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ORIGINAL ARTICLE

Operationalising a framework for understanding community resilience in Europe

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Abstract

A growing movement of bottom-up community-based initiatives across Europe are taking action intended to support a transition to a zero-carbon future. A simple framework for understanding the contribution of these diverse initiatives to building community resilience could provide a useful tool for researchers, funders, policymakers and others to understand their current, and likely future, impact and how they might be better supported. It would also provide a useful basis for such initiatives to critically reflect on and assess their own activities and priorities. The 'resilience compass' (Wilding 2011) provides one such possible framework and has the particular merit of having been developed with active participation of community activists. In this paper, this approach has been tested by organising data on the activities of 63 hugely varied community-based climate action initiatives in six European countries. This has created a visual guide to enable a simple comparison of their likely potential to catalyse change and consideration of how the efforts of each might be better balanced to enhance their impact. Further, to support the appropriation of the framework by communities themselves, we report the development of a novel online tool for community initiatives to use for resilience self-assessment and a downloadable resource to support them to run participatory, community resilience workshops. We conclude that this approach has significant potential to advance the scientific understanding of community resilience, and so help create the conditions in which the transformational 'bouncing forward' to a low-carbon future can emerge.

Keywords Community · Resilience · Climate change · Transition · Transformation

Introduction

A growing movement of bottom-up community-based initiatives (CBIs) across Europe are taking action intended to support a transition to a zero-carbon future (Seyfang and Haxeltine 2012; Henfrey et al. 2017). The strong innovative potential and flexibility of grassroots initiatives is increasingly recognised as having an important role in the development of sustainable practices (Smith et al. 2016).

Whilst many of these CBIs are achieving significant carbon emission reductions in their communities, there are also many wider impacts, which are often of much more immediate interest to those involved. These include local environmental regeneration, community engagement and awareness raising, social cohesion, social inclusion, improved health and wellbeing, the creation of local livelihoods and retention of wealth in local economies—plus feelings of empowerment and solidarity from working together, both within and between communities, to bring about change.

These CBIs are operating within a complex web of interacting social, political and economic systems all of which face renewal and reorganisation to be fit for a zero-carbon future within planetary limits (Speth 2012). How can community activists best navigate and work skilfully and creatively with this complexity, to focus their effort most effectively? How can researchers, policy makers, funders and others seeking to support bottom-up action best understand the relevance

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and impact of such initiatives? This is not simply a challenge of seeking to compare widely differing initiatives involved with diverse activities in varying contexts in different regions or countries. In a complex system, short-term impacts achieved to date may provide no guide to future performance (Duit et al. 2010) or to the potential of a CBI to support or catalyse wider long-term transformative change.

As our socio-ecological systems become increasingly stressed and unstable, multiple, interconnected and unpredictable challenges from the local to the global are inevitable. Resilience will be necessary at all levels, including in the small, geographic communities of place where so many CBIs are emerging. These communities will need to cope with and adapt to immediate challenges as they arise but also need to be able to pro-actively and creatively engage with and shape the longer-term, transformational changes necessary for the emergence of a sustainable, zero-carbon society (O'Brien 2012). Resilience as simply the ability to 'bounce back' to normal in the face of unexpected crises will no longer be sufficient as 'business as usual' becomes less and less fit for purpose (Skerrat 2013).

The need for community resilience is increasingly invoked but the concept has developed a number of interrelated and contested framings (Cretney 2014; Cinderby et al. 2016; Freshwater 2015). Could a simplified framework for understanding community resilience nonetheless provide a useful way to understand and assess community action? And, could this approach be of particular value to CBIs themselves in understanding how their activity fits within larger-scale systems change?

One such framework has been developed by Wilding (2011) during the course of a two-year action research project involving community activists, academics and community development professionals. This 'compass of resilience' is based on the idea that community resilience may be understood to comprise four broad dimensions and that a community may be in one of the three distinct states of resilience. Whilst providing a simple framework for understanding community resilience, it is nonetheless based on a thorough exploration of systems thinking and resilience theory. Crucially, it also grew out of the practical experience of communities—those that have experienced external shocks, such as floods or hurricanes, as well as those that are actively pioneering ways to engage with the zero-carbon transition.

To test this approach, a selection of the quantitative data collected during research into CBIs taking climate action in six regions of Europe[1] was organised according to this compass of resilience framework and was used to assess and compare these case study CBIs. This is discussed in more detail in section 'Research method'. Further to this, as described in section 'Analysis', an online tool was also developed and disseminated to CBIs with guidance and support materials. Whilst recognising the limitations, we conclude that this 'compass of resilience' approach could have considerable value, both for community activists themselves and those seeking to better support community action.

Theory of community resilience and the resilience compass

A brief theory of community resilience

The term resilience was used first by physical scientists to characterise the ability of materials to recover from external shocks. Resilience entered the field of ecology with the emergence of systems thinking and chaos theory in the 1960s. Holling (1973) distinguished between 'engineering resilience', which is concerned with how rapidly a system is able to regain normality, and 'ecological resilience', as a measure of the magnitude of disturbance that an eco-system can experience before moving into a different state. Gunderson and Holling (2002) went on to develop a sophisticated theory of the behaviour of socio-ecological systems that they termed 'panarchy'. This understands systems functioning as a series of nested adaptive cycles that operate and interact. They do so at multiple scales, at different speeds and in varied timeframes. It also models the cycle of any living system—from growth through stability to decay and eventual reorganisation and renewal. 'Resilience in this perspective is understood not as a fixed asset, but as a continually changing process; not as a being but as a becoming' (Davoudi in Davoudi et al. 2012). Another strand of thinking around personal or individual resilience has emerged in connection with experience of trauma, which has in turn informed thinking around the ability of communities to recover from natural disasters (Brown and Westaway 2011).

An increasing number of theorists (e.g. Berkes and Ross 2013) are now attempting to create a more integrated concept and understanding of community resilience and its relevance to community action and societal transformation (Henfrey et al. 2017). In the context of communities, resilience involves two related capacities: 'adaptability', or the capacity to plan for and cope with change, and 'transformability', the capacity to undergo a fundamental transformation when the existing forms, structures and ways of doing things can no longer persist in changing circumstances (Walker et al. 2004). Olsson et al. (2006) describe the 'window of opportunity' that can open up when an existing system decays or collapses and enters the reorganisation phase. Reorganisation is a time of uncertainty, innovation and transformation, when a crisis can

[1] The EU-FP7-funded TESS (Towards European Societal Sustainability) research project explored the role of community-based initiatives (CBIs) in transitioning to a sustainable and low-carbon Europe: http://www.tess-transition.eu accessed 21/06/17

be turned into an opportunity for renewal—a leverage point when small changes in key variables can determine future development: whether the system will recover its previous condition, transform, or break down.

Davoudi (Davoudi et al. 2012) highlights a number of issues in translating an understanding of resilience from natural to social systems. These include human interference with the course of adaptive cycles. As described by Fleming (2016), this may often take the form of doing everything possible to shore up and prolong the life of existing systems to cope with short-term challenges, making eventual collapse more catastrophic. Davoudi also raises the danger of the notions of self-organisation and self-reliance that are central to resilience thinking being co-opted by individualist, 'survivalist' ideologies advocating withdrawal of the state from local governance responsibilities: 'Advocating the rolling back of the state's support for vulnerable communities in the name of resilience is a misguided translation of self-organisation in ecological systems into self-reliance in social systems' (Davoudi et al. 2012).

Related to this is the question of resilience for whom? Magis (2010) defines community resilience as the 'existence, development and engagement of community resources by community members to thrive in an environment characterized by change, uncertainty, unpredictability and surprise'. The availability of local resources (natural, human, cultural, social, financial, political and built), and the ability of a community to mobilise them, is therefore a major determinant of its resilience. Clearly, some communities will be better resourced and more empowered than others and there will be a need for consideration of issues of justice and fairness between places as well as within them (Cretney 2014).

As noted above, our concern here is not just with resilience in the sense of the ability of a community to bounce back to 'normal' after a crisis but with this ability of a community to pro-actively engage with transformational change of existing systems that are becoming unfit for purpose. 'Transformability is the capacity to create a fundamentally new system when ecological, economic, or social (including political) structures make the existing system untenable' (Walker et al. 2004). "Rather than viewing resilience as bouncing back to an original state following the external 'shock', the term should be seen in terms of bouncing forward, reacting to crises by changing to a new state that is more sustainable in the current environment" (Shaw in Davoudi et al. 2012).

Whilst bearing in mind some of the caveats outlined above, common principles affect resilience in social and economic as well as ecological systems and understanding gained from observing and studying ecosystems can contribute to understanding of how human societies negotiate change (Berkes and Folke 1998). In particular, Walker and Salt (2006) highlight three general and key resilience principles around the importance of:

- modularity—ensuring that if one part breaks, the system as a whole can continue to function
- diversity—the more diverse a system is, the more capacity it has to withstand shock—because there are more options available to fall back on
- feedback—being able to quickly see and understand the consequences of our actions

These principles are clearly closely related and interlinked and apply at different scales. In general, small, sub-systems have shorter, faster adaptive cycles than the larger, slower-moving systems to which they belong and so are able to respond to feedback and innovate more rapidly (Berkes and Folke 1998). A nation of empowered communities that have the ability to self-organise and be self-reliant is therefore likely to also become more diverse as they each develop their own, locally adapted solutions to the challenge of meeting local needs. With some degree of interaction and feedback at the larger scale (through higher level infrastructures), this in turn can lead to mutual inspiration and learning and evolution, or 'bouncing forward', of the larger system.

Such an approach is in direct competition to conventional notions of 'efficiency' that have tended to drive standardisation, uniformity and a reduction in resilience (Walker and Salt 2006). Transformability may thus be in large part about widening understanding of how nested adaptive cycles can operate and interact to allow systems to be both efficient and innovative (Gunderson and Holling 2002; Walker et al. 2004; Folke et al. 2010). This will require individuals and communities to become comfortable living with change and uncertainty, which in turn may depend on a sense of agency and empowerment and developing 'the capacity to imagine alternative futures' (Davoudi Davoudi et al. 2012). This approach advocates resilience being understood as a multi-level phenomenon, in which local links readily to global, and the resilience of individuals contributes to and receives from the resilience of their communities and places (Hopkins 2008; Boyd and Folke 2011).

Grassroots organisations, such as our case study CBIs, clearly have a potentially important role in empowering their communities to self-organise, to engage and to develop particular community strengths in order to build the resilience of the local parts of the global system over which they have influence. Wilding (2011) likens community resilience to a muscle that it is developed through on-going community activity, as a means of building the social capital that will allow the community to self-organise. His very practical approach is to map community resilience on to a four-quadrant grid to provide a useful tool, a 'compass of resilience', for understanding its essential elements: healthy and

engaged people, economy, culture and cross-community links.

Introducing a compass of resilience

Wilding's 'compass of resilience' approach would seem to provide a way of operationalising the concept of resilience at the community scale. It emerged from a thorough action research process involving a wide range of stakeholders, including community activists (Wilding 2013). As such, it provides a simple framework for understanding the different aspects that contribute to community resilience in a way that would appear to be both meaningful and useful for assessing the current situation and for guiding future action.

Wilding reports that four broad themes or dimensions of community resilience emerged from the action research process. Using this approach, we can start to describe what a 'transformationally resilient' community will look and feel like. (1) The individuals within the community will have a high level of physical and psychological well-being, with strong, good-quality personal relationships, a good connection to nature, opportunities to learn and share skills and will generally feel a strong sense of meaning and purpose in life and control over decisions that affect them. (2) The local economy will be connected with and positively stewarding the local environment, ensuring that local resources are regenerated and biodiversity enhanced, with a thriving 'eco-system' of local enterprises that are able to meet many local needs whilst providing meaningful, low-carbon livelihoods. (3) The community will be self-confident, creative and inclusive, actively working for social justice and open to exploring ways of working that encourage real deliberation and value everyone's contribution. (4) Lastly, it will have active links with other communities, ready to give and receive support, to share knowledge and ideas and to develop active partnerships in a spirit of mutual aid.

The 'panarchy' model (Gunderson and Holling 2002) shows that systems can undergo 'step change' transformation to either much greater or significantly less resilience. This thinking lies behind Wilding's (2011) proposal that communities can experience (at least) three kinds of change: break-through transformation, break-even bounce-back, or break-down collapse (Fig. 1).

The colours represent the three states of resilience—blue (break-down), brown (break-even), and green (break-through).

Wilding (2011) proposes that a 'break-even' community is able to cope with disruptions, absorb shocks and bounce back to 'normal'. A 'break-down' community is fragile, brittle and vulnerable to collapse. A 'break-through' community is able to thrive on change and to use outside shocks as a stimulus to create a better future. Resilience theory suggests that these different experiences of change represent distinct regimes (or states of dynamic equilibrium) and that shifting from one regime to another requires either a lot of effort or an external shock big enough to cross a system threshold that prevents reversion to the pre-existing state (Gunderson and Holling 2002).

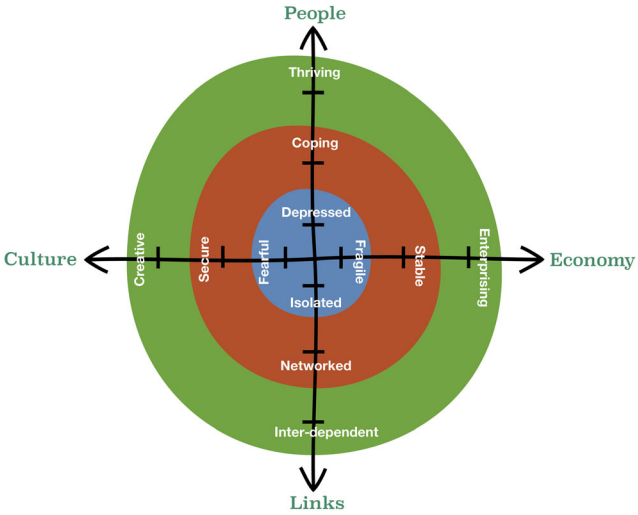

Fig. 1 Dimensions and states of community resilience (source, Wilding 2011)

Overlaying this understanding of distinct regimes, representing a community's ability to respond to change, onto the four dimensions of community resilience introduced above, may provide a way of understanding the work of community-based organisations that are taking climate action and how they may be enabling and catalysing transformational change and preparing their communities for a zero-carbon future. We can assume that a 'break-through' community may be developing strengths in and connections between each dimension, and that strength in one dimension may open opportunities for creative action in the others, too. However, it may be that some initiatives are too narrowly focused on one particular dimension of community resilience and that this is limiting their ability to create the overall conditions required for transformational change. This is explored with reference to our case study CBIs.

Research method

Community case studies

Our case study data covers 63 CBIs located across Europe: in the cities of Berlin and Rome, the region of Catalonia and in the countries of Finland, Romania and Scotland. All were initiated and managed by the community they serve, had been running for at least one year and operated in one or more of four domains: food, transport, energy or waste.

The data collected from these CBIs created a new and comprehensive database. A selection of these data has been organised using the 'compass of resilience' framework so as to assess if this can provide a useful approach to understanding and comparing these diverse initiatives and their transformative potential.

Long list and suitability of resilience indicators

As these data were not collected with the unifying concept of community resilience in mind, available data were retrospectively assessed for their suitability, according to the perception of their relevance to assessing each specific aspect of community resilience. A list of considered indicators is given in Table 1. Not all case study CBIs were able to provide complete sets of data and the quality of some of the data was also variable, both because CBIs do not necessarily keep accurate records of information of interest to researchers but also because of potentially varying interpretations of terminology and definitions. For example, 'beneficiaries' and 'participants' were assessed differently across CBIs operating in different contexts and with multiple interviewers.

Table 1 Description and units of possible quantitative and self-assessment indicators, by compass point

Compass point/indicator	Units	Description
Compass point 'healthy and engaged people'		
Participation index	%	The percentage of local beneficiaries who actively participate in running the initiative
Learning opportunity index by beneficiaries	Dimensionless	Number of events multiplied by average number of participants divided by total number of CBI beneficiaries Normalised by number of local beneficiaries
Self-assessment: healthy and engaged people	%	An aggregate score for CBI's self-assessment of the importance of a range of individual well-being indicators and their assessed degree of achievement—equal weighting for each of four aspects
Compass point 'localised economy within ecological limits'		
Number of jobs created as percentage of local beneficiaries	Full time equivalent (FTE)	Normalised by the number of local people who benefit from activities
Sum of local wealth generated and wealth retained: per local beneficiary per annum	Euros	The sum of wealth generated and retained locally, per local beneficiary per annum
Sum of local wealth generated and retained plus in-kind contribution: per local beneficiary per annum	Euros	The sum of wealth generated and retained locally plus the value of unpaid labour contributed by CBI volunteers, per local beneficiary per annum
Percentage local spend	%	The percentage of CBI turnover that is spent directly into the local economy
Self-assessment: localised economy within ecological limits	%	An aggregate score for CBI's self-assessment of the importance of a range of economic and environmental indicators and their assessed degree of achievement
Compass point 'cross-community links'		
External networking with other initiatives	Dimensionless	Sum of the self-assessed scores of the importance of connection with other initiatives with whom the CBI has contact
External networking with other actors	Dimensionless	Sum of the self-assessed scores of the importance of connection with other actors with whom the CBI has contact
Self-assessment: cross-community links	%	An aggregate score for CBI's self-assessment of the importance of external networking and working for social/political change and their assessed degree of achievement
Compass point 'creative inclusive culture'		
Participant bridging index normalised by number of beneficiaries	Dimensionless	Number of participants multiplied by new relationship factor (CBI's own estimate of how many participants previously knew each other prior to becoming involved) normalised by the number of CBI beneficiaries
Self-assessment: creative and inclusive culture	%	An aggregate score for CBI's self-assessment of the importance of social inclusion, creativity and innovation and their assessed degree of achievement

The data also includes a range of CBI 'self-assessment' questions, responses to which were again mapped onto the four 'compass of resilience' dimensions: healthy and engaged people, economy, culture and cross-community links. This allowed a comparison between the (relatively) objective indicators and the reflective self-judgement by the CBI.

Appendix 1 offers expanded detail on this table which assesses the appropriateness and utility of each of the possible indicators for the online resilience tool based on data availability and also the degree of subjectivity (some indicators require an element of value judgement by the CBI) and hence independent comparability. Key statistics for the indicator results from the 63 case studies are also shown (the minimum, maximum and inter-quartile range). This shows the wide range of values present in the data, reflecting the diverse nature of the case studies.

Analysis

Choosing the indicators

It was recognised that any single indicator used in isolation can, at best, only provide a very partial assessment of any particular aspect of community resilience—particularly when considering such a wide diversity of case studies operating in such a wide range of contexts.

After careful consideration of both the availability and the quality of the data available, two sets of key indicators for each dimension of community resilience were derived, one based on quantitative data collected and one based on responses to the self-assessment questions:

- Healthy engaged people: participation index
- Localised economy within ecological limits: local economic impact/beneficiary per annum
- Cross-community links: external networking with other initiatives
- Creative inclusive culture: participant bridging index

The simple quantitative indicators chosen allow some basic comparisons between the 63 case studies in the dataset.

Example plots from case studies

The two sets of key indicators allowed a comparison between CBIs' actual performance and their intentions and aspirations. All values were normalised by the size of the 'community of beneficiaries'; the local people that CBIs reported as receiving some benefit from their activities.

Plots of community resilience were created for all 63 case studies. This allowed an easy visual comparison to be made between highly diverse initiatives operating in very varied contexts, both within and between countries. These plots may be used to make an assessment of how successfully different initiatives are creating the resilience 'in the round' considered necessary to create conditions for transformational change.

A sample of these plots, representing a range of typologies of the CBIs being studied, from across the six countries is shown to briefly explore the possibilities and limitations of assessing impact through use of the compass of resilience concept (Fig. 2a–f). These illustrate a range of CBI type and levels of correlation between the self-assessment and selected key indicators.

Two plots are shown for each case study. One (blue/solid) uses a single selected key quantitative indicator, as explained above, for each compass point and the other (red/dashed) is based on the group's self-assessment scores.

In order to allow comparison of data within our dataset, all indicators have been converted to percentiles. The values plotted therefore indicate a percentage ranking relative to other CBIs within the current sample. An assessment of the states of community resilience that these scores may represent has not been attempted.

The online resilience tool and resources

Purpose of the tool

Building on Wilding's resilience compass, an online tool[2] that CBIs can use for their own assessments has been developed along with a design (and downloadable resources[3]) for a facilitated workshop exploring community resilience.

The resilience compass provides an approach for improved understanding of the extent to which a particular locality is able to respond creatively to change. Specifically, it can help to widen understanding of community resilience and its essential components and can support planning and prioritising local effort so as to give the best chance of developing the fertile ground from which systems change to a zero-carbon future can emerge.

Top-down action on climate change will never be sufficient and must link with bottom-up action. Communities must become more empowered to take action themselves but this often requires top-down action to put in place supportive policy and physical infrastructure. In trialling the use of Wilding's compass as a way of making sense of

[2] Available at: http://www.sustainable-communities.eu/resilience-compass/ accessed 21/06/17

[3] Available at: http://www.sustainable-communities.eu/tools/ accessed 21/06/17

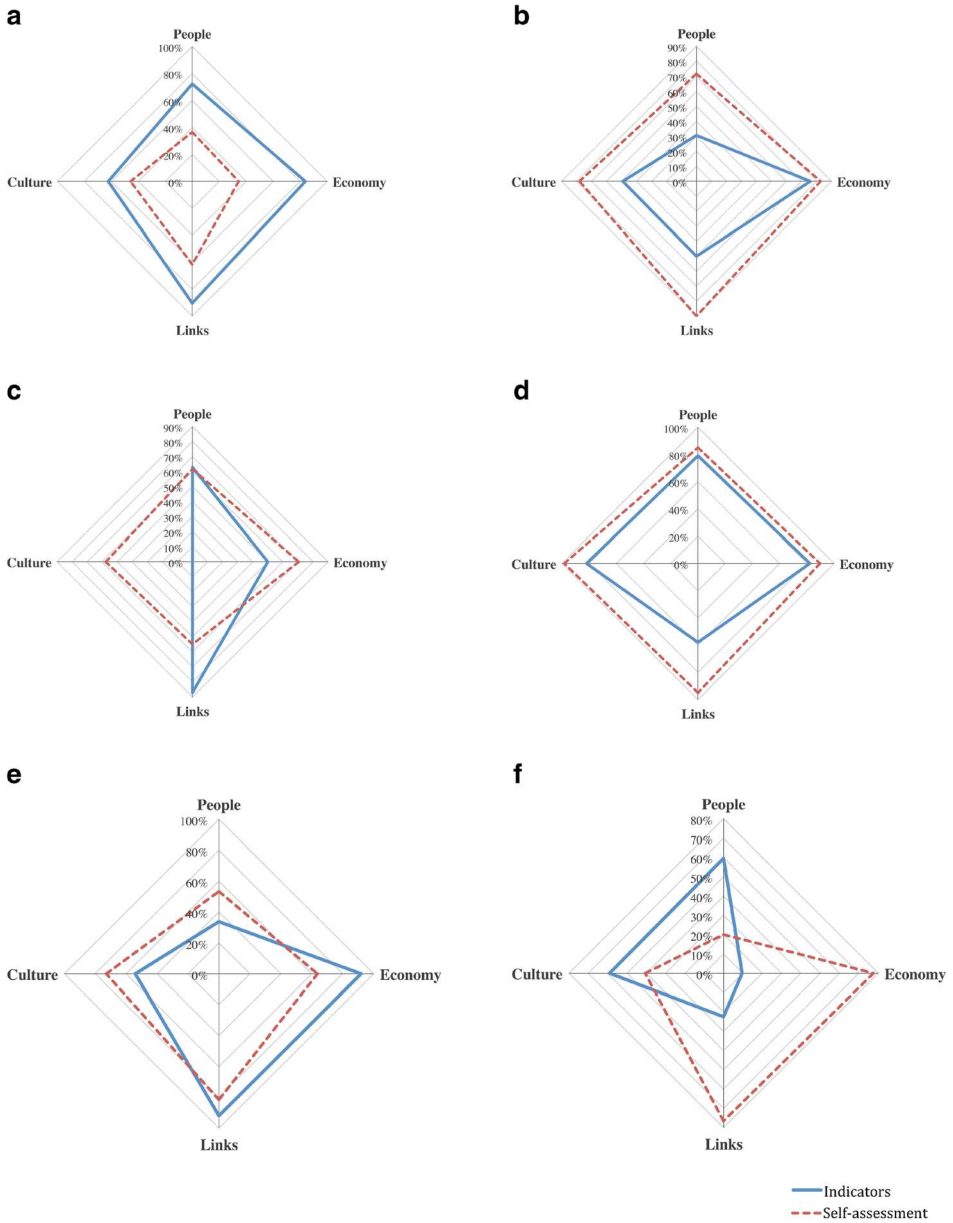

Fig. 2 Community impact plots of key resilience indicators and self-assessments for six selected community-based initiatives across Europe. **a** A Scottish rural Development Trust established to support and enable regeneration of its fragile local economy. Consistently low self-assessment scores reflect an ambition for much more radical transformation. The participant bridging index is lowered by being a small community in which most people already know each other. **b** Provides district heat with locally sourced wood with own heat plants and own district heating distribution network in Finland. The self-assessment suggests that they have a rounded approach to building community resilience whilst the indicators suggest activity is slightly skewed towards economic goals. **c** Uses helpers and experts to voluntarily support the participants in Berlin to repair broken devices. This is a response to the widespread throwaway mentality and built-in obsolescence. The participant bridging index is zero because they reported that all active participants (i.e. 'helpers') already knew each other prior to the initiative starting. Bridging capital is however undoubtedly being created between these helpers and those attending the repair cafe. **d** An Italian purchasing group that puts a particular focus on the 'solidarity' aspects of its activity, aiming at maximising small and local producers' income eliminating any middleman intervention during the purchasing process. The compass suggests a very rounded approach to building resilience, although cross-community links may not be quite as strong as they believe. **e** A 'green', bike and electric vehicle/bike courier and cleaning services cooperative founded 31 years ago in Catalonia. The cooperative is very well networked with similar enterprises. With a fairly small, self-defined community of beneficiaries, it scores highly in terms of economic impact per beneficiary. **f** This Romanian initiative promotes consumption of seasonal and local food, encourages farmers and small producers and raises awareness of risks of fast food, pesticides and GM crops. This example highlights an issue in ranking the economic impact of CBIs operating in countries with very different standards of living. There is also the fact that the self-assessment questions include ecological impact whereas these are ignored in the economic impact key indicator

the data from the project case studies, our interest was therefore always primarily in developing tools that would be useful to community-based initiatives themselves—to support them in enhancing and improving the effectiveness of their activities and to help them to more clearly advocate for necessary top-down action.

Wilding himself proposed an outline 'Resilience Compass Community Workshop' in an appendix to his 2011 report. We have used this as the basis for developing both an interactive online tool and a more detailed proposal and resources for a facilitated community workshop.

The resilience compass

The objectives of the tool are to support users to:

- understand the dimensions and states of resilience
- self-assess and discuss the current state of resilience of their locality and the contribution of their past and present activities
- plan and prioritise future activities that are most likely to create a state of transformational resilience locally across all four dimensions

A simple tile shifting game with twelve succinct, generic phrases provides an opportunity for a user to gain a basic sense of how each state of community resilience is likely to feel for each dimension of the compass (Fig. 3).

The next page of the online tool takes the user to an interactive version of Wilding's resilience compass and encourages a self-assessment of the resilience of their community—based on the qualitative descriptions from the previous exercise. The user is also encouraged to briefly list the reasons for each score that they have given—in what ways is their community already strong or weak in each aspect and to make a list of actions they suggest could be taken in order to support their community to develop a more rounded resilience across all four dimensions. They then have the option to create and print a pdf report and action plan. Experience shows that this activity can work particularly well if it is carried out individually before coming together in a group to discuss and compare the individual assessments (Fig. 4).

There is then the option for the user to continue their assessment by moving to the next page where there is the opportunity to enter seven pieces of quantitative data about their community initiative in order to enable a comparison between their CBI and the 63 case studies in our project sample. The tool uses these data to generate the four quantitative indicators described in section 'Long list and suitability of resilience indicators', namely the participation, economy, culture and networking indices. The description accompanying the tool makes it very clear that this exercise is not to be taken too seriously, that resilience is not an easily quantifiable concept and that any single indicator will always give a very partial assessment. Many groups may find it difficult to provide all the relevant data required. But, where they do have data available, or can make sensible estimates, the tool can make quantification of these indicators straightforward and our experience is that, despite the limitations, the exercise of considering and collecting these data can actually be very useful to stimulate discussion and broaden understanding around the diverse, and often unrecognised, impacts of community initiatives, particularly if this is done as a group exercise (Fig. 5).

Resources for facilitators

Through discussion with a number of people involved with community-based initiatives, it became clear that, where time permits, concepts of community resilience deserve a more thorough and deeper exploration than is possible through a simple online tool. It was therefore decided to develop a package of materials that could sit alongside the online tool to encourage and support those involved with community climate action to run 'exploring community resilience' workshops. This package is available as a downloadable resource.

This online tool and related resources were tested, with a positive response, with groups in both Scotland and Finland. The authors have since facilitated a number of workshops with a range of different participants that have all responded well to the concept and, in particular, to the need for a rounded view of the outcomes arising from community action—instead, for example, of a too specific focus on the, sometimes narrow, concerns of project funders. More extensive promotion, trialling and refinement is ongoing.

Discussion

The urgent need to reduce carbon emissions usually focuses either on the micro-level of the individual or household or the macro-level of large businesses, organisations and government. By studying community-based initiatives, this work forms part of a research effort seeking to bridge this gap. We recognise that, where they are unconstrained by mainstream (business as usual) priorities, values and vision, grassroots initiatives are able to innovate 'socio-technical configurations that would otherwise have been suppressed by existing patterns and concentrations of power' (Smith 2007). The CBIs studied within this project are just a tiny sample of the array of groups that have emerged at grassroots level across Europe to implement bottom-up climate action in recent years. In diverse contexts, these grassroots initiatives are demonstrating and prototyping innovative solutions to addressing local priorities and concerns across food, transport, waste and energy (Smith

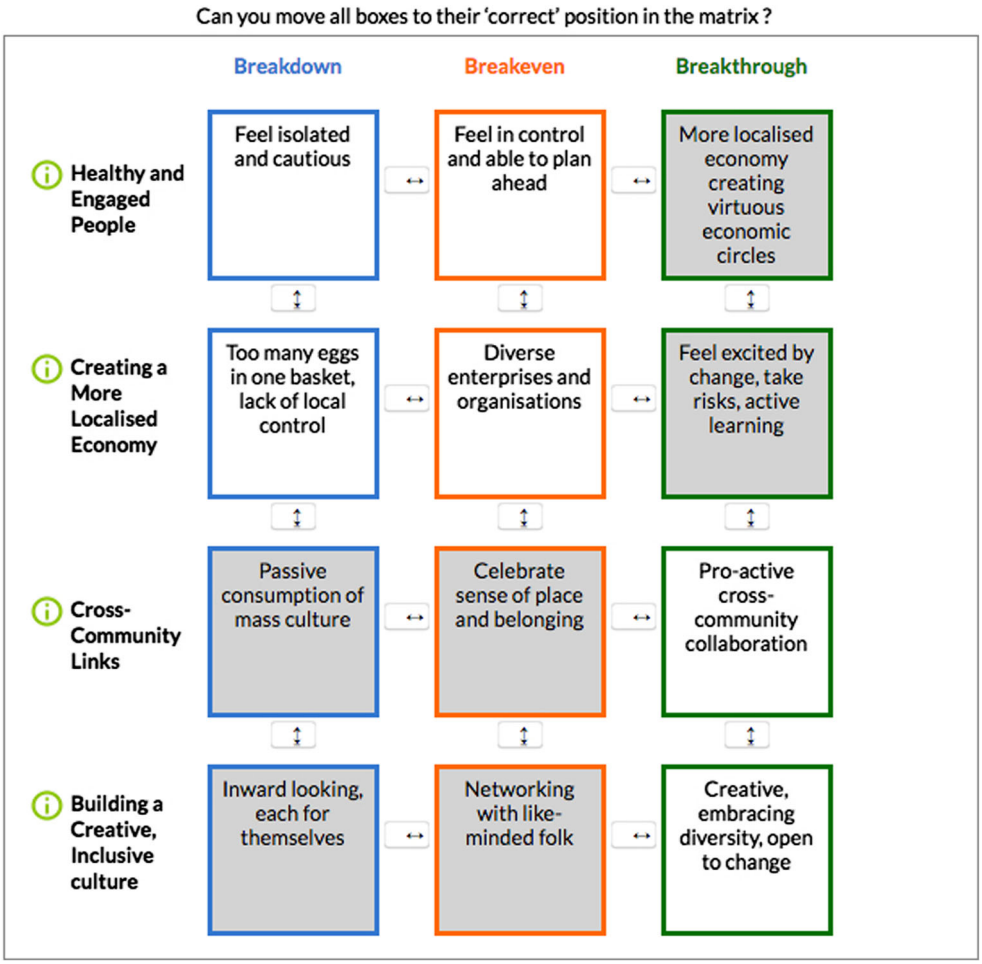

Fig. 3 'Completed' tile shifting game

and Stirling 2018)—often in the face of significant challenges. Beyond significant reductions in carbon emissions, they are also contributing to the revitalisation of local economies and the strengthening of social networks and cohesion. This local place-making role is a major driver for many activists who see communities of place as the basic building blocks of our society[4]—and thus as having a key role in societal transformation.

The 63 CBIs selected for detailed study in this project have all taken different forms depending on the particular context in which they have arisen. All could be described as being run by a community of interest (active participants) on behalf of a larger community of interest (beneficiaries) within a wider community of place. Their scale is hugely variable, ranging from a few tens of beneficiaries to half a million, mostly operating within small local neighbourhoods or towns but some covering a whole city or region.

We suggest that 'community resilience' is a useful frame for understanding the contribution that each of these diverse initiatives is making to their own localities. However, with increasing usage but, often, limited and differing understandings of its meaning and nuances, there is a real danger of the term 'community resilience' becoming devalued—as has happened, it could be argued, with the word 'sustainability'. Dominant discourses on resilience tend to uncritically assume the need to 'bounce back' to the status quo. In fact, if future possibilities are not to be closed down, it may be necessary to actively seek to reduce the resilience of existing systems, or elements of them, so as to enable the transformational, step change to a zero-carbon society (Walker in Henfrey et al. 2017). Discussion of resilience therefore needs to occur in the context of discussion around the sort of future we want. And, even if we cannot know what the future will hold, what are the core values that should underpin it? What of the main structures and functions of the current system would be valuable to retain? And who should decide?

If we understand community resilience as being a measure of people's ability to come together to engage creatively with steering a course through uncertain times and about enabling

[4] For example, see literature from the European Network for Community-led Initiatives on Climate Change and Sustainability: https://www.ecolise.eu (accessed 2/4/18)

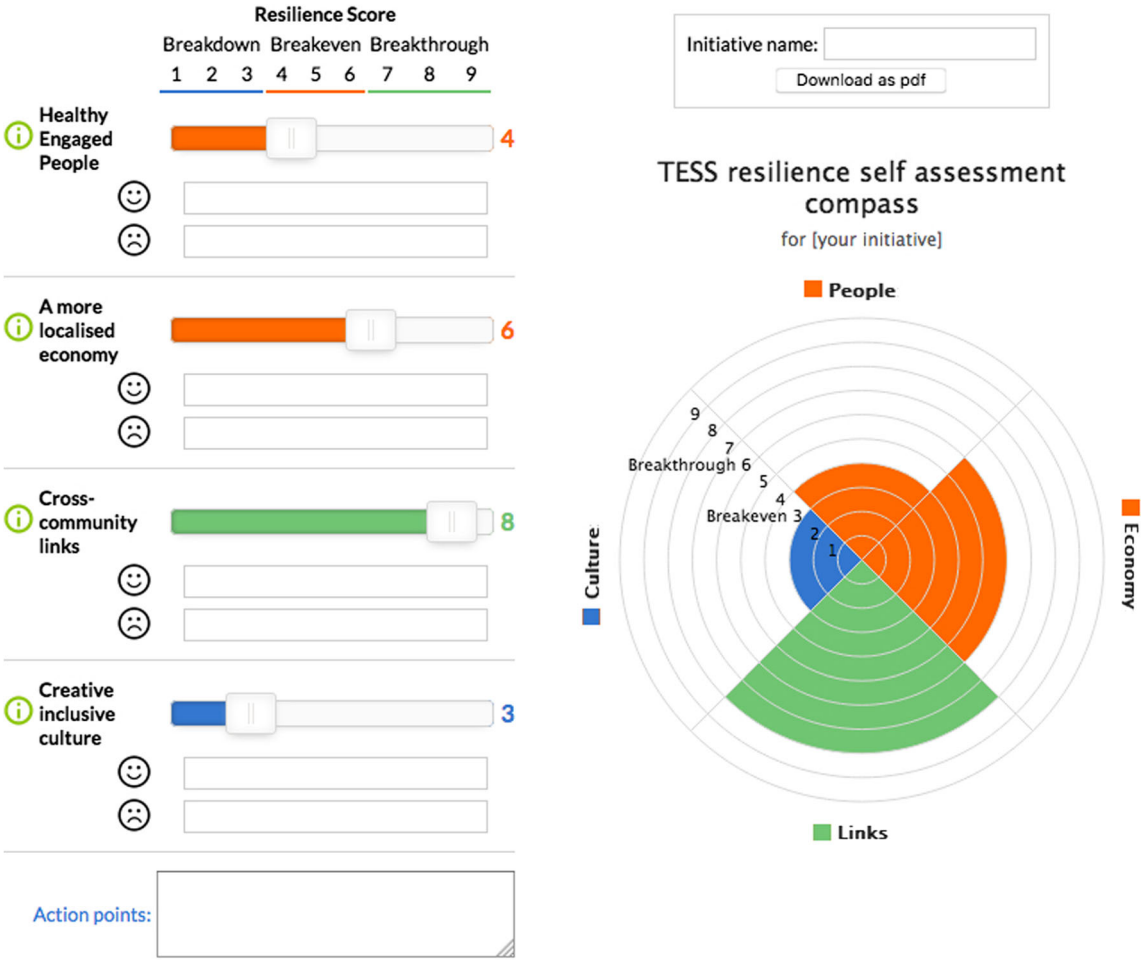

Fig. 4 Example self-assessment compass plot

communities to create the conditions in which locally appropriate transformational innovations can emerge to support the 'bouncing forward' to a low-carbon future, then it should be a concept whose time has come. A concept which needs to be much better and more widely understood.

For the concept to be useful though, an accessible and readily used framework for understanding and assessing community resilience is required. To date, this has been missing. Most attempts to measure community resilience, such as the 'Communities Advancing Resilience Toolkit Assessment Survey' (Pfefferbaum et al. 2015), have been focussed on local disaster readiness and response. In terms of recognising that resilience can pertain to transformational systems change, the 'Community Resilience Self-assessment' developed by Magis (2010) is most relevant. Building on the 'Community Capitals Framework' (Emery and Flora 2006), this proposes eight dimensions of resilience: 'community resources, development of community resources, engagement of community resources, active agents, collective action, strategic action, equity, and impact' (Magis 2010). The four dimensions of Wilding's compass of resilience can, in fact, be seen as an attempt to capture the sophistication of the Magis model within a simpler, more easily used, graphic framework. A similarly simplified 'Capacity for Change' framework for understanding community resilience has been used to explore why some communities in south-west Scotland do not engage with European-funded rural development programmes (Steiner and Markantoni 2014; Steiner et al. 2018). Through considering social and economic resilience at the level of the individual and the community, their approach captures many of the same components of resilience as the 'compass of resilience' used here.

The particular strength of the 'compass of resilience' framework is that it was developed through action research with active participation of community activists, drawing on diverse perspectives on personal, social, ecological and economic resilience. It is therefore particularly relevant in the context of community-based initiatives run by such community activists. The idea of the need for 'bounce forward', or transformational resilience, is already embedded in the approach of CBIs affiliated to the Transition Network and those embracing a systems-thinking approach such as permaculture. This framework has potential to support them in following through this approach and to help them in framing

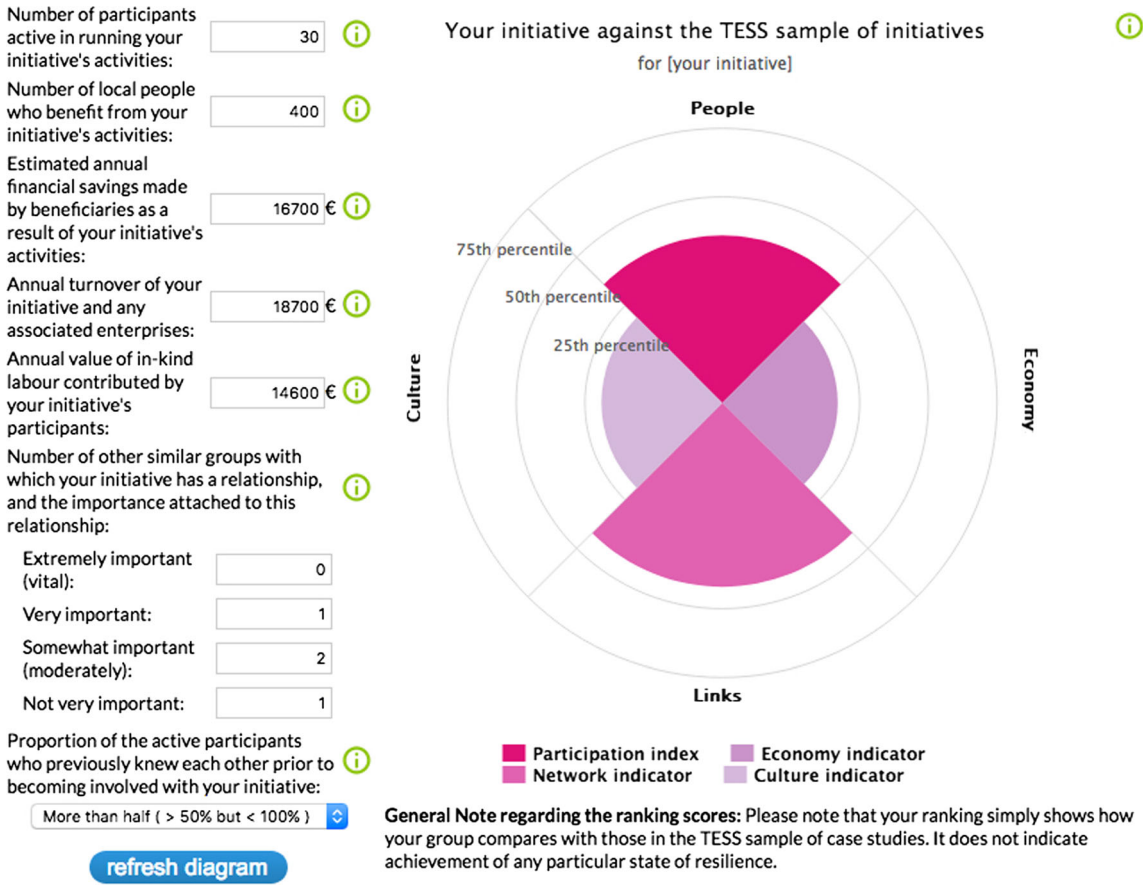

Fig. 5 Example of a quantitative assessment compass plot

conversations with their wider populace. It could also help to spread this systems-thinking, and the idea of the need for transformational change, more widely across the community sector, even if, as should be clear, a full understanding of community resilience and all its nuances is not easy to pin down and this simple framework can only provide a partial picture. 'A particular tool may be useful as a guide … but maps are never the territory, especially when navigating uncharted waters' (Wilding 2011).

Clearly also, attempting to design indicators of community resilience, particularly quantitative indicators, is fraught with difficulty, even more so when using data that was not collected with this framework in mind and which may be of variable quality. Individually, any single indicator cannot provide robust evidence of the success or otherwise of a particular initiative. However, provided the limitations are understood and care is used in interpretation of the results, we believe that this approach does provide a useful means for organising data related to the impact of community initiatives. The compass plots produced in this study enabled a rapid visual comparison of the 63 case study CBIs. For each CBI, it also allowed for meaningful consideration of its particular strengths and weaknesses and how their efforts might be better prioritised and balanced.

The particular indicators used in this study were generic enough to be relevant across all the CBIs across all six countries involved in this research project. The only limitation was in comparing economic indicators between communities in countries with differing levels of economic development. Design of future, locally relevant, quantitative resilience indicators and collection of data could provide fruitful scope for future action research in collaboration with CBIs. This should include devising suitable indicators for assessing the health of local eco-systems, and how these are affected by local economic activity—largely missing from the current dataset. However, whilst suitable quantitative indicators are necessary, as discussed above, any attempt to pin down what is a fluid concept related to emergent properties of complex systems can only ever be of limited value. The framework is therefore likely to be especially useful for a mostly qualitative approach, particularly if it can be appropriated as a tool that CBIs can use themselves. It provides a means for them to critically self-assess their current performance and how they might better prioritise and focus effort so as to maximise their likely future impact. Importantly, this can include becoming clear about the structural challenges and barriers they currently face so that they are better able to lobby and advocate for the policy change and appropriate support and infrastructure necessary for developing their resilience 'in the round'.

Whilst our study was focussed within Europe, our personal experience suggests that the attributes of a transformationally resilient community are equally attainable in many, economically much poorer, communities in the 'global south'. Indeed, we suggest that we could have much to learn about resilience from such communities. It would be very interesting to explore how this compass of resilience framework might be adapted for use in such a context.

Conclusion

For funders, policymakers and others, a suitable means of assessing community resilience, its individual components and how these are changing over time should be able to help determine where and how best to invest limited funding and resources so that any particular community initiative may best be supported so as to realise its transformative potential. The least resilient and most vulnerable communities may be more easily identified whilst those developing greater and more rounded resilience could be supported to spread and share their knowledge and experience with others. But it needs to be recognised that any measurement framework can have unintended consequences, especially if there is too narrow a focus on particular 'target' indicators when dealing with complex systems. One of the main benefits of wider use of the compass of resilience will be if it can help to build understanding of the complexity of community resilience as a concept. Particularly if it can reinforce an understanding of interdependence, and hence the need for a collaborative approach, at all levels, within and between communities of place and interest but also across sectors—that the resilience of each of the parts derives from and contributes to the resilience of all other parts, and of the whole. Resilient external supporting institutions and structures, including a functioning governance and economic system, legal frameworks and transport infrastructure, are necessary to support resilient communities and vice versa.

The compass of resilience provides a simple, yet sophisticated and highly practical visual framework for enhancing a scientific understanding of the multiple factors influencing the ability of any community (of place) not only to react, survive and adapt in the face of unpredictable external events but to get beyond that to pro-actively innovate to shape their future, and to flourish in the process. It may not be the definitive approach but, for what would seem to be the first time, provides a simple and easy-to-use community resilience assessment which, importantly, may be appropriated and used by communities themselves, as well as being of use to researchers and others. We hope that at the very least its accessibility may help to raise awareness of the value of a systems-thinking understanding of the complex and potentially chaotic changes likely to be ahead and that it may encourage the development of more sophisticated frameworks for understanding resilience at all scales, from the personal and household to communities of place and upwards.

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