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E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Re-framing Resilience: a Symposium Report

Edited by Melissa Leach

Resilience

STEPS centre

Re-framing Resilience: a Symposium Report

The concept of resilience is now capturing high interest across academic, policy and popular debate. In a world where threats – whether linked to climate change, epidemic disease, or fluctuating financial markets – loom ever larger, resilience thinking valuably highlights the complex, open, path-dependent dynamics of coupled social-economic-environmental systems. Not only does it provide an increasingly vigorous and sophisticated body of analysis, resilience thinking also offers prospects for more integrated and effective policy making towards sustainability.

How does resilience intersect with development and debates about it? What insights does resilience thinking bring to understanding and action concerned with reducing poverty, vulnerability and marginalisation? What are some of the frontier challenges, tensions and gaps as resilience thinking engages with perspectives and debates from other angles and disciplines? The STEPS Centre Symposium, which was held at Sussex University from 24-25 September 2008, set out to explore these questions, and to consider their implications for practical policy challenges in fields such as climate change adaptation, agricultural innovation, pharmaceutical and seed regulation, dealing with disease epidemics, water management and peri-urban transitions. Over an intense day and a half, the Symposium brought together a range of key researchers who identify themselves as part of the Resilience Alliance with those from other backgrounds – including in development studies, science and technology studies, history and anthropology, and in policy-oriented settings.

About the Editor

Since 2006, **Melissa Leach** has directed the ESRC STEPS (Social, Technological and Environmental Pathways to Sustainability) Centre. Professorial Fellow at IDS and leader of the Knowledge, Technology and Society (KNOTS) team, she originally trained as a geographer (MA Cambridge) and social anthropologist (PhD London). Over the last twenty years she has been closely involved both in ethnographic fieldwork, speaking four African languages, and in extensive interdisciplinary research. This has engaged anthropology with historical, ecological and science and technology studies approaches, as well as working with foresters, agricultural and medical scientists.

Melissa's recent work has explored the politics of science and knowledge in policy processes linked to environment and health; addressing vaccine controversies, scientific uncertainties, citizenship and public engagement; cultural and political dimensions of vaccine delivery; medical research trials, emerging infectious diseases, and ecology-health linkages.

About the STEPS Centre

How do we deal with the spread of HIV/AIDS or avian 'flu? How can farmers in dryland Africa cope with the challenges of climate change? How do we address water and pollution problems in rapidly growing Asian cities? Who benefits from genetically-modified crops? Today's world is experiencing rapid social, technological and environmental change, yet poverty and inequality are growing. Linking environmental sustainability with poverty reduction and social justice, and making science and technology work for the poor, have become central challenges of our times.

The STEPS Centre (Social, Technological and Environmental Pathways to Sustainability) is a new interdisciplinary global research and policy engagement hub that unites development studies with science and technology studies. We aim to develop a new approach to understanding and action on sustainability and development in an era of unprecedented dynamic change. Our pathways approach aims to link new theory with practical solutions that create better livelihoods, health and social justice for poor and marginalised people.

The STEPS Centre is based at the Institute of Development Studies and SPRU Science and Technology Policy Research at the University of Sussex, with partners in Africa, Asia and Latin America. We are funded by the ESRC, the UK's largest funding agency for research and training relating to social and economic issues.

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INTRODUCTION

The concept of resilience is now capturing high interest across academic, policy and popular debate. In a world where threats – whether linked to climate change, epidemic disease, or fluctuating financial markets – loom ever larger, resilience thinking valuably highlights the complex, open, path-dependent dynamics of coupled social-economic-environmental systems. Not only does it provide an increasingly vigorous and sophisticated body of analysis, resilience thinking also offers prospects for more integrated and effective policy making towards sustainability.

How does resilience intersect with development and debates about it? What insights does resilience thinking bring to understanding and action concerned with reducing poverty, vulnerability and marginalisation? What are some of the frontier challenges, tensions and gaps as resilience thinking engages with perspectives and debates from other angles and disciplines? This symposium set out to explore these questions, and to consider their implications for practical policy challenges in fields such as climate change adaptation, agricultural innovation, pharmaceutical and seed regulation, dealing with disease epidemics, water management and peri-urban transitions. Over an intense day and a half, the STEPS Centre Symposium 2008 (held 24-25 September at Sussex University) brought together a range of key researchers who identify themselves as part of the Resilience Alliance with those from other backgrounds – including in development studies, science and technology studies, history and anthropology, and in policy-oriented settings.

Overall, the Symposium set out to explore five questions;

- What are the potentials and tensions in linking resilience thinking with an emphasis on social justice and reducing vulnerability – as emphasised for instance in debates on adaptation and vulnerability in development studies?
- Can resilience thinking be reconciled with constructivist perspectives and the politics of knowledge, as emphasised for instance in STS debates?
- How helpful are resilience debates where long term structural change and radical transformations are at stake?
- How can we integrate insights from the fields of reflexive governance and technological transitions?
- And finally, what are the broader implications of resilience discourses and their growing popularity – and what dangers might they bring?

This report summarises some of the main points and lines of argument raised in six lively, wide-ranging sessions, involving a mix of keynote presentations, discussants' panels and plenary discussion. For further depth, richness and insight, inevitably not captured here, readers are referred to the original presentations and complementary resources available on the STEPS Centre website (www.steps-centre.org).

RESILIENCE THINKING AND PATHWAYS TO SUSTAINABILITY

The Symposium opened with an introductory presentation of the STEPS Centre's pathways approach, and its engagements with notions of resilience. The STEPS conceptual framework, grounded in an engagement of development studies and science and technology studies (STS), shares a number of features with resilience thinking. These include a systems perspective and a recognition that all social-ecological systems are complex adaptive systems; an interest in interactions across multiple scales, captured in resilience alliance work on panarchy; and a basic concern with resilience – or 'the capacity of a social-ecological system to absorb disturbance and reorganise while undergoing change so as to retain essentially the same function, structure, identity and feedbacks'. However, the STEPS starting point is explicitly normative, focused on reductions in poverty and social injustice as defined by/for particular people and settings. This means a concern with Sustainability (not just sustainability), referring to specified qualities of human wellbeing, social equity and environmental integrity, and the specific system qualities that can sustain these. Thus, we might ask, 'resilience of what, for whom?' We also disaggregate system structure and function, emphasising the need to maintain the resilience of key functions that maintain valued flows of goods and services for the poor – even while the structures that produce these may need to transform.

Elaborating these concerns, the STEPS framework emphasises that system boundaries, dynamics, functions and outcomes are open to multiple *framings* – particular, contextual, positioned and subjective assumptions, methods, forms of interpretation, values and goals – whether held for instance by diverse government, industry, civil society or local actors. Framings often take the form of narratives – an underlying storyline spelling out the nature of 'the problem' and how it might be addressed. Narratives/framings are produced by particular actors, and co-constructed with governance and intervention strategies and the power relations these involve. A central analytical task is to uncover the range of narratives in a given situation, identifying which are dominant, what alternative narratives exist, and which might be hidden or suppressed – including those produced by marginalised people, or supporting their perspectives and priorities.

The STEPS pathways approach also embarks on some further unpacking of concepts often bundled together in resilience thinking. Thus resilience thinking has drawn important attention to the risks facing humanity and inter-coupled social-ecological systems. Yet risk, in its strict sense, is only one dimension of incertitude; others include uncertainty, where the range of possible outcomes is known but probabilities cannot be assigned; ambiguity, where incommensurable priorities or notions of harm prevail, and ignorance, where neither outcome nor likelihoods are known, and the possibility of surprise is ever-present. Distinguishing these also enables us to highlight the ways that powerful actors and institutions often 'close down' towards risk-framings, through a variety of cognitive, methodological and institutional procedures, occluding other kinds of incertitude that might be crucial for understanding and responding to Sustainability challenges. In moving from knowledge to action, resilience thinking has valuably pointed out the dangers of attempting to control and optimise parts of systems when feedbacks and disturbances may make control illusory (and dangerous – perhaps precipitating collapse), instead emphasising response to disturbance. Yet whereas resilience thinking conflates different kinds of dynamics, the STEPS pathways approach distinguishes four possible kinds of strategy to deal with change: control to address short term shocks (stability) or long-term stresses (durability), and response to shocks (resilience) or to stresses (robustness).

This differentiation also enables us to highlight ways that, again, powerful actors and institutions often close down around stability framings that emphasise the status quo (and support their continued power). Strategies for Sustainability may require opening up to methods, practices and arrangements – involving flexibility, diversity and adaptive learning – geared not just to resilience, but also robustness.

Narratives thus co-construct particular pathways; alternative possible trajectories for intervention and change which prioritise different goals, values and functions, and address incertitude and dynamics in different ways. Which pathways are chosen and which are not can have profound material and distributional consequences. Building pathways to Sustainability implies recognising and highlighting less dominant alternative pathways, including those that might support the goals of particular marginalised groups; remaining open to a multiplicity of pathways rather than closing down around particular ones, and being explicit about the trade-offs and the politics involved.

THE WORK OF THE STOCKHOLM RESILIENCE CENTRE – A RESPONSE

Carl Folke

Carl Folke of the Stockholm Resilience Centre gave a short presentation highlighting some key perspectives brought by a resilience lens. While agreeing that there are many complementarities between STEPS thinking and resilience thinking, he emphasised the latter's history, from a starting point in ecological science, towards integrating social dimensions only in the last ten years. This helps contextualise a basic focus on environmental life support systems; in as much as resilience thinking has a normative stance, this is that one cannot have social and economic development without a functioning life support system. He emphasised, however, that understanding social-ecological dimensions in a more symmetrical way; understanding cross-scale and dynamic interactions and understanding the interplay between short term adaptations to reduce vulnerability and the long-term changes that may be necessary for sustainability – to steer away from undesired regimes towards new system states, or even new systems, that sustain and enhance ecosystem services, livelihoods and human wellbeing – are key concerns shared with STEPS. He also highlighted the growing emphasis, in resilience studies, of governance – such as the importance of institutional inertia in restricting adaptation and change, and policy windows that enable it. In these respects, he welcomes the emphasis on politics and governance in STEPS work and sees much scope for collaboration in moving forward.

Questions of normative positioning, and in particular the relationship between resilience and vulnerability, formed the focus of the first full Symposium session.

RESILIENCE AND VULNERABILITY

Neil Adger

Neil Adger of the Tyndall Centre gave a presentation to initiate this session. He presented two central arguments: first, that resilience theory can be used to describe and explain how socio-ecological systems (SES) act; it is not complete but is still very worthwhile. Second, he argued, resilience theory in itself does not deal with the normative dimension, so – by implication – it needs to be used in conjunction with other concepts that do.

Elaborating, he argued that resilience theory focuses on the maintenance of the structure and function of SESs. There is no normative element in the theory since it is based on the observation of SESs – observing that some systems are stable or persistent while others are not. In each case, however, systems provide ecosystem services which are desirable – drawing in questions of values as to what is desirable. Systems generating outcomes that are desirable or undesirable can be equally resilient. Furthermore, resilience may not always be desirable when it refers to undesirable structures.

In contrast, the term 'vulnerability' is explicitly normative, since it refers to susceptibility to harm, as measured in terms of distance from a specified (undesirable) threshold. While there can be trade-offs between vulnerability and resilience approaches, treatment of the two terms as antonyms is erroneous. In addition to resilience and vulnerability approaches a third approach, originating in environmental management and policy analysis, focuses on efficiency and optimality. Drawing on a recent article by Nelson et al (2007), this presentation compared the relative merits of the three approaches.

The efficiency approach starts from the position that adaptation *should* be promoted since it reduces the range of risks to the greatest number of people. It takes a utilitarian (Pareto) view of risks and trade-offs, even where there is a threshold. The vulnerability approach starts from very different position; that some risks are *unacceptable* and should be avoided at all costs. It is most allied to a Rawlesian theory of justice, in which 'the law of large numbers doesn't hold'. The vulnerability approach is the basis for the Convention on Climate Change and rights-based approaches in general. The focus is on the fundamental rights of individuals which are both universal and significant; they extend over time and cannot be discounted. In this view, adaptation should focus on those most vulnerable.

The resilience approach recognises the potential for regime shifts, which can in turn create both vulnerabilities and opportunities. Regime shifts can also create regimes which are productive and persistent but actually not resilient – for instance because they locked into situations from which there are few incentives to diversify (creating a 'gilded trap', for example in the case of lobster monocultures). The resilience approach emphasises the potential for learning and experimentation and hence allows for the inevitability of failure/loss in parts of a system. This may in some circumstances be antithetical to a vulnerability approach, as well as being widely seen as deviating from optimality and efficiency. Resilience-based planning looks for opportunities for experimentation and adaptive management, and is therefore important for critical transformations, especially in the context of climate change.

Discussion

In response, Christo Fabricius echoed the view that responsiveness, or ability to respond, is not necessarily inherently desirable. The key question turns on the ability to respond *appropriately* – in terms of timing, intensity and resources. If the response is inappropriate, it can do more harm than good. Similarly, he questioned whether the tendency of some communities towards inertia and maintaining the status quo was undesirable. 'If responsiveness is such a good thing, why is there so much resistance?' And why, he asked, are highly adapted societies, such as nomadic societies, so vulnerable? In this context, he emphasised the importance of communities' building up of capital and power to reduce their vulnerability. Yet, he suggested, there could be a trade-off involved between capital/stability, and resilience/adaptability. Diversification of production in southern settings, for instance, may be good for resilience, but has not always served communities well in terms of reducing their vulnerability.

Discussant Ian Scoones drew out the distinctions between resilience thinking and conventional adaptation, with its focus on individual actors and narrow forms of stability and risk framing. In contrast, the resilience approach brings in cross-scale interactions, uncertainty and surprise, thus moving the debate beyond the stability-risk framings that have, for instance, dominated climate change debates. This is important if the transformatory challenges presented by climate change are to be addressed.

But, he went on, are we asking the right questions? There is still a tendency to end up with institutional and governance proposals for 'how to sort it all out' – without asking the more searching questions about the political and institutional factors that lead to outcomes NOT supportive of resilience and robustness. He gave two examples: (i) a recent request to develop risk-based carrying capacity models for pastoralists in South Africa (classic stability/risk thinking which Holling criticised as far back as the 1980s), and (ii) the way in which 'outbreak narratives' surrounding Avian Flu remain 'stuck' in a stability-risk framing.

The key question, then, is what are the political and institutional factors that continue to push us into such stability/risk framings, despite a language of 'resilience'? This involves considering the narratives, processes and pressures operating in policy; professions and disciplines; bureaucracies; and wider politics and political-economy. Unless we tackle these, talk of new governance designs is just wishful thinking.

Further discussion from the floor emphasised the different historical and disciplinary (and hence by definition, normative) origins of the terms used in this debate – resilience (with its roots in ecology), adaptation (rooted in economics) – and other, perhaps more liberating terms such as justice and democracy. A key implication is that those in development need to engage with other professions and disciplines and discuss (often unstated) normative positions, and make the politics in this more explicit.

The tendency for powerful institutions – such as the UNFCCC and the World Bank's free trade agenda - to be 'locked into' problematic framings focused on optimality, stability and control was further discussed. This becomes a problem for understanding and dealing with major challenges. The key challenge is to move out of the 'lock-in' to stability and risk framings of major responses through more reflexive and reflective approaches. Encouraging the necessary 'opening up' requires both a symmetrical analysis, which can integrate different ways of thinking about a

problem (acknowledging the politics of framing involved), and communication approaches which can extend this beyond academia to worlds of policy and practice.

The relationship between resilience and vulnerability was a continued theme in the next session, which drew in more fully perspectives from science and technology studies (STS).

VULNERABILITY OF TECHNOLOGICAL CULTURES

Wiebe Bijker

From his perspective as an engineer-turned-STS scholar/practitioner, Wiebe Bijker began with a plea to shift from resilience to vulnerability. This is because within much mainstream engineering and technology-focused discussion, the term resilience implies a narrow engineering perspective, an assumption of rational actors, a foregrounding of technology (not social dimensions), and a conservative style. [Notably, these are quite different connotations from those it carries in ecologically-oriented resilience thinking and practice – emphasising, again, the shifting politics of terms such as resilience as they are used in different disciplines and contexts.]

Bijker's core interest in vulnerability is not vulnerability analysis of systems [the focus of the last session], but the vulnerability of 'technological cultures'. From this perspective, he emphasised first, that modern society cannot be understood without recognizing the role of science and technology. As STS scholars have long emphasised, science/technology are embedded in society and vice versa. Inevitably, explanations are co-produced, negotiated. The processes of construction are continuous and actors of many kinds are involved. It is these co-produced societal/technological processes that constitute what he terms technological cultures. Vulnerability is often a feature of technological cultures.

Second, and seen in these terms, vulnerability is not just negative. It also carries positive connotations, opposing stagnation and implying flexibility, learning, innovation and opportunity. Comparing several examples of flood response – in the US, the Netherlands, and Bihar, India – reveals these multiple values and dimensions.

Third, such vulnerability can usefully be studied from a constructivist point of view. However, Bijker asks, is a constructivist analysis possible at all without offending those at risk – somehow suggesting that their conditions are not 'real'? There is of course a need to pay due respect to the phenomenology of being vulnerable. Therefore it is important to distinguish between ontological aspects, referring to the nature of things, and constructivism as a methodological stance. It is the latter that Bijker argues for, suggesting that this creates valuable entry points for analysis and action. It also makes it possible to draw on more general insights from STS. In a Dutch example of governing the risks and uncertainties associated with nanotechnologies, he showed how a methodological constructivist approach can be used to understand the different perspectives of scientists, citizens and other stakeholders around the issue and to specify different roles for them in decision-making. This case also shows, he argued, that such a constructivist understanding does offer new possibilities for intervening too—in this case a new risk policy on nanotechnologies adopted by the Dutch government.

Discussion

Emily Boyd, as discussant, welcomed the addition of insights from work on STS and risk governance to debates on resilience. This offers the opportunity to consider how different perspectives, across multiple scales, might come together. However, it is equally critical to ask whose perspectives are not present, and about the invisible individuals and linkages in the decision-making process. In this, attention to power relations and shifts in power over time are critical. Ravi Prabhu also emphasised the constant presence of power relations and the continuous need to examine them, in situations where some kinds of knowledge are able to maintain authority over others. He illustrated this through reflections both on the history of colonialism, and on the dominant global financial system – 'the result of twenty years of authoritative knowledge' – yet now in crisis.

Andy Stirling elaborated further implications of a (methodological) constructivist approach. Focusing on diverse framings may, he suggested, move us away from resilience and towards vulnerability. However it is interesting to note that both words are essentially adjectives; they are words that apply to something: something is vulnerable; something is resilient. These words alone cannot therefore be normative – although in their application, they certainly can be. He notes that vulnerability analysis originally came from the Rand Corporation and their modelling of nuclear attack on the USA. Now however, vulnerability is more focused on the poorest and the most marginalized. Constructivist approaches encourage us to examine different types of dynamics – resisting a shock or adapting to a stress. It also leads us to consider the objects of dynamics, life support systems such as rainforests in Brazil, for example, or approaches to agriculture in the EU. And to consider the kinds of interpretative flexibility in play as different actors consider: What do we do? What do we want to be resilient? In short, there are choices, and it is the framing of choices which govern the future. In considering these, the constructivist turn offers more mileage than commonly accepted.

In discussion from the floor there was some objection to constructivist approaches, suggesting that these somehow denied the 'reality' of bio-physical processes and coupled human-environment systems. Others, however, reiterated the value of constructivism not as an ontology but as a methodology – and one which can provide useful tools, such as the notion of 'framing'. It also opens up consideration of diverse forms of knowledge and language through which people reflect on and vocalise their own experiences of both resilience, and of vulnerability and suffering. In this we need to recognise the validity of other knowledge systems, and to accept plurality in ways of understanding the world.

The next session continued reflection on the value of constructivist approaches, while also addressing the challenges of understanding and dealing with human-environment interactions over periods of long-term change and transformation.

A SKEPTIC'S COMMENTS ON RESILIENCE AND ALTERNATIVE APPROACHES TO COUPLED HUMAN-ENVIRONMENT SYSTEMS

B. L. Turner

B L Turner's presentation focused on a critical comparison of the insights provided by resilience approaches on the one hand, and approaches from environment and development (including political ecology), and 'sustainability science'.

While applauding the resilience community for attempting a dialogue between the ecological and social sciences, he suggested that in resilience thinking there is a tendency for 'the biophysical always to trump the social'. In purporting to offer a pervasive, agreed upon explanatory approach, resilience suggests a return of the biophysical sciences in claiming to explain human subsystems – originally a domain of human science. In this, resilience approaches offer some widely-used concepts – such as the 'adaptive cycle' of growth – consolidation – collapse – renewal, often portrayed as a loop or figure of eight lying on its side (the 'lazy 8'). This suggests that change can be understood in terms of nested sets of adaptive cycles operating over different temporal and spatial scales.

However for truly coupled human-environmental systems, evidence for the utility of resilience approaches – and concepts such as the lazy 8 - is limited. The example of the collapse of the Central Maya Lowlands 850-1050 ACE illustrates this. A radically changed and intensively managed landscape of farmsteads and forests shaped by local land pressures and institutions faced a myriad of problems related to environmental services. These problems ultimately confronted a period of severe aridity beginning about 800 ACE. The aridity 'spike' took place about a century after a prolonged (100 year) period of warfare between Tikal and Calakmul, two large kingdoms in conflict. Surrounding city states were forced to take sides, so there was a massive drain on people and labour to keep up environmental infrastructure during a time of major environmental stress. The social-ecological system collapsed, along with major depopulation. Over time, the forest returned – albeit with altered species presence and abundance – appearing thus to be resilient to disturbance. However the human subsystem failed to recover. Resilience approaches are helpful in explaining events in the ecological subsystem – with their insights about the dynamics of collapse and renewal, the importance of supporting ecosystem services and of slow and fast variables, and the shifting of the SES to a new state. However the 'lazy 8' provides few insights about why the human subsystem behaved as it did.

Alternative approaches to explaining changes in coupled systems might draw on the insights and emphases of alternative human-environment approaches, including those of environment-development. These place more emphasis on social, political and economic structures, institutions and action across scales in shaping resource access and control, and on the environment as both a setting of and product of human action. There are, however, some problematic tendencies with environment-development approaches, including their over-emphasis on provisioning environmental services at the expense of supporting services, failure to disaggregate 'communities', and lack of self-criticism of their values - for instance, failing adequately to address possible trade-offs between democratic accountability, and 'optimality' of solutions from an ecological point of view

In conclusion, Billie argued that ultimately it was impossible to reconcile these alternative explanations for the behaviour of coupled-human-environment systems – the (social-political) structural (of environment-development approaches), constructivist, and post-positivist explanations (of resilience approaches). Yet it is possible to appreciate general lessons drawn from one for the other.

Discussion

Per Olsson offered a set of spontaneous responses from the standpoint of work in the Resilience Alliance. He suggested that resilience thinking is imbued with more social science than this presentation had suggested. For instance the 'lazy 8' concept had actually emerged from social science – although it should not be over-applied; it is useful for a few things and not useful for other things. There is much happening in the Resilience Alliance around notions of fairness, ethics, social justice and so on. Per also stressed that resilience thinking is useful for thinking about long-term transformation as well as just 'bouncing back' after disturbance; 'resilience is also about transformation and the usefulness of transformation'. Emerging work on transitions is helpful here.

Kwesi Atta-Krah took up the issue of system ability both to bounce back after shocks, and to maintain useful functions in the face of long-term stresses – which, following the distinctions in the STEPS pathways approach, he termed as robustness. He emphasised diversity as a key element in giving a system robustness, and that there is often a direct link between different types of diversity – biological, cultural and so on. Policies could valuably focus on ensuring such diversity.

John Thompson emphasised the different roots of resilience thinking – much of it coming from Europe – and sustainability science, much coming from the US. Making explicit the different biases and emphases in these schools of thought, and recognising the limits of their concepts, is important – but this in turn should inform attempts to confront these limits and find ways to move beyond them. For example, the unhelpful 'obsession' with provisioning (rather than supporting) ecosystem services in environment-development and sustainability science is clear. Yet as a STEPS project on maize in Kenya is finding, even if farmers are successfully producing, they cannot always sell their products because of conditions linked to global economic transformation – implying the need to draw in understandings of political-economic processes at wider scales. This project is also revealing the relevance of constructivist approaches to framing – finding that different actors variously frame maize cropping systems in terms of seeds, a national food system, the international market, and so on. In short, in practical settings, combining lessons across approaches is both necessary and valuable. Drawing in technology – absent in Turner's Maya example – is also interesting and important, tracking the unfolding interfaces between science, ecology and technology.

Wider discussion from the floor endorsed the value of environment-development and sustainability science thinking. However like resilience approaches, this could benefit from lessons that might come from more constructivist angles, such as attention to voice, reflexive governance, and diverse framings of sustainability goals. Discussion also pursued the question of diversity – arguing that this should extend to knowledge too. Building diversity in knowledge is part of a route to democracy, understood as 'cognitive justice', or the rights of other forms of knowledge (including local knowledge) to coexist. In considering such questions, democratic

philosophy offers a rich field where exciting developments could greatly enrich approaches to resilience, environment and development.

The next session took up the challenge of exploring further the relationships between technology and resilience, offering a set of perspectives from those working on socio-technical systems, transitions and transformations.

ORDER IN SOCIO-TECHNICAL SYSTEMS: THE DARK SIDE OF RESILIENCE

Frans Berkhout

Frans Berkhout argued that resilience can be seen as a useful concept within debates about socio-technical transformations, yet made a plea for a more critical engagement. The notion of resilience is especially helpful in enriching debates about risk, by showing that (a) there are often ways of coping with damage or injury that in turn shape views about risks; (b) resilience draws attention not just to calculable risks but to capacities to deal with uncertainties that cannot be predicted in advance, and (c) resilience and vulnerability draw attention to the many dimensions – institutional, technical, behavioural – of both injury, and capacities to cope with it.

Nevertheless, the mainstream resilience literature is often limited by several factors. First, there is a reluctance to recognise the socially-contingent, normative aspect of resilience – that it depends on the person, group or place, so that we must always ask whose resilience is at stake, and about its unequal distribution, so that greater resilience for one group affects the resilience of others in both positive and negative ways. Second, in mainstream usage resilience is inherently conservative, focusing on the persistence of a system. Yet resilience is not always a desirable feature of social or economic systems. In some cases, there may be important trade-offs with efficiency. In others, there may be good reasons for wanting to destroy or transform a system – as, for instance, with slavery, fascism, Al Qaeda and fossil-fuel based energy systems. There is a failure to distinguish between different types of resilience and the debates that may take place about them – for instance between the resilience of particular functions (e.g. the desirable persistence of electricity supply) and of the structures to achieve them (e.g. it may be desirable to transform fossil-fuel-based structures to those based on new renewable technologies). While the adaptive cycle contains a notion of transformation, this is essentially re-organisation within recognisably the same system. In the study of technologies, economies and societies, there are also notions of transformation in which radical reconfigurations take place.
Third, the underlying model of change in resilience thinking is of a system in equilibrium disturbed by exogenous forces. In contrast, theories of change concerned with the internal, endogenous dynamics of systems have been important to analysts of technology, society and economy – for instance in theories of innovation.

While rarely using resilience language, studies of technological innovation – whether rooted in economics and management or in history and sociology – have also been concerned with the coexistence and interaction of flux and persistence in social systems. They draw attention to order and ordering as inherent features of socio-technical systems, as the outcome of behaviour of actors and institutions. Yet in this work, ordering, path-dependency and lock-in are just as

often seen as problems; attention also focuses on how to disorder and reconfigure established and unsustainable systems. Is this 'anti-resilience'? Paradoxically, the prescriptions for breaking out of existing socio-technical systems closely resemble the characteristics viewed by resilience scholars as being intrinsic to resilient systems: diversity, flexibility, learning. By seeding many alternative socio-technical experiments, by designing social and economic settings in which these radical alternatives can be nurtured and by significantly disadvantaging incumbent and resilient systems, there may be a way open towards 'path creation'.

Discussion

Adrian Smith made three main points in response. First, it is important to bear in mind the different analytical focus and purposes – and thus contestations and overlaps - between different bodies of work and disciplines with different intellectual histories (e.g. science and technology, ecology, sociology etc) in addressing issues of resilience and transformation. For instance, socio-ecological approaches to systems tend to be place based (e.g. river basin) while socio-technical theory operates across spatial-temporal scales (e.g. energy systems). Second, he argued that a framings approach can be useful, and provide important insights, in attempting to answer the question 'resilience for whom?' This helps to resolve the question of whether resilience is an intrinsic system feature or a property of social groups, by highlighting how people and groups frame/seek systems that are resilient for realising their particular needs or the persistence of their institutions. This also suggests an analysis of how groups seek resilience in relation to other resilience-seeking groups, exploring the processes through which certain framings acquire credibility, legitimacy, authority and power. Third, Berkhout's claim that radical socio-technical change is endogenously-derived (in contrast with the focus on exogenous shocks to socio-ecological systems) misses a key point. What often drive and shape change are processes of endogenisation whereby shifts in external contexts are endogenised and rendered manageable. Recent work in transition theory valuably highlights and explores these processes.

Jan-Peter Voss suggested that the difference in emphasis on persistence and change (in studies of socio-tech transitions and of social-ecological resilience) was not an indicator of opposing analytical and/or normative orientations (as Frans suggested), but offered complementary perspectives. These perspectives look at dynamics on different scale levels. Resilience studies put the focus on persistence in ecological systems; transition studies put the focus on change in social and technological systems. By referring to sustainability, however, the latter do explicitly orient themselves towards social-ecological persistence as a goal on a higher scale level, to which change on a lower scale level ought to be directed. More focused attention on the dynamics of socio political systems also offers an alternative perspective that can reinforce and strengthen resilience studies. Arguing that the dynamics of politics and change are important in their own right, he drew attention to examples such as the inertia of policy and governance communities, political economies and rigid (encumbering) regimes, but also the scope for learning from successful examples of political change – whether led by social activist and community movements or progressive states. What, he asks, makes some governance approaches more reflexive and some less so? This argument brings the wide-ranging and theoretically diverse area of research on governance, politics, and social and political institutions into fruitful interplay with resilience studies.

In wider discussion, Carl Folke suggested that current research under a 'resilience studies' umbrella already addresses a number of the perceived knowledge gaps highlighted by Berkhout

– for example the role of endogenous change. He emphasised the message that resilience thinking, and the other areas of theory highlighted in this session, may already be closer than some perceive – highlighting both the value and potential of further collaboration. Others emphasised the need to keep the practical focus of these discussions; that resilience risks losing its value unless it becomes grounded in a language that policy makers can understand, and that reflects realities on the ground.

With this warning in mind, the final session nevertheless broadened the debate further to consider how resilience operates as a discourse. Is resilience best understood as a reflection of realities on the ground or a more politically-laden concept? Who is deploying the term, in what context, to what ends? What kind of power relations is the concept enwrapped with? What effects does it enable, and what are obscured?

SURVIVAL OF THE FITTEST

Sheila Jasanoff

Sheila Jasanoff illustrated how resilience operates as a discourse of survival. Examples such as the recovery of plants after drought, ecosystems after insult, communities after disaster, children after abuse or deprivation, faith after trial and testing, and love after suffering present resilience as something to celebrate. So, she suggests, what could be wrong with resilience for sustainability?

Yet this discourse displaces (rather than resolves) central ambiguities concerning: resilience from whose point of view? Resilience of what? And resilience for what purpose? Obscured too are the very different meanings and implications of the different kinds of bonds that might prove resilient – from the polar extremes of bonds of love (e.g., between nurturing father and son) to bonds of need (e.g., among outlaws and predators). She argued for more attention to the meanings and imaginaries wrapped up with concepts of resilience, whether as drawn out in popular fiction with 'survival' themes, or in real life experiences – such as those of the Bhopal residents who experienced the Union Carbide disaster in 1984. The factory explosion drove home the non-resilience of material technological systems underpinning the green revolution. What proved resilient were more local capacities for social invention, legal innovation, interim relief, solidarity and spirit.

This example serves to emphasise further that resilience is a normative discourse and not just another planning discourse. It suggests that attention should focus on what resilience means for particular societies, contexts and groups of people faced with particular dilemmas and conflicts. This involves attending to possibilities for life, not just survival; and to the ethics, politics and notions of justice in supposedly self-organizing, self-regulating and self-governing systems. A key challenge is how to recognise and accommodate these normative notions within larger governance systems, such as the global constitution now being tacitly crafted to address the challenges of environmental and climate change.

Discussion

Phil Macnaghten responded with a set of reflections on resilience as a boundary object that has effects in relation to other discourses, most notably that of sustainability. He opened up four lines of questioning. Firstly, he suggested that resilience framings of sustainability had the potential to open up novel spaces for collaboration between the natural and social sciences, and on terms that centred on a shared temporality. Secondly, he suggested reasons why resilience discourse had proved so mobile over the last five years or so, including *inter alia*, its potential to reframe a sustainability discourse that had become eclipsed by narratives of fear, anxiety and powerlessness. Thirdly, he asked what constituted the social conditions for resilient communities, appealing for research where the starting point was one of listening, of dialogue, of being open to multiple framings, especially from marginal or hard to reach communities. And fourthly, he asked what a science and technology policy might look like that started from the premise of resilience priorities and how such thinking had potential to reframe current master narratives of economic progress and of innovation as an unproblematic good.

Paul Nightingale echoed some of these concerns, illustrating with pan-European historical examples how resilience discourses embody implicit ideas about equality, security and the directionality of development. Such implicit politics need to be rendered explicit.

Also drawing insights from European history, Paul Warde suggested that much work needs to be done in understanding the politics of resilience at the intermediary level – between community and globe. Here rest key questions around the resilience of certain bureaucracies, languages, types of commercial society and market.

In broader discussion, some tantalising questions for comparative inquiry were broached. How does a mobile term like resilience move, and become grounded, used and deployed in different contexts? What other imperatives – political, institutional or other – move with it? Resilience, as a term, is now used in a range of 'languages' – professional, scientific and popular. To what extent does it, or might it, travel and 'bed down' – whether in research, policy cultures, or everyday life – in ways that carry concerns for Sustainability and social justice with it? And, in ways that, paraphrasing Jasanoff, enable 'life' as well as mere 'survival'? What kind of politics and governance would enable this?

ROUND-UP – REFRAMING RESILIENCE?

In the Symposium's final session, a panel of speakers (Esha Shah, Andrew Scott, Henny Osbahr, Bronwyn Hayward, Joachim Voss, Carl Folke, Melissa Leach, Andy Stirling) offered their reflections on what had been learned, and what challenges and opportunities remain. Summarising across these discussions, a series of central themes emerged.

First, there is great value in a systems approach as a heuristic for understanding interlocked social-ecological-technological processes, and in analysis across multiple scales. Yet we need to move beyond both systems as portrayed in resilience thinking, and the focus on actors in work on vulnerability, to analyse **networks and relationships**, as well as to attend to the diverse **framings, narratives, imaginations and discourses** that different actors bring to bear.

Second, debates about resilience need to engage with **normative** concerns. This means that when we use terms like vulnerability and resilience we need to attach them to a person, form or organisation, rather than discuss them in the abstract. There is also a need to deal with the many trade-offs between people, systems, levels and scales in a normative way: someone's resilience may be someone else's vulnerability, or resilience at one scale may compromise that at another – but the key question is 'what trade-offs do we want or not want to see? Linking resilience with normative debates in this way may provide a valuable platform for critical discussion, helping to fill the current gulf between optimising and justice-based approaches in development, and contributing to the building of a new ethically and morally-driven development discourse.

Third, resilience approaches can be enriched through more disaggregated attention to **action and strategies**, considering transformations and transitions; endogeneity/exogeneity and depth of transitions; the relationships between functions, flows and structures; the dynamics (shocks/stresses) they address, and the agency (control/response) involved. We need to consider the processes through which actors at different levels decide strategies, and which would be enabling in terms of adaptiveness, learning, flexibility and empowerment.

Fourth, **power and politics** are crucial – as a growing area of resilience thinking that could valuably be strengthened with insights from other areas of work in politics, governance and democratic philosophy. Power relations are involved in assigning or avoiding responsibility and accountability; the domination of certain framings/narratives over others, asymmetries between pathways, and which are pursued and which are not. While resilience thinking is clear about the need to conserve life support systems, this will often require politically progressive thinking and action to challenge and transform unsustainable structures and framings in radical ways, and to hold powerful actors and networks to account. Depending on the issue and the setting, strategies might involve a spectrum from discursive and deliberative politics, to more antagonistic politics of resistance and struggle; all involve moves away from the managerialism that characterised early resilience approaches, towards conceptualising it in fundamentally political terms.

Finally, reframing and working with resilience involves an array of challenges for language and communication, and linking understanding and action. Resilience approaches involve complex language and concepts, and integration with other disciplinary perspectives can add to this complexity. A series of balances need to be struck, between attention to the nuances of different frameworks, and articulating their differences clearly; between conceptual advance, and remaining grounded in empirical settings; and between understanding complexity, and the clarity needed to inform policy and practice. The latter is crucial: policy decisions are being made as a matter of urgency in areas from climate change and energy to agriculture, water and health. Building resilience and pathways to Sustainability thus requires both reflection and reflexivity, and clear communication in terms that decision-makers can use.

In sum, participants generally agreed that while the Symposium aired and shared diverse and sometimes incompatible views, it was constructive. We hope discussions summarised in this report will provide a starting point for continued conversations and collaboration, through sharing of resources, follow-up discussions, linked practical projects, and research and training initiatives. Please join with us in taking this forward the debate.

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