*, stating innovation will be essential for meeting the environmental challenge (DTI, 2003). In this vein, 'sustainable innovation', 'ecopreneurship', and eco-efficiency are key terms used to describe greener business activity (Fussler & James, 1996; Beveridge & Guy, 2005), and espoused by bodies such as the World Business Council for Sustainable Development (Holliday & Pepper, 2001: 3). Alongside greener business innovation, the government aims to promote sustainable consumption through 'market transformation', and the development of more sustainable market choices for products and services (DEFRA, 2003).

However, the UK strategy also recognises the contribution made by small-scale local activities, and has a particular emphasis on *delivery* of sustainable development at all scales. Prime Minister Blair 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' (HM Government, 2005: 29). A new initiative, 'Community Action 2020', will build on Local Agenda 21 to be 'a catalyst for thinking globally and acting locally in communities across England' (29). It promotes local food initiatives, community energy efficiency schemes, recycling projects and Fairtrade activities, plus participation in decision-making, volunteering, capacity-building, information-sharing and community-mentoring (DEFRA, 2005b). Policy increasingly focuses upon the social economy as a source of sustainability transformation, active citizenship, and public service delivery (HM Government, 2005; Seyfang, 2006b) in ways that embed sustainability governance, behaviour and lifestyle changes in local communities (Rogers & Robinson, 2004; DEFRA 2005b). The environment ministry has its own strategy to support social enterprise because of the ways the sector combines social, economic and, increasingly, environmental objectives (DEFRA, 2005a).

This policy strand focuses upon 'quality of life' and for the first time departs from conventional pursuit of economic growth as the priority (Jackson, 2004) and considers social structures, by acknowledging that 'We need to understand more about the social and cultural influences which shape our consumption choices, habits and impacts' (HM Government, 2005: 51–2). Whilst Community Action 2020 lists actions which reshape social infrastructures of provision (DEFRA, 2005b), policy also acknowledges the role of 'socio-technical regimes' which influence behaviour, constrain individual choice sets and limit

the transformative potential of the market (Maniates, 2002; Jackson & Michaelis, 2003).

Community action is becoming embedded in sustainability policy 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 sustainable development (Young, 1997). Locally rooted action generates socially embedded changes in behaviour (Burgess *et al.*, 2003). Overlapping these are government objectives to boost social capital through micro- and meso-level activities (PIU, 2002) and the emerging policy agenda for decentralisation and the 'New Localism'. To this one could also add the (problematic) policy agenda for 'outsourcing' traditional welfare state functions to community groups.

In sustainable innovation policy, we also find recent statements and initiatives seeking to open developments 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). Public engagement is on the agenda, rhetorically at least (Stirling, 2004; Wilsdon & Willis, 2004), and threads within UK innovation policy are converging in a way that provides potential opportunities for grassroots innovation, and distinguishes this from an earlier generation of citizen science and alternative technology (Boyle & Harper, 1976; Winner, 1979; Irwin *et al.*, 1994; Smith, 2004; Corborn, 2005).

Understanding Sustainable Innovations

Attention now turns from the policy context to ideas in the sustainable innovation literature. Radical improvements in production and consumption *systems* (e.g. 'factor 20' resource efficiency or 60% carbon emissions reductions) imply greener innovation different from traditional improvements to single products or business practices; innovation is needed at the scale of 'socio-technical regimes' (Berkhout, 2002). Transforming systems of production and consumption poses considerable challenges; innovation studies identify mutually reinforcing processes that tend to channel developments along trajectories (Nelson & Winter, 1982; Dosi *et al.*, 1988; Russell & 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 will be profitable in the future (Dosi, 1982; Nelson & Winter, 1982);
- the way specific social and technical practices are embedded within wider, facilitating infrastructures, which subsequently restrict opportunities for alternatives (Jacobsson & Johnson, 2000);

- incumbent practices enjoy economies of scale (e.g. mass markets) and positive network externalities (it is easier and less risky to follow established practices than to invest in new practices) (Dosi, 1982; Arthur, 1988);
- the co-evolution of institutions with technological practices, 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 deemed satisfactory, and the lifestyle routines and norms that develop embed these practices further (Yearley, 1988; Shove, 2003).

In short, entrenched cognitive, social, economic, institutional and technological processes lock us into trajectories and lock out sustainable alternatives. The term ‘socio-technical regime’ captures this complex configuration of artefacts, institutions, and agents reproducing technological practices. 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 & Williams, 2002: 128). The development 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.

Consider the co-housing model. It is a model of community structure whereby residents live in houses around a ‘common house’. This common house contains a large kitchen and dining area for shared meals, and industrial-sized washing machines and lawnmowers. Cars are kept to the perimeter (and may be shared), allowing for open gardens and footpaths between houses. This structure combines privacy with communal activities (planning meetings, weekly shared meals, easy conviviality, supportive networks of neighbours), and potentially reduces overall consumption. 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 opens up terrain for more sustainable technologies. Co-housers can pool resources for the use of small-scale renewable energy technologies, rainwater harvesting, grey water recycling, and more sustainable construction materials and designs unavailable to individual households. In short, social innovations and the diffusion of technological innovations are intimately linked.

Historically regimes do undergo radical change. Succession tends to begin within a network of pioneering organisations, technologies and users that form a *niche* practice on the margins. Niche situations (e.g. unusual applications, demonstration programmes, social movements) provide space for new ideas, artefacts, and practices to develop without full exposure to the range of processes channelling regime development (Rip & Kemp, 1998; Schot, 1998;

Geels, 2004). Hoogma *et al.* (2002: 4) state: '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, alternatives become sufficiently robust to develop niche markets, branch out, and attract mainstream interest (Schot *et al.*, 1994). This perspective informs approaches to sustainable development based upon the strategic creation of green niches that inform possibilities for more sustainable regimes (Kemp *et al.*, 1998; Smith, 2004). Green niches are sustainability experiments in society in which participation is widespread¹ and the focus is on social learning. Niche-based approaches explore problem framings (e.g. mobility, food, energy services) and search for solutions – in contrast to technology demonstration projects that begin with 'technical solutions' to tightly framed problems. Niche practices that resonate with widespread public concern sometimes catch on, get copied, become adapted and spread.

Niche-based advocates qualify their bottom-up enthusiasm. Niches alone will not seed wider change (Hoogma *et al.*, 2002). Work on multi-level socio-technical change identifies tensions and contradictions within incumbent regimes, exacerbated by pressures deriving from broader socio-economic dynamics, as opening niche opportunities and driving the transformations (Geels, 2004). Social movement agitations against regimes contribute to these pressures, but are distinct activities from the grassroots innovations considered here. Oil shocks, demographic change, economic recessions and so on are more general sources of pressure or shock on regimes. Change depends upon contingencies and processes beyond the unilateral control of niche actors (Berkhout *et al.*, 2004). Niches still play a role as sites where alternatives try to resolve regime contradictions. Niches are potential sources of innovative ideas, even if not models or blueprints (Smith, 2006). More pragmatic, intermediary initiatives involving the mainstream help spread ideas and practices, but involve compromises and mutual adjustments that nevertheless take important cues from green niches. Ecopreneurs and intermediary organisations more attuned to market and commercial imperatives assist this bridging activity.

For example, East Anglia Food Link (EAFL), a small sustainable food NGO, began promoting locally sourced organic food in schools and hospitals in 1999. Marginal successes accrued 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. This galvanised public opinion and spurred government policy changes that encouraged local, freshly made organic food. EAFL, along with other Food Link organisations, were identified as pioneering sources of good practice (Wakeman, 2005). EAFL's approach is a radical departure from mainstream food and farming policy, reflecting quite different values, beliefs about the environment, and desirable sustainability outcomes (Seyfang, 2007). An organic farmer 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 offers a hitherto absent alternative to mainstream food, one which responds to the logic of internalising the environmental and social costs associated with globalised food systems (Pretty, 2002; Seyfang, 2006a).

As an analytical framework, the niche-based approach studies niche emergence and development (Smith, 2007). Analysis focuses upon the social networks, learning processes, expectations and enrolment of actors and resources in emerging niche practices. Armed accordingly, advocates recommend policies to improve the development and influence of niches, including nurturing diverse niches, facilitating greater actor interaction, promoting social learning, and seeking institutional changes that embed promising lessons (Kemp *et al.*, 1998; Hoogma *et al.*, 2002; Smith, 2007). Lessons derived from the niche need not be restricted to narrow, technical appraisals of performance. Such 'first-order' learning can be supplemented by 'second-order' learning that generates lessons about the alternative socio-cultural values underpinning the niche and implications for diffusion (Hoogma *et al.*, 2002). Insights into deeper institutional changes can be complemented by lessons relating to the constituencies, capabilities, contexts and markets able to appropriate niche elements (Kemp *et al.*, 1998; Weber *et al.*, 1999; Hoogma *et al.*, 2002). As such, niche-based approaches demand an interactive policy style 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. This niche-based analytic and policy perspective might also encourage fresh thinking about grassroots initiatives. 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, early case studies included grassroots initiatives (e.g. wind energy in Denmark, car clubs in Switzerland) (Kemp *et al.*, 1998; Hoogma *et al.*, 2002).

Some Characteristics of Grassroots Innovations

The niche framework provides a potentially fruitful bridge between analyses of grassroots initiatives as civil society activities and a role for them in sustainable innovation policy. Here we extend and translate the conceptual model of green niches to the grassroots realm, from the market economy to the social economy, with sensitivity to the fundamental differences between the two sectors. It is important to qualify this potential; grassroots innovations are not the exclusive, powerful vanguard for more sustainable futures, but a source of innovative diversity.

Sustainable innovation traditionally deals with niches within the market economy. Sustainable innovation is sheltered from the full extent of market

competition through a system of tax breaks and subsidies, to allow development until it can compete in the market. Niches are spaces where 'the rules are different', and conventionally these rules are those of the market. Grassroots innovations, in contrast, exist within the social economy of community activities and social enterprise. The social economy differs from the market economy; appropriation of profits by capital under the latter is suspended in favour of reinvesting any surplus into the grassroots under the former (Amin *et al.*, 2002). Relevant to our niche perspective is the way grassroots initiatives also emphasise different social, ethical and cultural rules. For example, community currencies are new forms of money 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 piloted in the Netherlands awards points for purchasing local, organic or fair trade products, or for recycling household waste; the points are redeemed for public transport tickets, or discounts off green services. In this way, it sets up incentives different from the mainstream economy (Seyfang, 2006c).

The institutional form of conventional innovations appears straightforward; firms generate financial income commercially, from selling the products they innovate. The driving force is profit; firms seek to appropriate the benefits of innovation in order to move ahead of the competition and so capture market rents (Schumpeter, 1961). Competitors innovate too, and rents are gradually eroded, inducing further innovation. Obviously, there are complexities and nuances associated with this basic logic,² but by situating itself within conventional market economics, the sustainable innovation literature has to align with it. Green market-based 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 (unsustainable) opportunities for capital.

The institutional forms for grassroots innovative niches are also complex, but in different ways. There are diverse organisational forms: cooperatives, voluntary associations, mutuals, informal community groups, social enterprises. Their resource base is similarly pluralistic, including grant funding, limited commercial activity, voluntary input and mutual exchanges. The spectrum of organisations exhibit varying degrees of professionalisation, funding and official recognition. Chanan (2004) finds four out of five identifiable groups in the grassroots sector are small, low-profile, voluntary, citizen-led and community-driven groups (cf. high-profile professionally-led voluntary organisations). Official and quasi-official groups operate alongside informal, voluntary activities, and their relationships can be both complementary and competitive. Grassroots innovations are driven by two motives more forgiving towards sustainable innovation compared to rent-seeking firms. These are social need and ideology. Meeting social (and environmental) needs is the primary function. The social economy provides flexible, localised services in situations where the market cannot. Incumbent production and consumption systems fail some communities, perhaps because groups are socially and

economically disadvantaged, unable to access goods, services and markets, or because market choices do not extend to sustainability, such as fresh, local organic food in season, or autonomous housing, or community renewable energy (Maniates, 2002; Manno, 2002).

However, niche approaches must not condemn to the margins people who do not wish to be there; grassroots participants might actually dream of mainstream consumption, but for reasons of social and economic exclusion find themselves in a niche instead, e.g. furniture recycling. Many initiatives in excluded communities seek to build capacities for entering the mainstream. Local Exchange Trading Schemes (LETS), a type of community currency, have been advocated as a tool to build the skills, confidence and social contacts for people to enter the formal employment market (Seyfang, 2001b; Williams *et al.*, 2001).

Unmet social need is not the sole grassroots driver; ideological commitment to alternative ways of doing things is another. Such ideologies run counter to the hegemony of the regime, and some grassroots innovations develop practices based on reordered priorities and alternative values. 'New economics', for example, proposes a socio-economic system geared towards quality of life rather than economic growth *per se*, and favours localised, self-reliant economies as the basis of sustainable communities (Robertson, 1999; Jackson, 2004). This can be expressed through initiatives like locally produced food, or by rewarding socially reproductive labour not valued in the formal labour market (Seyfang, 2006a, 2006b). Niches can emerge in explicit opposition to mainstream regimes. The organic movement began with idealists committed to healthy, local food economies in opposition to the industrialisation of food.

In summary, key comparisons between niche innovations in the market economy and the social economy 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
Driving force	Profit: Schumpeterian rent	Social need; ideological
Niche	Market rules are different: tax and subsidies temporarily shelter novelty from full forces of the market	Values are different: alternative social and cultural expressions enabled within niche
Organisational form	Firms	Diverse range of organisational types: voluntary associations, co-ops, informal community groups
Resource base	Income from commercial activity	Grant funding, voluntary input, mutual exchanges, limited commercial activity

Grassroots Innovative Potential

The theory on niches discussed above identifies two types of benefit: *intrinsic* benefits; and *diffusion* benefits. They are not mutually exclusive, and overlap in practice. However, the distinction is useful conceptually. One values the niche for its own sake (intrinsic benefits), the other as a means to an end (diffusion benefits). The distinction delineates ‘simple niches’ (not seeking regime change) from ‘strategic niches’ (seeds for wider transformation).

Intrinsic Benefits

The principal intrinsic benefit relates to the social and environmental basis of the niche. But what can small-scale community action contribute to sustainable development? A review of grassroots action for sustainability by Church and Elster (2002) identified a range of direct environmental benefits such as reduced car use, increased recycling, and planting trees. When assessing 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 & Elster, 2002: 25, citing the Community Recycling Network comprising 350 local initiatives). They also identified significant socio-economic impacts with benefits for sustainable communities. These related to job creation, training and skills development, personal growth (e.g. self-esteem and confidence), a sense of community, social capital, improved access to services and facilities, health improvements, and greater civic engagement. Integrating small-scale renewables into community projects brings similar benefits (Devine-Wright, 2006).

The self-image of these initiatives is not as environmental organisations, but rather as groups aiming to improve quality of life in local communities. This is an important point. Grassroots initiatives need not consciously practice ‘strong’ sustainability for them to have an impact concordant with those objectives. Groups doing ‘simple’ activities like furniture recycling, community composting, or running a volunteering project may nevertheless develop significant sustainability practices. Of course, sustainability is a contested concept, and diverse ‘sustainabilities’ are being experimented with at the grassroots and in other domains. Some practices run counter to certain forms of sustainability; consider the way extreme localism/autonomy projects conflict with sustainable developments conceived for poorer regions through Fair Trade. The point is to appreciate empirically the sustainability dimensions and tradeoffs being developed in niches, and to relate niche self-interpretations of performance to their motivating ideologies.

Grassroots innovation can deliver sustainability benefits where top-down measures struggle. This is because community action utilises contextualised knowledge and implies a better ‘fit’ of solution (cf. inflexible top-down targets and procedures) (Burgess *et al.*, 2003). Grassroots groups have experience and knowledge about what works in their localities, and what matters to local

people. They can be well placed to present sustainability issues in ways more meaningful, personal and directly relevant, and which ‘goes with the grain of people’s lives’ (Roberts, 2005). They can engage and reinforce behavioural change.

The grassroots can also be a site for action on ‘unpopular’ or ‘fringe’ issues not taken up by mainstream actors. A ‘world within a world’, grassroots innovations are a demonstration that another way is possible, building alternative infrastructures to the existing regime. However unlikely mainstream diffusion, the niche nevertheless stands as a symbolic embodiment of alternatives (Amin *et al.*, 2002; Leyshon *et al.*, 2003). 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), radical action on unfunded issues continuously regenerates at the grassroots.

Diffusion Benefits

In alternative green niches, people’s motivations for action are based upon different values from the mainstream. This represents the bottom-up generation of alternative systems of provision, 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 & 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 taken-for-granted (but sometimes scarce) skills and abilities, such as time for listening sympathetically, companionship, doing someone’s shopping, walking a dog, light gardening or home repairs, are recognised, valued and rewarded. The values expressed through this time-based system of exchange contrast with the conventional economy; they value all productive labour equally (Boyle, 2005). So while participants enjoy the social networking, sense of being useful, and opportunity to help others, they are also imbued with alternative values relating to the nature of work, how people are valued as assets; they respond to incentives to perform the types of neighbourhood work needed to build healthy communities. The alternative metrics expressed in this Time Banks niche are expanding as a network of small-scale projects that demonstrate how measuring ‘wealth’ and ‘sustainability’ is a matter of perspective. Indeed, the UK government’s sustainable development strategy calls for new research to define ‘wellbeing’ in place of economic growth (HM Government, 2005).

In such cases, grassroots activists seek to mobilise communities to create new ‘systems of provision’. These grassroots innovations offer the potential to generate transformations in production-consumption systems in a way that individuals cannot (Maniates, 2002). By joining small, everyday decisions about food, say, for whatever reason (taste, health concerns, food miles,

supporting local growers), communities of citizens participate in that (radical) creative process (Dobson, 2003). As such, they represent collective efforts to transform not simply the market choices available, but sometimes the entire market system itself. They help overcome the principal 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, 2006a, 2006c). Grassroots innovations can have ambitions beyond the micro-level. Some seek new institutions based upon different values from the incumbent regime, and hence contribute critically towards change at the regime level too.

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 mainstream efforts. Somewhat analogous to travelling through another country and culture, the experience causes us to reflect upon our home culture. The niche model might prove effective precisely because it draws contrasts. It could serve as a dialogical device for reflecting critically upon mainstream reforms. Stark contrasts between niche and mainstream, whilst making the translation of lessons from niche to mainstream difficult (see below), can still provide a basis for critical reflection.

In niche terms, grassroots initiatives exhibit first- and second-order learning. They build environmental support and capacity. Practices develop that provide services with reduced environmental impact whilst, at the same time, encouraging participants to further reflect upon how their need for services is framed and developed in other areas. 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 policy-makers, 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.

Challenges Faced by Grassroots Innovations

Whilst grassroots innovations hold normative promise, they are not a panacea. It is important to analyse their problematic challenges, which can be similarly categorised as *intrinsic* and *diffusion-related*.

Intrinsic Challenges

Challenges confront grassroots innovations from their inception; establishing an initiative requires a particular combination of skills, key individuals and

champions, resources and supportive contextual factors. After start-up, the challenge is to survive and keep going, which requires additional skills and people, plus resilience and a resource base. Dilemmas arise over whether to try to commercialise (presenting diffusion challenges, see below) or to engage with government support programmes. Grant funding and voluntary activity, common amongst grassroots innovations, pose significant problems. Funding programmes are often short-term, frequently linked to constraining targets, bureaucracy and requirements, and leave little room for core development (support programmes for community renewables being a prime example). Frameworks for funding are often imposed by funders, rather than responding to recipients' development. Grassroots innovations can fall between the interstices of traditional social, economic and environmental issue boundaries. Their 'institutional fit' with departmental-based funding regimes can be poor, resulting in difficulty combining and fulfilling the distinct criteria of multiple, single-issue funders.

Experience suggests initiatives spend 90% of their time simply surviving, and only 10% developing the activity (Church, 2005; Wakeman, 2005). This has implications for niche survival. First, they fail to develop robustness and resilience to shocks like funding cuts, key people leaving, turnover of volunteers, burnout of activists, shifts in government policy. Second, short-lived initiatives frequently leave no formally documented institutional learning. The skills and learning are tacitly held within people, rather than being consolidated in readily accessible forms.

Niches at the grassroots level are interdependent upon technology developers, and provide sites where emerging sustainable technologies find application and development. Yet grassroots innovators, like others, are technology takers initially, and can struggle to identify and obtain appropriate sustainable technologies. This interdependency could be made more effective by opening participation in technology development to grassroots innovation. The challenge is considerable, especially where technology development is transnational. Appliance recycling initiatives, for example, reveal considerable insights into design for repairability and remanufacture, but this needs conveying to the product development decision-makers of manufacturers whose headquarters may be in a different country.

Diffusion Challenges

Grassroots influence is limited by a number of factors. First, small-scale and geographical rootedness makes scaling up difficult. Niches need reinterpreting and transposing for other scales. Whilst policy interventions can bridge niche and mainstream situations, they can also filter and reformulate the practices that work on wider scales. Alternatively, small-scale initiatives can reproduce elsewhere by ensuring groups are well connected regionally and nationally. For instance, Time Banks operate successfully at a small scale, allowing participants to feel that they know most of the other members; they grow by

'budding off', to retain the sense of neighbourliness, and keep coordination manageable (Boyle, 2005).

Paradoxically, a key benefit of grassroots innovations, namely, the 'world within a world', undermines diffusion. Whilst practices where 'the rules are different' have certain strengths, those strengths become barriers when in concerted opposition to incumbent regimes. In these instances, there is an important distinction 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 contrasts with the niche literature, which argues that successful influence requires a degree of congruence with regime practices if niches are to have a chance of catching on (Weber *et al.*, 1999; Hoogma *et al.*, 2002). A corollary is that compatibility limits the degree to which green niches can diverge radically from the mainstream, thus blunting their radical potential (Smith, 2006).

However, even radical green niches can eventually exert influence upon the mainstream, though not in forms anticipated by original niche idealists. *Elements* of niche practice that can be adapted and accommodated easily within the market are appropriated when the regime feels pressure for sustainable reforms. In this way, grassroots initiatives remain sources of learning, even if it is only the more appropriable, marketable lessons that spread. The form of sustainability that diffuses alters (reduces) accordingly. The inability of the more complete versions of radical sustainability to diffuse from the niche suggests both the limited power of the niche and limited capacity of the incumbent regime to become more sustainable. Conflict arises between those wishing to remain 'purist' and others seeking wider yet partial influence (system-builders) and prepared to compromise. Systems builders might be welcomed as recognition of the worth of the niche, but also resented as an unwelcome sellout 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 (but which reaches further, e.g. large waste management companies developing kerb-side recycling activities to the detriment of earlier, less capitalised community-based operations).

A further challenge is policy-makers' risk aversion. Innovation is an experimental process, and an important aspect of this is openness to learning from failure. The policy culture is insufficiently mature to identify this as a positive process. Funding constraints inhibit experimentation and punish failure by withdrawal of resources. The challenge is to develop support mechanisms that allow grassroots initiatives to revise and continue in the light of earlier difficulties, and diffuse the lessons learnt. Whilst continued funding of failure can be difficult to justify, it seems unreasonable to cut funding from initiatives willing to adapt activities, overcome earlier problems, and continue experimenting. This is the lifeblood of innovation.

Finally, there is a wider, institutional challenge. Change at higher levels – within incumbent regimes and overarching socio-economic processes – opens opportunities for niche diffusion. Sustainability pressures can spur regime actors into appropriating greener activities from niches. Church (2005) argues that local action must connect with higher-level policies, capabilities and infrastructures. Grassroots innovators have to be sufficiently nimble to take advantage of windows of opportunity, like new funding programmes attached to shifting policy agendas, and cast themselves positively in the new light. But grassroots innovators find it extremely challenging to influence when and what form those opportunities take. A key challenge is to boost grassroots influence – local intelligence informing policy developments that further encourages diverse grassroots innovation (Roberts, 2005). Indeed, our central argument has been for a reconsideration of grassroots initiatives entwining the community action and sustainable innovation strands of higher-level sustainable development policy.

Conclusions

Technological innovation and community action are important strands of sustainable development that are rarely linked. The grassroots is a neglected site of innovation for sustainable development. Innovation literature describes the important role of niches in seeding transformations in wider socio-technological regimes. We adapted these ideas to grassroots activities for sustainable development in the social economy, and discussed the implications of this conceptual development. The characteristics of grassroots innovations were described, and the benefits and challenges for these niches discussed in terms of intrinsic and diffusion outcomes. Grassroots innovations appear good at creating alternatives for sustainable development, but they do not connect forcefully with mainstream socio-technical regimes. To address this conceptual and practical breach more robustly, we therefore identify the following new research and policy agendas.

If an innovation agenda is brought to the grassroots, a number of governance issues are raised. Grassroots innovations will become boundary objects, interpreted differently by networks of actors encountering one another's interests and commitments around the niche. Government departments have their own objectives; technology developers have a different modus operandi to grassroots idealists; ecopreneurs seek commercialisation, moving innovations from social economy to market economy; and academics bring their own agendas. Through niche engagement, and associated social learning, the positions and commitments of some actors will alter. The need for research into the contexts, actors and processes under which niche lessons are able or unable to translate into mainstream situations (and transform sustainabilities) will become even more pronounced (Smith, 2007). This raises important issues in research ethics, since it is vital to be respectful of the grassroots agenda, ensuring the intrinsic benefits of grassroots innovative niches are not

undermined by diffusion interventions. Seeing the grassroots solely as business incubators would denude them of important and diverse features. The wider diffusion of niche elements through the market can be a welcome contribution to wider (shallower) greening. But other, less immediately commercial elements of grassroots niches remain potential sources of strategic diversity, important for living with the uncertainties associated with sustainable development (Stirling, 1998).

Policy and research into grassroots innovations must nurture mutually beneficial relationships with niche activists. The emerging agenda 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 interface between the social and market economies. 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, research and policy is needed that learns from this wealth of alternative means of provision and embeds that social learning into the mainstream. Policy measures must put the incumbent socio-technical regime under tension and prompt wider searches for (grassroots) sustainability innovations. Researchers can contribute by bringing a reciprocal learning approach to grassroots innovations, e.g. through action research (Stringer, 1996). Engaged researchers can offer services such as evaluations and policy analyses which grassroots initiatives themselves may lack the capacity to produce, but done in a way that challenges conventional analytical criteria. This could prove an essential strategic response to the ethical dilemmas noted above.

Existing understandings of community action in sustainable development need reconsidering through the lens of grassroots innovation. Survey research can map the extent, characteristics, impacts and outcomes of grassroots innovations. In-depth qualitative analysis is needed to understand 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, reproduction, and policy. Such analysis must move between social and market economy settings. Finally, a policy analysis of institutions currently supporting grassroots innovations will aid our understanding of the ways in which innovation policy can be incorporated.

This agenda is indicative, not exhaustive. We have been deliberately upbeat about grassroots innovations, but more critical questions remain. Grassroots initiatives exhibit their own micro-politics and can be exclusive to some and inclusive to others. Much work needs to be done regarding 'whose' alternative values are being mobilised in niches. Niches find themselves at the weak end of complex and extended power relations under globalising capitalism, and dominant individualist and consumerist lifestyle aspirations run counter to community collectivism. Neither provides a sympathetic context for grassroots innovations to spread influentially. Research has also to ask where the

institutional power bases reside for supporting and harnessing grassroots innovation. Official policy commitments to sustainable innovation and community action provide rhetorical resources at least. State support for grassroots initiatives must extend beyond the local and symbolic. 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.

Notes

1. 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'.
2. In practice, market power can prevent perfect competition. The ability to 'catch up' depends upon resources, institutions, and abilities to appropriate benefits (Clark, 1985).

References

- Alakeson, V. & Sherwin, C. (2004) *Innovation for Sustainable Development* (London: Forum for the Future).
- Amin, A., Cameron, A. & Hudson, R. (2002) *Placing the Social Economy* (London: Routledge).
- Arthur, B. W. (1988) 'Competing technologies: an overview', in G. Dosi *et al.* (eds.), *Technical Change and Economic Theory* (London: Pinter).
- Berkhout, F. (2002) 'Technological regimes, path dependency and the environment', *Global Environmental Change* 12(1): 1–4.
- Berkhout, F., Smith, A. & Stirling, A. (2004) 'Sociotechnical regimes and transition contexts', in B. Elzen, F. W. Geels & K. Green (eds.), *System Innovation and the Transition to Sustainability: Theory, Evidence and Policy* (Camberley: Edward Elgar).
- Beveridge, R. & Guy, S. (2005) 'The rise of the eco-preneur and the messy world of environmental innovation', *Local Environment* 10(6): 665–76.
- Boyle, D. (2005) 'Sustainability and social assets', paper presented at Grassroots Innovations for Sustainable Development Conference, UCL, London, 10 June 2005. Available at: <http://www.uea.ac.uk/env/cserge/events/2005/grassroots/index.htm>
- Boyle, G. & Harper, P. (1976) *Radical Technology* (London: Wildwood House).
- Burgess, J., Bedford, T., Hobson, K., Davies, G. & Harrison, C. (2003) '(Un)sustainable consumption', in F. Berkhout, M. Leach & I. Scoones (eds.), *Negotiating Environmental Change*. pp. 261–91 (Cheltenham: Edward Elgar).
- Chanan, G. (2004) *Community Sector Anatomy* (London: Community Development Foundation).
- Church, C. (2005) 'Sustainability: the importance of grassroots initiatives', paper presented at Grassroots Innovations for Sustainable Development Conference, UCL, London, 10 June 2005. Available at: <http://www.uea.ac.uk/env/cserge/events/2005/grassroots/index.htm>
- Church, C. & Elster, J. (2002) *The Quiet Revolution* (Birmingham: Shell Better Britain).
- Clark, N. (1985) *The Political Economy of Science and Technology* (Oxford: Basil Blackwell).
- Corborn, J. (2005) *Street Science: Community Knowledge and Environmental Health Justice* (Cambridge, MA: MIT Press).
- DEFRA (2003) *Changing Patterns: UK Government Framework for Sustainable Production and Consumption* (London: DEFRA).
- DEFRA (2004) *Evidence and Innovation* (London: DEFRA).
- DEFRA (2005a) *DEFRA and Social Enterprise: A Position Statement* (London: DEFRA).

- DEFRA (2005b) *Delivering Sustainable Development at Community Level*. Available at: www.sustainable-development.gov.uk/delivery/global-local/community.htm (accessed 24 October 2005).
- DEFRA (2005c) *Sustainable Innovations*. Available at: www.sustainable-development.gov.uk/what/SustainableInnovations.htm (accessed 24 October 2005).
- Devine-Wright, P. (2006) 'Citizenship, responsibility and the governance of sustainable energy systems', in J. Murphy (ed.) *Framing the Present, Shaping the Future: Contemporary Governance of Sustainable Technologies* (London: Earthscan).
- Dobson, A. (2003) *Citizenship and the Environment* (Oxford: Oxford University Press).
- Dosi, G. (1982) 'Technological paradigms and technological trajectories', *Research Policy* 11: 147–62.
- Dosi, G., Freeman, C., Nelson, R., Silverberg, G. & Soete, L. (eds.) (1988) *Technical Change and Economic Theory* (London: Pinter).
- DTI (2003) *Innovation Report: Competing in the Global Economy, the Innovation Challenge* (London: DTI).
- DTI (2005) *Innovation*. Available at: www.innovation.gov.uk (accessed 24 October 2005).
- Fine, B. & Leopold, E. (1993) *The World of Consumption* (London: Routledge).
- Fussler, C. & James, P. (1996) *Driving Eco-innovation: A Breakthrough Discipline for Innovation and Sustainability* (London: Pitman).
- 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.
- Hines, J. (2005) 'Grassroots initiatives in housing', paper presented at Grassroots Innovations for Sustainable Development Conference, UCL, London, 10 June, 2005. Available at: <http://www.uea.ac.uk/env/cserge/events/2005/grassroots/index.htm>
- HM Government (2005) *Securing the Future: Delivering UK Sustainable Development Strategy* (Norwich: The Stationery Office).
- Holliday, C. & Pepper, J. (2001) *Sustainability through the Market: Seven Keys to Success* (Geneva: WBCSD).
- Hoogma, R., Kemp, R., Schot, J. & Truffer, B. (2002) *Experimenting for Sustainable Transport: The Approach of Strategic Niche Management* (London: Spon Press).
- Hughes, T. P. (1983) *Networks of Power: Electrification in Western Society, 1880–1930* (Baltimore: Johns Hopkins University Press).
- Irwin, A., Georg, S. & Vergragt, P. (1994) 'The social management of environmental change', *Futures* 26: 323–34.
- Jackson, T. (2004) *Chasing Progress: Beyond Measuring Economic Growth* (London: New Economics Foundation).
- Jackson, T. & Michaelis, L. (2003) *Policies for Sustainable Consumption* (Oxford: Sustainable Development Commission).
- Jacobsson, S. & Johnson, A. (2000) 'The diffusion of renewable energy technology: an analytical framework and key issues for research', *Energy Policy* 28: 625–40.
- Kemp, R., Schot, J. & Hoogma, R. (1998) 'Regime shifts to sustainability through processes of niche formation: the approach of strategic niche management', *Technology Analysis and Strategic Management* 10: 175–95.
- Leyshon, A., Lee, R. & Williams, C. (eds.) (2003) *Alternative Economic Spaces* (London: Sage).
- Maniates, M. (2002) 'Individualization: plant a tree, buy a bike, save the world?', in T. Princen, M. Maniates & K. Konca (eds) *Confronting Consumption* pp. 43–66 (London: MIT Press).
- Manno, J. (2002) 'Commoditization: consumption efficiency and an economy of care and connection', in T. Princen, M. Maniates & K. Konca (eds.), *Confronting Consumption*, pp. 67–99 (London: MIT Press).
- Meltzer, G. (2005) *Sustainable Community: Learning from the Co-housing Model* (Crewe: Trafford).
- Murphy, J. (2000) 'Ecological modernisation', *Geoforum* 31(1): 1–8.
- Nelson, R. R. & Winter, S. G. (1982) *An Evolutionary Theory of Economic Change* (Cambridge, MA: Bellknap Press).
- PIU (2002) *Social Capital: A Discussion Paper* (London: PIU).

- Pretty, J. (2002) *Agri-culture: Reconnecting People, Land and Nature* (London: Earthscan).
- Rip, A. & Kemp, R. (1998) 'Technological change', in S. Rayner & E. L. Malone (eds.), *Human Choice and Climate Change, Volume 2* (Columbus: Battelle Press).
- Roberts, S. (2005) 'Grassroots initiatives in energy', paper presented at Grassroots Innovations for Sustainable Development Conference, UCL, London, 10 June 2005. Available at: <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* (London: Kogan Page).
- Rogers, B. & Robinson, E. (2004) *The Benefits of Community Engagement: A Review of the Evidence* (London: Home Office).
- Russell, S. & Williams, R. (2002) 'Social shaping of technology: frameworks, findings and implications for policy with glossary of social shaping concepts', in K. H. Sørensen & R. Williams (eds.), *Shaping Technology, Guiding Policy: Concepts, Spaces and Tools* (Cheltenham: Edward Elgar).
- 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. & Elzen, B. (1994) 'Strategies for shifting technological systems: the case of the automobile system', *Futures* 26: 1060–76.
- Schumpeter, J. (1961) *The Theory of Economic Development* (Oxford: Oxford University Press).
- Seyfang, G. (2001a) 'Community currencies: small change for a green economy', *Environment and Planning A* 33(6): 975–96.
- 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* 15(3): 581–93.
- Seyfang, G. (2005) 'Shopping for sustainability: can sustainable consumption promote ecological citizenship?', *Environmental Politics* 14(2): 290–306.
- Seyfang, G. (2006a) 'Ecological citizenship and sustainable consumption: examining local food networks', *Journal of Rural Studies* 22(4): 385–95.
- Seyfang, G. (2006b) 'Harnessing the potential of the social economy? Time Banks and UK public policy', *International Journal of Sociology and Social Policy* 26(9/10): 430–43.
- Seyfang, G. (2006c) 'New institutions for sustainable consumption: an evaluation of community currencies', *Regional Studies* 40(7): 781–91.
- Seyfang, G. (2007) 'Cultivating carrots and community: local organic food and sustainable consumption', *Environmental Values* 16: 105–23.
- Shove, E. (2003) *Comfort, Cleanliness and Convenience: The Social Organisation of Normality* (Oxford: Berg).
- Smith, A. (2004) 'Alternative technology niches and sustainable development', *Innovation: Management, Policy and Practice* 6: 220–35.
- Smith, A. (2006) 'Green niches in sustainable development: the case of organic food in the UK', *Environment and Planning C: Government and Policy* 24: 439–58.
- Smith, A. (2007) 'Translating sustainabilities between green niches and socio-technical regimes', *Technology Analysis & Strategic Management* (in press).
- Smith, A., Stirling, A. & Berkhout, F. (2005) 'The governance of sustainable socio-technical transitions', *Research Policy* 34: 1491–510.
- Stirling, A. (1998) 'On the economics and analysis of diversity', *SPRU Electronic Working 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 M. Leach, I. Scoones & B. Wynne (eds.), *Science, Citizenship and Globalisation* (London: Zed).
- Stringer, E. (1996) *Action Research: A Handbook for Practitioners* (London: Sage).
- Wakeman, T. (2005) 'East Anglia Food Link: an NGO working on sustainable food', paper presented at Grassroots Innovations for Sustainable Development Conference, UCL, London, 10 June 2005. Available at: <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: 833–46.
- Weber, M., Hoogma, R., Lane, B. & Schot, J. (1999) *Experimenting with Sustainable Transport Innovations: A Workbook for Strategic Niche Management* (Twente: University of Twente Press).
- Williams, C. C., Aldridge, T., Tooke, J., Lee, R., Leyshon, A. & Thrift, N. (2001) *Bridges into Work: An Evaluation of Local Exchange Trading Schemes (LETS)* (Bristol: Policy Press).
- Wilsdon, J. & Willis, R. (2004) *See-Through Science: Why Public Engagement Needs to Move Upstream* (London: Demos).
- Winner, L. (1979) 'The political philosophy of alternative technology', *Technology in Society* 1: 75–86.
- Yearley, S. (1988) *Science, Technology and Social Change* (London: Unwin Hyman).
- Young, S. (1997) 'Community-based partnerships and sustainable development', in S. Baker, M. Kousis, D. Richardson & S. Young (eds.), *The Politics of Sustainable Development*, pp. 217–36 (Manchester: Manchester University Press).