A case study series published by the UNISDR Scientific and Technical Advisory Group

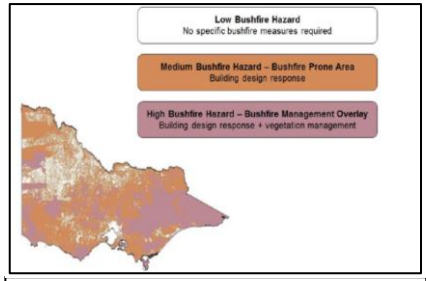
UNISDR
The United Nations Office for Disaster Risk Reduction

UNISDR Scientific and Technical Advisory Group Case Studies - 2015

Integrated regulation to reduce wildfire risk in Australia

The problem

Wildfires, locally known as bushfires, are a natural part of most forest ecosystems in Australia[1]. However, bushfire can become a serious hazard when fires encroach on human settlements, posing threats to life and property. Significant population growth in Australia has resulted in the expansion of settlements close to or within peri-urban vegetated areas, significantly increasing risk of exposure to bushfires. Multiple factors affect bushfire occurrence and risks, including physical factors such as slope and aspect, weather conditions, settlement and building design, layout and materials; and human factors such as ongoing vegetation management[2]. Climate change has also lead to higher frequencies of extreme weather conditions, intensifying bushfire risks. Australian losses are dominated by several major fire events that occurred under severe weather conditions, including the 2009 Black Saturday bushfires. The dynamic nature of factors contributing to fire risks and human settlements require complex responses in urban interface areas that integrate planning and design to reduce risks for structures and people.



[Victorian Bushfire Hazard level[6]]

The science

The Victorian bushfire provisions have been informed by studies of fire behaviour and building ignition and performance during bushfires[3]. In particular, research was carried out investigating variables affecting fire behaviour and its interaction with structures, highlighting the importance of settlement and building design as risk factors[4,5]. The role of land use planning came to the forefront as a powerful control mechanism to achieve bushfire resilient urban outcomes[6,7]. In addition, fire modelling tools were developed, such as the simulation system "Fire Impact and Risk Evaluation Decision Support Tool" providing fire planning information to emergency services and the community in an integrated system[8]. The tool models vegetation loads and likely fire weather in the terrain, using multiple real time data sets and historical information. It models fire behaviour and speed to predict likely impacts on properties and communities, and will allow for multiple possible scenarios to be examined in different weather conditions. These assessments integrate various spatial scales of risk analysis to provide a framework for prevention of unreasonably risky settlements gaining approvals in the first instance.

The application to policy and practice

The 7th February 2009 Victorian bushfires claimed 172 lives and several thousand homes, prompting significant improvement in urban planning and building regulation. The 2009 Victorian Bushfire Royal Commission (VBRC) recommended a range of land use planning improvements. The 'Bushfire Integrated Planning and Building Framework' strengthened controls at different stages of the planning process and integrated the previously separate planning and building systems[2]. This initiated a major change in Victorian bushfire polices, placing greater emphasis on the priority of human life and application of the precautionary principle to decision making dealing with development in high and extreme bushfire risk areas[1,2].

In Victoria, developments in identified bushfire risk areas are now regulated through planning and building systems[1,6]. Bushfire mapping divides the State into three risk areas, based on prior risk analysis via GIS mapping: Low–risk; Bushfire Prone Areas (BPA); and, Bushfire Management Overlay (BMO) areas. Currently, about 15% of the state is designated Low-risk. The remaining 85% is designated as BPA or BMO. This mapping requires detailed, evidence-based risk assessment prior to development being permitted on the basis of scientifically derived criteria[2].

House losses after the Victoria, Australia, 2009 Wildfires

To integrate the evidence, urban planning stipulates that new buildings identified in the Bushfire Management Overlay (BMO) of Planning Schemes (Clause 44.06) must comply with bushfire protection measures. These include defendable space and vegetation clearing standards, appropriate siting and location of buildings, water supply and access for emergency services[2]. In parallel, building regulations require all buildings within Bushfire Prone Areas (BPAs) to comply with the Building Act 1993, Building Regulations 2006 and the Building Code of Australia. Development in BPAs requires building construction requirements improving resistance to radiant heat, ember attack and direct flame contact under the Australian Standard (AS) 3959-2009 Construction of Buildings in Bushfire Prone Areas[1,2].

The BMO provision ensures that development in high risk bushfire areas can only occur after professional and technical consideration of bushfire safety issues. In particular, Clause 52.47 (Bushfire protection: planning requirements), specifies requirements for building works and subdivision. The design, location, layout and siting of the development, defendable space provisions around the buildings, emergency vehicle access and water supply are considered. A Bushfire Attack Level (BAL) is calculated, representing a modelled level of bushfire exposure considering factors such as embers, flying debris, radiant heat, wind and exposure to flame[2]. Development is refused on sites where these factors cannot be dealt with adequately.

Did it make a difference?

There can be little doubt that the newly introduced integrated building and land use planning controls have improved the design and siting of new developments in bushfire prone areas. Analysis shows that the number and severity of fires in natural vegetation is difficult to modify, but that properties complying with planning standards including vegetation management, building regulations, and setback distances to vegetation are three times more likely to survive in severe fires[3]. Higher standards of new building construction and cleared of vegetation around structures significantly improves buildings' resistance to bushfires, emergency services' response abilities, and people's refuge prospects within homes[2]. However this kind of regulatory approach is limited in that risk profiles are improved only when change occurs, when there is "trigger" for regulatory assessment. Accordingly, while the new controls are highly effective at improving risk profiles as settlements grow via new building construction, many existing and older buildings remain, and will take considerable time to be improved.

References

1. March A. & Rijal, Y. (2014) Reducing Bushfire Risk by Planning and Design: A Professional Focus [online], *Planning Practice & Research*.
2. Groenhart, L., March, A., & Holland, M. (2012) Shifting Victoria's emphasis in land-use planning for bushfire: towards a place-based approach, *Australian Journal of Emergency Management*, 27(4), pp.33-37.
3. Holland, M., March, A., Yu, J. & Jenkins, A. (2012) Land Use Planning and Bushfire Risk: CFA Referrals and the February 2009 Victorian Fire Area, *Urban Policy and Research*, 31(1), pp. 41-54.
4. Leonard, J. (2009) *Report to the 2009 Victorian Bushfires Royal Commission: Building Performance in Bushfires*, (Melbourne: CSIRO).
5. McCaw, L., Mills, G., Sullivan, A., Hurley, R., Ellis, P., Matthews, S., Plucinski, M., Pippen, B., & Boura, J. (2009) *Fire Behaviour Investigation: Victorian Bushfires 2009 Research Taskforce – Final Report*, (Victoria: Bushfire CRC).

Authors: Alan March, University of Melbourne; Brendan Gleeson, University of Melbourne; Jean Hillier, RMIT University; Diana MacCallum, Curtin University; Bob Cechet, GeoScience Australia.

6. Opie, K., March, A., Leonard, J., Newnham, G. (2014) Indicators of Fire Vulnerability: Risk Factors in Victorian Settlements, (Melbourne: CSIRO and Melbourne University).
7. Leonard, J., Blanchi, R., Leicester, R., Lipkin, F., Newnham, G., Siggins, A., Opie, K., Culvenor, B., Cechet, B., Corby, N., Thomas, C., Habili, N., Jakab, M., Coghlan, R., Lorenzin, G., Campbell, D., & Barwick, M. (2009) *Building and Land use planning research after the 7th February 2009 Victorian bushfires. Preliminary findings, Victorian Bushfires 2009 Research Taskforce- Final Report*, (Melbourne: CSIRO and Bushfires CRC).
8. Cechet, R.P., French, I.A, Kepert, J.D., Tolhurst, K.G., Meyer, C.P., Fawcett, R.J.B., Thurston, W., Duff, T.J., Chong, D., Keywood, M., & Cope, M. (2014) *Fire Impact and Risk Evaluation Decision Support Tool (FIREDST)- Final Report*, (Victoria: Bushfire CRC).

Authors: Alan March, University of Melbourne; Brendan Gleeson, University of Melbourne; Jean Hillier, RMIT University; Diana MacCallum, Curtin University; Bob Cechet, GeoScience Australia.