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Examining innovation for sustainability from the bottom up: An analysis of the permaculture community in England

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20 **Examining innovation for sustainability from the bottom up: An analysis of the**
21 **permaculture community in England**

22
23

24 **Abstract**

25

26 This paper applies the transitions approach to a novel food production context, via an
27 examination of the food production side of permaculture. More specifically, it examines
28 attempts by the permaculture community in England to interact and influence the Agriculture
29 Knowledge System of the mainstream agri-food regime. Strategic Niche Management and
30 Communities of Practice theory are combined to examine the ways in which the permaculture
31 community has evolved and has sought to develop its agro-ecology message and influence
32 the agri-food regime. Evidence of second order learning and networking with stakeholders
33 outside the community of practice is limited. A tension between internal activities that
34 reinforce a boundary between the permaculture knowledge system and the wider Agriculture
35 Knowledge System are evident. Some external activities designed to cross boundaries are
36 noted. However, activities designed to translate permaculture ideas into mainstream
37 agriculture have had limited success. There is some evidence of interaction and lateral linkage
38 with sub-regimes to enhance capacity but this is usually in individual capacities. Examining
39 the evolution of radical niche innovations such as permaculture thus reveals the way that
40 beliefs, values and epistemologies make the process of sustainability transition challenging
41 and complex, particularly when different knowledge systems clash with one another.

42

43

44 Introduction

45

46 Innovation has become something of a buzzword in recent years, especially within food and
47 rural and regional development policy (Bock 2012; Neumeier 2012; Kirwan *et al.* 2013;
48 Esparcia 2014; Hinrichs 2014; Ingram, 2015; Tisenkopfs *et al.* 2015). Adams and Hess (2008,
49 p. 1) note that ‘innovation occurs when a new idea (or combination of old ideas) forms a
50 different way of thinking or interacting’. In addition to this general definition, innovation also
51 typically involves processes that are highly contested because they challenge current thinking
52 and modes of development. Within agriculture the pressure to innovate is in response to the
53 challenge to increase food production sustainably. This will not be easy given various external
54 pressures, including a declining stock of key resources, energy prices, international trade
55 relations and climate change. (Maye and Kirwan 2013). Approaches to agriculture are needed
56 that extend beyond traditional sectorial agricultural boundaries, including sustainable
57 alternatives that challenge the existing socio-technical regime (Seyfang and Smith 2007;
58 Marsden 2013; Darnhofer 2015; Ingram and Maye 2016). Responding to agri-food
59 sustainability challenges will require system-level changes, or what is more generally termed
60 ‘sustainability transitions’ (Hargreaves *et al.* 2013; Feola and Nunes 2014).

61

62 Transition is a ‘gradual process of change which transforms the structural character of a
63 societal domain’ (Rotmans *et al.* 2001, quoted in Brunori *et al.* 2013, p. 27; see also Hinrichs
64 2014). The transition approach argues that socio-technical regimes (i.e. systems of rules and
65 principles) provide a frame of reference for actions/behaviours. Transition describes a process
66 of changing socio-technical regimes. In an agri-food context, mainstream agriculture refers to
67 prescribed agricultural practices within conventional systems e.g. arable farming. Mainstream
68 agriculture and the wider agri-food regime is underpinned by a productivist logic with
69 established supply chains and formal institutions and actors (Agriculture Knowledge System
70 (AKS)) that have responsibility for fostering innovation (Ingram 2015). Transition to
71 sustainability refers ‘to a shift from the ‘productivist regime’, characterised by production
72 growth, high yields, and input intensification, to a regime built around the principles of
73 sustainable production’ (Brunori *et al.* 2013, p. 28). However, transforming socio-technical
74 regimes is not a straightforward or easy task. As Seyfang and Smith (2007) observe,
75 sustainable alternatives are typically ‘locked out’ because socio-economies are locked in to
76 established systems and ways of thinking. This is reflected, for example, in the way global
77 markets, neoliberalism and technological artefacts dominate agri-food regime debates about
78 transitions to sustainability in agriculture (Marsden 2013).

79

80 Innovation is a key driver of transition – it provides the means to potentially ‘unlock’ old styles
81 of thinking. The transition approach identifies two types of innovation (Geels and Schot 2007;
82 Brunori *et al.* 2013; Hinrichs 2014). First, incremental (first order) innovations, which are
83 innovations (technological or social) that maintain the status quo; they are generated by the
84 existing rules of the regime and ‘fix’ problems within the regime. They do not challenge the
85 rules about how a system operates or how we behave as consumers/citizens. Second, radical
86 (second order) innovations, which respond to contradictions within the regime and external
87 pressures and, crucially, seek to change it; their socio-technical rules are generated *outside*
88 the regime. Transition takes place ‘when new techno-economic principles become a coherent
89 whole and replace the old ones’ (Brunori *et al.* 2013, p. 27). Organic agriculture in its early
90 days was a radical innovation (Smith 2006; Goodman *et al.* 2012). Transition Towns are

91 another contemporary example of a radical sustainable alternative that challenges the socio-
92 technical regime (Feola and Nunes 2014). These innovative grassroots networks are
93 synonymous with 'socio-technical niches' as defined by Seyfang and Smith (2007; cf. Geels
94 2004; Elzen *et al.* 2012; Smith and Raven 2012) in that they operate on the margins of
95 conventional agriculture, mainstream public funds and institutional support frameworks
96 (Ingram and Maye 2016).

97

98 This paper applies the transitions approach to a novel food production context, via an
99 examination of the permaculture community in England.¹ Permaculture is an international
100 grassroots development philosophy and sustainability movement that advocates an agro-
101 ecological design approach to community living and food production (Veteto and Lockyer
102 2008, p. 49; cf. Pickerill 2010; Ingram *et al.* 2014a). It offers a more radical and alternative
103 rural future similar in spirit to the counter-cultural back-to-the-land movement (Halfacree
104 2007a/b). The *food production* side of permaculture and in particular attempts by the
105 community to interact and influence the AKS of the mainstream agri-food regime in England
106 is the point of interest here. In transition theory terms, the agricultural research, extension
107 and education institutions are established sources for innovation (i.e. first order) and part of
108 the productivist regime (Curry *et al.* 2012). Permaculture is an alternative (second order)
109 approach to agriculture and food production which has emerged outside of the regime, with
110 its own knowledge base and resources. Its agro-ecological approach to food production and
111 sustainable living challenges the conventional wisdom of the mainstream regime. The paper
112 aims to examine the evolution of the permaculture community in England as an example of
113 an 'emerging transition' (i.e. 'transitions in-the-making', Darnhofer 2015, p. 17). Strategic
114 Niche Management and Communities Of Practice theory are utilised to examine the ways in
115 which the permaculture community in England has evolved and has sought to develop its
116 agro-ecology message and influence the mainstream agri-food regime. Three research
117 questions drive the analysis: first, what is the internal composition of the permaculture
118 community in terms of social processes and network dynamics and how might they influence
119 niche-regime interactions?; second, what methods and strategies has the permaculture
120 community employed to translate permaculture methods to the mainstream agri-food
121 regime?; and third, how effective has the community been in diffusing socio-technical
122 practices, in linking with regime actors and in creating relationships between regimes to
123 influence change? The next section of the paper introduces ideas from Strategic Niche
124 Management and Communities Of Practice, which sit within transition studies and knowledge
125 and learning systems literatures respectively. The permaculture concept and analysis of the
126 community in England is then presented, focusing on attempts by the group (and its
127 associated knowledge system) to influence and interact with the mainstream agri-food
128 regime and interested publics.

129

130 **Conceptualising sustainability transitions and niche-regime interactions**

131

132 A series of approaches within transition studies have developed to understand and study
133 sustainability transitions (Lachman 2013; Hinrichs 2014; Elzin *et al.* 2012; Darnhofer 2015).
134 The most established approach is the Multi-Level Perspective (here after MLP), which
135 conceptualises patterns of long-term change. Its main focus is socio-technical systems, which
136 are situated at three analytical levels and labelled respectively as landscape factors, regimes
137 and niches (Geels and Schot 2007). Transitions are non-linear processes and an outcome of

138 the interplay of developments at the three levels, with each level representing a
139 heterogeneous configuration of elements (Darnhofer 2015, p. 19). In relation to agriculture,
140 the socio-technical landscape represents pressures that are exogenous to niches and regimes
141 below. These include external challenges, such as climate change and macro economic
142 processes, which normally take place over a long time scale but create opportunities for
143 change. Niches and regimes have no impact on the landscape level, but the landscape factors
144 can impact these two levels below. The socio-technical regime is the locus of established
145 practices and rules that stabilise existing systems (*ibid.*), which in this case signifies the
146 mainstream agri-food system and its current governance mechanisms. This 'regime' can be
147 understood as being 'dynamically stable' and the dominant paradigm in terms of how things
148 are organised. The third element, niche innovations, is the locus of radical innovations, which
149 at present may not be directly putting pressure on the dominant paradigm to change, and yet
150 have the potential to do so.

151
152 Transitions occur 'as a result of dynamics at the different levels which reinforce each other
153 creating a "window of opportunity"' (Lachman 2013, p. 271). Thus, landscape factors
154 destabilise regimes and niches, constructed in 'protective space', gather momentum and
155 increase in importance within the system. Niches are the main focus for change; however,
156 there is no guarantee they will develop sufficiently to materially influence the dominant
157 regime. Understanding the relationship between niches and regimes is therefore key to
158 understanding the nature of transitions, notwithstanding the pressures that may also be
159 exerted on an existing regime from the landscape level. In practice, how change happens is
160 also dependent on timing, as well perhaps as on luck. This includes the relative strength and
161 stability of the niche in relation to the regime and concomitantly how well developed the
162 niche is (e.g. how realistic an alternative to the existing regime is it?). This highlights the
163 importance of understanding the processes of network building and actor alignment, in that
164 'the rules of [any] socio-technical regime are sustained through network interactions, inter-
165 organisational fields, and social worlds' (Wiskerke 2003, p. 431).

166
167 The MLP thus provides a generalisable model and heuristic framework to position radical
168 innovations and to examine potential interactions relative to the mainstream regime. MLP is
169 a 'multiple' approach in that it is able to account for a wide range of actors and institutions
170 that may be operating at different levels as well as being either internal or external to the
171 society/region/regime involved. However, the MLP has been criticised on the basis that
172 although it appears straightforward it is actually highly complex, with greater attention
173 needed to examine dynamics between levels and between actors at the same levels (Lawhon
174 and Murphy 2011; Smith and Raven 2012; Lachman 2013; Darnhofer 2015). There are a
175 number of events and relations that need to be accounted for, for example, including the
176 social, political and spatial dynamics that shape sustainability transitions. Moreover, MLP was
177 essentially designed to examine technological innovations.

178
179 Attention within transition studies is therefore increasingly focused on further analysis of
180 interactions between levels and better understanding boundary interactions. This forms a
181 core focus of this paper, which utilises a sub-set of MLP, Strategic Niche Management (here
182 after SNM), to study permaculture as an emerging sustainability transition, in combination
183 with ideas from Communities of Practice (here after COP). Transition studies have not
184 previously combined SNM and COP approaches but they offer useful synergies to examine

185 niche-regime interactions. SNM is particularly useful to scrutinise what we mean by ‘niche’
186 and to better understand ‘niche interactions’, which includes work by Seyfang and Smith
187 (2007) and Seyfang and Haxeltine (2012) that links SNM to grassroots social innovations (see
188 also Morris *et al.* 2014). It is a form of evolutionary theory that focuses on the governance of
189 niches (Seyfang and Haxeltine 2012). It argues that innovative approaches with the potential
190 to contribute to sustainable development may not have the capacity to compete with
191 established networks, without some form of financial, institutional and/or policy support. As
192 Lachman (2013, p. 272) notes, ‘the core idea behind SNM is learning-by-doing and doing-by-
193 learning in order to gain insights from transition experiments as to the (general applicable)
194 requirements regarding the breakthrough of niches into the mainstream...’ SNM examines
195 how new technologies and approaches can be understood and encouraged to achieve societal
196 goals e.g. sustainability. It seeks to understand *how niches can emerge through collective*
197 *engagement and practice*. SNM thus provides a focus on how innovations are developed at
198 the local level and how they may impact the regime. Seyfang and Haxeltine’s (2012) work on
199 the UK’s Transition Towns movement is useful to characterise what is meant by ‘niche’ from
200 an SNM perspective. They define niches as:

201
202 ‘...a protected space where suboptimally performing experiments can develop away
203 from regime selection pressures. [They] comprise intermediary organisations and
204 actors, which serve as ‘global carriers’ of best practice, standards, institutionalised
205 learning, and other intermediating resources such as networking and lobbying, which
206 are informed by, and in turn inform, concrete local projects (experiments)’ (*ibid.*, p.
207 383).

208
209 Three important processes for successful niche development are identified (*ibid.*; see also
210 Kemp *et al.* 1998). The first is *expectation management*, which is about how the niche
211 presents themselves to external audiences and whether they deliver on the promise they
212 make. They suggest ‘expectations should be widely shared, specific, realistic and achievable’.
213 The second is *building social networks* – networking activities work best to support niches if
214 they involve different stakeholders who can then draw in their organisational resources to
215 support niche development. The third is *learning*, and this is most effective when it
216 contributes to ‘second-order learning’ (i.e. participants involved question the logic and
217 recognise constraints of the regime). A successful niche innovation is one that diffuses socio-
218 technical practices. They need, in other words, to communicate effectively with wider
219 audiences. There are three ways in which a successfully developed niche diffuses (Seyfang
220 and Haxeltine 2012, p. 384):

- 221
- 222 • *Replication*: projects are replicated within the niche resulting in change as a result of
 - 223 an aggregation of small projects;
 - 224 • *Scaling up*: whereby projects grow in scale and attract more participants; and
 - 225 • *Translation*: where niche ideas are translated into the mainstream.
- 226

227 The diffusion of technological, market-based innovations (e.g. the latest mobile phone or
228 computer tablet) is different to grassroots innovations, such as permaculture, local food
229 projects or furniture recycling schemes, which are practice and values-based. The creation of
230 a space to develop ideas, experiment, express alternative values, etc. is crucial for grassroots
231 innovations (Seyfang and Smith 2007; Seyfang and Haxeltine 2012). This maintenance of a

232 protected space is seen as a key challenge for grassroots niches, which in turn links to practical
233 challenges like funding. Protected space in this context then is not describing a policy
234 framework that protects a niche innovation (e.g. novel technology) from market competition
235 (Raven and Smith, 2012). The dominant regime is not strategically 'protecting' permaculture
236 to sub-optimally perform experiments. Protected space in socially-orientated forms of
237 innovation refers instead to a space (and sympathetic community) where niche projects
238 promoting permaculture methods through distinctive values and social and environmental
239 aims are nurtured. As Seyfang and Haxeltine (2012, p. 384) put it, '[t]he 'protected space' may
240 be one of values and culture rather than market pressures...which makes translation of ideas
241 more difficult due to the fundamental clash of values, ideas, and practices'. For the niche to
242 successfully diffuse ideas in this context may require extra things to happen e.g. internal
243 adaptation by the niche, or the regime adapting its functions (e.g. change in regulations) to
244 incorporate niche ideas. Successful innovative socio-technical niches need to somehow
245 combine 'radical' and 'reforming' characteristics (Smith 2006; cf. Raven and Smith, 2012),
246 which in practice 'implies that there must be niche elements that can be appropriated easily
247 by the mainstream, leading towards mildly more sustainable reforms' (Morris *et al.* 2014:
248 193).

249
250 Seyfang and Haxeltine's (2012) review of SNM and their study of the UK's Transition Towns
251 movement provide fruitful insights for analysis of the permaculture network in England. Their
252 work also draws attention to the need to appreciate *internal niche processes versus external*
253 *processes* by understanding the role of identity and group formation. This element of SNM is
254 very important but under-researched. It is examined and extended here by combining insights
255 from COP, particularly in relation to boundary processes (Wenger 2000; Swan *et al* 2002;
256 Oreszczyn *et al* 2010; Tisenkopfs *et al.* 2015). We know from this work that forms of
257 knowledge, learning and practice are associated with specific groups or communities with
258 social bonds strengthened through a process of sharing the same knowledge, values,
259 practices and repertoires (Ingram and Maye 2016). Boundaries can be maintained by such
260 groups to protect critical competences but such communities or groups may also construct
261 and defend themselves to such an extent that they may become insular and orientated only
262 to their own communities of practice/interest. Boundaries may be a source of separation and
263 misunderstanding (Wenger 2000). For niches to develop effectively they need to
264 communicate effectively with wider audiences beyond their community of practice (Smith
265 2006). Research on knowledge in organisations shows how knowledge boundaries appear
266 when you have interaction between specialised domains. Knowledge in this moment
267 becomes a 'curse' because you need to abandon past knowledge at a boundary when a
268 novelty appears (Carlile 2004, p. 557). If you want effective exchange finding common
269 knowledge is therefore critical (Ingram and Maye 2016).

270
271 Boundaries can also become what Wenger (2000) describes as 'spaces of unusual learning'.
272 To enable niche-regime interactions the role of people who are able to provide connections
273 across boundaries and introduce elements of one practice into another is very important.
274 These 'boundary spanning processes' (*ibid.*) can be one-way or two-way connections that
275 involve different types of boundary agent, including (Oreszczyn *et al.* 2010, p. 406): 'brokers'
276 (caring for one boundary), 'roamers' (move around several boundaries), 'outposts' (explore
277 new territories and bring back new ideas) and 'pairs' (brokering via relationships between two
278 people of different communities). Boundary agent roles may be formal or informal. COP

279 theory and boundary spanning/knowledge brokerage in combination with SNM can therefore
280 inform analysis of bottom up innovation processes by better understanding *social relations*
281 *and interactions* between emerging sustainability transitions and mainstream AKS actors.
282 SNM is useful to assess the methods employed to diffuse and translate their socio-technical
283 practices. By combining SNM with COP theory the role of internal niche processes and
284 boundary spanning activities as enablers for niche-regime interactions can also be examined.
285 These conceptual elements (managing expectations, social learning, networking, diffusion
286 processes and boundary activities) therefore provide useful criteria to assess permaculture in
287 England as a grassroots social innovation and ‘radical novelty’ that forms at the micro-level of
288 niches (Geels and Schot 2007, p. 400; Ingram *et al.* 2014b).

289

290 **Methodology and research methods**

291

292 The analysis of the permaculture network is underpinned by a transdisciplinary approach
293 (Home and Rump, 2015) – i.e. it was a co-produced epistemology and data collection process,
294 which involved stakeholders and research participants from the start, actively informing and
295 co-constructing research design as well as outputs/findings. This approach was structured
296 around five participatory workshops, which were conducted over a four year period (for
297 details see: Ingram *et al.* 2013). Between 15-20 participants took part in each workshop and
298 were recruited to represent the diverse community of actors who participate and engage with
299 permaculture, which included representatives from the Permaculture Association (hereafter
300 PA), permaculture practitioners and others not directly involved but interested in the
301 permaculture movement or connected to an organisation in the mainstream agri-food
302 regime. In addition, 20 face-to-face interviews were conducted with individuals from the
303 permaculture community, as well as observation and participation at three meetings and two
304 telephone conferences of the Permaculture Association Research Advisory Board.

305

306 The workshops, interviews and observational work focused on the permaculture’s learning
307 and innovation networks and aimed to address the three research questions introduced at
308 the start of the paper. Some more specific research questions were also co-developed which
309 sought: to understand how learning networks emerge and operate in the permaculture
310 community; to understand the nature, extent and development of the permaculture
311 innovation; to evaluate specific strategies to disseminate permaculture practice, including a
312 project called Learning and Network Dissemination (hereafter LAND) and a related project
313 called FarmLAND; and to examine the constraints and opportunities for linking the
314 permaculture community to the AKSⁱⁱ and other elements of mainstream agriculture. For
315 example, the first workshop examined the evolution of the permaculture community in
316 England. In discussion with participants from the PA and at the first workshop, the LAND and
317 FarmLAND projects were identified as key strategic developments for the group and
318 something that warranted further analysis. The PA were awarded the LAND project in 2009.
319 The grant of £273,000 was awarded through the Big Lottery’s Local Food programme and it
320 aimed to broaden the scope of the network and to promote and disseminate permaculture
321 good practice to interested publics. The FarmLAND project aimed to promote permaculture
322 design at the farm scale by working with farmers and partners/training organisations in the
323 mainstream agricultural knowledge system. Two subsequent workshops examined these
324 particular initiatives in detail, as well as interviews and analysis of other sources. The final two
325 workshops examined links with other agro-ecology approaches and links and interactions

326 with mainstream agriculture/the AKS respectively, as well as providing space for general
327 reflexive analysis.

328

329 Drawing on material from the workshops and interviews the analysis below is framed to:
330 firstly, examine the internal composition of permaculture as a 'radical novelty' (i.e. to reveal
331 identity and social formation within the permaculture community); and secondly, to look at
332 strategies and processes of diffusion, linking the analysis to SNM diffusion ideas (replication,
333 scaling up and translation) and to COP work on boundaries (brokers, objects and interactions).
334 The second part of the analysis forms the main empirical focus for the paper.

335

336 **The permaculture community of practice**

337

338 This paper examines attempts by the permaculture community in England to interact with
339 the agri-food regime and to influence understandings of agri-food sustainability.
340 Understanding internal niche processes is important to analyse interaction processes, as
341 identity and social formation influence the diffusion of innovations. This section examines
342 learning processes among permaculture practitioners in England (see also Ingram *et al.*
343 2014a), utilising ideas from COP (Wenger, 2000) and themes within SNM, specifically
344 expectation management, networking and learning.

345

346 *The permaculture approach and transformative ambitions*

347

348 Permaculture is often described as a design system for creating sustainable human
349 environments. Definitions are broad ranging but all encompass a social and community
350 dimension and some reveal a political ideology. Take this quote, for example, which appears
351 on the inside cover of every edition of *Permaculture Activist* magazine:

352

353 'Permaculture is a holistic system of DESIGN, based on direct observation of nature,
354 learning from traditional knowledge and the findings of modern science. Embodying
355 a philosophy of positive action and grassroots education, Permaculture aims to
356 restructure society by returning control of resources for living: food, water, shelter
357 and the means of livelihood, to ordinary people in their communities, as the only
358 antidote to centralized power' (Permaculture Activist 2004, p. 3; quoted in Veteto and
359 Lockyer 2008, p. 48).

360

361 Veteto and Lockyer (2008, p. 49) capture the essence of permaculture neatly when they
362 describe it as 'a holistic and common-sense approach that recognises humans as an integrated
363 part of ecosystems'. It represents an alternative approach to food production and operates
364 under a distinct set of ethical and design principles.ⁱⁱⁱ Community and agricultural systems are
365 designed according to the principles that mimic ecological systems (Mollinson and Holmgren
366 1978; Mollison 1988; Holmgren 2002).

367

368 A key feature of the permaculture approach is achieving maximum gain for minimal energy
369 expenditure (in contrast to the energy intensive mainstream agri-food regime). Permaculture
370 is modelled on relationships in natural systems. It is not a production system but a land use
371 and community planning philosophy. It does not prescribe a specific practice of food
372 production. A central concept is the design of *ecological landscapes* that produce food. Given

373 the emphasis on ethics, philosophy and design principles, permaculture is not limited to a
374 specific method of production (like organic, for example); it's a design system and does not
375 have a rigid set of rules (Veteto and Lockyer 2008; see also Pickerill 2010). Nevertheless, it is
376 often described as 'agro-ecological production' and is commonly associated with perennial
377 plants, agroforestry, organic systems, forest gardening and polyculture, with community at
378 the centre of the model (Ingram and Maye 2016).

379
380 Permaculture then is a radical second order novelty that is developing in the wider value
381 space of agro-ecology. In terms of expectation management, the permaculture community
382 has high level ambitions (Ingram *et al.* 2014a). The approach questions the operation and
383 logic of the mainstream agricultural regime and advocates a radical shift in the way the food
384 regime is run towards agro-ecological principles. Its goals are transformative – it aims to
385 transform the food production system and its organisation.

386

387 *The permaculture network in England and social learning*

388

389 Individuals and communities practising permaculture in England are diffuse and distributed
390 across a range of sites, including home gardens, community gardens/farms, public spaces,
391 allotments and smallholdings. The permaculture community in England is focused around the
392 PA. This is a membership organisation that involves over 1200 individuals, 67 groups and 18
393 businesses (Permaculture Association 2011; Ingram *et al.* 2014a). It also has its own staff, a
394 board of trustees and a research advisory board. The PA has developed a set of tools and
395 information that the community can use. As well as providing access to advice and
396 information it also aims to promote the theory and practice of permaculture to the general
397 public and coordinates the LAND and FarmLAND initiatives.

398

399 Situated learning involves a process of engagement in a 'community of practice' and is based
400 on the notion that learning is social and comes largely from our experience of participating in
401 daily life (Lave and Wenger 1991). This view of learning as a social process underpins the
402 permaculture approach. The community has emerged through processes of social learning
403 and knowledge sharing amongst individuals and groups of practitioners who share a common
404 interest in, and enthusiasm for, the approach. As was explained in the workshops and
405 individual interviews and site visits, practitioners learn experientially on their own sites. A
406 significant level of individual, context-specific knowledge is built up, with an acceptance that
407 people have different knowledges (Ingram and Maye 2016). Social and experimental
408 knowledge generate tacit forms of knowledge. In the first workshop participants were asked
409 to explain what was unique about the permaculture approach. The capacity to share
410 knowledge about permaculture practice with no suggestion of personal gain emerged as a
411 defining characteristic. Sharing was enabled by people having the same 'ethical mindset'.
412 Participants explained that permaculture is difficult to define, with different interpretations
413 according to local circumstances. The 'spirit' of permaculture cannot be put down on paper –
414 it 'rubs off' from being and working with others. As one participant put it, '[t]here is no such
415 thing as wrong as long as you learn' (Permaculture workshop, Bristol, 19th March 2012).

416

417 Despite the emphasis on social and experiential learning, there are reified forms of knowledge
418 that individuals refer to, such as Mollison's (1998) *Permaculture – A Designer's Manual*, as
419 well as other inspirational individuals who act as advocates for permaculture. Experiential

420 learning is also supported by the Permaculture Design Course and the Diploma in Applied
421 Permaculture Design. These courses are run by the PA and, although formalised, the training
422 style emphasises co-learning and an ethos of sharing, unlike more mainstream learning
423 systems. Competence in practising permaculture is enhanced by undertaking these courses,
424 which can be regarded as part of a 'regime of accountability', a set of reified forms (rules,
425 standards, policies, goals) that the PA has developed over time to develop a sense of joint
426 enterprise (Wenger 2000; Swan et al 2002).

427
428 Interviewees and workshop participants explained also how they source information and
429 advice from beyond the PA through extensive networking. These were invariably sources in
430 the 'alternative social learning system' compared to the formal agricultural knowledge
431 system, including, for example, the Agroforestry Trust, the Soil Association, the Centre for
432 Alternative Technology and Transition groups. In discussions about knowledge sources and
433 networks participants opted for sources which they felt reflected their belief in self-
434 sufficiency, distinct from the farming community and formal knowledge system sources which
435 signified a very different, subsidy-orientated view, of food production.

436 437 **Diffusion processes**

438
439 SNM theory suggests learning and networking are crucial facets of successful socio-technical
440 niche development. Two aspects of these were identified as critical: first, a need to encourage
441 second-order learning; and second, a need to network with actors beyond the niche scale.
442 The analysis above shows how the permaculture community in England has developed a
443 distinct knowledge system, characterised by a community of individuals and groups who learn
444 experientially and share and validate their knowledge through social networks and events,
445 supported by formal structures and activities run mostly by the PA. The analysis reveals a high
446 degree of internal coherence and a group whose social identity is formed around the practice
447 of doing permaculture. The permaculture concept is also a focus of discussion, with
448 contestation about how permaculture is interpreted and operationalised. The potential for
449 permaculture to develop as a radical innovation is arguably constrained by internal processes
450 and the nature of group formation. The insularity of the permaculture community of practice
451 nurtures internal processes but restricts external communication and therefore constrains
452 diffusion. However, there are attempts to disseminate the permaculture concept beyond its
453 community of practice, as examined in this section, organised in relation to SNM diffusion
454 processes. As will be shown from this analysis, understanding the ability of a group to balance
455 internal processes and external communication provides an important new lens to the
456 analysis of diffusion processes for niche-level innovations.

457 458 *Demonstration and replication*

459
460 Grassroots innovations may face more challenges than market-based innovations because
461 they are 'protected spaces' that are values driven (Seyfang and Haxeltine 2012). External
462 interventions, such as grant funding, are crucial to network survival but may also create
463 internal tensions. The LAND grant, for example, funded 3 new and 4 existing part-time staff
464 members, including the PA's CEO as LAND Co-ordinator, a Learning co-ordinator and a
465 Network co-ordinator. The project aimed to develop a national permaculture demonstration
466 network in England, including home gardens, community gardens, public spaces and farms.

467 During workshop discussions and interviews with practitioners and PA employees it was
468 recognised that there were strong network ties between the PA and its members but weak
469 ties between members, with very little regional clustering (of activities). One aim of the LAND
470 project was to strengthen weak ties within the network, but it was designed also to encourage
471 boundary interaction with interested publics.

472

473 A key device/object was through the establishment of LAND Centres, which represent what
474 Wenger (2000, p. 236) terms ‘boundary encounters’ – which, through the form of visits and
475 discussions – provide direct exposure to, in this case, permaculture practice. There are around
476 60 LAND Centres linked to the project and distributed across parts of England, with an aim to
477 eventually reach 80 LAND Centres. The Centres provide learning and networking support (via
478 design tutorials), events (regional skill sharing, specific training, education working group) and
479 host Group Visits (where groups of interested practitioners or members of the general public
480 could visit an accredited site). To be recognised as a LAND Centre sites must meet eligibility
481 criteria.^{iv} The criteria were created by PA to allow them to promote projects to the general
482 public with the knowledge that the projects are well run and demonstrate permaculture
483 ethics and principles. There is also a wider network of 15-20 ‘LAND Learners’ – these are sites
484 progressing towards meeting the eligibility criteria for a LAND Centre. In this sense the LAND
485 project is attempting to create some standardisation and homogeneity, as LAND Centres must
486 meet the eligibility criteria and must be considered a good example of what permaculture is
487 (in practice).

488

489 Participants at workshops were encouraged to reflect on LAND and its aims. One participant,
490 who is based in London but visited sites in Devon and Cornwall, all of which were about
491 permaculture generally rather than just food growing (building, growing, waste management,
492 cultivation), valued the experience:

493

494 ‘I was on a trip recently and the places I visited were all a result of them being on the
495 LAND demonstration website. There was about 11 of them and through the visits I
496 learned a lot more about food growing and land management and stuff like that, so in
497 that respect I think it is very close to fulfilling its aims and objectives because all the
498 information is there and you can access it and you can get in touch with all the sites
499 and they are welcoming’ (Permaculture workshop, Bristol, 19th March 2012).

500

501 Some permaculture practitioners have therefore used the network to expand their learning
502 by visiting a number of sites. LAND Centre representatives at the workshop commented that
503 they appreciated the recognition LAND gave them and the structure it gave them in terms of
504 dissemination, including the provision of laminated visual aids to explain practices on sites.
505 These fairly simple aids acted as ‘boundary objects’ (Wenger 2000) in the sense that they
506 helped to connect visitors to the practice and support connections between practices. LAND
507 data regarding visitors to the LAND centres showed that the project had fairly limited success
508 in demonstrating permaculture practice to the general public when assessed in terms of
509 visitor numbers and activities (in 2010, for example, LAND learning centres had about 100
510 visitors per centre). Some visitors were already engaged permaculture practitioners and the
511 visits were an opportunity to learn more about permaculture. Demonstration and diffusion
512 to visitors unfamiliar with permaculture practice (i.e., expanding the niche to wider
513 audiences) was less evident in some cases. The emphasis on visitor numbers and activities

514 does not consider the quality of knowledge exchange, teaching and learning experiences of
515 those taking part. During the workshop and interview discussions participants noted that
516 permaculture (as a concept) is misunderstood by the public and that visitors (the general
517 public) do not fully understand permaculture in a 2-3 hour visit (despite the provision of signs,
518 etc.). The objective to reach the general public has therefore been challenging for the LAND
519 project. Boundary encounters (in terms of LAND site visits, etc.) tended to be 'insiders' rather
520 than the uninitiated, unaffiliated general public. LAND Centre 'hosts' also explained that they
521 found it hard to explain the permaculture concept to visitors in a short visit. Achieving second
522 order learning in this context takes time and immersion in the practice.

523

524 *Scaling up and social network relations*

525

526 Despite critical comments above about demonstration as diffusion, the LAND project has had
527 some success in enabling a number of sites to be accredited across the country, and growing
528 the LAND network and also the permaculture community more generally by attracting more
529 interest, even if not always new participants. The LAND initiative and grant therefore provided
530 a significant financial boost to permaculture as a radical novelty, enabling it to grow in scale.
531 Participants questioned however the ability of LAND at helping them to network. As one
532 participant commented, 'there is just not enough local connectivity' (Permaculture
533 participatory workshop, Bristol, 19th March 2012).

534

535 The PA FarmLAND initiative is another device to enable boundary interaction. The ambitions
536 of the initiative are to 'scale up' permaculture to larger-scale farms to show that it can be
537 done at that scale (demonstrating in turn how permaculture may become more extensive or
538 even replace the current agricultural regime). To date, the initiative has mainly attracted
539 smallholders who have an interest in permaculture, although a small number of larger scale
540 farmers attracted either by the permaculture approach or, more often, specific approaches
541 which can be implemented on conventional farms, including, for example, holistic grazing and
542 mob grazing.^v PA interviewees explained that there are some mainstream concepts which
543 resonate with permaculture (e.g. sustainable intensification) but such concepts are reframed
544 through a permaculture lens and boundary interactions are often at an individual rather than
545 organisational level. In fact the PA has faced resistance from mainstream farming bodies, such
546 as the National Farmers' Union (NFU), which represents farming interests in England and
547 Wales, despite attempts to engage them. Communication between permaculture
548 practitioners and farmers was also a problem, partly because permaculture is a difficult
549 concept to explain. One farmer who was applying permaculture principals on his farm
550 described, for example, how 'even to the closest farmers that we work with, if you said do
551 you know what permaculture means, if they do, it will be nothing to do with us. They know
552 that we're organic, and they know that we're grass-fed' (Organic farmer). Some permaculture
553 practitioners therefore reported having good social networks with local farmers but they did
554 not share knowledge.

555

556 Despite these difficulties, members of the PA in particular (especially the CEO) have played
557 brokering roles (Wenger, 2000), in the sense that they are networking with other individuals
558 and organisations outside the permaculture community. In the case of permaculture,
559 brokering is evident in terms of attempts to initiate conversations with farmers and farmer
560 unions, for example, as well as the academic community, through attempts to develop a

561 research strategy for PA and to develop evidence that shows permaculture works and is
562 credible. This brokering is not impartial, of course, but shows attempts to further develop
563 permaculture as a radical novelty innovation. This also includes building partnerships with
564 other organisations who promote agro-ecological approaches, including the Campaign for
565 Real Farming, Organic Growers Alliance and Biodynamic farming network.

566

567 *Translation*

568

569 The translation of core ideas underpinning the niche into mainstream thinking is a key process
570 of diffusion and successful SNM (Seyfang and Haxeltine 2012). There is limited evidence of
571 translation of ideas between the permaculture community and the regime. Translation is
572 largely through links with other or connected agro-ecology approaches. For example, interest
573 in systems such as holistic grazing and agroforestry is growing within mainstream agriculture.
574 Whilst not exclusive to permaculture, these systems are part of the overall permaculture
575 design package. The wider Transitions Movement and new initiatives like Regenerative
576 Agriculture also do not use the permaculture brand but have strong links and owe some of
577 their thinking to permaculture ideas. There is an argument too, however, that the best most
578 appropriate elements of permaculture are selectively taken by other interests but the wider
579 approach/philosophy is not. Analysis of the partnerships built by PA staff supports this point,
580 with interaction typically with those in the same social learning system (e.g. Biodynamic
581 farming network or the Campaign for Real Farming). Connections are made with some
582 mainstream AKS actors but interviewed PA participants described them more as
583 dissemination rather than learning and translation opportunities. Boundary connections are
584 also at an informal level and most boundary interaction is done at the individual level rather
585 than a more formalised organisational level. A second, arguably more significant, form of
586 translation is through an educational rather than agricultural route. Some courses and
587 modules (e.g. level one mulching module) have been accredited by the Open College Network
588 (Ingram and Maye 2016), which offers and awards vocational credit-based courses and
589 qualifications through its 2,500 centres in the UK. This offers another way to make
590 permaculture ideas accessible and open to a wider audience. Traditionally training was done
591 via the Permaculture Design Course and the Diploma in Applied Permaculture Design. Utilising
592 the Open College Network provides a common fora for knowledge sharing and the potential
593 for boundary crossing, even if not via conventional AKS educational pathways.

594

595 A third form of translation is through participatory research methods that the PA are using to
596 translate ideas to the scientific community in an attempt to provide credible evidence to
597 actors in the agri-food regime that permaculture ‘works’. In interviews and discussions this
598 development was something the PA CEO was keen to stress, seeing it as an important means
599 to provide intellectual rigour and credence to permaculture practices and thus to enable
600 translation of permaculture practices and ideas to AKS actors in the future. The PA has
601 implemented a research strategy and Research Advisory Board (including interested
602 academics), with the PA community of practitioners acting as a research resource (described
603 as a Practitioner Research Network) who can help to carry out small-scale research into a
604 range of topics, with the aim to bring together the data available from a number of plots to
605 produce a published research evidence base. A member of the Research Advisory Board
606 explained the rationale behind this research strategy further:

607

608 [A] few years down the line we will put out a paper to prove that permaculture works
609 and draw on evidence of applying principles to a plot from all continents, we will have
610 10-20 examples from the main ecosystems on the planet...We can offer evidence that
611 permaculture design works, the approach is working".
612

613 This research work was in early stages of development at the time of data collection (2011-
614 2013) but it reveals attempts and a need by PA to seek credibility with AKS actors and to
615 demonstrate and report that credibility through peer reviewed publications (as a common
616 knowledge and language), although translation may still be challenged in future interactions
617 because of the non-conventional approach adopted to collect data (e.g. small-scale
618 participatory trials of wheat and poly vegetable production).
619

620 **Conclusion**

621
622 This paper has provided an analysis of the permaculture community in England and has
623 situated it within the sustainability transition literature, looking specifically at the place of
624 niche innovations in the transition debate, particularly the challenge of understanding regime
625 and niche interactions to understand transition. Ideas from SNM and COP have been drawn
626 upon to examine the evolution of permaculture in England as a radical grassroots innovation.
627 Seyfang and Haxeltine's (2012) framework provides a useful means to examine grassroots
628 niches. When judged according to their criteria of managing expectations, social learning and
629 networking, permaculture remains as a novelty project in the process of establishment.
630 Evidence of second order learning and networking with stakeholders outside the community
631 of practice is limited, with any interaction done via individual networking and boundary
632 spanning, and the network is arguably over ambitious in its aim to transform the agri-food
633 regime. As Seyfang and Haxeltine (2012, p. 384) reflect, 'expectations should be widely
634 shared, specific, realistic and achievable'. The permaculture community is innovative in their
635 approach, positioning food as part of a wider land use and community based philosophy, with
636 distinct messages about system design and energy uses. The way elements of permaculture
637 practice are finding their way into mainstream farming and wider arguably now more
638 established niche innovations, notably Transition Towns, shows some influence and
639 evolutionary progress. However, there is limited evidence to suggest permaculture has
640 impacted mainstream agriculture. PA has attempted to replicate and, to a lesser extent, scale
641 up permaculture. However, the translation of permaculture into the mainstream agri-food
642 regime has been very challenging, in large part because it is a difficult concept to describe.
643 Projects like LAND and FarmLAND have only had limited success in translating permaculture
644 ideas into conventional agriculture, where links are weak, and the PA is not well-known to
645 actors in the mainstream AKS.
646

647 The value and need to appreciate internal niche processes and identity practices as well as
648 external communication mechanisms when conducting innovation diffusion analysis is
649 evident, particularly when examining social and grassroots innovation development
650 pathways. Wenger's (2000) work on boundary interactions has been utilised here to explore
651 interrelations with, and diffusion into, the mainstream agri-food regime. In the case of
652 permaculture we can see a clear tension between internal activities that tend to reinforce a
653 boundary between the permaculture knowledge system and the wider AKS. So far there has
654 been limited translation into mainstream thinking and practice. However, some external

655 activities designed to cross these boundaries are noted. Dynamics create opportunity for
656 niches and transition. In this regard, tensions between the permaculture knowledge system
657 and the formal AKS are creating opportunities as well as challenges (Ingram and Maye 2016).
658 At a practice level, the multiple ways that permaculture is interpreted and the multiple and
659 overlapping networks that permaculture practitioners and PA staff enrol into create learning
660 opportunities that cross AKS boundaries. Tensions within the agri-food regime itself are also
661 creating opportunities for boundary crossing. Within the mainstream agri-food regime, for
662 example, there is recognition for the need for an integrated approach to tackle complex food
663 system problems and this may provide opportunities for permaculture in the future, given the
664 systems approach that it advocates.

665
666 The analysis also reveals the heterogeneous configuration of elements from an MLP
667 perspective (Geels and Schot 2007) and the need to critique what we mean by 'niche'
668 innovations and how we examine them from the perspective of social and grassroots
669 innovations. In terms of understanding niche-regime interactions, there is a need for a much
670 less hierarchical representation of niches and regimes. For example, the mainstream agri-
671 food regime is not homogenous (Darnhofer 2015). Although limited to date there are
672 instances where some elements of the regime/regime actors have connected with
673 permaculture, albeit very selectively and usually in individual capacities. It is important to pay
674 attention to niche-regime interactions at a case level, as it reveals strategies employed by
675 novelty innovations to consolidate ideas. Particularly important in this regard is 'lateral
676 anchoring' (Elzen et al 2012) or 'lateral linkage' (Ingram 2015) to enhance capacity through
677 interaction with multiple sub-regimes and, in the case of permaculture, the important role
678 and influence of key individuals as boundary spanners.

679
680 Examining the evolution of radical niche innovations such as permaculture is therefore
681 valuable, revealing the way that beliefs, values and epistemologies make the process of
682 sustainability transition challenging and complex, particularly when different knowledge
683 systems clash with one another. It reiterates too the challenge faced by eco-economy
684 advocates to transform the mainstream agri-food regime (Goodman *et al.* 2012). Socio-
685 technical forms of ecological modernisation that modify but do not significantly reform the
686 productivist model of food provisioning continue to dominate agri-food policy discourse.
687 Permaculture has the potential to provide discursive and dialectical resources to challenge
688 this mantra, as well as practical examples and a dedicated knowledge system to support
689 learning. Future work is needed that not only examines the internal and external dynamics of
690 niche innovations but explores boundary work and processes of interaction between
691 knowledge systems. This is necessary to understand the dynamics and shape of new
692 constellations of actors which are forming in the context of sustainable food transitions,
693 including how they may be better supported. It also provides an opportunity for agri-food
694 scholars to take a lead in developing more reflexive forms of food system governance
695 (Hinrichs 2014) by fostering and nurturing the intersectional spaces between knowledge
696 systems so that sustainable food system niches and mainstream regimes can develop more
697 generative pathways of change.

698
699

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874 dutch wheat and bread. *Environment and Planning A* 35 pp. 429-448
- 875

876 **Notes**

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ⁱⁱ AKS refers to the formal institutes/actors responsible for enabling innovation, as well as the actor networks that support agricultural innovation and learning (Ingram 2015: 61). Within mainstream agriculture actor networks include, for example, agricultural scientists and extension officers, as well as private industry suppliers.

ⁱⁱⁱ Permaculture has three underpinning ethics: 1) care for the earth, 2) care for people, and 3) set limits to consumption and reproduction and redistribute surplus. Different sets of principles have been proposed building on those first proposed by Mollison (1985). The Permaculture Association uses the 12 design principles set out by Holmgren (2002): 1) observe and interact, 2) catch and store energy, 3) obtain a yield, 4) apply self-regulation and accept feedback, use and value renewable resources and sources, 6) produce no waste, 7) design from patterns to details, 8) integrate rather than segregate, 9) use small and slow solutions, 10) use and value diversity, 11) use edges and value the marginal, 12) creatively use and respond to change. A set of design tools are also available.

^{iv} There are 10 criteria that LAND Centres must meet (<https://www.permaculture.org.uk/people-projects-places/land-criteria>; accessed 25.03.2016): 1. have a design that uses the ethics, principles and methods of permaculture; 2. be committed to their project development in the medium and long term; 3. have at least one key project member with a Permaculture Design Course certificate; 4. be willing to share skills and relevant information with other permaculture projects, volunteers and visitors via the Permaculture Association website; 5. maintain Permaculture Association membership; 6. be willing to explain to visitors and volunteers how permaculture is put into practice on their site, in person and through interpretative signage; 7. be available to welcome and receive volunteers and visitors on at least 15 occasions a year (minimum numbers and a charge can be set by the Centre); 8. have appropriate insurance policies, health and safety procedures and risk assessments; 9. display membership of (and a weblink for) the LAND project on project websites and on the actual site; and 10. receive feedback, including a biennial check.

^v Holistic grazing is a land management system that mimics nature. It was developed in the 1970s by Allan Savory to improve biodiversity on rangeland environments. Wild grazing animals concentrate in small areas to graze but move on quickly to avoid predators. Holistic grazing and mob grazing copy this behaviour profile, with animals clustered into small areas but moved on quickly to avoid over-grazing (<https://www.permaculture.org.uk/education/course/holistic-management-farming-and-grazing-course-3-day-introductory-course-2014-10-06>; accessed 14.06.2016).