

Readiness for the next major bushfire emergency

Andrew Gissing

Risk Frontiers

Neil Bibby

People and Innovation

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Australia needs to be ambitious in its thinking about readiness for major bushfires; in particular, how future bushfires are managed and fought. Bushfires over 2019–2020 caused 35 fatalities, widespread disruption and significant damage with 3093 homes being destroyed and major damage to community infrastructure. We must learn from this experience.

Current management of bushfire risk is largely reliant on long-standing approaches that are resource intensive and that struggle to control fires when conditions are catastrophic. This issue is compounded under a warming climate with fire seasons becoming longer and days of significant fire danger more frequent.

An inherent problem is that bushfire detection is complex. In the time it takes before resources can be targeted and tasked, bushfires may have already spread to the point where suppression is difficult. This problem is exacerbated when bushfire ignition occurs in areas far from emergency response resources. Making the problem worse is a growing bushland-urban interface where buildings and community infrastructure are highly vulnerable and exposure is increasing.

Discovering the next generation of firefighting capability should be a priority.

New thinking is required

There are two stages in considering future capabilities. The first is planning and investment to improve capabilities in the short term particularly before the next bushfire season. The second is research and innovation to inspire the next generation of firefighters.

What is needed is a blueprint of how bushfires will be fought in the future. This blueprint should be a vision whereby bushfires can be rapidly managed and controlled in a coordinated manner that is informed by advanced predictive intelligence and where the built environment is resilient. Research into the development of such a blueprint should include:

- Bushfire detection and suppression:
 - How can bushfires be detected more quickly?
 - How can bushfires be extinguished before they are able to spread?
 - How can the safety of firefighters be improved?
- Coordination:
 - How can communications enable effective coordination?
 - How can resources be tasked and tracked more effectively?
 - How can situational awareness be enhanced to inform decision-making?
- Community resilience:
 - How can new buildings be made more resilient?
 - How can existing building stock be retrofitted for resilience?
 - How can community infrastructure such as energy distribution systems, telecommunications, water supplies and sewerage systems be designed with greater resilience?

Short term

It is widely agreed that there are many technologies and systems already existing that could enhance firefighting and disaster management capabilities. Specific opportunities identified by industry experts:

- Satellites, such as data sourced from the Himawari satellite, should be evaluated for

their ability to enhance fire detection. High Altitude Platform Systems may be another option.

- In the United States, Unmanned Aerial Vehicles (UAV) have been employed to provide enhanced imagery over firegrounds and, if equipped with infrared sensors, these can support monitoring of fire conditions at night. The Victorian Government has established a panel contract with UAV providers to assist with real-time fire detection and monitoring. Further policy regarding airspace management is required to support demand-based deployments of UAVs.
- Airborne sensors can improve data availability regarding bushfire fuels.
- Existing agricultural monitoring technologies could be repurposed to monitor bushfire fuels and soil conditions.
- Balloons equipped with radio communications could provide coverage when traditional communications technologies have been disrupted. Small UAVs could create a mesh network to provide a wireless communications network or equipment fitted to aircraft.
- Advances in using robotics in the mining sector may provide applications to firefighting, for example autonomous trucks.
- Resource tracking technologies could be implemented to improve coordination and firefighter safety.
- Night-time aerial firefighting capabilities could be used.

Operational decisions could be improved by enhanced collation and fusion of data already available. There are many data sources managed by different organisations, not just government agencies. Collating these datasets to provide a common operating picture across organisations would improve situational awareness and data analytics.

The widespread adoption of artificial intelligence and greater digital connectedness across the economy and the emergency management sector will find new ways to make sense of data and improve decisions. In the built environment, improved information to householders about the resilience of their buildings along with programs to implement simple retrofitting measures should be considered. Enhanced data availability and analytics could be used to tailor emergency warnings.

In the aftermath of bushfires, land swaps and buy-outs should be considered to reduce future exposure in high-risk areas. Similarly, communities should be better planned to ensure infrastructure is resistant to failure when most needed.

2030 and beyond

A key area for research and innovation investment over the coming decade should be how to rapidly suppress bushfires. This could see swarms of large-capacity UAVs supported by ground-based drones to target suppression and limit fire spread. Resources could be rapidly dispatched and coordinated autonomously. Pre-staging of resources would be informed by predictive analytics and enabled by unmanned traffic management systems. UAVs and drones have applications beyond fire suppression including for rapid impact assessment, search and rescue, logistics and clearance of supply routes.

The way forward

A research and innovation blueprint is needed that outlines how technologies will be translated to enhance firefighting and resilience in the short term and, beyond this, how the next generation of capability will be designed and built. Its development should involve government, research and industry stakeholders in a collaborative manner. The final blueprint should be integrated with future workforce and asset planning to support change management.

Adopting new technologies will not be easy and existing cultural and investment barriers should be considered. In adopting new technologies, it is important to recognise that innovation is an iterative process of improvement and rarely provides a perfect solution in the first instance.

Public-private partnerships will be key to realising opportunities and governments must engage a broad range of stakeholders. In the aftermath of Hurricane Sandy in 2012, the USA launched a competition called 'Re-build by Design'¹ focused on solutions to minimise risk. Already in Australia, numerous innovation challenges involving businesses and universities assist in inspiring ideas. There is an opportunity to harness and coordinate such challenges on a grand scale to promote new thinking and collaboration linked with responsible agencies.

We need to be bold in our thinking to build resilience!

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End note

- 1 Re-build by Design, at www.rebuildbydesign.org.