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From conceptualization to practice: enhancing economic resilience at the local government level in Australia

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ABSTRACT

Seven principles of resilience developed by Stockholm Resilience Centre were adopted as a central framework from which practical objectives were identified to support local government organizations, and small local businesses to enhance their level of resilience to natural disasters. Discussions and interviews with local government executives from four coastal, local governments in Australia were undertaken to refine each economic development objectives to ensure utility and relevance. The final suite of practical objectives aims to respond to socio-ecological system features such as slow and fast variables, feedbacks and thresholds that create climate risks for businesses, and consider the sector and individual businesses' learning capacity, participation and self-organization. We consider that these important objectives provide a pathway that enable small businesses, central to the local economic sector to self-assess their risks, and develop longer term adaptive and transformative strategies beyond preparedness and recovery. The significance of this research is in its ability to translate and anchor conceptual understandings of socio-ecological systems and resilience theory into a set of practical and useful objectives for local governments and small businesses to combat their vulnerability to natural disasters.

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Introduction

Despite multiple international shocks, Australia's economy in 2023 is promoted as stable and resilient, despite slow growth rates associated with tighter macroeconomic policies, persistently high levels of inflation, uncertainty in the global environment, and the ongoing impact of climate-related shocks (IMF, 2023). Over time, substantial economic losses have resulted from climate-induced disaster events that continue to increase in frequency and costs, both nationally and internationally (ICA, 2023; McAneney et al., 2019).

The increasing costs of disaster events can be attributed in part to the combined effects of rising populations and climate change. To accommodate population growth, settlements and industry have expanded into exposed and vulnerable areas, whilst processes of urbanization have spatially concentrated large populations of people and resources. Both of these processes have contributed to greater impacts and costs arising from extreme weather events (McAneney et al., 2019). But beyond financial losses and costs, the direct and indirect impacts of climate induced losses, damages and climate variability on the local economy, and on people's livelihoods are complex and far reaching, manifesting across different spatial and temporal scales.

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This article focuses on the resilience of the local economy that acts as a central component of a community's resilience (Singh-Peterson & Underhill, 2017). The concept of economic resilience has been defined by Martin (2016) as 'the quality that allows local economies to adjust to changes and locks in a way that promotes sustainable development, wellbeing and inclusive growth', which (Martin, 2012) identifies has become increasingly visible in economic research since 2006. In Australia, all three tiers of government (Local government, State or Territory government and Federal government) are involved in supporting and sustaining economic development activities and are therefore engaged in economic resilience contexts. Since the 1980s, however, the level of engagement and remit of local governments, herein referred to as Councils, in regional or metropolitan-based economic development roles has significantly increased across Australia (Jones, 2008; Pugalis & Gray, 2016). Dollery et al. (2006) describe this as Councils' transition from a 'services to property' focus to incorporate a greater emphasis on 'services to people'.

These activities, that sit beyond the formal authority given to Councils in legislation, reflect the later amendments made to the *Local Government Act* in the late 1990s (Grant & Drew, 2017, pp. 978–981). Following this, Councils have greater involvement in economic development activities at local and regional scales, in addition to increased engagement in issues of social safety, social services, application and monitoring of regulations, planning and development, public health and environmental management (Dollery et al., 2006). As Councils have adopted general competence powers beyond their legislative remit, there is much diversity in terms of their capacities and scope of economic development activities in alignment with size, geographic location, demographic features of residents, budgets, relationships with State-based legislative and performance frameworks (Walker et al., 2022).

Others note that Councils' increased role in economic development in Australia has, in part, stemmed from a broad scale recognition of the benefits of grounded, place-based strategies that are co-designed and implemented with local businesses and community leaders (Pugalis & Gray, 2016). Further, each local government area has unique characteristics that shape its economic pathways and trajectories, emergence and resilience (Courvisanos, Jain & Mardaneh, 2016) which similarly points to the appropriateness of Councils' engagement in this regard. One of the complications regarding the ambiguous role of Councils in economic development initiatives at the local and regional scales is the potential for duplication, fissures, contradiction and conflict with other tiers of government (Pugalis & Tan, 2016). More recently, as the localized effects of climate change are more commonplace, there is also an expectation that Councils should implement initiatives relating to infrastructure, tourism promotion, business development, employment development and generally facilitate efforts to enhance community resilience (Queensland Government, 2023).

However, for many Councils in Australia the capacity to support and facilitate economic development initiatives has become all the more complicated and costly as extreme weather events and slow onset climate change continue to wreak havoc. Yet the effective facilitation of economic policies and strategies by Councils were identified as one of the determinants of regional economic resilience (Martin & Sunley, 2015), providing great incentive for local governments to actively shape and influence the capacity of local businesses and institutions to adapt and transform as needed.

In considering the substantial future impacts of climate change and estimations of the opportunities to financially benefit from net zero transition, the Australian Treasury Office's Intergenerational Report 2023 states that 'increasing natural disaster risks warrants investment in resilience' (Australian Government, 2023a, 2023b, p. 125).

So, although there is significant support for Councils in Australia to engage in enhancing local levels of economic resilience, there is little direction on how to support local businesses to reorientate through incremental or transformative adaptation strategies towards a place-based, climate resilient pathway. To do so requires an understanding of the multiple, potential direct and indirect impacts that affect economic resilience, and associated uncertainties. Enhancing a community's resilience is further limited by a distinctive disconnect between academic knowledge or theorizing of the resilience concept with the practical application of the concept and implementation of the resilience solutions of relevance to local industry (Loehr & Becken, 2021).

This article contributes to addressing this gap by grounding resilience concepts into practical objectives for Councils that are collaboratively charged with growing and safeguarding the local economy. This study's aim

is to anchor these largely academic concepts of resilience into a practice domain that is easily accessible, relevant and of practical benefit to Councils in their efforts to support small businesses.

To achieve this, the study takes the following approach. Following a literature review, the seven principles of resilience theory developed by the Stockholm Resilience Centre, SRC (Biggs et al., 2012; Simonsen et al., 2014) were identified as a comprehensive framework from which to develop a series of objectives that could be developed into programs and initiatives by Councils. In the second stage of the project, expert advice was sought to identify economic objectives relevant to each of the resilience principles. Senior local government officers from three Australian Councils participated in semi-structured interviews before the third stage of the project commenced, which involved a case study approach with a fourth Australian Council. The Sunshine Coast local government area (LGA) in Queensland, Australia (see Figure 1), became the focus for reviewing the suite of objectives developed in stages one and two. A workshop was undertaken with economic, disaster and sustainability officers from Sunshine Coast Council to discuss the final suite of objectives that

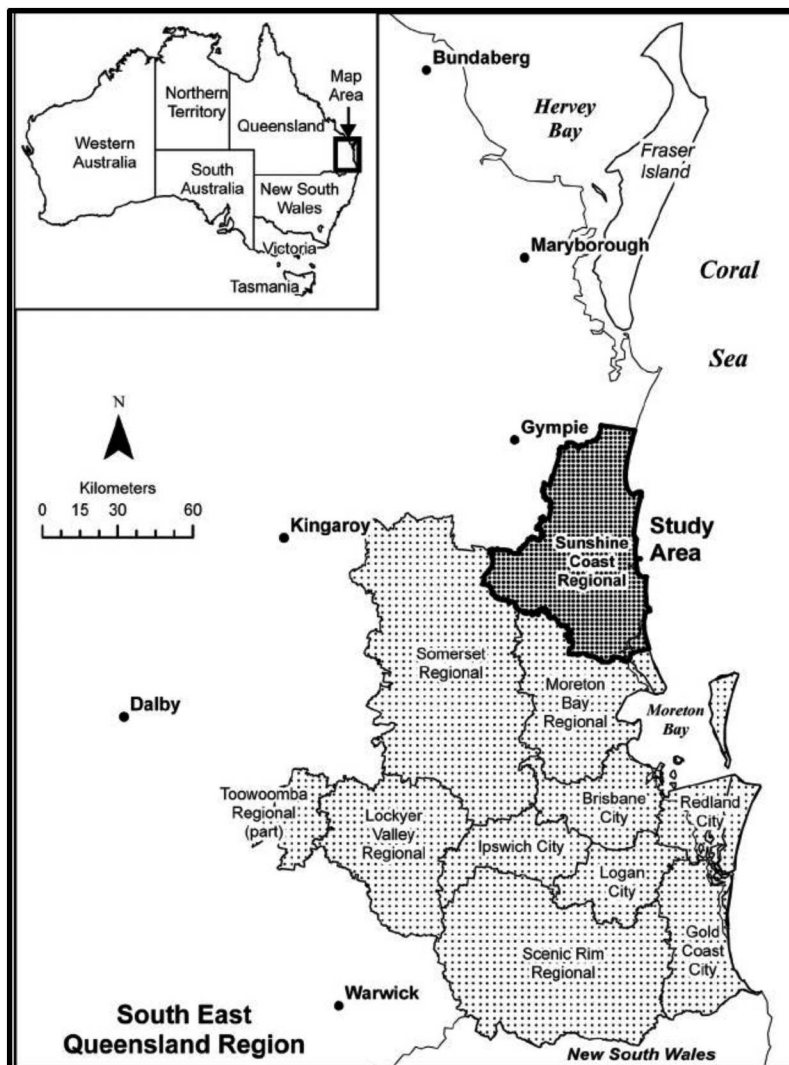


Figure 1. The location of the Sunshine Coast local government area positioned within the State of Queensland, and Australia (inset). Source: Singh-Peterson et al., 2014.

could operationalize the SRC's principles. These findings are presented in this article after a background section that positions the study within academic and policy developments. The study's limitations and key points emerging from the study are then presented in the final section of this manuscript.

Background

The incorporation of the resilience concept in Australian government policy

Resilience is undeniably a contested concept that is applied in different ways in many contexts, spanning from psychology, ecology to natural hazards research and development studies (see Davidson et al., 2016; Martin & Sunley, 2015; Sutton & Arku, 2022). In these diverse contexts, resilience can refer to a perceived attribute of an object, entity or system or as desired feature to be promoted or enhanced (Martin & Sunley, 2015).

In this study, we draw from the Stockholm Resilience Centre's (2014, p. 3) description of resilience as 'the capacity of a socio-ecological system (SES) to deal with change and continue to develop'. A merged SES highlights the multiple and concurrent interconnections and dependencies between complex and adaptive social and ecological systems that are constantly in a state of reshaping and reconnecting in response to perturbations and shocks encountered across parts of the SES. Within the context of regional economies, economic activities and livelihoods in general are vastly dependent upon ecosystem services and, as such, a coupling between the health of the natural environment with the health of people and societies is observed (Biggs et al., 2012).

These interactions across, and within, social and ecological systems is the foundation for the SES theory from which the seven principles for resilience we have adopted as a framework and apply to an economic resilience context were developed (Biggs et al., 2012)

Within this context, the adaptive capacity of businesses and the local economy as whole, Simmie and Martin (2010, p. 28) state occurs where there is a 'the differential ability of a regions' or localities' firms to adapt to changes and shocks in competitive, market, technological, policy and related conditions that shape the evolutionary dynamics and trajectories of that regional or local economy over time'. Importantly, economic resilience in this context is adaptive, complex and dynamic and continues to adapt or transform, innovate and grow (Courvisanos, Jain & Mardaneh, 2016). The resilience of an economy is further determined by the positive or negative adjustment or adaptation activities of stakeholders within the economy nested within an SES that renews itself through adaptation or transformative actions to enhance robustness or respond to emerging opportunities and changing conditions.

Disasters and shocks that can potentially erode the resilience of a community's economy include various manifestations of climate change, including increased heat waves, drought, flood, fires, storm surges and rising sea levels. Other potential major threats include pandemics, black swan events and terrorism and, as outlined by Martin et al. (2016), economic recessions. For this reason, the development of resilience strategies in Australia at all governmental scales has taken an all-hazards approach. For example, *The National Disaster Risk Reduction Framework, 2018* retains an emphasis on resilience building for an all-hazards approach by promoting the role of the whole-of-society in enhancing levels of resilience.

At State government level, the *Queensland Strategy for Disaster Resilience 2022–2027* for instance, similarly adopts an SES-based view of resilience in alignment with the academic literature, some of which is presented above. The Queensland Strategy presents 52 high-level actions and designates the government organizations responsible for undertaking the actions, such as A3.1.4, which specifies 'Improve the resilience of small and medium businesses through targeted activities and harnessing lessons from responding to, and recovering from, disaster events'. Of the 52 actions, Councils are allocated as a responsible party on 44 actions, or 85% of the actions in the strategy.

A systems-based resilience approach is favoured in these policy documents, possibly because it enables policy makers to embed consideration of multiple interactions across sectors and scales, and it supports futures focused policy development (Berkes, 2007; Folke, 2006). In practice, however, there are few examples of how resilience founded in SES theory can be translated into key objectives that matter to local businesses when confronted with an uncertain future.

In terms of local economic development, tourism and coastal businesses are highly sensitive to the negative impacts of climate change and associated hazards (Cabrini, 2010; Shahzad et al., 2021). This is particularly the case for businesses that are heavily dependent upon natural assets and ecosystems that are vulnerable to climate change (Heyenga et al., 2015; Loehr & Becken, 2021). Some of the impacts of slow onset climate change and environmental change include a loss of species such as coral on reefs, species migration which include the invasion of pest species, and the degradation of the environment due to coastal erosion, saltwater intrusion and variable precipitation levels (Arabadzhyan et al., 2021). Due to the impacts of these changes within the SES, we argue that it is important that local businesses understand their dependence on these environmental factors and are able to implement strategies to mitigate or minimize this impact on their business activities, or adapt to lessen their dependence on these natural features or landscapes.

Currently, there are several tools available to businesses to assist with developing plans to prepare and recover from disasters. The Australian Tourism Industry Council (2018) for instance has introduced a self-assessment tool to identify risks and opportunities arising from climate change relevant to key business functions such as marketing, operations and customer experience. Similarly, the Business Resilience Program presented on the Small Business Disaster Hub of Queensland Governments Business Queensland (2023) also follows along these same lines, identifying that the top three tips for small businesses are to: make a plan by identifying risks, review insurance policies and other documents and third, to prepare your business for potential disasters by undertaking activities such as clearing vegetation and loose items.

Importantly, these tools empower businesses to develop and enact preparedness and recovery strategies following a disaster event but, concurrently, there is also a need to take a broader look at enhancing the resilience of businesses and collectively, of the regional economy beyond preparedness and recovery (Shi et al., 2021). Businesses require a longer-term planning horizon where risks and vulnerabilities to a range of shocks and slow onset climate change effects can be assessed over several decades. From here, adaptation strategies, either incremental or transformative, can be identified and implemented where needed. This, we argue, is in keeping with a merged SES view of resilience that considers how the business operates within an interconnected system of other businesses, services, supply chains and social world with the natural environment that it may be dependent upon, particularly for nature-based, coastal tourism operators. Systems perspectives also include considerations of local businesses and institutions' buffer capacities or adaptive capacities that includes stocks of capital resources that can be used to absorb, or resist, disturbances from shocks or implement adaptation strategies (Martin, 2012; Simmie & Martin, 2010). Biggs et al. (2012) also noted that social capital in the form of networks of enterprise and individuals, and human capital as knowledge and experience can greatly enhance levels of economic resilience.

Methods

Adopted framework: the seven principles of resilience

The seven principles of resilience (Stockholm Resilience Centre, 2015) were developed to provide guidance on:

key opportunities for intervening in and working with joint socio-ecological systems (SES) to ensure that they remain resilient and able to provide the ecosystem services needed to sustain and support the well-being of people in a rapidly changing and increasingly crowded world.

The principles are described in [Table 1](#).

In this study, the seven principles of resilience are adopted as an underpinning framework to identify strategies to enhance the economic sector's resilience beyond preparedness and recovery. The aim is to consider economic resilience *conceptually* through the application of the framework and *operationally* by determining how the principles can be translated into economic development objectives and strategies at the local scale. Other important facets of community resilience such as ecological resilience, infrastructure resilience, social resilience and institutional resilience are touched upon as they integrate with enhancing a community's economic resilience, but the focus of this scoping study is specifically upon the resilience of the economic sector.

Table 1. A summary of the seven resilience principles (Biggs et al., 2012).

| Resilience principle | Context |
|---|---|
| 1. Maintain diversity and redundancy | Functional redundancy or the ability to perform the same function in different ways can provide 'insurance' within a system by allowing some components to fail and others to compensate. Encouraging diversity reduces the overall risk by increasing the availability of activities that perform similar functions but have different risk factors |
| 2. Manage connectivity | 'Connectivity refers to the structure and strength with which resources, species or actors disperse, migrate or interact across patches, habitats or social domains'. Connectivity can be a positive and negative system trait. Highly connective systems can support recovery and response, but may also spread disturbances faster |
| 3. Manage slow variables and feedback | To determine the resilience of one element within the system, the threshold at which the resource stops functioning, or stops providing the required services, needs to be determined. Within a system there are multiple interdependent slow variables and feedback loops operating, so linear causal relationships may not adequately describe the response to disturbance |
| 4. Foster complex and adaptive systems thinking | Complex adaptive systems thinking steps away from reductionist thinking by embracing the dynamic and complex interactions apparent within a socio-ecological system. Accepting complexity thinking allows for uncertainty, unpredictability and a multitude of different perspectives to be acknowledged and for issues to be approached as though through a complex adaptive system lens |
| 5. Encourage learning | A continuous learning and experimentation cycle is required to become aware of and adapt to the dynamic nature of the system and components within. A culture of continuous learning and experimentation can facilitate decision making and management processes that are responsive and adaptive (i.e. adaptive management or co-management) |
| 6. Broaden participation | Active participation by all stakeholders can lead to co-learning outcomes, innovation and creativity associated with redundancy, a pooling of knowledge and resources to address a specific risk, and a process through which networks, relationships and trust can be established. A strong collaborative foundation can lead to improved legitimacy of knowledge and authority during decision making |
| 7. Promote polycentricism | Creating nested institutions that are connected through a set of rules that interact across hierarchies and structures enables problems to be addressed swiftly by the right people at the right time |

The translation of the resilience principles into practical objectives was based upon three comprehensive data collection processes. A literature review resulted in the seven resilience principles being translated into a local government economic development context as key objectives for economic development by the authors which was followed by two further stages.

Qualitative studies

The second stage involved consulting experts from coastal Councils around Australia that were located in similar local environments as the Sunshine Coast local government area. Semi-structured interviews with seven local government senior executives from three coastal local government organizations were undertaken. The interviewees held positions as directors and senior managers of their organizations' economic development, emergency management and environmental sustainability teams. The three local governments were chosen based upon the criteria that they were located on the coast and experienced similar environmental hazards to the Sunshine Coast Council. Due to Human Research ethics agreement the anonymity of participants will be maintained, as will the name of the local governments themselves in order for interviewees to remain non-identifiable in this paper. Interviewees were identified via snowballing techniques, with enquiries commencing with the Chief Executive Officer (CEO) of each Council for permission to contact interviewees and recommendations regarding appropriate local government staff members to interview. Interviews were recorded, transcribed and imported into Nvivo software to assist with analysis.

The third stage involved presenting the analysis from the first two stages of the study to a panel of Sunshine Coast local government officers and resilience researchers during a one-day workshop. The workshop's objective was to review and refine the objectives identified in the previous stages to identify the resilience objectives suited to the Sunshine Coast's environmental, socio-economic and physical settings. Key discussion points raised in the workshop and interviews are presented in addition to the list of Council objectives that participants consider will enhance the resilience of the local economy.

The Sunshine Coast region (see [Figure 1](#)) and the three other coast Councils are well suited to a study of economic resilience as all are greatly affected by climate change and are regions representative of coastal development trends in Australia. All of Australia's State capital cities are located along the coast, and much of the nation's commercial activities are concentrated in coastal regions. Around 87% of Australia's population currently lives along the country's coastline with this population expected to continue to increase substantially as the state capital cities continue to expand in coming years (Australian Government, 2023a, 2023b).

Given this expansion along the coastline, recreation and activity providers, food outlets and eateries, retail businesses, marinas and homes continue to be constructed in these locations (Moreno & Becken, 2009). The Sunshine Coast's gross regional product (GRP) at the end of June 2022 was calculated to be \$20.96 billion and had grown by over eight percent from the previous year. The other three Councils had similar GRPs in 2022. Construction businesses were the largest business cohort reflecting the 2.7% increase in population in the previous five years, which comprised 355,889 people in 2022. The Sunshine Coast's largest industry is health care and social assistance which employs almost 20% of workers. After the Covid pandemic in 2019–2021, the tourism sector was still a major contributor to the local economy generating over \$A2.3 billion in tourism sales and half as much again in value added in the 2021/2022 financial year. Like the interviews, data compiled through the workshop were recorded, transcribed and imported as word documents into Nvivo software to assist with the thematic analysis utilized by researchers.

Results

Drawing from a literature review, the research team identified economic objectives that related mostly to practical strategies or to ideals that could be initiated or supported by coastal Councils of a similar size to the Sunshine Coast Council. Key comments returned from the interviewees and workshop participants are described in this section in relation to each of the resilience principles.

Principle 1. Maintain diversity and redundancy

A diversified economic structure is considered to be less prone to idiosyncratic sector specific shocks (Simmie & Martin, 2010). Economic diversity also contributes to attracting and maintaining diverse skill sets amongst the working population which supports the growth of other services and industries (Steiner & Atterton, 2015) and also adds to the vibrancy of local social life.

In the context of economic development, the principle of maintaining diversity and redundancy could include diversity and redundancy in the providers of services, information or back-up strategies in the case of emergency or supply chain collapses. To support this principle, strategies may also involve maintaining biodiversity and diverse ecosystems' health that resource-dependent businesses such as the tourism industry rely upon.

In practical terms, to maintain and manage diversity, frequent assessments of economic diversity and redundancy across the local economy need to be undertaken. This would lead to an understanding of the dimensions of the local economy, their dependencies, their service base and institutional structures that are needed to facilitate these flows.

The four participating Councils had varying degrees of information about their local businesses and the services they provided. All of the participants considered that maintaining current data at the scale required, across a local government area comprised of multiple regions, was challenging and required more resources than they currently had. The core aspect of this principle, that participants were drawn to, raised questions about whether there was an ideal level of place-based economic diversity and redundancy within a local economy, which to our knowledge, has not been answered by researchers.

In terms of facilitating the creation of diverse industries, innovation incubators that led or supported new ventures in different sectors were considered by all participants to be a useful strategy. Three of four Councils represented in the study had implemented, or were in the process of implementing, programs to promote entrepreneurship. A Sunshine Coast Council officer directly linked this program to enabling the economy to '... be

more resilient, more self-sufficient. There were examples of privately and publicly run institutions and programs that sought to encourage creative, and innovative ventures across the participating local government areas.

A Western Australian Council officer explained that their local economy is based primarily on small businesses, with only a handful employing more than 50 people. This Council had actively supported non-traditional groups and piloted arts-based entrepreneurial programs. This was perceived as a strength:

4,500 small businesses and the economy is very diversified ... Based on a lot of small operators – not based on a really big one, so this isn't a risk. (Economic Development, Western Australia)

In contrast, the Economic Development Officer from a Northern Queensland Council reflected on several large industries that underpin their local economy and which, according to the interviewee, spread the risk across the City which he considered was resistant to large-scale shocks, such as the global financial crisis or environmental shocks. These large industries included the military base, university, hospital and port. This Council also had an entrepreneur program, but like tourism, it was not considered to be a core component of the economy.

Further questions raised during the workshop related to whether a mix of small and large businesses offered greater resilience than a lot of small or a lot of large businesses. Larger businesses are considered to be better able to offset or absorb negative impacts and utilize networks to restore their business activities, providing greater security for employees (Dahlhammer & Tierney, 1998; Marshall et al., 2015), yet the impact on a local economy of a large business collapsing, is arguably far more significant than a small business.

Redundancy in a local context was also identified as a principle by which to strengthen resilience in the form of multiple businesses or services operating within the same sector. Collaboratively, these businesses might benefit through collaborative marketing, or by sharing resources and key information. For the service sector, redundancy in this form might strengthen the resilience of the local supply chain assisting other diverse businesses, or for agribusinesses or artisans it may enable small businesses to reach economies of scale that offer new opportunities or diverse markets. Overall, as a complex topic participants agreed that a place-based determination of the right levels of redundancy and diversity of the economic sector was most appropriate, as both of these aspects of a local economy were dependent on local characteristics but were also related and often held in tension.

2. Manage connectivity

Connectivity has multiple dimensions, which can result in positive and negative outcomes. Highly connected systems can result in better planning and can support recovery and response. Conversely, they may also accelerate the spread of disturbances and become cumbersome in circumstances where quick responses are required. Digital connectivity and capability has been a key focus for governments in Australia in enhancing resilience, and fostering economic growth in some regions (Marshall et al., 2023).

Two core aspects of connectivity were identified by interviewees that (i) related to the existence of mechanisms or structures that embed connectivity between the ecosystem and the economy and (ii) information flows and social networks for creating and maintaining connectivity. Workshop attendees proposed that Council should continue to facilitate and support network creation and platforms that share knowledge and learnings. Council could also provide examples of successful longer-term adaptation and transformation of business activities that have improved a business' level of resilience.

With respect to the involvement of businesses in environmental protection activities their business may rely upon, an interviewee noted that it is mainly non-profits involved, but

there are some businesses taking leadership in this space, and Council has built an Environmental Products and Services network that promotes this behaviour. (Sustainability Officer, Northern Queensland)

The dependencies of the businesses on ecosystem services were, participants say, individually determined and not monitored by any of the participating Councils other than through the Northern Queensland Council's environmental products and service hub, which could provide a platform for Council to link these business dependencies with their local and regional environment.

One of the other main mechanisms through which connectivity is achieved is through information flows and channels of communication. One of the interviewees discussed how his Council had created strong communication channels with accommodation services providers, who assisted by providing information about potential disasters to their customers. He stated that ...

All accommodation has information about cyclones and also information about stingers. Council visits and works with Caravan Parks in particular [because of the] transient nature and also [because] they are unsafe in cyclones ... We visit the caravan parks annually. (Disaster Management, Mid Queensland Council)

In contrast, a workshop participant spoke of limited willingness of the tourism industry to disseminate information about disasters, adding that *'Sometimes ... [they] don't have the appetite, probably because they get frightened it will scare clients away and [they will] have cancellations'*. In regard to determining what type of information, and how much information to provide about projected impacts of climate change to the region, another workshop participant identified that *'It's a balancing act – got nothing to hide, but don't want to start a fear campaign either'*.

Participants noted the role that informal networks and the relationships they foster can have practical benefits for resilience as explained below.

We put in a lot of effort to networking ... we have coffees [with staff in other emergency response agencies e.g. SES] ... and [keep the] relationship really strong. That does help a lot in emergencies because you know who is in the game. You can trust each other and get along well. (Disaster Management, Western Australia)

Overall, the participants recognized a need for communication and sharing of knowledge. Some Councils in Australia facilitate Local Disaster Management Group (LDMG) sub-groups which include the private sector, civil organizations and community members. Other Councils have instituted web-based platforms for cross-sector collaboration and learning that focus on the overall resilience of their city (see Sunshine Coast Disaster Hub). Some participants recognized a need to integrate short-term and long-term resilience objectives – a need they thought was not currently being met.

There are, however, some processes through which connectivity is monitored, such as through the environmental services and products network. A workshop participant spoke about the quality assurance process which requires tenderers to outline the dependencies and sensitivities in their supply chain. He commented that *'... The question is how far you go back?'* His feeling was that this information was under-utilized and could provide a good indicator of the region's dependence or otherwise.

3. Manage slow variables and feedback

Slow variables shift or adjust over time and can have a profound influence on the overall functioning or structure of an SES. Slow variables can also produce feedback mechanisms that respond to, or act to, counter the changes created by the slow variables. Feedbacks can be produced by a singular event or from a series of impacts, directly or indirectly, which can be difficult to predict. In the context of economic development, participants identified that potential slow variables could include bureaucratic processes, changes in population demographics, changes in local culture, as well as changes and shifts in environmental systems, in biodiversity and the slow expansion of the built environment. Increases in the areas of porous surfaces across the local government area were provided as an example of a slow variable that can lead to substantial changes in the SES over time.

Participants considered that where possible, monitoring of these natural structures and processes that respond to micro changes are required, to understand the extent of change, and potential impacts but the complexity and level of detail required could be overwhelming. A workshop participant commented that there are the modeling capabilities to be able to predict the status of fast and slow moving variables of consequence, and to some extent, understand some of the potential thresholds. Another participant supported the idea that *'in sensitive environments, we need to be able to understand the sensitivities and then be able to advise businesses dependent upon that environment or policy setting'*.

Within the workshop, Sunshine Coast participants considered that it was not only important to monitor the relationships between natural and social systems but there was a need to understand the implications of changes in parts of the local environment. Several participants noted a temporal and spatial dislocation that restricts businesses from being more active in this space. Environmental regulations act to bridge that gap in restricting exploitation and pollution, and some larger companies have positively focused corporate social and environmental responsibility programs. Additionally, several business operators were noted for their involvement in either acting or advocating for greater environmental protection.

Local government officers did state that the limited capacity of micro and small businesses to move beyond day-to-day financial viability concerns constrains their ability to become more involved in protection and conservation of the environment on which their businesses depend. A participant noted that some small businesses *'are doing it hard at the moment. That's been their priority – rather than the issues these businesses will face in 30–40 years' time*.

Provision of up-to-date information about changes in the socio-ecological system, what the repercussions may be, and examples of how other businesses have adapted or transformed their activities were suggestions all participants thought could be very useful to businesses. In addressing the constraints of smaller businesses, a mentoring system and the ability of local government to build capacity and offer support to enhance their resilience were proposed by participants as appropriate responses. Workshop participants agreed that ideally, Council should be able to identify and be prepared to advise business when current business-as-usual activities are not likely to be supported by the SES, or when thresholds within the system are in danger of collapse. Questions relating to whether remediation or mitigation work is required and who then will be required to pay for it are issues that Council officers were aware could become more important in coming years.

4. Foster complex and adaptive systems thinking

As a resilience principle, fostering complex and adaptive systems thinking is implicit in the interpretation of the other seven resilience principles. In the context of economic development, the implementation of this principle would assist with the creation of mutually beneficial connections between social, economic, political, technological, psychological and environmental aspects of the local government area. It would foster the creation of structures within Council that could facilitate networks between people, businesses and the environment that could respond to crisis and change in the short term, whilst remaining engaged on a long-term sustainable development pathway, consistent with Simmie and Martin's (2010) evolutionary adaptive cycle model of resilience.

Leadership in the context of complex and adaptive systems could include encouraging others to adopt thinking about dependencies, connectivity and change in alignment with the resilience principles. In both the interviews and workshops, the vast majority of participants commented that there are individuals who use systems thinking in local and State governments, however, policy outcomes are often influenced by political factors which are not always compatible with long-term systems thinking. Some participants considered that formal processes that support systems thinking and integration/collaboration across the organization would be really useful.

5. Encourage learning

Conceptually, resilience is not a static end point, but a process of adaptation and transformation that manages risks and uncertainty (Folke et al., 2002). Within an economic context, Simmie and Martin (2010) refer to this dynamic quality as a key component of an evolutionary adaptive system. In practice, this can be facilitated by enhancing capacities to learn and self-organize (Folke, 2006). The ability to learn and self-organize are the attributes through which societies are able to assess risks based upon prior experiences, new technologies and new understandings, and to mobilize and create new structures and livelihoods, to adapt and - where necessary - transform (Wilson, 2013). Continuous learning and experimentation are part of adapting to change, building capacity and innovation and, where possible, creating social networks and cohesion. Learning from prior experiences can also lead to innovation and new opportunities (Simmie & Martin, 2010).

Interview participants from Western Australia, and mid-Queensland Councils both described how a previous disaster had laid the foundation for positive adaptation in their organizations. A large storm prompted the formation of the emergency management department about four years ago, because it highlighted that they *'really weren't ready'*. Similarly, a mini tornado was the impetus for the formation of a collaboration between the Chamber of Commerce, the peak economic development and marketing organization in the region, the State government and the emergency preparedness group of local government. The local government organized a forum and provided tools for the development of recovery and disaster preparation plans. The strategy in place was to *'strike while the iron is hot and engage quickly with the community after the event'*. In another example, cyclone damage to the coastal strip prompted a redesign of the whole area and it is now *'one of the premier waterfront developments in Australia and that came as a result of a cyclone ... [it] gave a whole new look, whole new feel to the city'*.

Participants were focused on the various models of communication and engagement adopted by Council, and the extent to which they facilitate learning. The communication and engagement models described by participants vary in their structure and in the type of learning they encourage. Participants explained that Councils all have forums in place which facilitate information sharing between the local government and focus groups of business organizations. One of the participants spoke about their engagement strategy with local businesses which was not direct. He noted that

We don't directly engage with community. We have a group that represents a lot of community organizations that meets every 3 months. 30–40 community organizations are represented on that group. We'll present to that group so they can feed back to their own groups.

The facilitation role of Council to disperse information amongst industry groups was the dominant model amongst the four participating Councils. Similarly, the Western Australian Council appoints one staff member to be the conduit between the organization and the business community relaying information between the Council and business community.

All of the interviewees and workshop participants considered that Council had a central role in first understanding through scientific studies the changes occurring within their local area, and of understanding what repercussions these might have for their business community. Workshop participants considered that Council and other industry bodies needed to act as information portals to provide timely and accurate information. They added that case studies of successful adaptation stories was invaluable for other businesses facing similar stress points.

In regard to preparedness, one participant related experience with learning. He referred to his local region which experiences frequent cyclones. He commented that

We have a high level of understanding of all the risks, as do businesses here. It is constantly with us. Cyclones are coming our way. Everyone is really conscious – we don't have to do much to convince them.

Other participants were concerned about technical learning, and policies around climate change and sea level rise being largely influenced by the position of State governments. For example, one participant referred to the potential use of climate change projections. He considered that 100-year projections are utilized for coastal planning and some infrastructure projects, but should be considered broadly across the planning domain. He suggested that all tiers of government really need to be able to consider politically unpalatable questions regarding whether desired changes in land-use are the most appropriate.

6. Broaden participation

Broadening participation can achieve better outcomes by increasing the pool of adaptive capacity, particularly in regards to sharing of resources and the potential for creativity and innovation. Participation also encourages shared responsibility, building trust and cohesion. The collaborative approach this principle engenders is fundamental to businesses being able to work together to address common challenges and seize opportunities. Broadening participation could include increased involvement in decision making, monitoring, evaluation and in formulating planning that has long-term implications.

Themes emerging from the interviewees include the importance of supporting collaboration and social cohesion, and the capacity building within Council to achieve this broad participation. Interviewees referred to the various programs Council has introduced, mostly within a disaster context. This included thematic communication and community-based social marketing as part of their resilience and sustainability activities. In each case, the interviewees described their approach as having had positive benefits for Council.

7. Promote polycentricism

Polycentricity relates to the creation of nested institutions that are able to coordinate a swift and appropriate response to disaster events, noting that the timing, location and the exact nature of a response cannot be predicted. In theory, having interconnected institutions with broad ranging capacity, and some overlap, facilitates a more resilient response. In this way, this principle is also related to the principles of diversity and redundancy.

Numerous examples of participatory methods that engage with a broad range of stakeholders and build the internal capacity of staff were provided by the participants. However, undeniably in Australia, local government executives pointed out that local governments are not able to influence the location, or degree of modularity of service provision. This includes the provision of electricity, water, sewerage, telecommunications, roads and hospitals. Modularity and centralization policies of the utilities are usually driven through economic efficiency incentives that operate at scales larger than local government.

A participant talked about the lessons and approaches taken to recover from the 09/11 experience in New York. One participant recalled realizing that local governments in Australia have a reduced capacity to embed resilience strategies because they do not have influence or control over key assets. Local governments are also heavily impacted by changing political views at the State government level, which practically influences their ability to develop long-term strategies, build capacity and foster deep learning through a consistent approach.

A participant talked about the position of his local government on community driven decentralization projects. He stated that *'there is demand, and often compelling evidence to support community's decentralization projects, but acceptance is difficult to secure from utilities and State agencies'*. He recalled an example where his Council had to step back, after advocating on behalf of communities, because of the barriers they encountered from Utilities and State government. He concluded that Council can add influence to these incentives but, at the end of the day, Australian local governments do not have statutory power and are in fact agents of the State government. In the interviewee's opinion, there was not the evidence to demonstrate benefits of polycentricism which limits Council's ability to advocate for decentralized approaches.

Within the workshop, a researcher proposed the idea of the initiation of a non-monetary economy which has been successful in assisting people to acquire skills, build self-esteem and participate more in the economy. For example, the Lewes Pound scheme that operated in the United Kingdom, the participant considered was successful because it decoupled local businesses to some extent from the ripples experienced across a globally connected economy. She added that it was also celebrated for building greater social resilience and connectivity between businesses, and generally within the community. None of the other workshop participants had experience with a non-monetary scheme, like the Lewes Pound scheme. An opportunity to shorten supply chains and engage more people in the informal economy may be realized through these initiatives, however, further investigation is warranted before adoption as a resilience building strategy.

Discussion

By reviewing the seven principles of resilience developed by the SRC, key themes have emerged about how the business sector is currently supported to enhance its resilience to multiple hazards, and how several Australian Councils are bridging the gap between the conceptualization of resilience and the practice of enhancing resilience. Council executives engaged in this study have all acknowledged the importance of understanding risks and embracing change in response. Currently, activities promoted by government focus upon preparation, principally driven through *Get Ready* campaigns, and recovery activities in accordance with the *National*

Disaster Recovery Guidelines. At this time, there is little focus on evaluating ongoing risks and slow variables/feedbacks to determine if, or when, adaptation and transformation strategies for local businesses are warranted, which participants state is necessary.

Of interest is that local governments in Australia are not legislatively mandated to undertake economic development activities yet in Queensland, for example, disaster management teams within local governments are required under the *Disaster Management Act 2003, (Qld)* to undertake economic recovery activities. Similarly, under the *Queensland Strategy for Disaster Resilience 2022–2027*, Councils are responsible for undertaking 85% of the actions identified in the strategy, yet some Councils have very limited resources. For instance, during 2013–2014, Pugalis and Tan (2016) report that local government expenditure in Australia made up only 6% of the total government expenditure of approximately \$A564 billion. Consequently, the capacity of some Councils to develop and implement programs is severely constrained.

Similarly, as private–public partnerships have gained momentum at the Federal, State and local government levels, Councils may not have a great deal of influence over the maintenance and resourcing associated with key utilities on which the community, as a whole is dependent. These are important considerations in the context of resilience.

Fortunately, there is also much that local government is able to do, and from the accounts of participants in this study, are already doing in terms of facilitation, direction and support that can strengthen the resilience of the economic sector. Councils through their established connections across their region can be instrumental in fostering an adaptive systems context in which resilience building is adopted by the sector – recognizing the interdependence of the sector itself, and its relationships with the community and surrounding environment.

Through the discussions and interviews with Council executives, one of the key messages that participants relayed was that businesses need to be in a position to understand their interdependence, as well as risks associated with the natural environment and built systems. They also need to be able to understand the resilience of their own assets, service industry and supply chains to be able to assess their own risks and make strategic decisions to mitigate risks, or minimize their exposure to these risks or impacts, or to effect strategies to adapt or transform their business activities. Our study recommends that there is a need for information to be compiled, communicated and recommendations to be developed that are place specific, scale specific and compatible with the types of dependence (on natural and built assets), and size of businesses.

The Atlas of Economic Complexity Index produced by Harvard University (Hausmann & Hidalgo, 2014) has been adopted by the Australian Treasury (2023) as a comparative national indicator of economic diversity and measure of resilience. It is proposed that high levels of economic complexity at the national scale reflect a broad economic base and associated levels of economic resilience (Australian Government, The Treasury, 2023). At a local scale, participants in this study questioned whether a diverse economy was indicative of a resilient local economy, particularly given the benefits of redundancy as proposed by the SRC's principles. In practice, our study highlights that within a local economic resilience context there is a tension between ideals of a diversified economy with the need for redundancy in services and supply chains. The question examined in the Sunshine Coast workshop related to what participants considered to be the ideal mix of diversity and redundancy in the local economic sector that promoted resilience, but further research was needed to understand this tension and potential trade-offs.

Overall, the use of the seven principles of resilience as a framework for identifying resilience objectives produced some interesting findings. Despite limitations and ambiguities regarding Council's role in economy development activities broadly, participants were able to provide many ideas about how their local businesses and institutions can become more resilient to climate change effects and other disasters.

One of the main criticisms of the resilience concept is that normative conceptualizations of resilience reflect the reproduction of a status quo without acknowledging structural inequities in social systems or power imbalances. For instance, Oliver-Smith (2016, p. 34) notes that the resilience concept 'contains an emphasis on stability and continuity, which may include patterns of vulnerability, inequality, and exploitation'. Similarly, resilience thinking, Barrios (2016) adds, emphasizes a community's ability to withstand and endure without drawing attention to the systemic inequities and injustices that have produced the hazards and precarities with which people live. Others point to a lack of recognition of power, or agency that can have significant

implications for resilience planning and programming (Cannon & Müller-Mahn, 2010). In contrast, Martin and Sunley (2015, p. 9) argue that political and social conflicts, social unity and political influence are often featured in studies of resilience in political ecology, socio-ecology and ecological economics, stating that ‘discussion [s] of resilience in economic and social settings need not be depoliticized or avoid political issues’. Even so, we acknowledge that this study does not account for political influence, or social conflicts between institutions and between organizations or individuals.

Another limitation is based on the notion of SES equilibrium of resilience planning, which ascribes to an ideal of economic growth in which businesses flourish and employment levels increase. The implications for natural resource economies already under strain from biodiversity loss, and changes in climate, mean that this ideal is unrealistic and unsustainable. Monitoring and evaluation of natural systems proposed in this study provide important information that enables businesses to think about their dependence on natural and built resources, and their future sustainability, which by necessity would de-couple business growth from natural ecosystem degradation and biodiversity loss.

Conclusion

The concept of resilience has gained much traction in academic and policy discussions in Australia. There is, however, much difficulty in applying the resilience concept in practice. A tension between simplifying the concept to operationalize it and reducing the nature of its complexity and dynamism to the point where it loses utility emerges. In this study, we employ the seven principles of resilience developed by the Stockholm Resilience Centre and in collaboration with senior staff from four local government organizations, identify a set of objectives that Councils could use to develop programs and initiatives aimed at enhancing local economic resilience.

The application of the objectives would assist businesses to prepare, and recover from disasters, but would also support knowledge creation and dissemination about the nature of the socio-ecological system in which societies are situated. By understanding and monitoring dependencies, interconnectedness, slow and fast variables and feedbacks, we propose that decisions regarding adaptation and transformation options could be determined, moving communities beyond merely coping and preparedness. Central to orientating towards sustainable development is the need to prioritize capacity building internally, and externally, in regard to learning, communication and self-organization within Councils and across the communities they serve. To this end, we acknowledge the vast, and multifaceted role of local government organizations in Australia, as they rally to support local businesses, and the livelihoods of their fellow community members.

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