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# Geo-based technologies, tourists and bushfires in northern Australia

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# Geo-based technologies, tourists and bushfires in northern Australia

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## Abstract

*This paper analyses how the use of geo-based technologies can play a role in the safety of tourism operations and tourist travel—especially in the case of bushfires. The study uses data from 42 qualitative interviews with tourists, tourism operators and other stakeholders in the remote Kununurra area of Western Australia carried out in 2012 and 2013. We contend that the spatiotemporal nature of tourism has stimulated considerable development in a range of geo-based technologies. The paper argues that geo-based technologies are an integral part of fire suppression and mitigation practices, and that tourists' familiarity with geo-based technologies makes these technologies an effective mode of fire safety information for independent tourists, especially those travelling in remote and regional areas of Australia. A key finding, from a thematic analysis of the data, is the importance and relevance of real-time fire warning information for tourist operators and independent tourists, along with an observation that tourists and tourism operators are particularly interested in using the new user-friendly MyFireWatch website. This finding draws a parallel with the high use of geospatial technologies in the tourism industry by both tourism operators and tourists themselves. Further, this paper also calls attention to outback tourism and the importance of a 'loci of responsibility' between emergency services, tourism operators and the independent tourist in times of bushfire and other emergencies in remote Australia.*

## Introduction

This study has its beginnings in an Australian Research Council Linkage funded project between Edith Cowan University and Landgate WA—a government statutory authority in Western Australia responsible for land information services—to develop a new user- friendly site, MyFireWatch, http://myfirewatch.landgate.wa.gov.au/ which provides previously difficult to retrieve fire information to the general public.

The paper argues that geo-based technologies, which provide crisis and safety information, are particularly relevant for the independent tourist and tourism operators in remote and regional Australia. It contends that as the 'loci of responsibility' for community and visitor safety shifts (from emergency service providers to more of an individual/personal responsibility) when people move through or live in more remote areas of Australia, the need for independently sourced fire and emergency information

(along with the appropriation communications devices) is greater.  The paper also argues for the development of popular tourists' information sites to redirect tourists to appropriate local emergency information sites and channels in times of crisis.

The study focuses on findings from the 'community phase' of the research project, involving emergency and fire mitigation workers, visitors and general community members, in the area of Kununurra WA. Participants were interviewed, not only about their thoughts and expectations regarding the new user-friendly FireWatch site, but also their current information seeking behaviours, and especially their internet based information seeking behaviours. A key finding, reported here, is the importance and relevance of fire warning information for tourist operators and independent tourists, along with an observation that tourists and tourism operators are particularly interested in using the new user-friendly website.  This finding draws a parallel with the high use of geospatial technologies in the tourism industry by both tourism operators and tourists themselves.

The range of geospatial technologies available to tourists includes a variety of geographic platforms and devices ranging from "navigation systems, digital maps, portable guides and/or recommender systems" (Tussyadiah & Zach 2012, p. 782)—as well as more recently developed geographic websites dedicated to real-time, map-based humanitarian, health and safety information. These includes online travel warning maps, severe weather warning maps, global incidents maps, fire hotspot maps—as well as crowd-sourced, humanitarian crisis maps. Recent location-aware technologies enables locative media and the use of online social communications sites and services to track tourists/travellers and provide additional tourism support such as the location of nearby restaurants or visitor guides (Tussyadiah & Zach 2012).

Nonetheless, research regarding the use of these technologies in tourism is somewhat limited to the field of product development (Burigat & Chittara 2007; Garzotto et al. 2004; Jitendra, Pratap & Preevanti 2012; Maruyama et al. 2004) and, to a lesser extent, the adoption of geo-based technologies by tourists (MacKay & Vogt 2012; Wang, Xiang & Fesenmaier 2014). More recently, geo-based technologies have also enabled tracking the behaviour and location of tourists. This includes tracking tourists via their geo-tagged photography (Kádár & Gede 2013; Vu et al. 2015), tracking and locating tourists in outdoor areas through the use of radio-frequency identification (RFID) technologies (Lu & Sun 2012) and data mining social network sites to evaluate the distribution of international visitors in a tourist region (Edwards et al. 2014).

## Remote Tourism in Australia

One of the main attractions for tourists (both domestic and international) is outback Australia, usually areas remote from population centres and coastal regions. These remote areas (tropical, grassland and dessert regions) of Australia pose particular risks to travellers, especially tourists unfamiliar with the dangers of outback travel.  Tourists (and other travellers) can find themselves lost, stranded or injured in very remote landscapes, which have limited infrastructure and fragile communication networks (Holloway & Green 2013a; White & White 2011).

This lack of familiarity with local conditions and ways of handling them, finds tourists attempting trips and activities for which they are unprepared. For example, recent news headlines have reported on tourists attempting road trips along the Oodnadatta Track in outback South Australia in "temperatures [that] are forecast to reach almost 50 degrees Celsius [122 Fahrenheit]" ('As Rural South Australians', 2014). Headlines such as "As rural South Australians retreat from heat, 'mad' tourists continue down the Oodnadatta Track" (2014) reflect the frustration some local residents experience when tourists choose to ignore safety advice.

## Bushfire Threats

The bushfire season in the north of Australia coincides with the area's peak tourist season. This occurs between May and September during the tropical and subtropical dry season—and at the opposite time of year than in the south. While the most intense and publicised bushfires occur in the southern half of Australia, larger and more frequent bushfires occur in the northern part of the continent. Australia's vastness means it has a variety of climate zones and holds substantial biodiversity and there is no specific time of the year or season in which Australia is free from the threat of bushfire (Tropical Savannas CRC n.d.).

Northern bushfires do not, however, impact as many people due to the relatively sparse population. Nonetheless, these fires are increasing in frequency and intensity. This is primarily due to reduced occupation and access by Indigenous communities to traditional lands and the decline of traditional fire management practices, deficient fire mitigation practices on pastoral leases, the spread of introduced plant species resulting in higher fuel loads, as well as the higher temperatures associated with climate change. (Tropical Savannas CRC n.d.; Williams, Karoly & Tapper 2001).

Tourism in the north of Australia is highly dependent on access to the natural environment (Russell-Smith et al. 2009). Northern bushfires, which can burn up to half the total savanna woodlands every year or second year (Bryant 2008, p. 5), can lead to both short term and long term consequences. In the short run, these fires can lead to limited tourist access to National and State parks, as well as road closures on both main and secondary roads—which in turn can limit the travel plans of tourists and tourist operators. Fire emergencies can also affect tourist comfort and safety. Smoke from these large tracts of fire also affects tourists and locals. Tourism operator, Gini complains that;

> …we all live with the smoke hazard and health implications every year because they don't put fires out. Even fires that are close to here, close to properties, close to communities – they don't do anything (2013).

An increasing number of independent tourists are visiting outback Australia, including Australian retirees on long-term tours of Australia, backpackers and other self-drive tourists, as well as those on commercially organised itineraries. With this trend, the question of hazard responsibility becomes increasingly important. Jeuring and Becken (2013) suggest that:

there are discrepancies in responsibility perceptions between tourists and tourism related organisations which can have far reaching (negative) consequences when tourists are unaware of risks, or expect to be protected by authorities (p. 194).

With nearly one million (only six per cent of tourists in Australia) travelling to the northern region of Western Australia and most of these from intrastate (usually the south west of Western Australia) (Tourism Western Australia 2015), the region is still a relatively remote and isolated tourist destination. Travel between towns and other stopover destinations is isolated and tourists going off-road (off the main roads onto non-sealed roads) when inexperienced or unprepared can leave them stranded or lost (Office of Road Safety 2014). Accordingly, the 'loci of responsibility' is a particular challenge for tourism authorities and businesses in remote Australia, as well as a burden on outback residents, who have to undertake rescue and recovery activities for tourists who find themselves in trouble.  Tourists may assume that tourism authorities or local emergency services have the main 'loci of responsibility' when it comes to their safety.  On the other hand, the ability of these groups to effectively inform and keep safe a dispersed collection of tourists in remote areas is limited.

## The role of Geo-based technologies in tourism

When tourists go away from home they are usually thought of as being away from both place (home) and relationships (family and friends).  Nowadays, however, the temporary geographical separation of tourists from their family and friends is somewhat negated by the ease and speed of today's telecommunication technologies which allow for a greater amount of co-presence with family and friends from home (Holloway 2010, pp. 97-98). This means that everyday social relationships need not be put on hold during vacation or touring times (Holloway & Holloway 2011).

The everyday availability and use of geo-based technologies such as car navigation systems, geo-based software and applications on either personal computers or mobile technologies (smart phones and touchscreen tablets) has also quickly spread to the tourist experience. Due to the spatiotemporal nature of travel, tourists and businesses alike find these technologies relevant and important for various purposes, including leisure and business travel (Raubal & Rinner 2004; Tussyadiah & Zach 2012). Indeed, tourism has witnessed a significant development of various geographic technologies and platforms of technology applications for tourist purposes, including navigation systems, digital maps, portable guides and/or recommendation systems created for general travel use or specific to tourism destinations (see Burigat & Chittaro 2007; Maruyama et al. 2004; Tussyadiah & Zach 2011; Wang, Park & Fesenmaier 2012).

MyFireWatch, is an internet-based information service based on near real time satellite and remotely sensed information relevant to bushfire safety within Australia. This publically available, geo-based technology overlays onto Google maps, a popular and easily used map-based site or app readily used by tourists.  The site/app delivers timely, bushfire information that is sourced from satellite readings occurring approximately every two and a half hours. This information is particularly relevant to people living and travelling in remote Australia—as up to date fire information is often limited. Thus, the use of

Google Maps merges tourists preferences and abilities in the utilization of geo-based technologies with new independently sourced bushfire information.

## Safety information seeking behaviours of tourists

Tourism disaster management literature now recommends improved communications for tourism managers and tourists in times of disaster (Orchiston & Higham 2014; Thapa et al 2012; Warren 2013) and that there is a "critical importance of [for] knowledge management and effective inter-agency collaboration and communication in the immediate disaster response" (Orchiston & Higham 2014, p. 1). However, while tourism operators are required to manage safety for their customers/tourists, (Parfitt et al. 2006) the 'loci of responsibility' for independent tourists seems relatively fluid, both in terms of tourist expectations and in terms of the expectations of government authorities such as emergency services and tourism authorities.

In New Zealand Jeuring and Becken (2013) found that the perceptions of independent tourists about who is responsible for their protection vary. Some independent tourists have a relatively high perceived reliance on external safety support while most believed that the responsibility for their safety during severe weather events is a shared responsibility—between the individual tourist and local emergency service organisations (p. 199). They also found that availability of information about severe weather events was important to all independent tourists they surveyed irrelevant of whether or not they expected local organisations to be responsible for their safety (p. 198). However, tourists differed greatly in their preferences for information sources—and weather related information. They were also less likely to go to official sites for information and more likely to go to popular tourist sites ('i-sites' and tourist 'product' sites) for information. Jeuring and Becken therefore suggest that these sites should be used to disseminate or link to more reliable and official sites (p. 200).

## Multiple channels of information for maximum coverage

In the past, officially sourced alerts and warnings to the public about bushfires in Australia have been broadcast over radio and television. However, several inquiries into the recent bushfires within Australia have recommended that organisations spread their warning and education information across a variety of sources or channels of information (Elsworth et al. 2008) for greater coverage and to increase the credibility of the information (Paton et al. 2008).

Tourists differ in their preferences for information during emergencies (Jeuring & Becken 2013, p. 200). Some prefer more conventional sources such as television and radio, as well as asking key informants in the local community. A growing number of tourists also prefer to use the internet to obtain hazard warning and protection information. Jeuring and Becken also found that, while most tourists can access the internet while touring, the information sources they turn to are not usually the "channels used by authorities to inform the public" (2013, p. 200) of impending danger. This mismatch between sources of

information used by tourists and official or authoritative sources of information needs to be addressed by emergency authorities.

These findings are particularly salient to independent tourists in rural and remote Australia who are less able to rely on local communication networks (formal and informal) to be informed of imminent bushfire danger, floods or other dangers. Geo-based technologies, technologies that are already utilised extensively by tourists, are better able to deliver disaster information and provide enhanced tourist safety, as well as disaster mitigation and recovery.

## Research Methods

A community consultation phase was carried out as part of the project, during which emergency workers, community members and tourists in the town of Kununurra WA were interviewed. A social shaping of technology framework was used (MacKenzie & Wajcman 2003), in which interviewees are considered part of an active audience making choices about when and how they access information and what they do with it. Context and relevance is as important as the quality and usability of information.

## Fieldwork Locale

The fieldwork site chosen for this project was the Kununurra area located in the north east of the Kimberley region in Western Australia about 40 kilometres from the border with the Northern Territory. This town was chosen because the MyFireWatch site/app was developed specifically for remote and regional users.

## Participants

Purposive sampling was employed as a recruitment strategy (Patton 1990).  Interviews with 42 stakeholders were conducted in Kununurra (2012/13) to determine fire-related information-seeking behaviours and attitudes to mediated information services, Stakeholders included emergency services personnel (paid and volunteer), shire representatives, tourism operators, small business operators (including tourism sales), a forest manager, a mango farmer, an Indigenous ranger team manager, residents on very remote pastoral properties, visiting tourists and general community members

## Data Collection and Analysis

Open-ended and semi-structured, conversational interviews were used. The semi structured interview approach provides some degree of direction while empowering the interviewee to pursue their own agendas related to fire prevention and mitigation (Holloway & Green 2013b).  The interview audiotapes were transcribed and thematic analysis was used to identify the key, as well as other emergent, themes.

# Geo-based technology use by tourists and tourist operators

The creation and "development of location-aware or context-aware technologies has opened access for tourists to various venues for retrieving geographic information before, during and after traveling" (Tussyadiah & Zach 2012, p. 782). Geo-based technologies have flourished with the development of a variety of devices, platforms and apps. Thus, while individual tourist's experiences with geospatial technologies informs whether or not (or the degree to which) tourists use these technologies while travelling, the spatiotemporal characteristics of travelling itself can be a motivator for using these technologies.

Tourists and tourism operators interviewed did use geo-based technologies, especially interactive map-based internet sites. Nearly all the uses involved safety. Local tour operators accessed their GPSs and the Bureau of Meteorology (BOM) map-based site to ascertain current weather conditions during the wet season. Tour operator, Dieter, who runs a crocodile watching business along the Ord River, needs to check weather conditions in case of heavy rainfall or floods—which may affect his customers safety.

> If I want to know what the weather is like in Kununurra the closest [BOM] radar is Wyndham so I press on Wyndham and that gives me a map of the area. Right now there is just a little bit of cloud cover, but in the wet season we can see a storm rolling through and down the bottom are colour codes so you know the intensity – cloud, heavy rain, and I think it is on that loop (Deiter 2013).

Seasoned independent tourists are also familiar with, and use, geo-based technology. Grey nomads, Verity and Sam, use a travel router which uses 3G or 4G modem and mobile phones when in range and a two-way radio when out of town.

> And I find that the WiFi that I plug in, not one of the little... similar to that, which just plugs into the power and I can pick it up out here and I don't have to actually plug it into the side of my computer. I just plug it into the power and it will pick up my computer and my laptop out here. That's a big thing. You certainly need communication. The 2-way radio. I think the one we bought has about 25-30 km range which isn't bad but when you are in places, some of these roads where there is not a lot of traffic, if you break down you just better hope that someone does come along and you can flag them down…. I've got a computer, mobile phone, CB, a couple of iPads, we've both got a phone (Verity 2013).

Tourist operators are also beginning to use geo-based technologies to keep a track of hikers. Paul, a resort owner, finds that wearable satellite trackers are a safety advantage to the industry.

> They are a little satellite tracker. Put a wrist band on, log it in, and we can go onto a satellite website – several companies do it – and we can see exactly where those people are in real time – within 10m of their location. If they are walking, you will see on your screen, that person

walking.  So we knew exactly where these people were, then we could talk on the phone – on Google Earth map, showing their location on a map (Paul 2012).

The use of geo-based technologies, we contend, will continue to be a growing area of positive impact on both tourist operators and individual tourists, particularly in remote regions of Australia. This trend will continue, especially so, given the important issue of enhancing safety in bushfire prone regions of the country: an issue explored in the next section.

## Fire and tourism in northwest Australia

Nearly one million tourists visited the northern region of Western Australia in 2014. Most visitors were domestic tourists (73 per cent from intrastate and 20 per cent from interstate), with marginal number of international visitors (7 per cent) (Tourism Western Australia, 2015). Tourist operators and people from associated businesses and bodies interviewed were concerned about sustaining the exiting habitat or landscape from the large tracts of fires that rage across the north of Australia in the dry season of May to September. In particular, they are concerned with the fire mitigation practices carried out by both the Department of Parks and Wildlife (DPAW previously DEC) and the Department of Fire and Emergency Services (DFES previously FESA) who are purportedly overzealous in their burning off practices, allowing large fires to rage uncontrolled across the landscape. Artist John who has lived in the area for over 23 years notes;

> The weeds are really taking over since the [prescribed] fires, and the change of vegetation is quite remarked. The big trees – we don't have huge trees up here apart from our boabs – but what trees we do have like the Papuanas [Ghost Gums] are a reasonably big eucalyptus. A lot of those are going missing and some of the paperbarks and melaleucas. Those big older trees, when people come in later – a lot of government officials who come in later – don't know that they were here (John 2013).

Resort owner Paul reports that sparser vegetation on rocky hillsides is changing due to repeated burning.

> That Spinifex up the hill was massive and of course it ignites because it's got oil in it but because you are burning it year after year, it is only staying small. In a lot of places it is not even growing back because it's been burnt so much that there's nothing left […] and Cane Grass has taken over and if you look at the satellite picture, that was taken 5 years ago and you can see the burns on that (Paul 2012).

This can lead to less than optimal tourist experiences.  Bushwalking operator Mike recalls a trip where his tour group encountered days of fire scarred landscape.

> The group of Sydney bushwalkers – we walked them from Berkley up the coast to Faraway Bay – those trips are always two years in the planning.  People get holidays and pay for their airfares, and when they leave home – even 12 months ahead the country is fine.  This year DEC [now

DPAW] drops the incendiaries out there again, and for eight out of the ten days where we were walking was through completely burnt out country, and these people have waited for two years to come and trek the Kimberleys. They were not happy (Mike 2012).

Tourist operators are also concerned about the safety of tourists in their charge—as they themselves have been caught up in dangerous scenarios involving prescribed burns. "There is no way we would leave our car anywhere in the bush now. Not just from other people lighting fires but from DEC and FESA with the aerial bombing" (Brian 2102). Noni also notes:

It is becoming a huge safety issue with the constant burning practices. There are too many people up here now. I've just come back from Kalumburu last week, and right down through there on every little dirt track you will see a Brit's van, way down in the bush. They [backpackers] love going bush, they love to get out there looking at water holes and finding their own things. How many of them come close to being caught in the fires? (Noni 2013)

Some tourists, especially experienced outback travellers, also use geo-based technologies for safety communications when on the road. When asked about their communications capacity, Leanne and John who had just purchased a satellite phone with GPS indicated that they are now happy with their communications technologies. "We are now but before we got the sat phone we were a bit concerned" (John 2013).

The behaviours of both individual tourists and tourism operators have changed over time as the impact of fires, find management practices has resulted in the need for a greater level of care and concern about safety in remote and regional Australia. This does raise the question about the 'loci of responsibility' amongst the different groups and stakeholders in these regions.

## Geo-based technologies, the 'loci of responsibility' and fire in remote Australia

Geo-based technologies are used extensively by fire and emergency services (Aloudat & Michael 2011; Küpper 2005; Van Oosterom, Zlatanova & Fendel 2006). In outback Australia, where the 'loci of responsibility' weighs more heavily on the individual, local property owners (for example pastoralists and resort owners) and their staff tend to fight their own fires, and geo-based technologies are also used. In the excerpt below, remote resort owner Paul retells the night his resort came under significant danger from nearby bushfires. He used a variety of geo-based technologies (a fire-mapping website, satellite phones and geo-trackers) to help in fighting the fire, to keep a track of the safety of his staff and to keep tourists safe.

The night of the big fire … It was still a fair way away and no one thought it would jump the spillway. There is always someone around give a hand to do that sort of stuff. There are fire bugs everywhere. We had the option to back burn, the fire was getting closer, we knew the wind was going to change, we keep a good eye on the weather and watch everything, the NAFI

website is quite good because it shows the direction of the smoke.  Quite often the smoke is going low level that way then suddenly will go that way because the high level winds are different… That night we contacted the guys on satellite phone – on our phone we called their satellite phones where they were.  Luckily they all had trackers so we knew where every individual was.  We were reluctant to back burn because we knew there were 40 people there and we would have been lighting upwind of them.  Whereas the fire was burning into the wind, so we were between a rock and a hard place.  We couldn't protect our own assets because it would probably have wiped out the 40 people.  They were on the other side of the river but we knew the fire would jump the river.  We knew how strong the fire was and the wind was picking up, so we had to make that judgement.  We called on a couple of local tour guides…..  We spoke to him [a boat tour operator] about what he thought about getting across the river where the people should be, if we light up how they would be affected, so it is just common sense (Paul 2012).

In remote Australia, especially in areas outside the reach of town based emergency services, property owners tend to take on the loci of responsibility for fire mitigation and suppression. "In terms of looking after the homestead, sometimes we will do a wet season burn out here and the stations also do wet season burns" (Penny 2013).

While experienced Australian tourists may understand the shift in the 'loci of responsibility' towards the individual when carrying out independent outback travel, other tourists may not. Grey nomads, Gerry and Peter noticed many younger travellers are seemingly unprepared, in terms of vehicles and communication technologies, when they go bush.

I see young people getting around the place, rubbish cars, and if something goes wrong I don't know how they get on – the young Germans and that – they must take some risks.  Then there's the cost of sending helicopters out to try and find them because they haven't got any communication.  It happens seriously, people get lost in the bush (Gerry 2013).

The growing use of geo-based technologies is altering both the practices of key stakeholders, including tourism operators and tourists, and does raise the question of how to educate and manage this evolutionary change of behaviours in the tourism realm.

## Conclusion

In the sparsely populated north of Australia, where emergency organisations cover large areas prone to regular seasonal fires, there is clearly a role for the kind of fire information that can be provided by MyFireWatch.  This is particularly relevant in remote areas where communication channels are often patchy or of poor quality making seamless communication difficult—and where people from outside the community, such as tourists, are exposed to high-level risk during the dry season. Findings from this overall project is that the MyFireWatch site/app will be a welcome, and easy to use, information source for remote community members and tourists who currently feel under informed about fires in the area.

More specifically, this paper has clearly identified that the spatiotemporal nature of tourism has stimulated considerable development in a range of geo-based technologies. The paper has posited that geo-based technologies are an integral part of fire suppression and mitigation practices, and that tourists' familiarity with geo-based technologies makes these technologies an effective mode of fire safety information for independent tourists, especially those travelling in remote and regional area of Australia. These technologies also have major relevance for tourism operators and other key stakeholder groups in remote and regional Australia. Finally, this paper also calls attention to outback tourism and the importance of a 'loci of responsibility' between emergency services, tourism operators and the independent tourist in times of bushfire and other emergencies in remote Australia.

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