

Understand your bushfire risk

Chair: Malcolm Hackett OAM

Presenter: Dr Kevin Tolhurst AM



Chair

Welcome Kevin

Kevin Tolhurst

What's important to get out of tonight is a better understanding of what bushfire risk is and where we fit within that bushfire spectrum.

What is bushfire risk? Fundamentally it's the chance of fire damaging or destroying human life or property, humanity, natural resources, income potential, sense of wellbeing, infrastructure such as power, water, roads, schools, hospitals and so on. It's really the potential for bushfires to do damage.

The bushfire risk that we're looking at is the result of the interaction of three main factors. The first being the exposure to bushfire hazards and I'll describe what those hazards are in a little more detail in a minute.

The vulnerability of the assets and values to those hazards and finally, the likelihood that those hazards are going to occur. The likelihood of the severe weather conditions, the ignition points that start a fire and so on that lead to that exposure by those vulnerable values and assets.

It's important to take into account the fact that there's a landscape level perspective as well as a local perspective that needs to be taken here. Often we might get a bit distracted by looking just at the local perspective, but we really need to look at the landscape we're living in as well. And I'll try and explain some of the factors that we need to look at there. As well as that spatial extent we need to be looking temporarily as well. What we do to prepare ourselves for the next one to five years on one hand is okay, but we also need to be looking at a longer-term occurrence of events as well. So the 20-50 year type timeframe where a much bigger event and more severe outcomes might occur, we need to be prepared for that as well. So, it's both the spatial and temporal scales we need to be considering when we're looking at bushfire hazards.

I would see the main five fire hazards that we're concerned with as smoke, embers, heat, flames and fire induced winds. Smoke might affect visibility, it might affect your ability to breathe so it has health potential implications. Embers are important because they can start spot fires, but they also can set fire to houses, dwellings, and materials around houses. Heat comes in various forms, convection, radiation and conduction. Heat causes degradation or potentially lethal effects on human and other animal life. Flame again is more obvious because it's visible, but it generates heat, radiative and convective heat but also involves free radicals which assist in the ignition process of flammable material and finally, fire induced winds.

We've been seeing those more and more with more severe climate conditions where you can get cyclone strength winds produced by the fire and associated with that downburst and potentially the development of fire tornadoes. These are fire induced weather events that wouldn't exist without the presence of large-scale fires.

They're the five major fire hazards we're considering, so what we need to understand then is the likelihood of our exposure in terms of both the magnitude, the duration and the extent of those exposures. Those three factors - magnitude, duration and extent will all influence whether or not a value or an asset that we're interested in may be impacted by a fire.

Exposure is viewed from the asset and values perspective in terms of those magnitude, duration, extent and frequency and what that value and asset might experience and so, the range of conditions that we're actually planning for. The main question to be answered with this assessment of the potential exposure to bushfire hazard is whether or not the vulnerability level of that value and asset is likely to be exceeded or not in each instance. It's not a matter of whether or not fire will reach a particular value or asset but whether or not it actually will damage or destroy that value or asset and that's dependent on its vulnerability.

Before we delve a little more into that it's interesting perhaps to have a look at the new Fire Danger Rating system that's been produced for Australia. The country has been divided into eight broad fuel types. Forest and grassland are just two of those. The new Fire Danger Rating System has tried to give a number, the fire behaviour index, that is equivalent in terms of its potential to do damage across the landscape regardless of whether you're in shrub land, forests, grassland, cropland, or whatever. When we look at the scales between forests and grasslands being quite different fuels you see the same numbers come up, but what's important here is that the categorization in terms of the potential to do damage so that the bushfire risk is expressed in similar terms.

For example under extreme and catastrophic the likelihood is that we're going to have significant losses both in terms of life and property but also other values and assets. And when you get to catastrophic it's highly probable that we're going to see those severe conditions. So there's been a standardising of how those messages are being portrayed with the new Australian Fire Danger Rating system.

Just reflecting on how the Fire Danger Rating system is helping people understand their bushfire risk locally better.

We need to be looking at both the spatial and temporal scale. I've just picked out a couple of notional properties - one at Strathewen and another one at Arthur's Creek. We could look at anywhere across the country but I'll just pick those two.

What I'm suggesting is you need to be looking at a 5-10km area beyond your property to see what level of bushfire risk you really might be placed in. In this case out to about 10km away from your property a large fire in that zone could produce an ember storm that creates firestorm potential around your property. The steepness of the terrain, the amount of fuel, the size of the fire that could generate there could have an impact on you.

So, it's not a matter of just looking at what's within your immediate vicinity with 100m or a kilometre of where you are. In fact this 5-10km range is really quite important.

I'll go through a little bit more detail. These two properties, almost neighbours, are actually situated in quite different bushfire risk areas. Looking at the more southern one to start with (Arthurs Creek) what we can see it's largely surrounded by grassy area, there's certainly some forested area nearby but it's a reasonable distance, 7-8km from these hills. The amount of embers going to be falling on this property from a large fire in these hills is going to be significantly less than the other property we were looking at before, but it will be subjected to embers and intense fire potentially from some of these local forest patches. and also the grassland area.

Looking a little closer to this Arthur's Creek example. We can see it's about 7-8km away from this urban area, so potentially occupants of this property if they wanted to leave they'd have 7-8km to travel to perhaps get into an area that they know won't be subjected to a severe bushfire. But the question is whether or not they make that decision and what the road conditions are like in the event of wanting to do that movement.

Looking at the second property. This one's further up the valley towards Strathewen. What we can see it's more surrounded by forest. So almost regardless of which way the wind is coming from the potential for this property to be subjected to intense spotting activity and therefore the potential for firestorm development is much much greater. The impact of potential fire induced winds from a large fire in the surrounding area is more likely to impact this area. Even though it's only a few kilometres away from the other property the potential severity of a bushfire effect on this property is significantly greater.

One of the considerations for this property is the fact that the access and egress is along a fairly well-made road but it's tree lined. These trees may be blown over by strong winds, they may be burning because of spotting or the fire impacting on them. But during a fire, or even before a fire because of the weather conditions, the access and egress may in fact be significantly compromised. So, the decisions that this property owner needs to make in the face of fire is quite different in a way to what the other property owner would need to consider given that they're much closer to urban development.

In trying to provide a little bit of guidance as to the severity difference of the exposure we're talking about between Property 1 and Property 2. The amount of duration of the heating impact on the first property might be between 10 and 60 minutes compared to perhaps one to four hours with the property further up the valley and more surrounded by those hills. Flame exposure is likely to be similar because largely surrounded by grass within that last 100m or so around the property. Embers are likely to be arriving at the southern property for perhaps 1-3 hours compared to that perhaps 2-8 hours in the more northern property.

Even though they're only a couple of kilometres apart, their potential exposure is quite different. Smoke in the southern area up to an hour and perhaps more likely one to two hours for that northern property.

The southern property far less likely to be impacted by fire induced winds because of its distance from those heavy fuel accumulations but quite a potential for the Strathewen property (the more northern property), to be exposed to perhaps up to 20 minutes of cyclone strength wind. So that cyclone strength wind could break branches off trees, uproot trees, lift roofing iron or tiles, throw things around houses and break windows.

The significance of the cyclone strength winds are quite great in terms of your ability to be able to do anything outside but also to try and defend a property if you're going to be exposed to those sorts of hazards.

Your options might be to avoid by leaving early, using some sort of building, some sort of barriers or refuge area, or shelter to avoid the exposure to those conditions. Or you may reduce the exposure by how you treat the surrounding area through grazing, slashing, fuel reduction of various forms, and so on. So, there are ways of perhaps minimizing or reducing the magnitude and nature of those exposures.

From a more local perspective it's interesting to look at an area that was burnt in 2009. This is Marysville. A number of houses survived here but 95% of the houses were lost. But to understand what was different about these properties that actually survived compared with the ones that weren't. One of the differences is that most of the houses that survived at Marysville were actually much closer to the bush which seems to be a bit counterintuitive. But one of the things that happens in a development like this is that there's a lot of house-to-house ignition. And this has occurred a number of times in various geographic areas in Eastern Australia and Western Australia in the last decade or so. But it's also quite dependent on the nature of how well the house is prepared. How hard it is in terms of how resistant it might be to ember attack and even just the way in which the structures are built, verandas, materials around the outside of the house and so on.

What we can see here is a lot of the vegetation in this township didn't actually burn. When we see these severe fires going through we have this vision of a wall of flame going through but that's not really the reality a lot of people in these areas were exposed to. It's more spotting, spot fires, house to house ignition and the like. This would have been more like a township fire we know was going to be difficult to survive because of the amount of heat generated from the houses burning more so than perhaps the surrounding forest burning. But the forest produced the embers that helped spread the fire through this township and provided an ignition source.

We've got to be a little careful about thinking that we're safe just because we're living in an open area. We need to be looking at the vegetation as fuel and differentiate between vegetation that might in fact be reducing local winds or embers or radiation compared with vegetation that may in fact be increasing the number of embers or the radiation that the house might be exposed to.

What we can see in this picture over here for example. The house was lost but the leaves are still on the vegetation. The vegetation actually provided a buffer or a protection to this house to some extent. What this house was probably most exposed to were embers coming from the surrounding areas and then landing on material associated with the house, whether it's doormats, verandas, getting in under the eaves, burning leaves that have caught in the guttering around the house. A whole host of possibilities, but the fact the house was lost probably had more to do with the maintenance and construction of the house than it did about the vegetation around it. So, the vegetation is not necessarily always the baddie.

The things that we need to look at when we're assessing the vegetation as fuel. We need to be looking at those layers that exist in perhaps trying to provide some separation both horizontally and vertically. Over here on the left I've tried to depict the surface fuel layers, leaf twigs, bark, material on the ground. Then there's grasses and sedges and material is more vertically oriented which we call near surface fuel. Fuel we can consider as shrub land if you like which we call elevated fuel which will be responsible for more higher flames and radiation. Then we've got the trees broken into two parts I suppose, the bark coming off the trees which produces a large proportion of the embers and then the canopy fuel as well which adds to the fuel burning.

Once we understand these strata of fuel exist we can modify those to break up both the horizontal and the vertical continuity of those fuels. Without removing all the vegetation we can modify the vegetation to reduce the fuel hazard so that the fuels are less likely to contribute to the fire load. They may in fact even assist in reducing the exposure to some of those hazards by reducing embers, wind and spotting material. We can't just look at fire hazards associated with fire, there's going to be other hazards we need to consider and that includes ambient weather conditions.

Just trying to work under these conditions can be quite hazardous and quite onerous. We can end up with heatstroke or dehydration, be falling off ladders or out of trees because it's so windy, the ambient weather can be a hazard, falling trees and branches can be a hazard. So overhanging branches or trees over houses, roads, or access in and out of property can be hazardous in itself. Pre-existing medical conditions of individuals can be a hazard, respiratory, cardiological, or physical medical conditions that will be exposed under these stressful conditions, road accidents or congestion, trying to evacuate or get emergency help is going to be limited potentially. Poor communications, perhaps your phone's out or your radio's out so, you lose situational awareness, you don't really know what's going on about you so it makes it more difficult to make good decisions.

And the other one is that neighbouring houses could be burning. One of the biggest threats to your property is one of the biggest hazards - the heat generated by a neighbouring house burning if we don't have some sort of barrier between us or a gap for structures within 10-12m of us.

So where do we come to with all this? Well, what we have to sum up in a sense is make an assessment of our own property. And two people living side by side can have quite a significantly different level of bushfire risk. We have to customize this to our own situation and work out what's acceptable to us. And that may change over time. It depends on us, our personal and our situational conditions. We need to work out what's acceptable to us based on our situation.

The risk has to be assessed not only at a local level but also at a landscape level. We see where we sit in the context. And we may have to use Maps or Google Earth or something similar to really see that or maybe get a drone. But you need to be looking at a larger view than what you can perhaps see out your back door because the fire is working at a much larger scale than what we can perhaps see from our back door. And in terms of risk reduction, we can work on reducing our exposure, so, the magnitude and duration or extent of that exposure, we can work on reducing the likelihood of that. Although a lot of that will be determined outside our control by the severity of the weather conditions or the amount of ignition points in the landscape.

But one of the things that we will have a lot of influence over is our ability to reduce the vulnerability of ourselves and the buildings that we live in. Hardening of our dwellings and perhaps even our own physical state can significantly reduce our vulnerability. So, there are a number of ways of dealing with this risk once we understand what the nature of the exposures are.