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Relational risk and collective management: a pathway to transformational risk management

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Abstract

Risk tends to be conceptualised at the individual scale, with global risk communication and governance efforts fixated on an individual's knowledge and behaviour. While individuals are undoubtedly influenced by those who surround them, such human-human interactions tend to be excluded from empirical and field-based analyses of risk taking. This study diverges from prevailing analyses of risk as an individualised phenomenon, exploring the collective and relational practices that influence risk while fishing from hazardous rocky coasts. The aim is to counter the near-universal tendency to individualise risk in empirical analyses by instead using a mixed-methodology that can quantify and enable consideration of collective responses to risk, in real-time. We demonstrate that both rock fishing practice and many of the high-risk events that emerge while rock fishing are managed collectively. Compared to the tendency to individualise risk, we demonstrate that collective responses to risk are more representative of how risk is experienced and acted upon, with implications for risk management in countless contexts.

KEYWORDS – relational; risk; collective; attunement; risk management

1. INTRODUCTION

Globally, drowning is the third leading cause of unintentional fatalities, accounting for seven percent of all such deaths (World Health Organization, 2016). Despite countless efforts by drowning prevention authorities and continual efforts to influence behaviour, drownings remain a health problem of significance, with an estimated 350,000 annual drowning deaths worldwide (World Health Organization, 2016). Unsuccessful attempts by the risk sector to prompt behaviour change calls for innovative approaches to drowning risk management. Building on long-standing but unrealised calls to move away from individualised conceptualisations of (drowning) risk (Adams, 1995; Renn, 2017) towards community-based risk management, we present an empirically-based pathway for this fundamental reconceptualisation of drowning risk reduction.

From a governance perspective, an individual's risk perceptions cannot simply be translated into policy. This is because an individual's risk-taking behaviours are difficult to generalise across large populations. At the same time, an understanding of risk perceptions is critical for the development of public safety and governance (Adams, 1995; Jasanoff, 1998; Renn, 1998). Despite the difficulty of translating perception into policy, risk managers continue to make policy decisions based on how certain individuals understand risk and, to date, few methodologies have been developed that are able to account for collective actions or responses (Dobbie & Brown, 2014), especially outside of laboratory environments.

An individualised focus, relative to relational thinking, assumes that people experience risk in a vacuum, isolated from their past and their immersive, ongoing, shared experiences with others. This often manifests in reports that blame individuals using monocausal attribution of 'operator error' within complex systems where accidents are anything but simple (Birkland & Lawrence, 2009). Our analysis suggests that conceiving risk as relational to understand the material ways that collectives perceive and respond to risk offers new opportunities for governance. Here, relational thinking interprets space and place as an outcome of (human) interactions, intimately connected with social practices (Massey, 1985, 1999) that are performed. We contend that neglect of relational understandings of risk explain the lack of success in implementing risk mitigation strategies: the prevailing, individualised understandings cannot account for the relational practices that inform collective responses to risk.

Individualised conceptualisations of risk contribute to decision-making that reinforces the unchallenged centrality of rational actor theory (Clarke, 1999). In this way, both the 'problem' (risk events such as drownings by rock fishers) and the 'solution' (common efforts to alter fishers' individual behaviours) orient governance towards the individual (Birkland, 2006), excluding and ignoring relationally-based risk reduction practices. Furthermore, the tendency of risk managers to implement governance via information transfer and awareness raising strategies at the individual scale frames risk as an individualised problem-solution, with behaviour conceived as a product of individual awareness, knowledge, and experience. Like the preponderance of evidence in support of risk as an individualised phenomenon, the effectiveness of information transfer for individual behaviour change has long been unsupported empirically, even though it is endemic in risk research and governance (Cook & Zurita, 2019; Kamstra, Cook, Edensor, & Kennedy, 2019).

1.1. Drowning context

Any scrutiny of the practice of rock fishing from uneven, jagged, and slippery rocky coastal environments reveals that these recreational activities are replete with risk (see Fig.1.). In such environments, risk emerges via human-environment relations shaped by swell changes in direction, winds and wave heights, and the ways in which fishers' respond to these agencies. Despite – or perhaps because of – the dynamism of these processes, these hazardous environments present a pleasurable location for fishing for over one million Australians (Ryan, Rijksen, Stone, & Daw, 2018).

Although not all are equally aware of how coastal conditions interrelate to produce risk, experienced rock fishers or 'experiential-experts' appear to be more acutely attuned to the emergence of site-specific hazards and to how these hazards influence human behaviours (Kamstra, Cook, Edensor, et al., 2019). In this study, we explore the relations amongst fishers via the practices they co-produce, presenting an innovative analysis of how hazardous events are managed collectively. This is accomplished by integrating quantitative and qualitative data to analyse a relational conceptualisation of risk.

Fig.1. Fishers casting their lines offshore platforms in Maroubra, South East of Sydney, Australia.

Conceiving risk as relational departs from assuming that risk is an individual cognitive operation, emphasising the experiential realm of dwelling, skill, and engagement (Ingold, 2000). In the context of rock fishing, the interactions between a fishers' sensorial experience of wave energy as it washes over their feet, the practices they deploy when walking through spaces where waves overtop, and their perceptions of whether waves will impact a fisher standing near them constitute contexts in which risk is relational. This understanding of spatiality allows for no separation between the individual and their environment and, especially in the given focus here, with the other humans who co-occupy these spaces.

Over time, fishers become attuned to the interrelated medley of changing conditions in which they choose to fish, developing a relational understanding or 'feeling' of risk in which fishers' ability to anticipate, respond and attend to potentially hazardous situations is heightened (Dewsbury & Bissell, 2015). This skilful attunement is not only built from the repetition of learned behaviours, but involves constant variation and improvisation in response to unpredictable events, including an attunement to others' behaviours. We analyse this skilful attunement empirically by using a mixed methodology to explore the different ways that experiential-expert fishers anticipate, recognise, and interject when other, often inexperienced, fishers engage in potentially hazardous practices.

The introduction has outlined the prevailing norms of risk research and management; in the following section, a more detailed review of why we used a relational theory of risk is presented. A discussion of the mixed methodology we deploy and the cases upon which we draw follow. The findings are then presented, successively focusing on collective fishing practices, attunement to risk, and a counter-factual exploration of relational risk when collectives breakdown. We conclude by asserting that relational risk is both conceptually and methodologically advantageous in comparison to conceptions that individualise risk, opening new possibilities for risk management in a world beset with increasingly frequent and severe risk events and scenarios.

2.0 THEORY

Social scientists have argued that uncertainty and risk are perceived in terms of knowledge and practices formed from people's previous experiences and collective identities (Caplan, 2000; R. Stoffle & Minnis, 2008; R. W. Stoffle & Arnold, 2003). Situated risk(s) thus emerge in embedded social environments in which people's perceptions of risk vary, even though the same environmental phenomena is often being assessed (Boholm & Corvellec, 2011). The first step someone takes when crossing a busy street, for example, undoubtedly influences how, when, and whether another individual observing or 'feeling' their behaviour chooses to cross. Yet, few studies explore the moderating role of social factors on cognitive cues, nor have empirical analyses been used to explore the influence that co-occupiers have on other decision-makers in space.

Sociological critiques of notions of risk as individualised point to 'culture' – the organised, practice-based structures of context-specific collective knowledge and understanding – as that which shapes human-environmental systems (Ingold, 2000), rather than individuals. Culture, therefore, is a precondition for coordinated social practice and should be conceived in terms of relational thinking and the negotiation of dynamic human-human interactions. This involves recognition of the ways in which practices are learned and defined, but also how people understand contingency and causality. This is pertinent in the case of rock fishing where the diversity of languages and cultural backgrounds amongst fishers make it difficult to communicate, reinforcing the need for fishers to become attuned to each other's movements and practices by watching, as much as to their environments.

Similar to the development of an attunement to emergent environmental hazards, appreciation for the actions that should be taken when another fisher is at risk is acquired through experience and participation in relational responses to risk. We contend that such experience with coordinated and distributed risk-based practices improve an individual's ability to anticipate when another fisher is at risk and how to respond. This knowledge – developed through experience and admission into fishing culture – provides more experienced fishers with the skilful ability to perceive and react to dangerous situations, if they so choose. We empirically explore the practice-based social environments that are negotiated in real-time by rock fishers. We use selected cases to add an empirical basis to critiques of the individualised framing of risk in section 4, presenting the dynamism of collective responses as part of our case to fundamentally reconfigure drowning risk reduction governance.

2.1 Attending to relational risk(s)

To explore how social cues or human-human interactions may affect practice, we draw on Ingold's (1993) concept of the 'taskscape'. The taskscape considers 'tasks' or everyday actions that are carried out by people as constitutive practices of dwelling and being part of the 'landscape', rather than being separate from it. Ingold (2000) contends that variable tasks are performed as a part of the landscape, either in sequence or in parallel, and often by people working together. In shared spatial contexts of action and activity – like rock fishing – the intentional and unintentional attunement to each other's movements is what Ingold argues may lie at the very foundation of

'sociality'. In this study, understanding social practice as embedded within the taskscape is used to elucidate fishers' shared attentive engagements that affect relational risks and collective responses.

Relational conceptions of risk are not new. For instance, Boholm and Corvellec (2011) establish a 'relational theory' in which people perceive an object as a risk. This understanding of risk, however, freezes risk in time, ignoring the ways that humans evolve and learn as they experience and consider socio-material risk environments and the risky objects in them; part of what Beck (1994) refers to as 'reflexive modernity'. Moreover, the interactions between a subject at risk and the object of risk neglects how social phenomena relate to one another, for instance, how cognition affects practice and how practices reinforce cognition. This means that there has been little exploration of how risks are relationally produced, nor how others might directly or indirectly influence whether something is perceived as a risk (Dobbie & Brown, 2014). When an individual fisher chooses to retreat from an incoming wave they perceive as hazardous, for example, they may trigger others to respond similarly. On the other hand, if that same fisher stands still, other fishers could remain still and be engulfed by an overtopping wave. These types of human-human interactions, all in the context of relational space, affect risk (Renn & Rohrmann, 2000), yet little is known about how these space-perception assemblages influence practice.

Recent studies that analyse risk as a relational phenomenon include collective responses to stressful situations (Wang, Luh, Chang, & Sun, 2008), how individuals perceive the risk of crowds in confined spaces (Alkhadim, Gidado, & Painting, 2018), and how social cues influence an individual seeking protection (Lindell & Perry, 2012). Lindell and Perry (2012) argue that people who transmit information by preparing for evacuation can lead others to also take preparatory actions, but such examples have been difficult to analyse empirically. In the context of coastal drowning risk, recent studies have begun to explore the collective practices that influence risk by analysing the characteristics of rescues performed by 'bystanders' who drown in the attempt (Brander et al., 2019; Franklin, Peden, Brander, & Leggat, 2019). These studies show a shift in thinking towards coastal risk as a relational phenomenon that can be collectively managed, but supporting empirical analyses remain a key challenge, requiring a more substantive methodology attuned to relational interactions, their quantification, and connection to the perceptions driving those actions. Accordingly, we contribute to this gap by adopting a mixed methods approach to analyse the social cues, perceptions, and collective practices fishers perform while engaging with risk.

3. METHODS

Data collection was undertaken at two rock fishing drowning blackspots, San Remo, Victoria (Vic) and Little Bay, New South Wales (NSW) (see Fig.2.). 'Drowning black spots' are locations that have had some of the highest number of rock fishing-related drownings in Australia (Ryan et al., 2018). To sample diverse respondents, data was collected from 52 rock fishers over 18 months (September 2016 – March 2018) whose fishing practices tend to coincide with seasonal changes in coastal conditions and associated fish species. Multiple drowning deaths, with 104 reported preventable drowning deaths since 2004 in New South Wales, have encouraged councils to legislate the wearing of life jackets for all individuals engaged in rock fishing (Water Safety New South Wales, 2018). Additionally, Surf Life Saving Australia (SLSA) target 'occasional' (typically inexperienced) rock fishers as especially at-risk and in need of safety education (Surf Life Saving Australia, 2020). In the context of these changing public safety education targets and legislation, analyses focused on individual rock fishers' risk-based practices are important, yet to date there have been few studies that analyse the relational ways that fishers create or prevent risk, nor how their relational practices might be used to contribute to public safety.

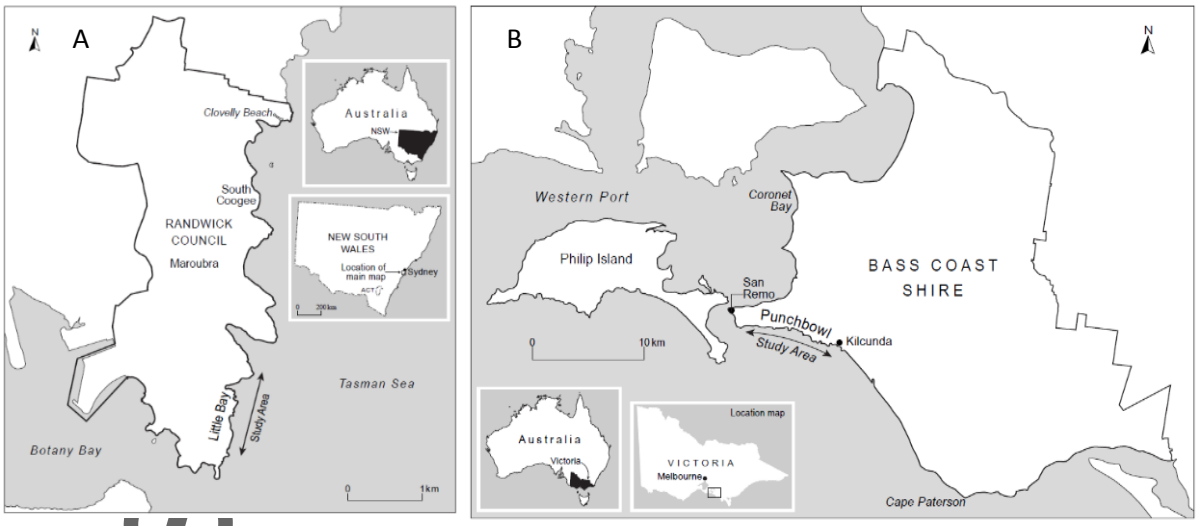


Fig. 2. Study sites were in either in Little Bay south-east of Sydney (A) on the south coast and in Punchbowl (B) south-east of Melbourne on the Bass Straight.

Analytically, we draw on a mixed methods and qualitative GIS-based analysis of the relational way(s) in which risk is anticipated, experienced and responded to in coastal space (Kamstra, Cook, Kennedy, & Brennan-Horley, 2019). This approach extends consideration of how visual analyses can expand critical geographical inquiry (Schuurman & Pratt, 2002; Sheppard, 2001) by developing methods for the creative exploration of socio-spatial structures (O'Sullivan, Bergmann, & Thatcher, 2018). Ethics approval from the University of Melbourne was approved to collect data using six methods: First, demographic data and consent were collected via a self-completion questionnaire. Second, participant observations were collected on-site using a field-notebook. Third, quantitative movement data was collected from rock fishers willing to wear a hand-held GPS (Global Positioning System) to map their spatial and temporal movement patterns. Forth, mapping-interviews were conducted with participants who sketched features onto paper to represent their activities on the coast, the areas they perceive to be hazardous, and where risk had been experienced both first-hand and indirectly – witnessed or learned about through discussion with other fishers. Sketched features were then digitized via the spatial software ArcGIS to demonstrate fishers' mapped perceptions of space that was perceived as being 'safer', at risk of 'overtopping waves', or as a hazardous fast flowing 'channel' (see Fig. 3.). Fifth, semi-structured interviews were conducted with fishers. Lastly, concealed low-resolution video footage recorded pertinent events that were revisited during data analysis.

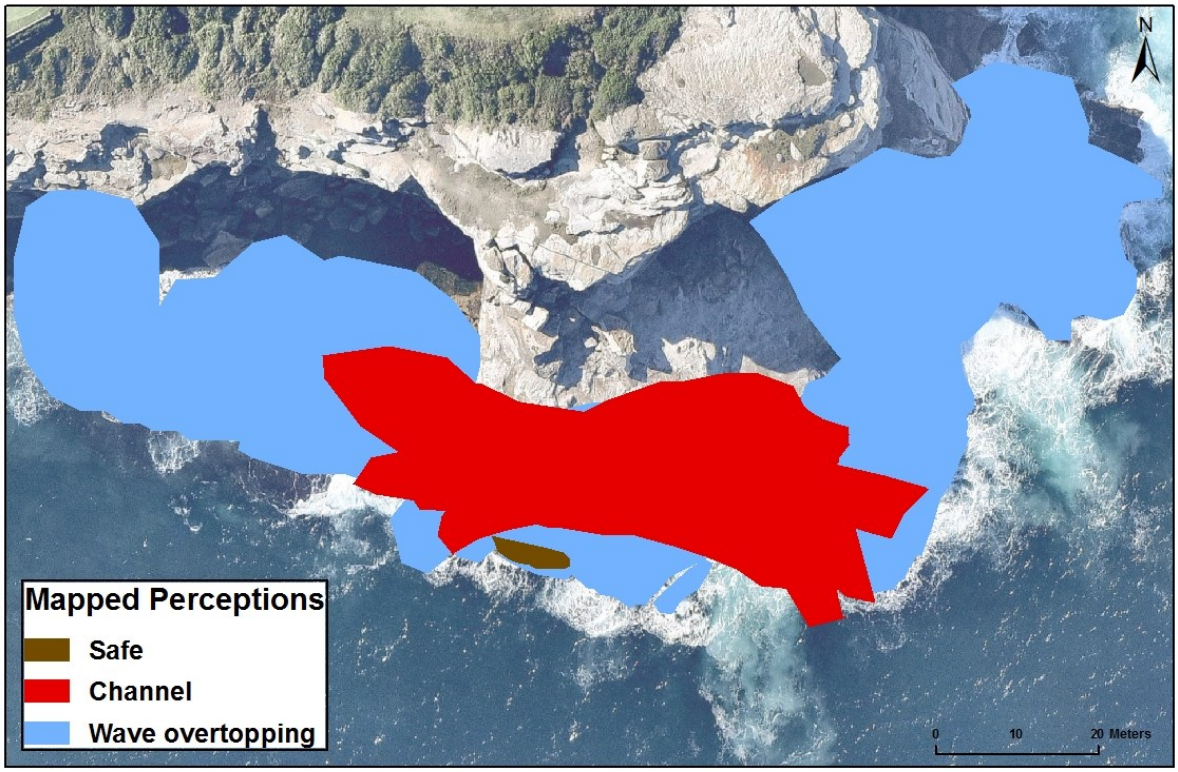


Fig. 3. Mapped perceptions of safe space (brown) as well as where fishers anticipate the risk of overtopping waves (blue) and a fast-flowing channel (red) at Little Bay, NSW.

Concealing video footage was queried by the ethics committee, but deemed essential because fishers aware that they were being recorded would alter their behaviours. The aim of this study was to capture an 'objective' understanding of rock fishers *in* situ, to record their responses to changing environmental conditions (i.e., GPS movement) and to compare those data with their self-reported risk perceptions and behaviours (i.e., sketch-maps and interviews). Thus, it was essential that participants were not told that they were being recorded. Despite the success of using video footage as evidence of how rock fishers perceive and respond to risk, as demonstrated in the events discussed in section 4, it was the most challenging method of data collection. This was a result of the bag containing the camera rarely being positioned correctly to capture fishers' behaviours and when it was, the bag was constantly moved by fishers because it was 'in the way'.

The time of noteworthy 'events', including instances of hazardous environmental conditions, the retrieval of fish, and any other pertinent shifts in practice were recorded in a field notebook, with these events serving as the unit of analysis. Each event was built in a GIS by linking the time of observed events to spatio-temporal GPS tracking and sketch-maps with video footage to demonstrate how fishers collectively respond to risk (see section 4 to view video recordings of three events). Events used in this analysis were selected because they represent not only the rare situations where data from all six methods were captured, but also to demonstrate empirically, how theorised collective risk-based practices (Boholm & Corvellec, 2011; Dobbie & Brown, 2014; Renn & Rohrmann, 2000) and breakdowns in collectives (Birkland, 2006) are enacted by fishers. Each event has a researcher-defined temporal scale for ease of empirical analysis. For example, how a group of rock fishers respond to a snagged fishing line begins when it is recognised by more than one fisher and concludes when fishers resume their previous fishing practices.

These events are subsequently contextualised with demographic data, interview quotes, and the processes through which the corresponding author 'became' a rock fisher. This involved learning from experiential-experts about how to prepare a rod for targeting different fish species, landing a

fish, and helping others retrieve fish. This first-hand experience generated a connection with participants that encouraged them to relay their stories and solicited an understanding of risk that is somewhat attuned to the ways in which experienced rock fishers' practices and skills develop. The experience of becoming a rock fisher is thus not merely a theoretical tool but a methodological tool that allowed for fuller comprehension of collective practices. This means that the analysis is attuned, at least partially, to the embodied intricacies that fishers describe in their accounts of risk.

4. EXPERIENCING RISK AS RELATIONAL

4.1 Practices

Fishers' risk perceptions are not solely established through their individual experiences and responses to non-human coastal environmental processes perceived as hazardous. They are developed through human-human interactions within a fishing culture of experiential-experts as well as with fishers who are less familiar with the rhythms and risks of fishing. When checking conditions before fishing, for example, online message boards, texts, and phone calls are made across a multi-cultural online network, providing ample opportunity for more experienced fishers to voice their expert perceptions of risk on a particular day. This helps to mitigate the potentially high-risk behaviours of those who are unsure of when and where to fish:

> We tend to message about who is going out today, where they are going, what the conditions are like and what's biting. There are probably four different groups including Pacific Islanders, Indonesians, Koreans, and some Māori guys, all these guys and my mates usually chat about where to go (John, 2018).

Once on the platform, fishers often greet each other with a summary of the conditions and which fish are biting, helping fishers who have just arrived become more attuned to the fishing environment of the day, all before stepping on to the seaward edge to cast. This collective behaviour, which in many cases requires fishers to sit and wait for tides to change, is a temporal aspect of fishing 'culture' that allows the dissemination of advice and know-how, including knowledge-sharing about where to target casting, discussion about the most desirable fishing techniques or tackle to use, and the introduction of fishers, both experienced and inexperienced, to spaces that are particularly hazardous. This practice is especially evident when fishers arrive at the platform but is also maintained through constant social exchanges while casting. Some describe the act of rock fishing as an important place for recreation while for others, rock fishing is a place for healing and mateship. The connection between fishers from different cultural backgrounds that rarely interact outside of these coastal encounters is described by Rob, a fisher at Little Bay with over fifteen years of experience:

> On the edge of this platform, one day you can be a fisherman or a friend or a therapist or a safety advisor, and sometimes you can be all at once [laughs]. This place is an escape for a lot of us and while we are here for hours, it's great to have a chat about fishing but other things as well (2018).

The act of casting in these environments may appear individual but it is relational, for fishers who co-occupy space move and work together, necessarily attuning themselves to each other's movements and casting practices. Experienced fishers, for example, will join a casting rhythm – where no one fisher casts at the same time – to avoid tangling lines but also to attract fish (see Fig.4.). This behaviour is described by Gord (2018):

> The odds of landing your bait right beside a fish are small, but if we are all casting out there in a similar place and a fish chases our line towards the rocks it helps

> increase our chances of hooking up. That's what we want to do, draw the fish to the rock so the next cast might land beside the fish and you get a bite (2018).

By targeting their casts in a similar space off the platform edge, fishers work together – some knowingly, others not – to attract fish towards the platform, improving the chances of a catch for all.

Fig. 4. Fishers south-east of Sydney casting from the same space in rhythm to draw fish towards the platform.

A common mistake made by behavioural psychologists and sociologists of practice is to assert that social practices can be disentangled from changing social environments, with the goal of identifying elements for the purposes of modelling an individual's social practices. Shove, Pantzar, and Watson (2012) dynamics of social practice theory, for example, proposes that individuals are 'carriers' of social practices that are composed of various stable and unstable elements. Problematically, this assumes that social practices remain the same and are simply reiterated, 'carried' by individuals to other risk-based contexts irrespective of changing social and environmental settings. Yet separating social practices from changing social environments overlooks the affective, embodied, communicative, sensuous, and relational social interactions that influence perceptions, behaviours, and practices. In this context, the struggle to safely and successfully land a fish, for example, is an affective, adrenalin-filled experience that is driven by an individual's fight with an unknown fish species, but it is equally influenced by the collective encouragement – or hindrance – of other fishers through their willingness and skilful ability to assist, circumstances that vary across sites of fishing:

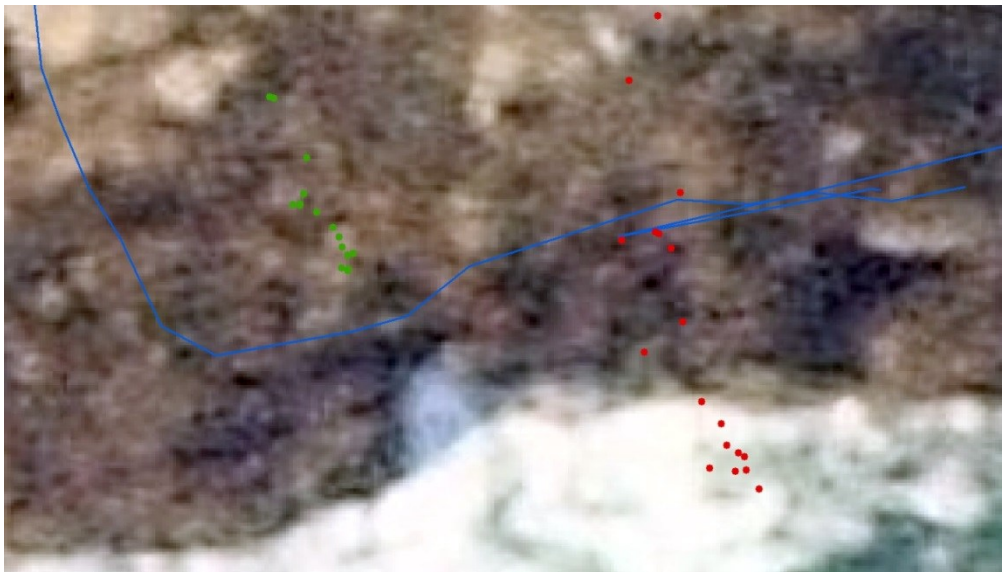
> When someone hooks a fish, you can kind of tell if it's big fish and if they are going to need some help landing it [pulling the fish on to the rocks] by the way that the rod bends but mainly how much line the fish takes. If it's a big fish, it will take a lot of line and most of us know to get out of their way and then it's on (Dwayne, 2018)!

The social practice of landing fish lies within the experiential realms of dwelling, feeling, and sensing, and in the intentional and unintentional relations between fishers, even if other fishers choose not to assist. Although the practice of landing a fish is 'carried' within an individual fishers' embodied experiences of previously catching fish, we diverge from assuming that social practices are carried by individuals and, instead, argue that social practices – especially in the context of risk – are inextricably linked with the situated, affective, and relational interactions that are distributed between different fishers moving through space. By observing, listening, and occasionally touching, fishers constantly attend to each other's presence, at every moment adjusting their movements in response to this continual monitoring (Ingold, 1993). The above examples of casting rhythms and attempting to land a fish signify the embedded practice-based social contexts and shared fishing culture that appears to transcend race and age, at least momentarily, providing initial evidence of relational risk.

4.2 Attunement to risk

In remaining attuned to each other's casting rhythms, the sight of another fishers' line being 'snagged' stimulates a collective response to a potential risk by fishers. Such a situation can quickly become hazardous, especially if the fisher holding the snagged rod attempts to release the hook by themselves. This is because snagged lines typically occur near the seaward edge of the platform where fishers are vulnerable to slipping and falling into the turbulent sea (Ryan et al., 2018), where they can be battered against sharp rocks and drown. Event 1 (see video) demonstrates how this potential risk is mitigated by one fisher helping another by grabbing a gaff hook, walking beyond an area that was mapped as the 'safe' edge of the platform during sketch-map interviews (see blue line in still of Event 1 below) and disappearing from view to retrieve the seaweed-snagged line. While this coordinated practice unfolds, the snagged fisher's (holding the rod) attention is fixed on incoming waves, surveying the ocean surface for hazardous waves that would endanger the distracted fisher who is helping to unsnag the line. Bill, a fisher with over twenty years of experience emphasises the preventable nature of drowning incidents related to snagged lines, more generally showing why a relational understanding of risk carries important implications for management:

> This is how I reckon many people get into trouble. They get snagged on the reef or stuck in some seaweed and then walk down to the edge rather than just giving up on a two-dollar lure.



Event 1. The green GPS points represent the movement of the fisher whose rod is snagged while the red GPS points show the other fisher walking towards the seaward edge of the platform – in space where waves do

overtop as captured in this aerial photo – past the blue line that was mapped as the boundary between safety-risky by fishers.

Once individual lines have been cast, fishers are attuned to the feeling of their own rod while simultaneously being attuned to the lines of others so that when the distinctive sound of another fishers' line 'hooks up', collective attention is captured. Typically, fishers without a hooked fish respond by reeling in their lines to give the hooked fisher more space to move, as well as making themselves available to help retrieve the fish if needed (see video of Event 2). This process is described as a 'fish-on' and produces multiple relations that influence fishers' movements, regardless of their familiarity with each other, because of the shared desire to see a fish safely and successfully caught.

Event 2. This still from a video of Event 2 shows an experienced fisherman wearing red (with fifteen years of experience) watching a less experienced fisher wearing a black life vest (with less than one year of experience) reeling in what is perceived to be a large fish. Then, one minute later, standing behind the less experienced fisher, holding their lifejacket to prevent them from falling into the sea. Importantly this relational response emerges as the inexperienced fisher steps over the mapped safe area (brown) into the blue space, which was mapped by fishers as a space where hazardous waves frequently overtop.

Throughout the early stage of reeling in the fish, Event 2 shows the experienced fisher pointing to different areas, instructing the inexperienced fisher to move to specific parts of the platform, all with little verbal communication because the two do not share a common language. Importantly, as soon as the hooked fisher moves from the space mapped by rock fishers as 'safe' to a lower part of the platform that is closer to the seaward edge and mapped as 'hazardous' (because it is prone to wave overtopping), the experienced fisher's behaviour turns decisively to risk management on behalf of the collective. In taking responsibility for assisting the inexperienced fisher throughout this potentially hazardous event, he is subsequently accompanied by a third fisher, wearing white, who

takes on the task of watching for potentially hazardous waves offshore. The collective response of a fisher watching for hazardous waves offshore while other distracted fishers attempt to land a fish is described as a common, but important risk prevention strategy by Gill, a fisher with over seven years of experience fishing at Little Bay, NSW:

> When people are focused on trying to land a big fish, someone will look offshore for big waves and will call out 'wave' if they think a big one is coming. This gives people the time to look up and see what angle the wave is coming from or how it looks before they decide what to do. If the wave looks big, I'd run to here [points to the area mapped as safe] and get ready for it, but if it isn't, I'll use the wave to help me bring the fish onto the rocks rather than trying to hoist it out of the water. It's really easy to lose a fish trying to just pull it up, instead of using the wave.

These social relations provide empirical evidence of the collective ways in which experienced fishers share risk mitigation practices. Although the experienced fisher wearing red was born in China, speaks little English, and had likely never met the younger Italian fisher who has hooked the fish, he was attuned to the potential risk that the fisher was undertaking by moving from the slightly elevated 'safe' edge to the lower, more hazardous space prone to overtopping waves. Nevertheless, he put himself at risk to help the other fisher land his catch. Event 2 also shows that once the fishers re-emerge from the lower part of the platform, the experienced fisher holds the fish in one hand, running in front of the other, encouraging the potentially distracted inexperienced fisher to move quickly through the hazardous channel (mapped red space) to an area protected from overtopping waves before he admires his highly-prized catch. Even after he had moved away from the hazardous seaward edge, the experienced fisher continues to encourage the inexperienced fisher to exit the space mapped by rock fishers as hazardous because of the potential danger posed by the existence of a channel. This reveals the inclusion of anticipatory practices in collective risk prevention beyond those that directly prevent fishers from falling into the sea.

This event demonstrates how risk is produced relationally and experienced collectively, with some focusing their attention on the fish while others remain attuned to the sea conditions. The experienced fisher who retrieves the large fish from the lower parts of the platform in Event 2 reduces the likelihood of the line snapping while also minimising interference with the inexperienced fishers' pleasure in reeling in the fish for himself. These examples – mapped and tracked empirically – epitomise the communal qualities of rock fishing culture and reveal in real-time the distributed relational interconnections and embedded practices that respond to risk.

What is especially important about this example is that these individuals are not friends outside of this high-risk space, and these actions are too improvisational and emergent for them to be planned. This suggests that the ways that rock fishers relationally produce, perceive, and respond to hazardous events are often forged between fishers who are unfamiliar with one another. Bourdieu (1977, 1984) discusses the significance of probing social worlds and the interconnections between people who seek to affect their environments in shared, often habitual ways. In this instance, an experienced fisher shows such interconnections by assuming a leadership role within collective risk-mitigating practices. Other fishers have cited additional roles within the collective practice of landing fish by habitually bringing their personal gaff hook to help fishers safely land fish:

> I always bring my gaff with me because most people don't have one and if I hook a big fish I want someone to help me pull it onto the rocks and I think it's important to help other people safely pull the fish on to the rocks. If we don't have a gaff handy [available], it can be pretty dangerous pulling a fish on to the rocks because if it fights right as you are trying to pull it on to the rocks, you can

> easily lose your balance. But if someone can hook the fish with the gaff, it helps you pull it up and keep your balance. It's just safer and makes it easier to land a big fish (Hassan, 2018).

Lastly, in Event 3, the ever-present risk of overtopping waves is shown to be recognised by an experienced fisher but not by inexperienced fishers, emphasising their differentiated skills and modes of attunement to the conditions. In this case, the experienced fisher seeks to protect his own bag from being washed off the platform. Social cues taken by the inexperienced fishers (one of which is the corresponding author) from the experiential-expert shows how non-linguistic communication affects behaviour, without verbal or direct instruction. This video shows the experienced fisher moving, calmly assessing the angle and energy of the incoming wave, subtly positioning his body between where he perceives the wave will overtop and the other fishers. Fascinatingly, this event was a reaction to the sole wave that overtopped the platform over a seven-hour fishing session. Yet the 'experiential-expert' attuned to risk was able to anticipate this wave before it reached the platform, reacted to it and, whether intentionally or not, prevented the two inexperienced fishers from a hazardous situation. Had the experienced fisher not been present and moved in this particular way, a more hazardous situation would have likely emerged. This timely reaction to risk, which cued risk-minimising actions by the inexperienced fishers, demonstrates the capacity of collectives to recognise and mitigate relational risk – consciously and/or subconsciously. Furthermore, along with the other two events explored in this section, this incident lends empirical support to our contentions about the different ways that risk is perceived and acted upon collectively by those who co-occupy space and who share a 'fishing culture'.

Event 3. Waves overtop, and inexperienced fishers' behaviour is cued by how and when the more experienced fishers moves in response to the wave that he anticipates as hazardous (corresponding author is Blue checked shirt).

4.3 Breakdowns in collectives

Understanding and emphasising examples of the collective ways in which fishers manage risk also have value in understanding the problems that occur when such collective responses breakdown. The value of belonging to the rock fishing culture became apparent after a rock fisher entered the water at the field site in NSW on December 31st, 2017 and later died in hospital. Interviews conducted two weeks after this incident found that none of the participating fishers or members of their associated networks went fishing on that day or knew the man. The victim is thought to have been fishing during hazardous conditions and, because he was not connected to the 'locals' or known by them, he was assumed to be unfamiliar with local risks, which might well have been mitigated had he been part of the local fishing culture.

Other socio-cultural examples of collective risk management breaking down are when experienced fishers attempt to transfer their knowledge to others but are unsuccessful because they lack a common language or because other fishers respond negatively to the advice that is proffered. Once a fisher is treated dismissively, many noted, they were less willing to share their experiential-expertise, leading to frustration as described by Greg (2018):

> Look, I went up to the guy to tell him 'mate, you're standing in the stupidest spot' and he started shaking his head, motioning with their arms for me to leave him alone and it pissed me off because I was only trying to help him and he treated me like shit. So I said fine, get into trouble, it's not my issue.

The important influence that experience has on movement through hazardous space and the communication of this knowledge to less experienced fishers was demonstrated by Tom, an inexperienced fisher who explains that the only reason he was able to map hazardous space was because he had been taught by another, more experienced fisher:

> Well the only reason I know about this channel or where waves come over is because some of the older guys told me when I came down here. I still don't know the area that well but the one thing I remember was the guys telling me that on certain days, waves wash over here [where a channel was mapped) and if you stand here you can be swept in (2018).

In addition to standing in hazardous space, failing to accord with shared fishing etiquette can also limit the willingness of experienced fishers to prevent risk. The leaving of rubbish on platforms was described by Steve as a key factor in shaping why he feels less compelled, as an experiential-expert, to help some inexperienced fishers during high-risk events:

> The rubbish and lack of respect for the sea [that] people have pushes them out of the community and makes me not want to help them. It is so easy to bring a bag and throw all your rubbish in there. They just do not have any respect, so I could not care less about helping them (2018).

These breakdowns provide counter-factual examples of the ways that relational risk is managed collectively, offering risk managers possible pathways to improve public safety by encouraging fishers to become more active members of fishing 'culture'. Lacking awareness or acceptance into a rock fishing culture limits the capacity of inexperienced fishers to engage with online networks and the experiential-experts in customarily accepted ways. This removes their opportunities to learn about risk through experience with experts and to absorb the subsequent collective risk prevention practices that are produced. Identifying and documenting how these processes unfold provides evidence that risk is often, if not always, relationally produced, perceived, and responded to collectively, despite the overwhelming tendency to individualise risk.

5. CONCLUSION

Drowning is a leading but preventable cause of unintentional death worldwide. Despite countless safety education campaigns that attempt to change individuals' behaviours, alongside continual investment in lifesaving services, drowning remains a significant global health problem. Our findings suggest that drowning risk management can expand to consider the collective practices that mitigate risk. Analyses of collective practices offer an innovative pathway for the reduction of preventable drownings worldwide. Relational conceptualisations enable analysis of the collective ways that people behave when they interact with hazardous aquatic environments and with each other. We contend that coastal risk management could collaborate with existing rock fishers, integrating their collective practices, to fundamentally reconfigure risk prevention practices.

In this study, we have provided examples of high-risk situations, including occasions with snagged lines, hooked fish, and overtopping waves, to demonstrate the various ways that rock fishers experience and manage risk collectively. In most situations where multiple people are rock fishing, collective risk management is the most immediate materialisation of risk prevention, and this aligns with existing safety messages that encourage fishers to 'never fish alone' (BOM, 2018). Such policies show that risk managers can incorporate relational conceptualisations into governance. A collective fishing etiquette, for example, has the immediate and site-specific benefits of crossing boundaries of language and experience, overcoming potential restrictions on fishers' opportunities to cooperate when risks inevitably emerge. Crucially, we argue that approaches that account for these kinds of collective responses are more likely to succeed than those that prioritise the individual, which remain dominant in coastal risk management and global risk governance (Beck & Beck-Gernsheim, 2002). In a context in which government agencies struggle to integrate different cultures and underfunded risk managers often fail to influence individual behaviours, conceptualising risk as relational may create opportunities for more cost-effective strategies that nurture pre-existing collective risk management in which a shared culture and trust are already established.

This study also reveals the embeddedness of collective practices that can lead inexperienced fishers to collaborate with more experienced fishers. Experiential-experts often consider rock fishing culture as a communal praxis that functions as a resource for navigating risk and training newcomers (Kamstra, Cook, Edensor, et al., 2019). This culture is passed from one fisher to the next, over years of collectively experiencing the reward of landing big fish and negotiating hazardous situations together. Yet in risk governance, there is little accounting for how relational risks and collective responses are produced. Our analysis of collective practices can serve to validate and enhance the salience of conceptualisations of relational risk (Adams, 1995; Adger et al., 2009; Renn, 2017), which, to date, has escaped substantive empirical confirmation.

Capturing and measuring these rare collective responses to risk in real-time was made possible by deploying an innovative mixed methodology. By relating empirical material from six different methods, we were able to capture the nuances of collective risk prevention, providing visual and empirical examples of how a shared fishing culture collectively responds to risk in real-time. Our examples of the collaborative, relational practices of managing risk could inform further research into many other risk settings, which would further challenge contemporary, individualised risk governance and management practices.

Safety education, for example, could facilitate casting lessons to prevent inexperienced fishers from snagging their lines close to the hazardous seaward edge or tangling lines with experiential-experts, disrupting casting rhythms and the fishing collective. Further, safety education could emphasise the importance of collectively landing fish, encouraging a stronger collective fishing culture, while simultaneously instilling collective risk prevention techniques. Examples of relational risk and collective management breaking down also provide counter-factual evidence that reveals how, in

many cases, the risk of drowning is increased when the collective is removed or rendered ineffective, which should be a paramount concern for those implementing risk governance. We suggest that decisions-makers could benefit from improving the willingness of experiential-experts to collectively respond to risk by discouraging fishers from unwittingly separating themselves from the collective by, for example leaving rubbish on the platforms. The fishers we feature in this paper exhibit a relational understanding of risk that has emerged from a habitual collective response as part of their sophisticated, well-practised fishing experiences. The challenge this poses for managers lies in their moving beyond conceptualisations of risk and strategies of risk management that are founded on individualistic rather than collective, relational assumptions.

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