Positioning resilience for 2015: the role of resistance, incremental adjustment and transformation in disaster risk management policy

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Resilience is a ubiquitous term in disaster risk management and is an increasingly prominent concept in early discussions focused on elaborating the post-2015 international policy landscape. Riddled with competing meanings and diverse policy implications, however, it is a concept caught between the abstract and operational. This paper provides a review of the rise to prominence of the concept of resilience and advances an elaboration of the related concepts of resistance, incremental adjustment and transformation. We argue that these concepts can contribute to decision-making by offering three distinct options for risk management policy. In order to deliberately and effectively choose among these options, we suggest that critical reflexivity is a prerequisite, necessitating improved decision-making capacity if varied perspectives (including those of the most vulnerable) are to be involved in the selection of the best approach to risk management.

Keywords: disaster risk management, incremental adjustment, resilience, resistance, transformation, vulnerability

Introduction

The rapid rise of resilience in the disaster risk management (DRM) policy landscape is marked in the Hyogo Framework for Action 2005–2015 (HFA), whose subtitle, ‘Building the Resilience of Nations and Communities to Disasters’, looks to place the concept at the core of DRM aspirations. Focused on the ability to withstand stress and bounce back (UNISDR, 2005, IIIA(h), the HFA presents a decidedly conservative understanding of resilience—one committed to the maintenance of functionality during and after shocks (UNISDR, 2005, B4i(i), B4i(i), B4i(i)). While this position reflects the inherited use of resilience from the disasters community, it does less well at encompassing the emerging centrality of disaster risk reduction in DRM and its call for action to tackle the underlying root causes of risk production in development decision-making. In short, the challenge for the post-2015 HFA is to embrace not only bouncing back, but also bouncing back better—and, indeed, loss avoidance. Can these three trajectories for risk management be encompassed within the policy discourse offered by resilience?

In the growing literature on resilience, understandings of change within the concept are diverse and often ill defined (Alexander, in press). Some echo the HFA’s...
conservative positioning (US National Academies, 2012), while others provide more progressive interpretations (UNISDR, 2012). Beyond DRM, resilience has been embraced as a priority concept by a host of more general development and humanitarian organisations (e.g. DFID, 2012; European Commission, 2012; FAO, 2011; IRWG, 2012; UNDP, 2012; UNICEF, 2011; USAID, 2012), although with similarly vague and varied conceptions of types of change within resilience. The Intergovernmental Panel on Climate Change (IPCC) Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (Field et al., 2012) is one of the few documents that advances the debate by delving explicitly into the different textures of change, exploring the meanings of incremental and transformative DRM and the relationship between them. Nonetheless, as the sectors that employ resilience as a dominant concept in research and policy continue to expand and the meanings attached to it continue to broaden (Brown, 2011), there is a risk that the usefulness of the concept will be undermined by a continued lack of conceptual specificity and absence of practical evidence (Miller et al., 2010). The danger is that ‘resilience’ provides a new term, but no new action on the ground.

Given the widespread attractiveness of resilience for contemporary development policy, it is likely that it will be among the key terms used to make sense of and give normative direction to international development post-2015—particularly through reformulated Millennium Development Goals, Sustainable Development Goals and/or the HFA. As discussions outlining the post-2015 international policy landscape begin (UNISDR, 2012), what role should there be for resilience? How can a concept that has existed predominantly as a policy aspiration be converted into a robust analytical category? This paper aims to contribute to the post-2015 policy discussions by first offering an account of the rise to popularity of resilience, and then by stepping back to consider what resilience may be obscuring or crowding out by rapidly becoming a normative, all-encompassing term. In particular, we suggest that resilience can be imbued with greater analytical depth through the elaboration of resistance, incremental adjustment and transformation as distinct (although not discrete) types of change. The ability of this typology to empower more acutely risk-sensitive decision-making rests with governance reflexivity, learning and self-organisation.

The confounding epistemology of resilience

The analytical roots of resilience can be traced to a variety of distinct intellectual traditions. Engineering, psychology, disaster studies and social ecological systems work have all contributed important interpretations of resilience. Engineering resilience derived the ‘bounce-back’ analogy, which is closely related to the concept of ‘resistance’ in social vulnerability literature (Gordon, 1978) and the idea of ‘robustness’ in social-ecological systems theory (Schoon et al., 2011). Engineering origins assume a linear system—or at least one in which a linear approximation is appropriate—and focus on the time it takes a displaced variable to return to a particular equilibrium
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Positioning resilience for 2015 (Ludwig et al., 1997, cited in Folke, 2006; Pimm, 1991). The psychological interpretation of resilience is richest in studies of child development (Garmezy, Master and Tellegen, 1984; Werner, Bierman and French, 1971), health, war and terrorism, military life and personality adaptation, psychiatry, sociology, and natural disaster management (Chang Seng, 2012). Here, resilience tends to be associated with the capacity of an agent to choose a vital and authentic life, the process of overcoming the negative effects of exposure (bouncing back), and the ability to cope successfully with traumatic experiences and avoid the negative trajectories associated with risks (emBRACE, 2012). While psychological resilience has largely focused on functional persistence and the return to a particular steady state, it is capable of envisioning improved psychological health and well-being, going beyond the stability seeking of engineering resilience to consider enhanced resilience as part of a transition or transformation to a better quality of life (Gail, 2010, cited in emBRACE, 2012). In the DRM community resilience began to be employed as the inverse of human vulnerability in the late 1970s, with increased use in recent years (Birkmann 2006; Gaillard 2010; Torry, 1979). Although many interpretations of the term abound in the disasters community, this understanding of resilience has proved to be persistent.

Taking its cue from systems theory, as worked out through ecology (Holling, 1973), and drawing from natural hazards and political ecology (Adger, 2006), social-ecological systems theory (SES) seeks to understand the dynamic, cross-scale interactions of coupled human–environment systems. It provides a variety of heuristics related to these systems, including the notions of an adaptive cycle, panarchy, adaptability and transformability in explaining resilience as a systems property (Walker et al., 2006). Although the SES conception of resilience is primarily descriptive, it does offer considerable scope for enhanced policy through reflection on scale, functional persistence, self-organisation, social learning and flexibility. Given their roots in general systems theory approaches, these themes can be applied independently of a full SES framing—where focused attention on social or environmental subsystems is considered more appropriate. Despite providing the most holistic interpretation of resilience, the SES perspective as it is currently applied continues to show significant weaknesses: it does not easily account for politics (Scoones and Voss, cited in Leach, 2008), lacks a consideration of agency (i.e. is more interested in structural change/stability than the behaviour of actors within a system) (Brown and Westaway, 2011), and has not yet engaged with emotion or with the opportunities for development that arise with the collapse of system resilience (Pelling, 2011).

Attempts to operationalise resilience

Resilience is noted as an effective boundary object (Brand and Jax, 2007) that is capable of bridging disparate policy agendas (notably humanitarian and development; see DFID, 2012), but this potential has also contributed to its clarity being somewhat obscured and its ability to act as a catalyst for new policy options being diluted (Brown,
A number of recent integrative frameworks have emerged that have attempted to bridge this expansive conceptual landscape (IFRC, 2008; Twigg, 2009; UK Cabinet Office, 2011). These attempts, however, are not all comprehensive and there are many disagreements, oversights and omissions among them. Cutter, Burton and Emrich (2010), for example, suggest that ecological elements cannot be included in resilience due to the prominence of poor data quality and that critical infrastructure approaches are difficult to transfer to the realm of community resilience because of their dynamism. Social-resilience-oriented approaches (IFRC, 2008; Twigg, 2009) are widely transferable and inspired by a range of resilience thinking, but they have tended to overlook the idea of redundancy. So where does this leave us in our understanding of resilience? Where has consensus been reached and where do contestations persist?

Resolved issues

In considering the value of resilience as an operational term for DRM, several debates in the literature have been resolved, identifying key aspects of the concept that can now be advanced.

Firstly, resilience is not the opposite of vulnerability and, while overlaps exist, they are best understood as discrete concepts. Besides the fact that perceiving these as ‘two sides of the same coin’ leads to unproductive circular reasoning (so that no new policy options arise, despite the linguistic turn) (Klein, Nicholls and Thomalla, 2003), there are characteristics or attributes that can simultaneously make us vulnerable and affect our capacity to adapt (Paton, pers. comm., cited in Manyena, 2006). Old age, for instance, can be a source of considerable vulnerability while simultaneously facilitating greater resilience through experience, learning and reflexivity.

Secondly, although early definitions of resilience tended to be more outcome oriented, there has been a recent shift towards a more process-oriented understanding (Kaplan, 1999, cited in Manyena, 2006; Manyena, 2006; Norris et al., 2008). While the former entails a fixed state, the latter can be understood as ongoing and dynamic, focusing attention on decision-making systems rather than on their results. Solely presenting resilience as outcome oriented tends to lead towards a reactive (rather than proactive, risk reducing) position and a reinforcement of traditional disaster management practice (McEntire et al., 2002, cited in Manyena, 2006). However, by presenting resilience exclusively as process, policy agendas and goals can be unhelpfully abstracted. Rather than forcing a meaning on the term, resilience is usefully understood as both process and outcome.

Thirdly, resilience is about more than just bouncing back (Folke, 2006). Unlike ecosystems, individuals and societies have the capacity for anticipation and critical learning (Dovers and Handmer, 1992; Folke 2006). Both socially and politically this means that, having learnt from an experience, it will never actually be possible to bounce back to the same position. Even if the structures are the same, the individuals and organisations within those structures have changed, thus highlighting the importance of reflexivity as a key theme in resilience. Furthermore, as will be discussed later, social-ecological systems have multiple potential equilibria (Holling,
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1996, cited in Folke, 2006), making it possible to ‘bounce’ or ‘reorganise’ to new equilibria and not just ‘back’ to the same state.

**Unresolved issues**

Despite the fact that some of the conceptual debates have now been resolved, others have yet to be determined.

Firstly, is resilience a spontaneous or a deliberate process/outcome, or can it be both? In the former conception, resilience is not something that is pursued or fostered, but an unplanned-for or unintentional attribute that arises from the complex interactions of system components. As resilience increasingly captivates the risk-management policy agenda, however, we have seen an alternative conception of resilience emerge in which it is presented as an attribute that can be fostered and developed. The empirical evidence on how resilience understanding is adopted and applied by practitioners, managers, community leaders and policymakers in disaster risk management, however, is quite limited (Berkes, Colding and Folke, 2003; Gunderson and Holling, 2002; Olsson, Folke and Berkes, 2004; Walker and Salt, 2006). It is possible to learn from other policy areas, most notably natural resource management, food security and livelihoods, and health and nutrition, but it is unclear how applicable these lessons will be in contexts where risk and uncertainty are involved. While research into deliberate resilience building across integrated DRM systems is an area being pursued with great fervour—particularly in regions such as the Sahel and Horn of Africa—the evidence base remains limited.

Secondly, is resilience a normative concept? Particularly, in the dominant social-ecological systems perspective resilience is fundamentally a descriptive concept. While it is capable of observing system stability, it is not capable of making normative judgements about that stability, and, accordingly, it needs to be coupled with other frameworks to determine whether that stability is good or bad (Pelling, 2011). If we take a more specific view on resilience, however, systems provide ecosystems and generate outcomes that may be desirable or undesirable for different components of the system (Adger, cited in Leach, 2008). From this perspective, resilience is not only normative, but deeply implicated in issues of power and politics. From the perspective of action and intervention, cultural values can constrain or enable a spectrum of choices. In the short term cultural values can impede actors from switching activities or capitals, thus limiting coping capacity (Arce, 2003, cited in de Haan and Zoomers, 2005). In the longer term reluctance to grapple with underlying cultural values and their expression through emotion can seriously limit the scope of adaptation/resilience policy (Handmer and Dovers, 1996; O’Brien, 2011; Pelling, 2011).

**Box 1. Resolved issues related to resilience**

1. Resilience is a discrete category and is not simply the opposite of vulnerability.
2. Resilience is usefully understood as both a process and an outcome.
3. Resilience is more than just ‘bouncing back’.
Thirdly, does resilience relate to specific or general characteristics? A major outstanding debate involves whether resilience making should be directed towards the individual components of a system or the system itself (Carpenter et al., 2001; Walker, 2009). Resilience is not necessarily a positive-sum game. Building the resilience of one component can simultaneously reduce the resilience of another, the system as a whole (Miller et al., 2010) or of neighbouring systems, with potentially global effects. The focus of resilience, accordingly, is by no means clear, with potentially vastly different impacts, depending on the locus of attention. Awareness of the differences between these two types of resilience and the interaction between them is important, particularly for policy development. However, only a limited amount of work has been undertaken on the trade-offs between resilience and other development goals—such as robustness and vulnerability reduction—or on the impacts that DRM interventions generate across systems.

**Box 2. Unresolved issues related to resilience**

1. Is resilience a spontaneous or deliberate process/outcome?
2. Is resilience a normative concept?
3. Does resilience relate to specific or general characteristics?

Placing resilience

The questions outlined above do not represent a deficiency of resilience so much as illuminate the need for greater empirical and conceptual rigour in approaching this concept. At this point in the evolution of resilience as a potential guiding concept for DRM post-2015, we argue that for resilience to offer its greatest benefit to policy-making, greater clarity and specificity is needed in the type of change that it seeks to address. Below we identify three of these options: resistance, incremental adjustment and transformation. Choosing to do nothing is yet another risk management state, but offers little in the way of intervention and is not pursued in this account.

Revitalising resistance as a legitimate risk-management option

Resistance is the most utilised strategy in disaster risk reduction, but is arguably the least popular option among academics and critics of current risk management paradigms (Pelling, 2001). Part of this apprehension relates to the evolution of resilience thinking, emerging in no small part as a reaction to resistance and approaches that failed to account for more general, systemic issues (see Folke, 2006 for a discussion of the emergence of resilience and complex systems). While this critique of specific interventions remains relevant in instances where resistance-led risk management is dogmatically adhered to, there are certainly instances in which resistance may prove the most appropriate and useful option. There is, however, an important difference between uncritical resistance and resistance considered reflectively alongside other risk-
management options—a trade-off to buy short-term stability while longer-term adjustments are considered or prepared for. Here it is the capacity for critical reflexivity that emerges as an important theme, distinguishing resistance as tied in by path dependence from a more critically conscious risk management strategy.

**Incremental adjustment as a discrete DRM objective**

Stability can be achieved through both incremental adjustment and resistance. The distinction is that while resistance seeks to avoid disaster impacts, incremental adjustment accepts this possibility, but is determined to return to pre-disaster conditions. Incremental adjustment indicates a willingness and ability to adapt at the margins (Handmer and Dovers, 1996) while fundamental systems attributes are to be protected. Research and development will tend to focus on improving the outcomes of existing practices or innovation to protect established policy goals and popular aspirations for development. Incremental adjustment does require trade-offs between that which is to be expended and that which is to be protected in achieving the desired trajectory of adaptation, but not between comparing visions for development. Post-disaster, incremental adjustment is expressed through an acceptance of adjustment (e.g. temporary migration) and a desire for a return to normalcy.

**The turn to transformation**

Over the past few years a growing body of literature has emerged that engages with the concept of transformation (Chapin, Kofinas and Folke, 2009; Field et al., 2012; O’Brien, 2011; Pelling, 2011; Pelling and Manuel-Navarette, 2011; Schlüter and Herrfährdt-Pähle, 2011; Wilson et al., 2013). Critical of the ability of incremental approaches to effectively address the challenges of large-scale environmental shocks, transformation signifies deeper-rooted changes to areas ranging from individuals, institutions and regimes (Pelling, 2011) to infrastructure (Kates, Travis and Wilibanks, 2012). Directly challenging structures and systems of power (Pelling, 2011), it has been presented in the global environmental change domain as a fourth option to the conventional policy triumvirate of mitigation, adaptation and suffering (‘do nothing’) (O’Brien, 2011).

**Options for resilience in DRM**

In this section we present resistance, incremental adjustment and transformation as three approaches for building resilience into risk management policy. In order to deliberately and effectively choose among these options, we argue that critical reflexivity is prerequisite for a DRM system that seeks to be resilient. Handmer and Dovers (1996) first observed that across scales, choices made to confront risk and uncertainty can be understood as existing in a spectrum from denial to incremental and transformational. They outline three states for risk management: resistance and maintenance,
change at the margins, and openness and adaptability. These three states of risk management, and the associated spectrum of policy choices, correspond closely to resistance, incremental adjustment and transformation, as can be illustrated through the SES principle of multiple system equilibria. This approach builds on others, for example the work of Twigg (2009), who presents resistance and adaptation as subsets of an overarching concept of resilience. Similarly, from a natural resource management perspective, Béné, Newsham and Davies (2013) present a continuum of adjustments from absorptive to adaptive and transformative capacity, with each stage signifying greater intensity of change and transaction costs, recalling the ‘coping cascade’ presented by Pelling (2011). While we consider resistance, incremental adjustment and transformation separately throughout this section, it is important to acknowledge that they could occur simultaneously in a system at different scales, as easily complementing as antagonising one another.

Figure 1 illustrates the different trajectories in development and risk management implied by resistance, incremental adjustment and transformation. Under resistance, the system remains at the same point of equilibrium. Hazards are either deflected or not, with the latter outcome often resulting in catastrophic consequences. Under incremental adjustment, the system, having experienced disturbance, is able to reorganise its assets, capacities or capabilities, enabling a return to a similar equilibrium. Transformation involves a more fundamental restructuring based on a provoking of systems-level change, pushing the system towards a different status quo as part of risk management. We argue that reflexive risk management systems are able to consider each option and threshold beyond which one or other approach is preferred. The positioning of such thresholds will be a function of risk tolerance in society set against competing resource demands. The deliberate positioning of these strategies requires reflexive modes of governance (Nelson, Adger and Brown, 2007) and tools that can monitor trade-offs and critical thresholds (O’Brien et al., 2012).

**Figure 1. Resistance, incremental adjustment and transformation**

![Figure 1. Resistance, incremental adjustment and transformation](image-url)
Box 3. Comparative cases of resistance, incremental adjustment and transformation

Case 1: A city in an earthquake-prone region is concerned about its communication infrastructure in the event of a shock. Early-warning messages are sent from a central hub via automated phone calls and the telephone lines all run beneath a single street in the city. If a shock severed this communication route, all communication capacity would be lost. Resistance planning may strengthen the structures that house the phone lines to try and minimise the amount of damage that an earthquake could inflict on them. Incremental adjustment planning may involve a diversification of types of early-warning communication to include radio broadcasts, bicycle riders with loudspeakers and/or messages sent to mobile phone. Transformation planning could involve a paradigm shift in control of early-warning systems consisting of political devolution/decentralisation and a radical shift in the ownership of information. Observed locally, information could be communicated upwards in real time through mobile technology and streamlined through online hubs (e.g. Ushahidi, Sahana, etc.).

Case 2: A community living on a coastal floodplain faces inundation from storm surges and the prospects of a tsunami. It has a sea wall that has weakened since it was initially constructed and a mangrove that has been degraded by industrial effluents from a factory upstream that is a major source of employment for the community. The local government is looking to improve the community’s capacity to deal with these shocks. Resistance planning may involve reinforcing the existing sea wall. Incremental adjustment planning could include a diversification of risk management from prevention alone to also include preparedness. In addition to an enhancement of the sea wall (and potentially superficial restrictions on the emissions of the factory to help revitalise the mangrove), there is also investment in education/planning for contingencies in which the wall is breached. Transformation planning may involve a critical reappraisal of the local economy, the possibility of closing (or radically altering) the factory, and the community employment structure so as to preserve and regrow the mangrove (potentially as a new source of income).

Case 3: A rural household whose primary source of income is agriculture saves through cattle and small remnants. The household faces the prospect of losing its crops through a negative rainfall shock and is contemplating financial modes of covering this risk and smoothing consumption. Resistance planning may involve building up savings as a buffer and selling the cattle or small remnants in the event of a shock. Incremental adjustment planning may involve building flexibility into the household economy by transferring risk through the purchase of a weather-based index insurance product. This product may be sold through an established risk-sharing network, thus complementing (or entrenching) existing structures. Transformation planning may mean the liquidation of all assets and the movement of the household to a nearby city after accessing its economic opportunities and services.

Risk management trade-offs must be considered among a number of imperatives that drive current understandings of organisational performance; others include efficiency, equity, transparency and accountability. These imperatives may complement reflexivity or work to obstruct it. Equity and accountability, for instance, can help accommodate reflexivity, the former by democratising critical thinking and the latter by fostering responsibility in the process. Conversely, efficiency and transparency can impose constraints on innovation and experimentation, thus limiting the scope for reflexivity (Pelling, 2011). Distinctions among the practical application of resistance, incremental adjustment and transformation are exemplified in Box 3.

Table 1 draws out the core elements of resistance-, incremental adjustment- and transformation-oriented strategies based on the narratives presented in Box 3. In practice such approaches may overlap and interact. Incremental adjustment in a social system, for instance, can constrain prospects for transformation and limit scope for longer-term systemic resilience. Path dependency from previous administrations and the incremental adjustment of patronage networks, for example, can lock a system into a particular less desirable regime (Schlüter and Herrfahrdt-Pähle, 2011). At the micro level high levels of trust between family or friends in conjunction with mistrust for others in the community may create closed circuits of power, constraining the prospects for organised opposition and limiting the communication of alternative values and discourses elsewhere in the system (Pelling and Manuel-Navarette, 2011).
Table 1. Comparative case summaries for resistance, incremental adjustment and transformation

<table>
<thead>
<tr>
<th>Case 1: Earthquake risk communication in an urban context</th>
<th>Resistance</th>
<th>Incremental adjustment</th>
<th>Transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard mitigation through reinforcement of structures to protect the existing communication infrastructure</td>
<td>Diversification of early-warning communication systems to reach a broader network of actors</td>
<td>A paradigm shift in the control of early-warning systems consisting of political devolution/decentralisation and a radical shift in ownership of information</td>
<td></td>
</tr>
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</table>

| Case 2: Facing the threat of community inundation in a coastal floodplain | Hazard mitigation by reinforcing the existing seawall | Diversification of risk management through risk transfer | A critical reappraisal of the local economy, the possibility of closing (or radically altering) the factory, and community employment structure so as to preserve and regrow the mangrove (potentially as a new source of income) |

| Case 3: Confronting rainfall shocks in an agrarian household | Strengthening coping capacity by drawing on savings | Building flexibility into the household economy through risk transfer | Reorganising assets and lifestyle by migrating to an urban area |

There is no inherent advantage in employing resistance, incremental adjustment or transformation. Preferred options depend on the viewpoint of the decision-makers and the context. Incremental adjustment, which is often emphasised in policy and academic circles (see Brown, 2011), may be detrimental. For instance, taking an incremental adjustment approach to flood defence may leave a community susceptible to an extreme, one-hundred-year flood event. Resistance, conversely, although somewhat marginalised in the literature (see Handmer and Dovers, 1996; Schlüter and Herrfahrdr-Pähle, 2011), may be the most effective approach in a given context—for a small island developing state facing sea-level rise and the increased frequency and severity of tropical storms, it is useful to discuss mangrove health and improved early-warning systems, but the resistance provided by a seawall may be the most important form of risk management. Ultimately, resistance, incremental adjustment, and transformation are distinct approaches to risks and uncertainties with varying degrees of appropriateness depending on context and the actors involved. This is illustrated in Box 3. Regarding the debate on whether resilience relates to specific or general characteristics, we suggests that both can be important, depending on the circumstances: while targeted (specific) interventions may be most needed in some cases (resistance), more general interventions may be more appropriate in different conditions (incremental adjustment).

There are, however, limitations to resistance, incremental adjustment and transformation. Resistance may look like the best option for stability-seeking decision-makers. Under the influence of rapid social and dynamic environmental change, however, this ‘all-or-nothing’ strategy can be quite vulnerable to sudden collapse.
Incremental adjustment (and resistance as well, for that matter) is limited in being fundamentally committed to the continuance of prioritised systems functions. By being committed to maintaining the system in its current state, there is no scope to challenge the underlying values and associated organisational and governance forms that give rise to vulnerability. Implying significant structural changes, transformation has more potential to lead to maladaptation than resistance or resilience. Although transformation may be necessary to avoid the sudden collapses or crises that an incremental approach could engender, it may unintentionally damage necessary structures/processes or make changes less appropriate for possible contingencies (Kates, Travis and Wilibanks, 2012; O’Brien, 2011). Accordingly, it is important that steps are taken to minimise the scope for maladaptation from transformation. It is also important to ensure that transformations do not occur perpetually. Continuously cycling from transformation to transformation can undermine the viability of a community or society.

While it is common for scholars to reference ‘positive’ or ‘desirable’ transformation (Folke, 2006; O’Brien, 2011; Wilson, 2013), this is also true of resistance and incremental adjustment. Each has implications for the social, spatial, and temporal distribution of risk and security. But each is also inherently political. Since these processes are implicated in macro- or micro-level power struggles, we must ask ‘to whom’ they are ‘desirable’ and acknowledge that those at greatest risk are generally those who have the least say in these processes and least capacity to cope with uncertainty. This is the catch-22 of risk management: the most vulnerable are not only most liable to harm from risk, but also least able to deliberately choose transformative risk reduction. Table 2 identifies some of the key advantages and disadvantages of resistance, incremental adjustment and transformation, illustrating important trade-offs among

| Table 2. The advantages and disadvantages of resistance, incremental adjustment and transformation |
|-----------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| **Resistance**                               | **Advantages**                                  | **Disadvantages**                               |
| • Allows for ‘business as usual’: established stakeholders and institutional regimes are already in place and are supported by capital throughput. Investments are externally visible examples of risk management with built in political advantage. | • In isolation this ‘all-or-nothing’ strategy can narrow down management options, often to an engineering paradigm, excluding social and economic tools for risk management and so generating vulnerability to sudden collapse. |
| **Incremental adjustment**                   | **Advantages**                                  | **Disadvantages**                               |
| • Enables reorganisation without causing major systemic disruption  
  • Allows for system flexibility and diversity, supports redundancy, and incrementally can open scope for experiments in decision-making enhancing broader governance objectives | • Committed to functional persistence, it does not allow for challenges to the underlying values that give rise to systemic vulnerability. |
| **Transformation**                           | **Advantages**                                  | **Disadvantages**                               |
| • Opens new areas of policy response by going beyond existing systemic forms. Allows deep-rooted causes of risk and vulnerability to be addressed | • Can cause significant secondary costs as systems reach new equilibria—costs that may not all be expected  
  • If repeated perpetually, can undermine the stability and viability of an economy, environment or society |
them. These dimensions help to explain why DRM policy continues to be dominated by resistance, especially in urban systems, although there have been recent advances in incremental adjustment-oriented risk management, particularly in rural livelihoods and food security systems. Regarding the debate on the normative underpinnings of resilience, we acknowledge that decisions about risk ultimately rest on established values. Although resilience in itself may not challenge these values, critical reflexivity forces an awareness of their existence and transformation provides scope for affecting change in them. Additionally, while resistance, incremental adjustment or transformation may be the most appropriate resilience approach in a given context, a wide range of constraints and blockages may limit action (i.e. the most appropriate path might not be possible) (Pelling, Matyas and O’Brien, 2013).

Towards greater reflexivity in disaster risk decision-making

The range of interactions presented above highlight the importance of critical reflexivity in decision-making, i.e. decision-making able to examine not only imperatives such as efficiency of delivery, but its own goals and underlying assumptions as well. In short, critically reflective decision-making is an approach that is able to reflect on the position of DRM in development over time, a perspective—perhaps encoded through the notion of resilience—that can reify risk sensitivity and uncertainty consciousness in the post-2015 agenda. The mechanics of reflexivity, however, remain in many ways opaque. Two processes that have been shown to help broaden the range of ideas and actors involved in deliberation and action, and that have accordingly helped to foster reflexivity and the sustainability of social systems facing disaster risk, are learning and self-organisation (Field et al., 2012). While we consider these separately, it is important to note that they are often complementary, reinforcing one another in their collective contribution to reflexivity (Pelling, 2011). It is these capacities, we argue, that should be enhanced in the name of resilience—with specific development and risk management trajectories (resistance, incremental adjustment or transformation) positioned as second-order policy objectives that should be scrutinised and elaborated in their own right, but which are not the essence of resilience itself.

Learning

Field et al. (2012, p. 56) find with high confidence that ‘robustness over time would increase if learning were a central pillar of adaptation efforts, including learning focussed on addressing current vulnerabilities and enhancing current risk management’. Although learning is often about changing behaviour or doing things differently, it can be about excising unwanted dimensions, processes or attributes. Reflecting critically on a past experience can enable actors or institutions to understand the importance of failure and allow for loss to occur (Adger, 2008, cited in Leach, 2008).

Although learning is predominantly viewed as a positive process, the possibility of ‘learning the wrong thing’ must also be taken into account: processes like groupthink
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(\textit{Janis, 1972}), partially addressing systemic failure (\textit{Redclift, Manuel-Navarrete and Pelling, 2011}), and shifting epistemic (\textit{Arieh, 2007}) and normative (\textit{Foucault, 1964/1988}) regimes can all be implicated in learning with negative consequences. Constraints on learning must also be explored. In certain contexts, institutions shown elsewhere to enable learning, like social networks, can actually constrain learning opportunities (\textit{Sclüter and Herrfahrdt-Pähle, 2011}). More reflective, ‘\textit{triple loop}’ learning in particular may be easier to discuss in academic, media or even political discourses than to implement in practice (see \textit{Argyris and Schön, 1996}, and additional references in \textit{O’Brien, 2011}). Finally, as in resistance, resilience, and transformation more generally, politics and power are largely omitted from the analysis of social learning. Competitive politics, centralised power and rapid regime changes (with an associated lack of technocratic consistency) can limit whether and how learning takes place (\textit{Pelling and Manuel-Navarette, 2011}). Taking the idea of learning forward, it is important to recognise that while it is about puzzling things out (\textit{Heclo, 1974}), it is also about powering forward (\textit{Hall, 1993}): we can aspire to have equality for all actors involved, but must also appreciate how hierarchies play out in the learning process.

\textbf{Self-organisation}

Self-organisation describes the capacity to form networks, institutions, organisations, or other social collectives independently from the state or other central authority. It describes both formal (canonical) organisations such as registered cooperatives and trade unions and informal (shadow) organisations like networks of friends and faith groups (\textit{Pelling, 2011}). The emergence of new canonical or shadow self-organisations is indicative of reflexivity and provides an amenable context for it through the building of trust and the creation of new pathways for information to flow and be validated. Shadow organisations, in particular, operating beyond the purview of formal administrations and administrators may be a locus of innovation by enabling experimentation and risk taking (\textit{Shaw, 1997}, cited in \textit{Pelling, 2011}). Within these networks, small groups of committed individuals can provide leadership and critical reflexivity (\textit{Olsson, Folke and Berkes, 2004; Pelling et al., 2008}, cited in \textit{O’Brien, 2012}).

\textbf{Building a tool-set for reflexive decision-making}

Given the importance of reflexivity in enabling a deliberate approach to DRM for the post-2015 agenda where resistance, incremental adjustment and transformation are all viable responses to social-ecological stress, there is a need to develop tools that can be employed to encourage this process. A good starting point for this would be to recalibrate the existing tool-set towards a more reflexive process and reorganise existing methods, which are at present a relatively ad-hoc assemblage of techniques drawn from disparate fields. While some methods—such as cost-benefit analysis (\textit{Harberger, 1978, 1984}), participatory learning (\textit{Berkes, 2009}), scenario analysis (\textit{Moss et al., 2010}), narrative storylines (\textit{Tschakert and Dietrich, 2010}), simulations (\textit{Nicholls et al., 2007}), action research (\textit{List, 2005}), multi-criteria decision-making
(Birkmann, 2006) and adaptive co-management (Olsson, Folke and Berkes, 2004) (among others)—show promise, they have yet to be systematically applied and reviewed for the distinct challenges of reflexivity in the context of DRM. Least developed are those tools that can build local capacity for reflexivity that matters—approaches that combine risk analysis with entitlements and resourcing to make changes to the local and not-so-local development structures that generate risk locally. Furthermore, institutional structures rarely allow for learning (reflexivity) across institutional levels and time frames (Keen et al., 2005, cited in Miller et al., 2010). A more integrated reflexivity could potentially be facilitated through adjusted organisational structures, working routines and training. Going forward, new tools may be needed if critical reflexivity is to be encouraged in the DRM decision-making process (Field et al., 2012), specifically tools to better consider tensions between existing imperatives (transparency and efficiency) and reflexive processes (social learning and self-organisation).

**Conclusion: competing futures**

With resilience set to continue informing the discourse and practice of humanitarian and development practitioners, funding agencies and academics post-2015, the importance of critical engagement with the concept is manifest. While decidedly useful in certain contexts, it is also necessary to explore the concept’s weaknesses. Elaborating resistance, incremental adjustment and transformation as expressions of a resilience approach, this paper has sought to disaggregate some of the internal contradictions of resilience. It has introduced DRM perspectives and illustrated how critical reflexivity as the enactment of a resilience approach can contribute to a richer engagement with the trade-offs inherent in a closer relationship between development and risk management. Perhaps most importantly, the paper has sought to present resilience not as an abstract catch-all phrase, but as a term with its grounding in reflexive decision-making and in consequence its own policy implications for learning and self-organisation. This opens scope for developing clear indicators of resilience as a capacity (built on learning and self-organisation). This separates resilience capacity from the trajectory of decision outcomes—resistance, incremental adjustment and transformation. In so doing we offer a framework through which to refine the use of resilience in post-2015 agreements without binding this to any preconceived set of management preferences. In this understanding, resilience for DRM becomes identified as a way of thinking of which the doing is an extension.

Given the path dependency that decisions taken now will have on the future, critical reflection on contemporary vulnerabilities and candidness about the potential impact of policies going forward are essential. Decision-makers will need to consider alternative, deeper-rooted interventions that may engage in riskier policy choices and challenge the trade-offs implicit in the multiple (and often-competing) goals of DRM actors, agendas, resource allocation and system rules.
Much work remains to be done to determine the thresholds of resistance, incremental adjustment, and transformation, and the contexts and values in which one approach may outweigh another. These trade-offs should not be denied or hidden beneath a veneer of technical methodology and epistemological confusion, which is a risk, given resilience’s current trajectory. Rather, in the build-up to 2015, now is an opportunity to better define the development pressures that underlie disaster risk and confront the associated challenges with a critically reflexive understanding of the texture and appropriateness of varied pathways for change.

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