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Abstract

This study analyses the use of contextual and universal variables to assess the resilience of human systems. The article examines the terms 'contextual' and 'universal' in relation to resilience variables, how widely accepted different variables are as indicators of resilience, and the extent to which variables can be classified using these conceptual terms. The article analyses how the 'direction' of a variable indicating either resilience or vulnerability can be assessed and argues that often the same variable can be interpreted differently for the resilience of a human system, depending on the context of the system under investigation and the positionality of the researcher. The study informs future resilience research by providing a clearer understanding of the role and status of different variables in relation to measuring and understanding the different domains of resilience in different spatial and research contexts, and invites researchers to think more reflexively about their interpretations of resilience variables.

1. Introduction

The notion of 'resilience' in human systems has assumed ever greater scientific and socio-political importance over the past few decades given the extent and gravity of environmental threats facing societies throughout the world (Adger, 2000; Cote and Nightingale, 2012). The concept of resilience has been developed from its ecological systems origins as an approach to understand changes in human systems at various spatial scales, over several time horizons and in relation to many different aspects of environmental change. More recently, the concept has broadened to include the study of social, economic and political as well as environmental change (Brown, 2015). Resilience has become a key tenet of policy-making at international as well as national levels as it is perceived to be an essential component of sustainable development as illustrated in the United Nations Sustainable Development Goals: "we are determined to take the bold and transformative steps which are urgently needed to shift the world on to a sustainable and resilient path" (UN, 2015, 1).

Resilience is generally understood as the capacity of a human system (whether individuals, households, communities or larger spatial scales) to absorb disturbance and reorganize while undergoing change to still retain essentially the same function, structure, identity, and feedbacks. Resilience is often assessed by the size of the displacement a system can tolerate and yet return to a state where a given function can be maintained. Walker and Salt (2006) distinguished between three different aspects of resilience: persistence, adaptability, transformability. In this view, resilient systems should have the capacity to buffer shocks and conserve existing functions and structures in the face of disturbances (persistence); they should be able to reorganise and learn within the current system (adaptability, adaptive capacity); and they should have the capacity to create a new trajectory rooted in change (transformability). Shocks and disturbances can, therefore, also be positive, and can lead to a system to implement transformative change. A key concept within the resilience literature is the ability of human

systems to use their own 'capitals' (social, political, human) as opposed to relying on external actors. Resilience is, therefore, often associated with decentralised decision-making and empowerment at local and community level.

Both Emery and Flora (2006) and Kelly et al. (2015) suggested that the resilience of human systems can be best understood as the interplay between social, economic, cultural, political and environmental dimensions as well as the capacity of each to respond and adapt to change[1] (Figure 1). In this sense, resilient human systems are generally found where these dimensions or 'domains' are strongly developed (e.g. strong social ties, strong and diversified economy, evidence of cultural pride/strong social memory, inclusive governance systems and a well-managed environment). In vulnerable systems one or several of these domains are poorly developed (e.g. weak social ties, monofunctional economy, lack of cultural pride/weak social memory, non-inclusive governance structures, poorly managed environment). There is, nonetheless, debate about the relative importance and contribution of each dimension to resilience, given the variety of human systems that exist (Kelly et al., 2015).

Figure 1: Conceptual framework for analysing community resilience
(Source: authors, after Emery and Flora, 2006; Kelly et al., 2015)

Opinions differ as to whether 'resilience' is the antithesis of 'vulnerability' and whether resilience should be seen as a normative concept that can help policy-makers to influence system development pathways in particular ways. In this study we follow Adger's (2000), Cote and Nightingale's (2012) and Wilson's (2017) suggestion that resilience *should* be seen as a normative term, where the resilience of a system is the antithesis of system vulnerability. In this view, system vulnerabilities can be identified and overcome to improve the resilience of a system.

Despite the widely recognised potential of resilience to understand and promote change in a sustainable way, there are several conceptual and methodological criticisms of the resilience approach. Conceptual debates have been discussed in detail elsewhere (e.g. Walker and Salt, 2006; Brown, 2015), but criticisms of methodologies employed to measure resilience include in particular the 'case specific nature' of resilience and the difficulties of establishing generally agreed methodological approaches. The abstract and 'fuzzy' nature of resilience as a concept means that there is no one single resilience variable that can be measured. Instead, resilience must be inferred from a number of variables or indicators. Cosco et al. (2016, 1), for example, argued that "owing to the unobservable nature of the construct, resilience cannot physically be

[1] This differs somewhat from studies focusing on individuals where specific methodologies such as the Connor-Davidson Resilience Scale have been developed to assess resilience (Connor and Davidson, 2003).

measured, only inferred via measurement of its … constituent components". Jones and Tanner (2015, 8) argued that the lack of clarity surrounding the concept of resilience "further muddies the water particularly when it comes to designing tools for the measurement of resilience". The widening of the concept of resilience to include the five domains noted above means that there are many variables that could potentially be used to measure resilience. As Cumming et al. (2005, 976) emphasised, "it is by no means obvious …which variables should be measured in a given study of resilience". Cutter (2016, 3) noted that "the landscape of resilience indicators is just as diverse as the systems, communities, or disasters that are studied". This point was re-emphasised by Keating et al. (2017, 3) who argued that there is "no one-size-fits-all resilience measure, nor should there be".

As both Rigg (2006) and Sharifi (2016) emphasised, the selection of resilience variables has implications for real people, and the application of resilience methodologies to 'real world' contexts emphasises that resilience is not just an abstract academic concept but that it can be and is being used to change and influence lives and livelihoods. In investigating resilience it is, therefore, important to be aware of who conducts resilience research, for whom and for what purposes. Resilience research can be broadly divided into two categories: 'applied' research carried out by policy-makers and planners and aid agencies (the latter especially where communities are affected by sudden shocks such as natural hazards and disasters) with the purpose of enhancing the resilience of the study area; and 'pure' research carried out by academics to understand resilience as a theoretical concept. In the former case, choice of methodology and therefore variables may be influenced by the views of the research agency as to what a resilient community should be, in other words it is informed by normative values (which can be classified as 'top down' in nature). In these studies there may be a tendency to study more 'objective' variables that can be more easily measured and compared with other systems, although there is also a recognition that "the attributes of a system that determine its resilience are highly context specific" (Resilience Alliance, 2007, 36; Welle and Birkmann, 2015). In the latter case, the researcher may seek to study resilience from the viewpoint of the subject (a more bottom-up approach) which will also affect choice of variables, often including the choice of more qualitative, subjective variables that are more context specific. Critical commentators such as Cote and Nightingale (2012) have further criticised the one-sided selection of resilience variables in many studies based on what they term a 'modelling culture' – i.e. selection of variables that lend themselves to quantification rather than to analysing complex human processes. Many resilience studies have been criticised for lack of reflexive engagement with both the selection of variables and their interpretation (e.g. Cumming et al., 2005). Cote and Nightingale (2012, 481) have, therefore, challenged "the positionality and subjectivities" of commentators researching resilience. A better understanding of methodological approaches and their underlying purposes will help researchers across a broad range of disciplines to share findings and data that may ultimately result in more resilient systems.

Several studies have critically engaged with different types of resilience variables at various spatial scales. These include (to name but a few): Anderies et al.'s (2004) analysis of the robustness of human systems from an institutional perspective; the much-cited list of resilience variables suggested by the Resilience Alliance (2007); the discussion of variables to assess community resilience (e.g. Buikstra et al., 2010; Wilson et al., 2018); Ahlborg and Nightingale's (2012) analysis of mismatches between 'scales of knowledge' in assessing the resilience of human systems; Cumming et al.'s (2005) contribution on empirical measurement of resilience processes; Frazier et al.'s (2013) analysis of spatial and temporal quantification of resilience to natural disasters at community scale; Cutter's (2016) overview of 27 assessment tools to 'measure' community resilience in relation to natural hazards; Bergstrand et al.'s (2015) identification of generic and specific indicators of vulnerability to disasters and Davidson et

al.'s (2016) innovative suggestion for a resilience typology to help operationalisation of resilience methodologies. These studies all highlight the lack of integration between the disciplines and the variety of methodological approaches used.

Wilson et al.'s (2018) study of the resilience of a remote mountain community in the European Alps is one of the few studies that recognises that specific resilience variables can be either objectively or subjectively interpreted in the measurement of resilience (e.g. educational levels as an 'objective' variable; the importance of rites, traditions and taboos as 'subjective variables'). They argued that "objective resilience variables include those where there is relatively little debate as to the 'direction' of impact of the variable on resilience … while subjective variables include those where interpretation of impact is highly dependent on cultural norms and positionality of those doing the interpreting" (Wilson et al., 2018, 375). Jones and Tanner (2015, 8) similarly argued that "the subjective elements of resilience are associated with a range of issues such as perceptions of risk … beliefs and culture, social norms … power and cultural identity". Moore et al. (2014) coined the interesting notion of 'reflexive resilience', meaning a system that reflexively engages with resilience challenges. The notion of 'objective' and 'subjective' variables can be seen as a way of categorising whether a particular variable is universally present/measurable and recognised as an indicator of resilience (or vulnerability) or whether it is contextual, less easily measured and a less widely accepted indicator of resilience.

The aim of this study is, therefore, to critically analyse the use of what we term contextual and universal variables to assess the resilience of human systems, and to assess the role of both types of variable in resilience research, both by policy-makers/practitioners and academic researchers. The article will examine what is meant by the terms contextual and universal in relation to resilience variables, how widely accepted different variables are as indicators of resilience, and the extent to which variables can be classified using these conceptual terms across the five domains of resilience (economic, environmental, social, cultural and political; Figure 1). A key question to be asked will be how the 'direction' of a variable indicating either increased resilience or vulnerability can be assessed? Can the same variable be interpreted differently in its meaning for the resilience of a human system depending on the local context of the system under investigation and the positionality of the researcher?

While examples of variables will be discussed, it is not the aim to provide a comprehensive list of resilience variables as this would be beyond scope of this study, nor does the paper discuss how to measure the 'accuracy' of resilience variables (see for example Welle and Birkmann, 2015 for a discussion of the robustness of indicators used in risk indices). It is also acknowledged that discussing variables in isolation does not reflect the complex spatial and temporal interrelationships between variables that affect resilience in practice (Meerow and Newell, 2016). Instead, the aim is to invite critical debate about the differing approaches to assess resilience and the assumptions that underlie these. While the discussion will be relevant in the context of resilience of human systems to both fast-and slow onset shocks/disturbances, it will be most relevant for understanding resilience to anthropogenic slow-onset shocks/disturbances such as economic restructuring, political and social upheaval or (on a longer time scale) climate change. It is intended that the outcome of this analysis will inform future approaches to resilience research through providing a clearer understanding of the role and status of different variables in relation to measuring and understanding the different domains of resilience in different spatial and research contexts, and to invite researchers to think more reflexively about their interpretations of resilience variables.

2. Resilience variables: subjective/contextual and objective/universal assessments

This study argues that there are essentially two types of variables used to assess the resilience of human systems: universal variables and contextual variables. On the one hand, ***universal resilience variables*** can be understood as variables that are *universally applicable and that can generally be objectively interpreted* in their utility as resilience variables. In other words, irrespective of social or cultural context and irrespective of the positionality of the commentator, universal resilience variables are applicable in any geographical or temporal context. This means that the 'direction' of resilience or vulnerability that universal resilience variables indicate is generally accepted, i.e. the spatial context or positionality of the researcher does not influence the interpretation of the variables. These variables are often underpinned by international standards and conventions, for example the United Nations Sustainable Development Goals (UN, 2015). These variables also often lend themselves to quantification and can often be obtained through secondary data. We will argue in more detail below that there is a tendency for non-academic stakeholders (NGOs, aid agencies, policy-makers) to place greater emphasis on such universal variables and that, as a result, these variables are also often used as 'proxy' variables for assessing resilience.

On the other hand, ***contextual resilience variables*** are variables that are *context-dependent* and that are generally *subjectively interpreted*. Contextual variables may be contested as indicators of resilience or vulnerability as social, cultural and geographical context and the positionality of the commentator play a crucial role in how these variables are interpreted with regard to whether they describe increased resilience or vulnerability of a system. Subjectivity, thus, relates here to the assumption that these variables may be interpreted differently as to their relative importance and weighting for assessing resilience depending on socio-cultural context and positionality of the observer.

The following discussion will analyse universal and contextual resilience variables in relation to the five domains of resilient communities shown in Figure 1. The discussion is based on a detailed review of the resilience literature, including academic articles and books but also non-academic sources, such as reports by the United Nations or the Resilience Alliance, as well as drawing on long-standing experience by the authors working on various aspects of community resilience in different socio-cultural settings. The discussion will, inevitably, be selective and will focus particularly on either contested variables or those that best illustrate the differences between universal and contextual variables. Table 1 shows selected variables discussed below and their relative levels of universality or contextuality. The table suggests that universal variables are generally accepted as showing processes enhancing or decreasing resilience, while contextual variables are ambiguous with regard to being either negative or positive for resilience (depending on the positionality of the commentator and the specific context of study). Most of the universal variables are also identified as, or linked to, sustainable development goals by the UN (2015). The contextual variables, on the other hand, are not directly identified as sustainable development goals, either because their relevance to sustainable development is not yet universally accepted and/or because they are more subjective and therefore harder to measure. A key aim is to examine the balance of universal and contextual indicators for assessing resilience for each of the five domains shown in Figure 1 (above), while acknowledging that there are complex linkages between them. The findings will be summarised on a diagram (see Figure 2 below) to highlight the domains that are more closely associated with universally recognised variables and those that are more associated with contextual variables.

Resilience domain	Resilience variable examples	Universal or contextual?	Link to UN Sustainable Development Goals (UNSDG)	Examples of use in resilience research
Economic (predominantly universal variables)	Wealth/poverty	universal	1 and 10 (end poverty; reduce inequality)	Rigg (2006); Brown (2015)
	Financial capital	universal	8 (sustainable economic growth)	Jones and Tanner (2015); Wilson et al. (2018)
	Economic structure	universal	2 (sustainable agriculture); 8 (sustainable economic growth)	Kelly et al. (2015); Davison et al. (2016)
	GDP/capita	universal	8 (sustainable economic growth)	Costanza et al. (2009); Wilson (2012b)
	Purchasing power parity	universal		Costanza et al. (2009); Wilson (2012a)
	System embeddedness into the global capitalist system	contextual	8 (sustainable economic growth)	Anderies et al. (2004); Wilson (2012b)
	Infrastructure development	universal	9 (build resilient infrastructure)	Resilience Alliance (2007); Lebel et al (2006)
	Energy availability	universal	7 (access to modern energy for all)	Rigg (2006); Wilson et al. (2018)
Environmental (mainly universal variables)	Climate change related variables	universal	13 (combat climate change)	Adger (2000); Anderies et al. (2004)
	Access to clean water and sanitation	Universal	6 (water and sanitation for all)	Cumming et al. (2005); Resilience Alliance (2007)
	Ecosystem stability and sustainable resource use	Universal	15 (sustainable use of terrestrial ecosystems, forests, combat desertification, halt and reverse land degradation and halt biodiversity loss)	Adger (2000); Davison et al. (2016)
Social domain (universal and contextual variables)	Bonding capital (e.g. networks, trust, communication, indigenous knowledge systems)	Contextual		Kelly et al. (2015); Wilson et al. (2018)
	Bridging capital (cohesion, cooperation, interaction over several scales)	Contextual		Kelly et al. (2015); Davison et al. (2016)
	Education	Universal	4 (education and lifelong learning)	Resilience Alliance (2007); Brown (2015)
	Immigration/outmigration	Contextual		Anderies at al. (2004); Wilson et al. (2018)
	Health and well-being (e.g. access to health services; absence of psycho-pathology in community)	Universal	3 (healthy lives and well-being)	Cumming et al. (2005); Resilience Alliance (2007)
	Self-expressed happiness	Universal		Walker and Salt (2006); Wilson et al. (2018)
	Empowerment of women	Universal	5 (gender equality and empowerment)	Rigg (2006); Smyth and Sweetman (2015)
	LGBT rights	Contextual		Beyrer (2012); Kosciw et al. (2014)
	Housing and shelter	Universal	11 (inclusive cities and settlements)	Resilience Alliance (2007); Costanza et al. (2009)

Cultural domain (predominantly contextual variables)	Rites	Contextual		Wilson (2012a); Wilson et al. (2018)
	Language/dialects	Contextual		Anderies et al. (2004); Wilson et al. (2018)
	Traditions	Contextual		Rigg (2006); Brown (2015)
	Religion	contextual		Yang et al. (2017); Pinker (2018)
	Worldviews	Contextual		Wilson (2012a); Pinker (2018)
	Taboos	Contextual		Adger (2000); Wilson (2012a)
Political domain (predominantly contextual variables)	Governance system (e.g. representative/ pluralist democracy; first past the post; proportional representation; autocratic regime)	Contextual		Brown (2015); Davidson et al. (2016)
	Power	Contextual		Brown (2014); Brown (2015)
	Legal system	universal	16 (access to justice for all)	Adger (2000); Brown (2015)
	Institutional transparency	Universal	16 (effective, accountable and inclusive institutions)	Brown (2015); Kelly et al. (2015)
	Land ownership	Contextual		Adger (2000); Buikstra et al. (2010)

2.1 Economic resilience variables

Economic resilience variables are commonly used to assess the resilience of a human system and can be mainly categorised as universally accepted variables (Costanza et al., 2009; Wilson, 2012b). Most commentators are in general agreement about what 'positive' or 'negative' economic resilience indicators are (Rigg, 2006). For example, in almost any context 'poverty' would be seen as bad for resilience by locking in stakeholders into negative pathways with low adaptive capacity and transformability, while surplus capital generated in a human system (i.e. relative wealth, high income, high standard of living) is usually seen as positive for engendering stronger resilience pathways as it opens up more opportunities for adaptive capacity and transformability of a system (Jones and Tanner, 2015; see Table 1). The first of the UN Sustainable Development Goals is to end poverty, highlighting the internationally accepted importance of tackling poverty. Similarly, a narrow focus of a human system on a monofunctional economic activity would generally be seen as an indicator of vulnerability (Resilience Alliance, 2007), whereas multifunctional and diversified economic systems are usually seen as better adapted to buffer shocks and disturbances (Wilson, 2012a).

However, poverty is relational and subjective assessments of resilience become apparent when comparing wealth or poverty across human systems and inferring specific resilience traits from these (Rigg, 2006; Costanza et al., 2009). For example, in non-monetised societies (e.g. hunter-gatherer societies) 'economic' resilience needs to be assessed based on non-monetised wealth associated with the ability to fulfil basic needs and wants. The resilience of systems deemed by Western observers as 'poor' may, therefore, be stronger as long as basic human needs of food, water, shelter and hygiene are fulfilled. This point highlights that GDP/capita-related quantitative variables to assess resilience are problematic and that GDP/capita may only be a meaningful objective variable if compared over time (Costanza et al., 2009). In the context of the resilience/vulnerability of a remote mountain community in the Alps, for example, Wilson et al. (2018, 382) argued "that even in wealthy European countries, and within a community that has many relatively wealthy and well-connected residents, tipping points towards vulnerability are never far". As a result, purchasing-power-parity has been used as a

more meaningful variable as it can be linked to relative economic resilience of human systems (Costanza et al., 2009), while others have suggested increasing focus on understanding the complex interlinkages between *equitable* wealth distribution and resilience in human systems (e.g. Adger, 2000). Thus, although there is a general understanding that wealth and poverty are universal resilience variables, it is only through their embeddedness within specific spatial and temporal contexts that the 'direction' of these variables for resilience makes sense.

Yet, there are also economic variables that are contextual. The embeddedness of an economy into the global capitalist system is a case in point which strongly interlinks with political factors and the positionality of the researcher (e.g. whether from a more or less globalised part of the world) (Kelly et al., 2015; Jones and Tanner, 2015). As Wilson (2012b) argued there are essentially two schools of thought. One argues that globalisation can be good for resilience as it is often linked to improved education, improved trading opportunities, and access to ideas, technology and opportunities well beyond the confines of a community or region. The other school of thought argues that globalisation leads to a widening gap between rich and poor due to loss of local control over means of production. This widening of income disparities can reduce resilience by creating social and economic divisions and the disintegration of traditional social networks (often an indicator of vulnerability) (Piketty, 2014). In this view, although global poverty has been reduced through globalisation processes this has not meant that the vulnerability of poorer members in many societies has been reduced, especially in rural areas of the developing world (Rigg, 2006).

Nonetheless, both the relative availability of economic resilience variables and the fact that most economic resilience variables are seen as objective and universal has meant that emphasis has been placed in resilience studies on assessing economic factors, especially on the part of policy-makers (Cumming et al., 2005). It, therefore, comes as no surprise that the UN Sustainable Development Goals place primacy on economic variables. They also tend to be used in a normative way, especially when used by policy-makers, in that 'improvements' in economic indicators are seen as an indication of improved resilience and conversely a deterioration is seen as indicating vulnerability.

2.2 Environmental resilience variables

Environmental resilience variables are at the heart of resilience studies given the origins of resilience research in ecology (Adger, 2000) and frequent analysis through the conceptual lens of social-ecological system theory (Walker and Salt, 2006). The emphasis on the 'ecological' in socio-ecological resilience studies explains why research into environmental resilience variables has often been foregrounded over more opaque variables linked to culture, politics and power (Brown, 2014; Biermann et al., 2015).

Many environmental resilience variables are universally accepted as there is general agreement about what natural and environmental parameters a human systems needs to be resilient irrespective of the socio-cultural context within which they are interpreted (Adger, 2000; see Table 1). In other words, a researcher from Afghanistan, France or the Democratic Republic of Congo would be likely to interpret environmental resilience variables in similar ways, while the same is unlikely to be true for other resilience variables (see below). The universality of environmental resilience for sustainable development is reflected in three of the UN's Sustainable Development goals (6, 13 and 15; see Table 1).

Environmental resilience variables are often measured over longer time series that enable change in the state of a system to be identified (Cutter, 2016). Most frequently environmental resilience variables include climate change related parameters such as changing temperatures and rainfall, taking into account 'natural' variability of a system. Climate change variables

nonetheless need to be assessed on a case-by-case basis as only through as complete an understanding as possible of local/regional environmental conditions such as soil and water resources, vegetation cover, biodiversity, and vulnerability to environmental hazards can assumptions be made as to whether a system is transitioning towards improved environmental resilience or worsening vulnerability. There is also little debate about the importance for resilience of environmental variables such as access to fresh/clean water and air within a human system and protection of environmentally important resources such as landscape and biodiversity. Here it is most commonly argued that, as long as these resources are used sustainably (however measured), the system should remain resilient in environmental terms (Wilson, 2012a).

Nonetheless, some environmental resilience variables are contextual and highly culturally contingent. For example, *land degradation* is generally viewed as a key indicator for loss of resilience. While there is little debate that human systems need healthy and well-managed soils for long-term survival (Imeson, 2012), perceptions about what is a 'degraded' landscape are highly subjective. Seminal work by commentators such as Roxo and Casimiro (1998) and Imeson (2012) has shown that what researchers from northern latitude countries who provided the bulk of initial research on global land degradation often saw as severely 'degraded' landscapes in Mediterranean, Middle Eastern or northern African contexts, often turned out to be relatively 'stable' landscapes that had changed very little over longer time spans, suggesting stability rather than vulnerability. Thus, while land degradation *per se* is a relatively universal indicator of vulnerability, the positionality of the researcher is important for the interpretation of the *severity* of degradation processes. While this subjectivity is arguably most pronounced in the context of soil-related land degradation, some critical commentators have also argued that a Western-dominated 'gaze' of other degraded landscapes (e.g. deforested landscapes, loss of amenity values of landscapes) may equally over-emphasise assumptions of degradation based on research experiences from northern countries with relatively stable soils and abundant rainfall. This example also highlights that resilience can only be assessed by examining change in variables over time, while assessing the resilience of a system using data for one point in time can lead to subjective assessments.

Environmental resilience variables, thus, can mostly be assessed objectively and are among the most universally accepted set of resilience variables, but the assessment of certain environmental resilience processes requires careful thought about the positionality of the researcher.

2.3 Social resilience variables

Social resilience variables are among the most important variables in resilience research "because they mediate the relationship between socio-economic and environmental components of a system" (Kelly et al., 2015, 13). The positionality of researchers plays a more important role in assessing social resilience variables than it does for economic and environmental variables, as often different interpretations of positive or negative social resilience indicators emerge depending on a commentator's socio-cultural context.

Critical resilience researchers such as Cumming et al. (2005), Wilson (2012a) or Kelly et al. (2015) have highlighted the wide range of social resilience variables linked to what has been termed 'bonding' and 'bridging' capital in human systems. Bonding capital refers to the links (networks, trust) between like-minded stakeholder groups and the reinforcement of homogeneity in human communities. Through bonding capital networks of stakeholders can build up strong ties and cooperative connections with each other (which can also exclude those who do not qualify for the peer group). Bridging capital, meanwhile, usually refers to the

building of connections between heterogeneous groups, i.e. outside the immediate peer group. Bridging networks are often more fragile but can also foster social inclusion. Key variables associated with bridging capital include communication between stakeholder groups, learning processes, indigenous knowledge systems, discourses, gender roles and/or inclusion/exclusion of disadvantaged groups in society (Cote and Nightingale, 2012; Brown, 2014). Strong bonding and bridging capital are usually seen as key social resilience indicators, although interpretations about the importance of the depth and nature of bonding, and its implications for strengthening or weakening social capital, will often be contextually contingent (Cumming et al., 2005; Wilson, 2012a). For example, Kelly et al. (2015) and Wilson et al. (2018) highlighted how outmigration by young people from a community can, on the one hand, reduce resilience by negatively influencing how skills and knowledge are passed on through the generations (learning ruptures and disruption of social memory), while, on the other hand, raise community resilience through the sending back of much needed financial help through remittances or by bringing back newly acquired skills. Adger (2000, 355) argued that "changes in resilience cannot simply be inferred from the presence or absence of migrants in any area or community". The variable outmigration can be seen as both a *response* to reduced resilience within a community or region but also as a *cause* of increased vulnerability by adversely affecting bonding capital. Arguably, bonding capital, bridging capital and migration can only be assessed as resilience variables through contextual assessments.

Many social resilience variables can nonetheless be classified as universally accepted. Few would disagree that a good level of health and well-being as well as self-expressed 'happiness' are variables associated with resilience (Cosco et al., 2016). Housing and shelter are also universally recognised. This point links directly to discussions about 'objective well-being' determined by the extent to which they satisfy a predefined list of variables deemed to assess what makes up a 'good life' (Diener, 2000). Global-level assessments such as the World Values Survey, for example, use universally accepted variables that show that in 45 out of 52 countries happiness increased between 1981 and 2007, suggesting a relative increase in personal resilience (Pinker, 2018). Further, trust, access to education, well-established lines of communication, strongly established learning processes within a community, and strong ties between individuals and stakeholder groups are also universally accepted resilience indicators irrespective of the socio-cultural background of the commentator (Wilson, 2012a).

Most researchers would identify gender as a universal variable affecting resilience, with the status and empowerment of women seen as an indicator of vulnerability (low female status) or resilience (higher female status) (see for example Smyth and Sweetman, 2015; Drolet at al., 2015). From a Western and developed economies' perspective, in particular, there is little debate that gender equality raises the resilience of a human system by empowering women and strengthening bonding capital between male and female stakeholder groups. Yet, both local community leaders and external agencies (Morchain et al., 2015) see women and girls as frequently more vulnerable to environmental, economic or political pressures due to their less 'visible' position in many societies, which means that their specific needs are often overlooked. For example, in a study of the impact of flooding in the Sindh district of Pakistan, an area where the status of women is internationally recognised as low, women were disadvantaged by the lack of appropriate shelter provided for them (as according to local customs women are expected to live in seclusion). The study also found that women's workloads increased after flooding as they took on 'men's' work in the fields as well as their traditional activities in the home (Drolet et al., 2015).

While some studies of resilience have been criticised for accepting the social status quo of a community, even where the status quo is 'unjust' (Meerow and Newell, 2016, 5), gender and the role of women has become widely recognised as a transformative issue in resilience research. As well as being a universally recognised indicator of resilience, gender is also an

internationally recognised indicator of human rights and sustainable development. The UN Sustainable Development Goals state that the 17 adopted sustainable development goals "seek to realise the human rights of all and to achieve gender equality and the empowerment of all women and girls" (UN, 2015, p. 1). Goal 5 concerns gender equality and the empowerment of all women and girls. Gender is therefore also generally recognised as a normative variable in resilience research in that researchers (as well as aid and development agencies) seek to enhance women's empowerment through their resilience research (Smyth and Sweetman, 2015). Their aim is to achieve lasting improvements in the status of women which will have wider benefits for the resilience of communities. Morchain et al. (2015, 485) argued that "in order to be transformative, resilience-building initiatives need to be understood as a long-term process of social transformation, and should therefore incorporate a stronger focus on confronting attitudes and beliefs about gender in order to shift the power dynamics that exacerbate vulnerabilities". The UN's international commitment to gender equality reflects this widely held normative view.

The universality of gender (and specifically women's status) as a resilience variable, however, does not mean that gender can be used uncritically in resilience research. Drolet et al. (2015) noted that the specific role and status of women is context-specific and cannot be assumed. They also highlight that gender is intertwined with other variables such as age, education, disability, poverty and language, meaning that the resilience of women in any situation will be nuanced. For example, in a study of migrant farm workers in a rural community in Florida, researchers found that non-English-speaking migrant workers were overlooked by official agencies, and that migrant women in particular were isolated (Drolet et al., 2015). Morchain et al. (2015) also point out that researchers and aid workers can meet resistance when working with local communities. They note an example from South Africa where a study looking at gender-based violence and the risks of HIV was hi-jacked by local men who blamed women for these problems. This example highlights that while improving women's status is internationally recognised as a key development goal, it will not always be locally accepted, highlighting the need for a culturally nuanced and context specific approach to this aspect of resilience.

However, some social resilience indicators are highly contextual and strongly contingent upon the socio-cultural background of the commentator (Kelly et al., 2015). Recent social developments and debates across the world about empowerment of lesbian-gay-bisexual-transgender communities (LGBT) have been highly instructive in this respect. Most Western societies have come to accept equal rights for LGBT communities (e.g. gay marriage legalised in Holland 2001, UK 2014, Australia 2017). This recognition has contributed both towards improved resilience of these formerly marginalised groups as well as increasing resilience of society as a whole through more inclusive decision-making structures, improved adaptability of systems acknowledging LGBT rights, and increased transformability of systems that see LGBT stakeholders as having equal rights for self-expression. However, the question of LGBT rights in many countries is still far from being recognised, and indeed is seen in many cultures as a threat to the status quo and thereby increasing vulnerability (Kosciw et al., 2014). It is highly likely that discussions around LGBT issues will gather pace over the next years, and that in a few decades it will be commonplace globally to regard inclusive approaches towards LGBT groups as part-and-parcel of the resilience building process. However, at present inclusion of LBGT stakeholders has to be seen as a contextual resilience variable.

2.4 Cultural resilience variables

Ganga and Scott (2006) highlighted how positionality is particularly important in the context of resilience research on cultural issues, precisely because the notion of 'culture' itself – what it means and what its individual components are – is highly contextual. It comes as no surprise, therefore, that interpretation of **cultural resilience variables** is one of the most subjective elements of any assessment of resilience of human systems, leading Kelly et al. (2015, 13) to suggest that cultural variables "are among the most challenging" in resilience methodologies. Indeed, there is little consensus in the critical resilience literature about the importance and role of many cultural variables for resilience. The same cultural indicator can be interpreted as raising resilience by some commentators while reducing resilience for others, leading Jones and Tanner (2015, 12) to ask whether "resilience is culturally relative" and Diener (2000) to emphasise the constantly shifting basis of cultural resilience variables across societies based on culturally-defined social norms. Arguably this is one of the reasons why many resilience studies have shied away from investigating in-depth the role of cultural resilience variables (Kelly et al., 2015). Notably, the UN Sustainable Development goals only refer to local culture in the context of promoting tourism.

Key cultural resilience variables include the importance of rites, dialects, traditions, religion, worldviews and taboos in human systems and how they may raise or lower resilience (Wilson, 2012a). While for some commentators rites and traditions are crucial components for raising resilience of a human system by suggesting important linkages with social memory and the passing on of skills from one generation to another (e.g. Wilson et al., 2018), for others rites and traditions can 'lock-in' communities or societies into dangerous pathways of vulnerability (Pinker, 2018). Similarly, whether the maintenance of local languages or dialects is an indicator of resilience is highly contextual. For some, dialects can be a sign of self-assertiveness, autonomy, self-regulation and pride in a community, while for others local dialects may be seen as a parochial lock-in preventing modern ideas and forms of communication entering a community. In a recent study on the resilience of a remote mountain community in the Austrian Alps Wilson et al. (2018, 379) supported the importance of dialects for resilience as

> "tradition through language continues to be very important … Maintenance of the local dialect has led to a recent 'identity push' as the dialect is perceived to be very important in the community … suggesting that the dialect shows clear signs of survival of community networks as well as pride in the locality".

Religion also emerges as one of the most contested and contextual cultural resilience variables. Does religion help the resilience of individuals, stakeholders, communities or society, and do different religions influence resilience pathways and in what ways? It is here that the socio-cultural positionality of the observer becomes particularly crucial, as it is almost impossible to argue a case for or against religion and resilience without considering one's own cultural and religious norms which are, inevitably, used as a yardstick to assess the importance of religion in a specific case study. Thus, on the one hand those suggesting that religion can raise resilience have argued that humans have needed a spiritual dimension in their lives for millennia, often through veneration of specific objects with talismanic purpose and rituals to access the transcendent and to connect people to invisible worlds (e.g. the cross, figure of Buddha). Religion is, thus, a socio-cultural phenomenon present in every age of history. This is becoming particularly clear in modern China where a modernising population is looking for a religious moral framework to go with its new wealth and mobility (Yang et al., 2017). Brusco (2010) highlighted how in the case of Columbia spirituality/religion can help increase individual-level resilience especially as religion can help people to situate themselves within common frameworks and belief systems, and to cement and express social bonds. Some have argued that churches and religious centres are often the only functioning community organisations maintaining and supporting resilient pathways (e.g. O'Neill, 2015, for Guatemala).

On the other hand, arguments against religion as a resilience variable and as a force for disruption and vulnerability are plentiful, including religious wars, the Christian church's position on LGBT issues, the apartheid regime underpinned by the Dutch Reformed Church in South Africa, etc. Some critics have also argued that the belief by some religious groups in the imminent apocalypse (e.g. Pentecostalism) militates against strong social engagement and, therefore, the need for building strongly resilient societies (Pinker, 2018). For these critics a decline in religiosity may, therefore, be an indicator for *increased* resilience. As a result, few resilience studies have critically engaged with the question of religion as a key resilience attribute, and overall most studies have tended to avoid investigation of complex cultural variables and resilience.

2.5 Political resilience variables

Finally, **political resilience variables** include a mix of universal and contextual variables but are very contentious as to their impact on resilience (Wilson et al., 2018). The role of politics and power in resilience raises a number of questions, for example: are democratic political systems likely to engender more resilient human systems than non-democratic ones? Are certain institutional structures more likely to increase resilience? What impact does corruption have on resilience?

A key argument comes from those advocating neo-liberal governance systems, where the role of the state itself is questioned as a key facilitator of resilience processes and where questions are asked about whether improving the resilience of human systems is better served through market forces and business interests (Piketty, 2014). Indeed, several commentators (e.g. Meerow and Newell, 2016; Wilson, 2017) have argued that resilience can increasingly be interpreted as a neoliberal project, especially as many mainstream resilience researchers see neoliberal pathways as the key to making societies more resilient. Some critical commentators on the other hand have argued that resilience is compromised by neoliberal ideology, for example Reid (2012, 67) refers to the "disastrous and politically debased subject of resilience". By incorporating political resilience factors into research on the resilience of human systems, some suggest, therefore, that resilience research has tended to reinforce rather than challenge the neoliberal status quo (e.g. Davidson et al., 2016; Wilson, 2017). As the above has highlighted, this raises fundamental questions about the 'best' socio-political development pathways and, indeed, the importance of democratic processes themselves in building resilience. Thus, could a political-economic system such as China's be more conducive to developing resilient pathways than that of 'ultra'-neoliberal countries such as the UK or the USA or does the Chinese political model epitomise what Nathan (2003) coined 'authoritarian resilience'?

Inevitably, there is a very close link between political resilience variables and notions of power, in particular in relation to the extent to which the power of individuals or stakeholder groups increases or reduces the resilience of a human system (Brown, 2014; Biermann et al., 2015). Understanding power, thus, is in itself a contextual process as power is relational. In other words, what baseline is used by a resilience commentator to assess resilience and how is that assessment itself influenced by the commentator's own positionality on issues of power between different stakeholder groups? How does a commentator assess the depth and importance of corruption as a vulnerability factor? For some, therefore, the empowerment of an individual or a group could be seen as an indicator of resilience (e.g. the re-election a powerful decision-maker who has specific views about future community development), while for others this same political process could be seen as an indicator of vulnerability (negative lock-ins and path dependencies may be engendered by that same decision-maker stifling

innovation and inclusive decision-making) (Biermann et al., 2015). Wilson et al. (2018, 379), thus, suggested that "the political domain is often difficult to investigate methodologically due to issues of … positionality … and a reluctance [among researchers and commentators] to talk about notions of power and politics", while Cote and Nightingale (2012, 478) argued that resilience research has "under-theorised the role of political … factors". Brown (2014, 2015) is among the few resilience researchers that directly addresses the omission of politics and social dynamics in resilience studies by proposing methods to analyse how agency and collective action of both powerful and disenfranchised actors, as well as power and information asymmetries, affect the resilience of human systems.

Any assessment of the role of political resilience variables is, therefore, highly socio-culturally contingent and closely interlinked with social and cultural resilience variables (Nathan, 2003). As with cultural resilience variables in particular (see above), any commentator on resilience has inevitably been influenced by their own socio-cultural embeddedness within societal norms that may suggest that some political or governance systems engender 'better' resilience pathways than others. Kelly et al. (2015, 13), thus, argued that "political factors are broadly linked to predominant ideologies and worldviews held by local, regional and national decision-makers" and that "institutional processes are often closely associated with ideological paradigms defined by societal worldviews, norms and accumulated organisational knowledge". Commentators' political positionality is, therefore, key for understanding their interpretation of political resilience variables. Lebel et al. (2006), for example, argued that empirical support can be found for improved resilience in systems where participatory, deliberative, multi-layered and accountable institutions govern natural resource use. Yet, some could argue that the fact that ca. six billion people around the world live in what Transparency International terms 'corrupt' countries may suggest that corruption is the *norm* rather than the *exception* and that, controversially, corruption may be part-and-parcel of many systems deemed to be 'resilient'. Walker and Salt (2006), thus, argued that some system regimes may be considered desirable by one segment of society and undesirable by another, while Cote and Nightingale (2012, 479) suggested that

> "an understanding of resilient or vulnerable systems in terms of abstract structural [variables] masks the necessity … to analyse the adaptive capacity of … systems that involve different sets of stakeholders at various scales, with multiple approaches to resource valuation and leadership, and the heterogeneous social networks of relations that underlie and shape [human systems]".

An interesting example comes from China where arguments have been raised that the Chinese one-party autocratic regime is much more effective at fast implementation of measures that may help increase resilience (e.g. rapid top-down decision-making regarding the installation of renewable energy facilities such as wind farms), while in the West democratic and participatory decision-making and planning processes have been blamed (often by commentators from non-democratic settings) for stifling rapid and innovative implementation of alternative energy pathways (Nathan, 2003). In turn, many Western commentators have argued that democratic processes are needed to ensure that all stakeholder voices are heard when it comes to key strategic decision-making, i.e. that without inclusive democratic processes it is difficult to increase resilience pathways (Healey, 2006; Piketty, 2014).

An equally complex debate has emerged around the issue of land ownership/property and resilience (Adger, 2000). Echoing debates about the tragedy of the commons as to whether common or enclosed lands generate more environmentally sustainable development pathways, resilience debates about the role of ownership and property are equally complex. On the one hand, clear and transparent ownership rights are seen by most as positive for resilience as it imbues certain stakeholders with power over decision-making processes on 'their' land. On the other hand debates about the 'tragedy of enclosure' (The Ecologist, 1993) have also highlighted that human systems are not necessarily made more resilient by enclosing land and potentially excluding weaker stakeholders from access to resources (Adger, 2000).

Inevitably, political resilience variables interlink closely with social and cultural resilience variables, issues around 'resilience for whom?', and, in particular, questions about power. Thus, a more detailed analysis could untangle more specific differences between institutional forms of resilience (i.e. political domain around democracy/autocracy) and the issue of power and resilience (who benefits from what kinds of resilience).

2.6 Universal and contextual variables across the five resilience domains

As Table 1 highlighted, universal and contextual resilience variables are unevenly distributed among the five key domains that make up a resilient human system (economic, social, cultural, political, environmental). Indeed, there appears to be a 'hierarchy of universality' of resilience variables. Figure 2 shows the balance of universal and contextual variables across the five resilience domains. Each domain represents a contextual-universal spectrum ranging from purely contextual (at the centre of the diagram) to purely universal (at the outside of the diagram). Based on the discussion above, it is evident that none of the resilience domains contain variables that are solely contextual or universal and that there are always certain variables that shift a resilience domain either towards greater contextuality or towards greater universality. Figure 2 suggests that *economic* and *environmental* resilience variables emerge as the most objective/ universally recognised (i.e. there is a wide consensus as to which variables to select and what 'direction' of resilience/vulnerability these variables indicate). Commentators struggle more to find common ground with the meaning and 'direction' of *social* variables for assessing resilience (i.e. there is a mix between contextual and universally acceptable variables with a slight predominance of universally accepted variables). *Cultural* variables, meanwhile, are largely contextual and, therefore, highly subjective, while *political* variables also emerge as mainly contextual and subjective and highly dependent on a researcher's positionality.

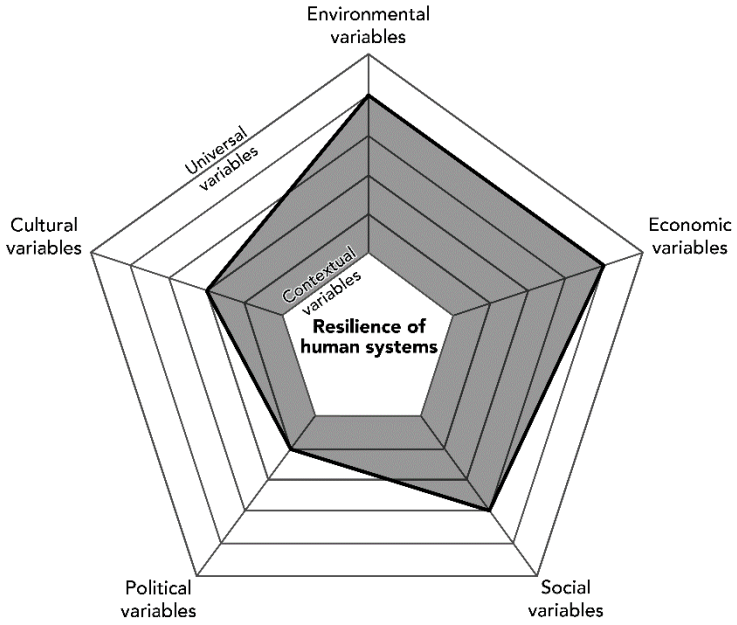

Figure 2: The balance of universal and contextual variables across the five resilience domains (Source: authors)

3. Discussion and conclusions

The aim of this study was to critically analyse contextual and universal variables used to assess the resilience of human systems across the five domains of resilience. The study suggested a conceptual framework for classifying resilience variables based on their universality/objectivity and contextuality/subjectivity, and discussed different types of variables, the 'direction' these variables indicate with regard to resilience/vulnerability, and the extent to which they can be used to understand the resilience of a system (see Table 1 above).

The discussion of the five domains of resilience has highlighted the breadth of resilience variables used, and the complex interlinkages between the domains, as well as the universality/ contextuality of the variables as indicators of resilience or vulnerability. The study has highlighted that many variables used to measure aspects of resilience are subjective in that their interpretation as to what is good for resilience is contingent upon the context of the system under investigation as well as of the positionality of the researcher. Universal resilience variables, meanwhile, are more objective in that they are widely recognised as indicators of resilience. This paper has argued, however, that even universally recognised variables still need to be contextualised and that their interpretation can be affected by the positionality of the researcher. The study has particularly highlighted that there *cannot* be one common stance from which to assess 'good resilience' or 'bad vulnerability', but that researchers need to continuously question their socio-cultural positionality in interpretations of resilience. Building on critical authors such as Rose (1997), Diener (2000) and Oswald and Wu (2010), there is, therefore, an urgent need for a more culturally nuanced approach to resilience assessments, for a deeper acknowledgement of the role of a researcher's positionality in resilience research, and for increased interdisciplinary approaches.

Several key points emerge from the hierarchy of resilience variables highlighted in Figure 2 (above). First, the hierarchy of resilience variables may explain why most resilience research as well as the United Nations Sustainable Development Goals have shied away from engaging with cultural and political dimensions of resilience, given that these variables may be harder to measure and their interpretation is more subjective and contested (Biermann et al., 2015). The highly subjective nature of political resilience variables is a key explanation why "resilience [often] fails to take account of politics and power relations" (Brown, 2014, 109). It is, therefore, important that any study examining cultural or political resilience recognises the often subjective and contested nature of these variables and reflects upon the cultural/ political context of the study and the positionality of the researcher.

Second, if researchers use the full range of factors to assess the resilience of a human system, it is unlikely that a fully *objective* resilience assessment is possible. In other words, some elements of the analysis will, inevitably, entail subjective and contextual assessments of resilience processes, and standardised sets of resilience questions/approaches are, therefore, highly unlikely. This point highlights that more research is needed about "how subjective resilience can be adequately incorporated into methods of measuring and tracking resilience" (Jones and Tanner, 2015, 7).

Third, the categorisation of variables as objective or subjective reflects normative values about what constitutes a resilient system, and these will change over time (Meerow and Newell, 2016). For example, the role of women has come to be viewed as an objective indicator of resilience in that it is universally recognised that promotion of gender equality supports resilience (as reflected in the UN Sustainable Development Goals, highlighted in Table 1). Where a variable such as gender equality is universally recognised, then resilience research can promote change in a system where that variable is weak, even where locally there may be opposing views. Over time, more social and cultural variables that are currently seen as subjective/contested (such as LGBT rights) may also come to be seen as universal. This

highlights that indicator selection and interpretation requires a reflexive and nuanced approach. As Meerow and Newell (2017) highlighted, even universally accepted indicators might be understood differently and may lead to varying conclusions as to a system's resilience. Emerging from this caveat is the issue of validation of resilience indicators (Welle and Birkmann, 2015). Thus, thorough validation can only be ensured by robust empirical testing of variables.

Fourth, the discussion has highlighted that raising resilience within one of the five domains (e.g. gender and LGBT rights within the social domain) may conflict with aspects of resilience in another domain. Thus, acknowledging LGBT rights from a social perspective may be seen in some societies to weaken cultural resilience, while fostering social resilience by supporting western values around gender may lead to reduced cultural resilience in patriarchal societies. While it may be positive if cultural values around gender and LGBT change, this issue highlights that careful attention needs to be given to debates around culture, power and universality. This begs further questions as to how cultural resilience is evaluated by researchers (including aid agencies and practitioners) and what methodologies are used to label a system as 'culturally resilient'.

Fifth, the hierarchy of resilience variable contextuality suggests possible differences between groups who *conduct* resilience research. Brown (2014, 113), therefore, argued that "resilience has been seized and is being used in quite different ways by civil society groups, social movements and communities". Jones and Tanner highlighted (2015, 6) "efforts to measure resilience [by aid agencies] have largely focused on the use of 'objective' frameworks and methods of indicator selection", where the notion of resilience is used as a normative organising principle to challenge the status quo and to design more resilient futures for communities affected by shocks and disturbances. Policy-makers (and to some extent aid agencies) will view the range of potential variables differently to academics, in that the former will adopt a more normative approach (seeking a particular outcome, usually an adaptive change, within a narrow set of parameters), while the latter will adopt a more critical approach, more willing to question the causes of resilience/vulnerability and recommend transformative change. As Cote and Nightingale (2012, 484) argued, academic resilience research "emerges from heterogeneous processes that must be understood through the recursive relationship between knowledge, agency and context as mediated by power, culture and history". This may suggest that policy makers and aid agencies, in particular, need to take more account of cultural and political resilience variables – i.e. more challenging moral and ethical domains – and that they should not shy away from more difficult questions linked to the resilience of human systems by adopting more holistic and critical resilience frameworks. On the other hand, academics need to acknowledge more the utility of quick 'snapshot' assessments of resilience based largely on universal resilience variables, and that there are circumstances where it may be better and more practical to undertake quick assessments than none at all or than to rely on lengthy and complex academic studies.

Finally, the study has particularly highlighted that there *cannot* be one common stance from which to assess 'good resilience' or 'bad vulnerability', but that researchers need to continuously question their socio-cultural positionality in interpretations of resilience. Building on critical authors such as Rose (1997), Diener (2000) and Oswald and Wu (2010), there is, therefore, an urgent need for a more culturally nuanced approach to resilience assessments, and for a deeper acknowledgement of the role of a researcher's positionality in resilience research. The above analysis also begs the question whether it is possible for more contextual variables to be *moved towards universality*. Cote and Nightingale (2012) asked for an epistemological shift in resilience research that acknowledges more the complexity of assessing factors that lead to increased resilience or vulnerability of human systems. The above discussion highlights that this may be difficult, as issues of positionality and reflexivity cannot be easily and quickly

overcome. Instead, and in line with Jones and Tanner (2015), the intermediate aim in resilience research should be to see the discussion about contextual and universal resilience variables as an invitation for more culturally nuanced and reflexive approaches to resilience that challenge, criticise, and evaluate both the many different approaches used to assess the resilience of human systems and the assumptions that underlie these.

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