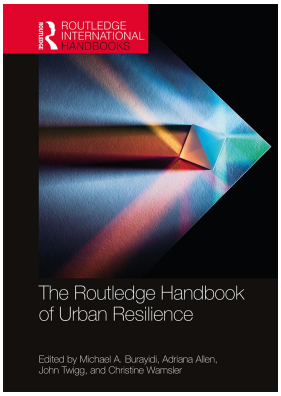

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Against general resilience

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Introduction

In recent discussions on resilience many have found it useful to distinguish between two kinds of resilience: general resilience and specific resilience. For example, Fiona Miller and colleagues (2010) consider specific resilience to involve – in the frequently used slogan of Carpenter *et al.* (2001) – "the resilience of what to what," whereas general resilience "concerns the resilience of all aspects of a system to unspecified, including novel and unforeseen, disturbances" (Miller *et al.* 2010). Brian Walker and David Salt (2012) in a recent volume discuss the distinction as follows:

> Specified resilience, as its name suggests, is the resilience of some specified part of the system to a specified shock – a particular kind of disturbance. General resilience is the capacity of a system that allows it to absorb disturbances of all kinds, including novel, unforeseen ones, so that all parts of the system keep functioning as they have in the past.
>
> *(Walker and Salt 2012, 18)*

In their recent review Sara Meerow, Joshua Newell, and Melissa Stults (2016) cash out the distinction in terms of the ability of systems to adapt and note that more than half of the definitions they include in their review – they collected 25 definitions of urban resilience – associate resilience with "general adaptive capacity as opposed to adaptedness" (Meerow *et al.* 2016, 42). *Adaptedness* is understood as the property of being adapted to specific and "known threats" (Meerow *et al.* 2016, 44) whereas *general adaptive capacity*, on the other hand, is associated with the ability to adapt to whatever may come; known or unknown.

In what follows I focus on the idea of general resilience more broadly and try to show why this notion is unhelpful and even obstructive. Any resilience concept applied to a real system, it will be argued, needs to involve some specification of what that system is, and the kinds of disturbances involved.

Concepts of resilience

Writing about resilience is in some respects a perilous affair. The concept is famously a mess of different definitions, and there are wildly different ideas about what the concept does, and

should do, and what is significant about it. Is it a useful metaphor not to be taken too seriously, a powerful way to conceptualize sustainability, or a framework that gives scientific legitimacy to a political agenda? Hence, it is useful to make some preliminary remarks.

There is a considerable literature on the different versions of the concept of resilience and its historical background (see e.g. Meerow *et al.* 2016, Thorén 2014, Zebrowski 2013, Olsson *et al.* 2003) and any attempt at analyzing the concept at this junction is prone to complaints of not covering all relevant definitions. This chapter will not primarily concern itself with that, but assume a wide, albeit perhaps somewhat simplified, understanding of the notion: Namely resilience as the ability to absorb a disturbance or the ability to adapt to a change. Such an understanding of resilience is perhaps somewhat vague, but nonetheless, substantive enough to be subject to analysis, as well as broadly representative of a range of definitions and characterizations (Thorén 2014).

It is nonetheless good to have some kind of idea about what we might mean by "resilience". I have argued elsewhere for an understanding of this concept as the ability of a system to keep some property fixed *through* a disturbance (Thorén 2014, Thorén and Olsson 2017). This idea both highlights the distinction between stability (or engineering resilience) and resilience (ecological resilience) that has sometimes been thought to be important (Holling 1973, Holling 1996), and it is representative of many, although certainly not all, uses of this notion across disciplinary contexts (Thorén 2014).[1] For the present argument, however, it does not matter a great deal which precise definition of resilience one prefers. The core issues here revolve around persistence, change, and identity in complex systems in general, and social systems in particular, and how these notions are to be made operable in scientific practice. Such notions will figure in most, if not all, concepts of resilience in one way or the other and for this reason I will in this chapter use notions such as "resilience" and "adaptability" more or less interchangeably (unless otherwise indicated).

General and specific resilience

Let us begin by setting the stage. As might have become apparent already at the outset there is more than one version of the distinction between general resilience and specific resilience present in the literature. Sometimes epistemological and cognitive notions are highlighted, such as when Walker and Salt make note of "unforeseen" disturbances, raising issues such as: unforeseen *by whom?* At other times the idea is cast in more immediate ontological terms, if you will, as a straight-up property of the system. Meerow *et al.*'s (2016) "general adaptive capacity" might pass for the latter.

There will be reason later on to return to the epistemological version of the distinction. At this juncture, however, let us focus on the ontological construal – that is to say the idea that the distinction is to be understood as capturing something real about the systems under consideration – perhaps even a (more or less) straightforwardly measurable quantity.[2]

Specific resilience is usually defined as involving a number of practical steps. One has to identify the kinds of disturbances and what (part of) the system they afflict and in what sense they are absorbed, and so on (cf. Carpenter *et al.* 2001). General resilience, presumably, involves none of this but is to be understood as some raw property; an unspecific ability of something to adapt. So, characterizations of specific resilience often retain an epistemological component potentially emphasizing the role that conceptualization and system individuation etc. play, whereas general resilience is seen as something like the "real" property of the "real" system.

There are a number of issues that immediately come to mind, some seemingly more serious than others. One confounding aspect of general and specific resilience conceived of as real properties of some system has to do with their interrelation. If system *S* is (highly) generally resilient,

then would it not imply that it is specifically resilient in every way? Or should we understand the magnitude of general resilience rather as being specifically resilient in many ways? Neither of these understandings, however, jive particularly well with how the distinction is typically portrayed. On the official take of the Resilience Alliance specific resilience and general resilience (see Resilience Alliance 2009, section 1.5) it is claimed that optimizing the specific resilience of some system may come at the expense of the general resilience. At the very least this interrelationship remains elusive in the literature.

Moreover, and keeping to the issue of trade-offs, it is clearly the case that for many, if not all systems – from the simplest to the most complex – resilience with respect to one kind of disturbance often comes at the expense of the resilience of that system with respect to some other kind of specific disturbance. A simplistic example: A tennis ball may be resilient to compression in the sense that it retains its structural integrity by being flexible. But the rubber construction that makes this possible may also result in the "system" not being resilient with respect to some other kind of disturbance, such as being put in an open fire or cut up with a pair of scissors. Although it is perhaps possible to provide a model of the system and its resilience given a focus on a particular kind of disturbance, the inter-relationship between different kinds of resilience has to do with any number of different qualitative aspects of that particular system, and the specifics of the disturbance in question, that can be difficult to integrate in a single model.

Here, one suspects, there is more work to do. But then perhaps I am using the concept of resilience too loosely. After all many, if not most, of those who use the concept of resilience to begin with are committed in one way or the other to a particular ontology. Namely, that the systems they are looking at are instances of, or can be described as, complex (adaptive) systems. This is itself an abstract way of thinking about aspects of reality, but it nonetheless points to certain ways in which resilience is in fact realized in systems. That is, as a function of the interrelations and interaction of the components of that system and how they respond to external or internal disturbances.

So, let us now move to discuss a set of concerns that have to do with identity and persistence in complex systems and how different ways of thinking about real systems impinge on how resilience is understood in those systems.

Identity and persistence

Notions of identity and persistence are closely associated with resilience (see e.g. Walker and Salt 2012, 3). Holling was explicit when he said that resilience "is a measure of the persistence of systems" (Holling 1973, 14). To see this we only have to rehearse an argument that has been made elsewhere. Resilience as a concept makes little sense without some notion of persistence. That is to say, the entity that is supposed to be resilient has to be the same entity in some important respect. The point is conceptual, and to some extent trivial, but important nonetheless: for *S* to be resilient with respect to disturbance *D* it has to be *the same system* through a disturbance (Thorén 2014, Thorén and Olsson 2017). The concept itself becomes highly unstable without such a notion of persistence and it becomes hard – impossible even – to distinguish between instances of collapse from instances of adaptation as one and the same event can, with only small adjustments with respect to how the system is described, be construed as either showing a system to be resilient or showing that system to lack resilience. Here are two examples borrowed from Thorén (2014). The role of migration has been an issue in discussing the resilience of social systems such as coastal communities (see e.g. Adger 2000). If we have a community that has been subjected to, say, severe flooding and has responded to that flooding by dispersing, should we think of that community

as resilient or not? How this question is to be answered depends on what it means for that community to persist. If persistence is conceived to hinge on e.g. inhabiting some specific physical space then migration, clearly, involves the collapse of that system. But there is nothing about the notion of resilience itself that forces this conclusion. A different idea about what constitutes persistence for this community might have the community persisting by adapting to a change in circumstances. *Ceteris paribus*, migration might just as well be seen as the dynamic adaptation of a highly resilient community (see also Thorén and Olsson 2017).

Similarly, psychologists, to whom resilience also has been an important concept, have argued about whether depression should be perceived to be an adaptation to psychological trauma, or the "collapse" of that individual (Rutter 1993, 627).

Now I am not suggesting either of these issues are as a matter of fact controversial in their respective fields – they do not seem to be – but rather to point out that landing on one side or the other depends on how persistence is construed for the relevant system. There are however related concerns that have indeed been controversial. The Arctic Council recently released a report on the topic of resilience (Arctic Council 2016). The report contains a wealth of cases of how a changing climate (and other "disturbances" such as tourism and mining) are impinging on indigenous and local communities in the region. The willingness of the inhabitants of the city of Kiruna in northern Sweden to move as a consequence of the mining operation in the area is portrayed as a sign of the resilience of these local communities and their ability to adapt. But, as Thorén and Olsson (2017) point out, this way of representing the situation obscures conflicts of interest and power differentials among stakeholders and thus hides crucial normative dimensions of the development in this area.[3]

Describing the system

The main point in the previous section was that the adaptation/collapse distinction is sensitive to how the system itself is described. Slight alterations in that description can lead one to think of one and the same material situation as one or the other. So this is of little interest if it were the case that there really is only one correct or appropriate way of describing the kinds of systems we might be interested in. This leads us to consider how system descriptions relate to the systems themselves. What is at stake presently are primarily urban systems but the point I will make could be made more generally.

If the idea that there is usually (or always) only one correct description towards which we should strive can be labelled as a form of *monism* it is noteworthy that pluralism has often reigned in these discussions. Gerald Weinberg writes in his *An Introduction to General Systems Thinking* from 1975: "What is a system? As any poet knows, a system is a way of looking at the world. The system is a point of view – natural for a poet, yet terrifying for a scientist!" (Weinberg 1975, 105). Arriving at a description of a system is taking a certain perspective on the world the implication being: there are many admissible perspectives on offer. James Kay argues along similar lines writing: "A system description is always from the perspective of an observer, and the questions or issues in which they are interested. […] So when we talk about a system we are not talking about a physical object but rather our limited mental representations of it. The system is not 'out there' but 'inside us'" (Kay 2008, 16). Even if we confine ourselves to ecology in particular this point has been emphasized. Collier and Cumming write: "[t]he difficulty of defining an ecosystem is complicated by the fact that any description of an ecosystem is from the perspective of an observer, and the focus of their description will be on the issues in which they are most interested" (Collier and Cumming 2011, 203).

All these authors emphasize the role of the observer or inquirer in studying complex systems. The implication is *pluralism* with respect to system descriptions. That is to say, there is no definitive single description of a given system but many. But let us make that more precise. Plural*ism* is usually understood to be normative in the sense that it provides some prescriptive claim (Mäki 1997). In this case, that there *should* be a plurality of system descriptions. Undergirding any specific form of pluralism, however, are the justifications, and here pluralists tend to differ. Some have motivated pluralism as a kind of temporarily useful state of affairs eventually to be discarded once relevant uncertainties can be sufficiently minimized (Kitcher 1991). Others have maintained that pluralism is neither a stepping stone towards a more enlightened situation, nor as it were the sorry imposition we happen to find ourselves in: pluralism reflects the complexity of the world. Mitchell (2002) writes "the diversity of views found in contemporary science is not an embarrassment or sign of failure, but rather the product of scientists doing what they must do to produce effective science" (p. 55).

The perspectival pluralism of e.g. Collier, Cummings, seems to go beyond the less substantive forms of the dogma.[4] That is to say, they are not merely claiming that there are practical, or indeed in-principle, epistemological limits – i.e. that we cannot for some reason access the true nature of the systems (but that there nonetheless may be such a true nature). If this is correct the position could be summarized as involving two claims: (1) *a perspective* is necessary for the system to emerge in the first place, and (2), there are several legitimate options.[5]

In many ways it seems clear that for ecosystems, as for many other kinds of systems, the representations used by scientists to investigate and understand real systems are constrained in ways that the systems themselves are not. For example, whereas actual ecosystems are rarely unambiguously bounded – although they may on occasion approach such an ideal – models of ecosystems have to be bounded. There is just no way of constructing them otherwise. Not to speak of all the further simplifications and idealizations that have to be deployed in order to make the models cognitively tractable and usefully manipulable.

For social systems these issues are further exacerbated, for several reason. An argument could be mounted that ecologists to a greater extent than social scientists share values and norms that dictate what is important and central about what they are studying as well as tools and practices (cf. Kuhn 1996/1962). Diagnosing the roots of this difference lays bare central conflict lines in the social sciences that is quite beyond the scope of this particular chapter. But let us just surmise that social systems are both highly complex and, in particular with respect to contemporary social systems, imbued with values. Descriptive claims about what it means for a social system to persist are often inseparable from normative claims about what that system should be. Deeply contested values come to the fore and remain there. This makes descriptions of social systems inherently unstable and tentative in a way that is obscured by an ontological notion of general resilience.

Now someone may object that complete and permanent destruction would surely pass for collapse on any reasonable construal of persistence thus providing a kind of baseline for distinguishing collapse and adaptation. Indeed, if one would consider Lotka-Volterra predator–prey models used in population ecology (and elsewhere) as an analogue – not unreasonable given that is whence the concept once sprung – such systems collapse when they are put on inescapable trajectories that lead towards the extinction of one (and then all) species. This is true, of course, but often enough we are interested in something more than the survival of the species, or the persistence of some city in a nominal sense. Thomas Campanella notes that "the modern city is virtually indestructible" (Campanella 2006, 142) if considered merely in terms of its physical manifestation. But a city is something more than its buildings, obviously, and reconstructing

it after a disaster still can involve some crucial breach of the continuity upon which its identity would hinge.

General resilience and self-governance

Now it is time to return to the issue of general resilience. If a pluralism like the one hinted at above is indeed an appropriate stance to assume, then that seems to speak against the use of a notion of general resilience. *Any* applicable notion of resilience – that is, that purports to say something about actual systems – involves implicit or explicit system descriptions. The point here is that talk of general resilience either misconstrues the property of resilience or, at best, is a puzzling way of thinking about the ontology and epistemology of complex systems.

Another possibility is that the distinction really captures the difference between resilience as an abstract concept and resilience as applied to a concrete situation. Applying the concept to an actual system necessarily relies on some kind of model or framework that provides points of attachment (see Thorén 2014). Otherwise we get into the kinds of difficulties with the collapse/adaptation distinction outlined above. In the abstract, of course, no such thing is needed. But again, if this is indeed what is intended, construing this in terms of two different abilities or properties of systems seems misleading.

Finally, we need to underscore that it is clear that it is useful to talk about something like the adaptive scope of different systems in relative terms. Some systems appear to have a broader adaptive scope than others, for whatever reason. Ismael (2011), for instance, illustrates such a difference by comparing self-governing systems with self-organizing systems. The former are systems that have a central processing unit (CPU) that manages what Ismael calls a *self-model*. A simple example is a ship that navigates using a map that has a representation of where the ship is that is continually updated. Self-organizing systems have no CPU and no self-model and instead relies on local interactions between "dumb" elements. Paradigmatic examples of self-organizing systems are colonies of insects or flocks of birds that coordinate activities "spontaneously". Ismael points out that there are important trade-offs made between these two idealized structures with respect to the scope and cost of adaptation. Self-organizing systems are computationally inexpensive but lack second-order capabilities of self-governing systems. The latter are involved in their own goal-setting in ways that self-organizing systems can never be. The benefit of self-governance is an enormous capacity to adapt to new situations. But this ability comes at great computational costs. Although Ismael argues these two adaptive strategies are analytically different they are not in practice mutually exclusive: real systems tend to blend them in various ways. The design problem is to get an appropriate balance.

Self-governing systems have, in an important sense, a much greater adaptive scope than self-organizing systems – that are to an extent hard-wired to respond to certain types of disturbances – and could perhaps thus be said to be generally resilient. This could possibly provide resilience theorists with a way of fleshing out the details with the added potential benefit that it is framed in a familiar terminology. The down-side is that self-governance is a much too broad notion to be particularly useful on its own. The general level theorizing does not help us much since there are massive differences between self-organizing systems in their ability to adapt.

The challenge of urban resilience

The argument presented above is aimed at showing how the notion of *general resilience* obscures how values and perspectives play a central, and ineliminable role in assessing systems in terms

of their resilience. In order to understand resilience *at all* we have to come to terms with *what* it is that is resilient. If this is indeed true, general resilience, at least on some formulations, starts to look like something of an oxymoron. There is a risk that one mistakes conceptual flaws for a genuine adaptive capacity.

The focus in this chapter has been on the concept of general resilience understood in ontological terms. One point was to show that this particular understanding is difficult to marry to an (arguably) sensible pluralism about system descriptions. This particular construal of concept is not perhaps necessary, but the notion does appear to have such connotation. That in turn risks obfuscating important aspects of how the concept works when applied to concrete situations. Towards the end of the last section, it was hinted at one possible understanding of the description that captures some of the aspects of the distinction. But let us now return to a different understanding of the distinction altogether – namely as a primarily epistemological distinction. On their online Wiki-style workbook on resilience thinking, the Resilience Alliance, in discussing this precise distinction, do warn that too narrow a focus on a particular construal of the system (specific resilience) is dangerous.

> The distinction between these two aspects of resilience [specific and general resilience] is important because there is a danger in focusing too much on known or suspected thresholds […]. If all the attention and resources of management are channeled into managing for identified (specified) resilience and associated thresholds, the management may inadvertently be reducing resilience in other ways – resilience to completely novel "surprises". There is therefore a need to consider both general and specified resilience.
>
> *(Resilience Alliance 2009, section 1.5)*

The over-arching idea captured in this quote is in line with what has been claimed here. What is objectionable about *general resilience* as a concept is not that one should not be wary of unknown unknowns. We have only a limited perspective of the consequences on urban areas of e.g. climate change and efforts to build resilience should be carried out whilst minimizing new vulnerabilities. The warning of the dangers of a singular focus on certain types of disturbances at the expense of all others is hence well taken. If this is indeed all that the general/specific distinction aims to do in this context, then the charge here should be understood as concerning terminology. General resilience brings unfortunate connotations that engenders rather than makes us wary of precisely the sort of myopia the Resilience Alliance implores us to be wary of. Here the focus has been on how a notion of general resilience tends to lead towards a monistic view of systems that simplifies the relationship between system descriptions and systems they describe. Some other concerns, like the tenability of a notion of universal and unconstrained adaptability, have been more tangentially touched upon.

Finally, the conclusion here is thus neither that *resilience* as such is an inherently flawed concept, nor somehow unworkable for social systems such as urban systems, but that care needs to be taken to avoid overly reductive accounts that the notion of general resilience in this context can be counter-productive.

Notes

1 It is notable that the stability/resilience distinction that so much turns on in early texts, such as Holling (1973) is now sometimes explicitly conflated. For an example of this see Meerow *et al.* (2016). See also

Hansson and Helgesson (2003) for a careful conceptual analysis of these two notions are related to one another.

2 In his original paper on resilience Holling emphasised that measurability was a crucial aspect of the concept (Holling 1973, 19). In the social sciences measurements are typically introduced in the form of (sometimes aggregated) indicators, see e.g. Cutter *et al.* (2010) and Sherrieb *et al.* (2010).

3 These issues even flared up in the popular press briefly (see e.g. Reid and Skoglund, 2017).

4 For instructive overviews of the idea of pluralism see e.g. Kellert *et al.* (2006) and Mäki (1997). See also Mitchell (2009).

5 This can be contrasted against the reductionism of e.g. Holling when he writes that the "complexity of living systems of people and nature emerges not from a random association of a large number of interacting factors rather from a smaller number of controlling processes" (Holling 2001, 391).

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