RetroSuburbia

Bushfire Resilience Extract

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This is an extract from my book *RetroSuburbia: the downshifters guide to a resilient future*, a 550 page, richly illustrated manual that has become a best seller since its publication in February 2018. The production and availability of this extract as a free and sharable download is part of our response the Australian bushfire crisis of summer 2019/20.

RetroSuburbia includes 34 chapters across three fields of retrofitting action: the built, biological and behavioural. 'Bushfire resilient design' and 'Household disaster planning' are two distinct chapters in *RetroSuburbia* which exemplify strategies of permaculture-inspired adaption to challenging futures that simultaneously address climate change by reducing carbon emissions.

Those who have are considering relocation in the light of this bushfire season will find the RetroSuburban Real Estate Checklist a useful tool to help balance current concerns about bushfire with the myriad other factors to consider in those difficult decisions.

Bushfire resilient home, landscape and community design has been a part of permaculture from its origins in the 1970s on the urban fringe property that Bill Mollison saved from the great Hobart fires of 1967. My own focus on bushfire intensified following the Ash Wednesday fires of 1983 including the documentation of a bushfire resistant building in *The Flywire House* (1991/2009) and design and development of Melliodora, our 1 hectare property on the edge of Hepburn Springs where we have had a 'stay and actively defend' bushfire plan since 1988. Following Black Saturday (2009), my teaching and advocacy lead to writing 'Bushfire resilient landscapes and communities', a 52-page report to our own bushfire vulnerable community and Hepburn Shire council.

In February 2019 we had the first direct bushfire threat to Melliodora in thirty years leading to 'Reflections on fire'. That experience had us tweaking our plans for this summer, which has been so devastating in other fire-vulnerable regions where climate change drought has been more intense.

A new essay 'Bushfire Resilient Land and Climate Care' draws on the truths of the polarised debate between those identifying climate change as the root cause and those recognising weak or absent land management as the direct cause. It paints a vision of a resilient and re-energised Australia that could grow from small beginnings in fire-impacted and vulnerable communities at the urban/bushland interface.

As always, crisis is an opportunity for personal, household, community and national reflection to *Creatively use and respond to change* 🦋

Dr David Holmgren
Co-originator of Permaculture
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11. Retrofitting for bushfire defence

In Chapter 4, *How to assess a property*, I discussed avoiding sites more prone to natural disasters. This chapter is focused on what can be done to *retrofit* buildings to reduce vulnerabilities to natural disasters. Chapter 33, *Household disaster planning*, then addresses the most important behavioural changes that increase *resilience* to disasters.

Upgrading insulation and fire sealing in roof flashings, Melliodora, Hepburn, central Vic.

The illustration below highlights the main vulnerabilities that buildings have to bushfire attack.

This chapter is almost solely focused on retrofitting for bushfire resilience because:

- bushfire is by far the most prevalent and severe natural disaster threat in southern Australia and is predicted to increase with climate change
- in energy descent futures, centralised responses to bushfire are likely to become less reliable, more dysfunctional and even draconian over time[1]
- as explained in Chapter 4, there is a growing and under-acknowledged bushfire threat to suburban residential areas
- retrofitting in the Built and Biological fields can make a substantial difference in the security of a house and property to bushfire
- retrofitting to protect against windstorm is really a subset of retrofits for bushfire
- making houses and gardens more fire safe is mostly a natural consequence of, or

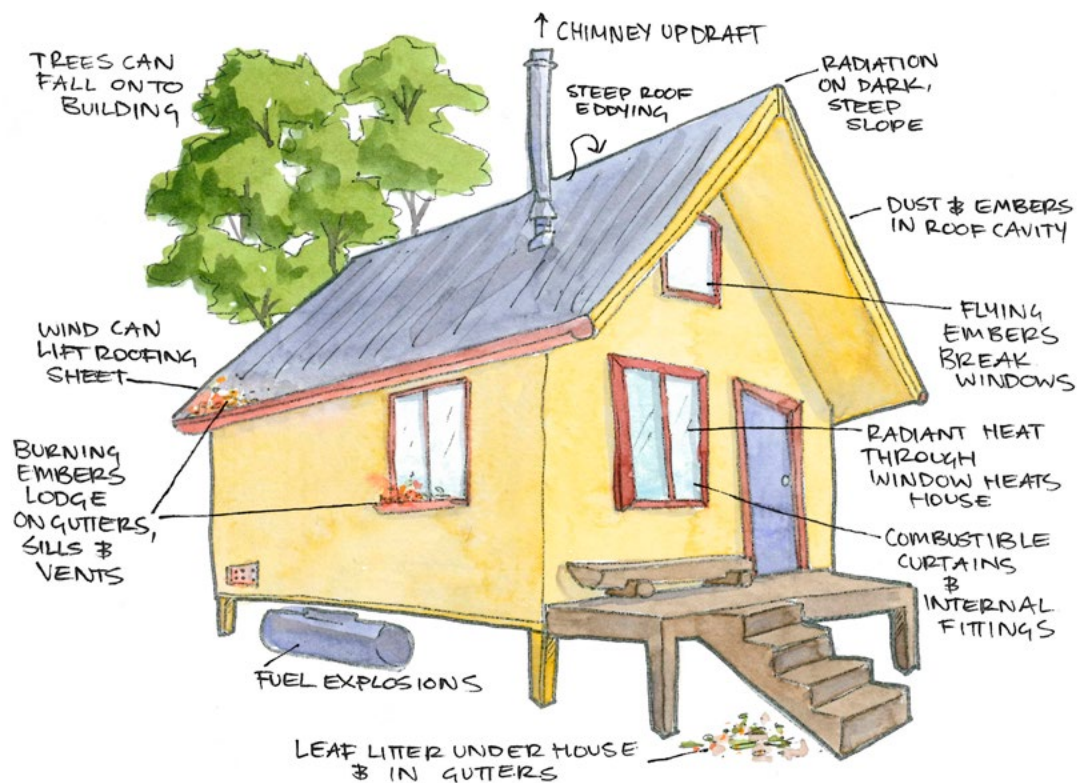complementary to, other aspects of retrofitting the Built, Biological and Behavioural fields
- retrofitting options to protect against flood and stormwater are limited.[2]

While retrofitting buildings and gardens can increase the chances of an unattended property surviving bushfire threat, its real value is increasing the confidence and ability of residents to enact a 'Stay and Defend' fire plan (see Chapter 33.) The presence of one able-bodied person is between two and four times more significant than any site feature or design factor in determining whether a house survives a bushfire.[3]

You should consider retrofitting to improve bushfire protection in the following situations:

- on residential sites at the fringe of suburbia
- in steeper, more forested suburbs
- in small towns on steep terrain surrounded by forest[4]
- where the 'Bushfire Attack Level' (BAL) is 29 or higher.[5]

How a Building Catches Fire

TREES CAN FALL ONTO BUILDING

↑ CHIMNEY UPDRAFT

STEEP ROOF EDDYING

RADIATION ON DARK, STEEP SLOPE

DUST & EMBERS IN ROOF CAVITY

WIND CAN LIFT ROOFING SHEET

FLYING EMBERS BREAK WINDOWS

BURNING EMBERS LODGE ON GUTTERS, SILLS & VENTS

RADIANT HEAT THROUGH WINDOW HEATS HOUSE

COMBUSTIBLE CURTAINS & INTERNAL FITTINGS

FUEL EXPLOSIONS

LEAF LITTER UNDER HOUSE & IN GUTTERS

AFTER ILLUSTRATION BY MAGGIE FOOKE IN 'THE FLYWIRE HOUSE', HOLMGREN 2010.

Suburban bushfire hazard review

While a BAL rating provides a general guide, the evaluation tool largely ignores several factors, including the management of adjacent natural vegetation to reduce risk and the hazards of residential areas with garden landscapes. While well-managed gardens are a low hazard, or even an asset in protecting a house, the greatest threat is from neighbouring undefended houses that have a fair chance of burning down when embers enter through gaps in roofs or eaves. Burning houses release more heat and embers than bush would on the same sized piece of land. When most residents evacuate and centralised fire protection fails to defend houses, the threat to defended houses increases dramatically.

The bushfire safety of suburban residences is consequently subject to two *positive feedback loops*. These can generate very different outcomes out of all proportion to the scale or intensity of the fire:

- In fires of modest scale and intensity, firefighting services are mobilised to protect houses even if the surrounding landscapes all burn. This capacity to defend houses is substantially assisted by the presence of a fair proportion of residents. Those who are not prepared are protected by a combination of prepared residents and centralised services.
- In more extensive and severe fires, people may leave at short notice and with little preparation of their houses while the authorities still consider it safe to evacuate. Resources to defend houses then become stretched; managing evacuating residents demands more support and impedes the free flow of firefighters on the roads. Consequently, those residents choosing to defend have to deal with unattended houses burning next door rather than just their own properties. The severity of the threat then elevates to a level more akin to rural bushland properties than safe suburban landscapes.

Retrofitting buildings for bushfire safety

The following points summarise a wide range of research and advice on enhancing the bushfire resistance of buildings.

Seal gaps

Since ember entry into the roof cavity or under floor spaces is the most common cause of houses burning in bushfires, a good level of finish and detail in all *flashings*, timber cladding and crawl spaces are classic retrofit opportunities.

Silicone mastic and flywire[6] are the two most useful materials in sealing gaps. Silicone is fire resistant, while flywire can screen vents and openings or be used as a substrate for silicone when filling in larger gaps.

Seal or protect eave ends

The most common and difficult to seal gaps are under the eaves of corrugated iron roofs. Commercial products are available but can be time consuming to fit around a whole roof. Alternatively, gutter mesh products can protect eave ends and eliminate regular cleaning of gutters. However, enclosed gutters can still accumulate substantial amounts of sediment and very fine debris. You still need points at which to inject high-pressure water or other means to clean the gutter.

1. See Holmgren (2009) 'Bushfire resilient communities and landscapes' in Holmgren (2018), for the broader picture with a focus on small, bushfire vulnerable communities.
2. The rebuild (using onsite salvaged materials) at Abdallah House (see *Case study 1*) had the advantage of being able to raise the building above flood level.
3. According to results from various surveys (mostly by CSIRO) of all major bushfires in southeastern Australia since 1983; see Webster (2000) pp 77–78.
4. Such as Hepburn in central Victoria or, as an extreme case, Katoomba in the Blue Mountains.
5. Online BAL calculators can provide a guide (for instance, balreport.com.au).
6. For more on extensive use of flywire in bushfire resistant design see Holmgren (2010).

Screen windows and doors

External metal flywire screens serve three functions in bushfires:

- they prevent the accumulation of embers on window sills
- they give some protection to glass from flying debris
- they somewhat attenuate radiation affecting glazing

Where a high level of protection is required, security mesh or shutters can be used.

Maintain or upgrade draught seals

Draught seals on doors and windows are important for thermal efficiency (see Chapter 5, *Warm in winter, cool in summer*) and to keep embers and smoke from entering the building in a bushfire. Some draught seals are more resistant to heat and embers. Silicone rubber is the best for high-risk situations.

Maintain woodwork

Burnable materials such as wooden cladding are less of a problem than is generally thought, but painted dressed surfaces are substantially harder to burn than weathered rough-sawn timber. When replacing rough, weathered softwood, use dense and durable hardwoods where possible.[7]

Where possible, remove all CCA[8] treated timber including decking, garden beds, retaining walls, pergolas and other structures to eliminate the most hazardous and common source of ***heavy metal*** contamination of residential sites after bushfires.[9]

Protect or upgrade skylights and plastic roofing

Perspex, acrylic and other plastic roofing materials are best replaced with toughened or laminated glass in high-risk sites. Otherwise, protection with metal flywire can be adequate. For lower risk sites, woollen blanket coverings with heavy weights

could be a workable solution as a bushfire plan procedure, similar to blocking and filling gutters.

Upgrade window glazing

Double glazed window panels with outer sheets of toughened glass are now so cheap that upgrading windows for thermal efficiency and bushfire safety is a retrofit worth considering, especially for large windows exposed to prevailing winds. Windowpanes and panels bedded on silicone have better shock resistance than those bedded in traditional putty.

The main problem is that double glazed panels with an optimal gap[10] for thermal insulation are too thick to fit in most window frames. Alternatively, fixing a sheet of toughened glass to an existing window frame with silicone mastic can create homemade double glazing.

Reinforce roof fixing

Winds in severe firestorms can lift roofs, especially of older houses with less reliable fastenings.[11] Simple reinforcing measures can make a difference between success and failure in defending a house.

On older corrugated iron roofs, nails can be replaced or supplemented with roof screws. On tile roofs, replace any cracked or broken tiles. Replacing degraded sarking generally requires removing roof tiles.

Where the roof cavity is accessible, triple grips (galvanised brackets that connect in three planes at once) can be added to roofing battens, rafters and trusses. In closed roofs with exposed rafters (cathedral ceilings) you can also add triple grips to reinforce the existing rafter to wall plate fixing although these will be visible on the outside or inside.

Enclose under-floor areas

On elevated buildings, enclosing under-floor storage areas is a high priority. Cement sheet or corrugated metal siding are commonly used. Where full weather protection and security are not required, metal flywire supported by an appropriate timber frame is suitable.

Roof spray systems

Roof spray systems are generally only worthwhile on more severe risk bushland sites that are mostly unsuitable for food growing, and thus are not appropriate sites for DIY permaculture self-reliance.

If you are considering roof water systems, eave spray lines are more effective, require less pressure and use less water than roof mounted impact sprinklers. High-pressure poly pipe with brass 180^0 fan sprayers will survive severe radiant and even flame heat if water is flowing in the system.

Retrofitting gardens for fire safety

Fire-safe food gardens

Well designed, managed and irrigated productive food gardens are a low fire hazard. In some situations they may even reduce fire threat to a house (more than bare ground) because they:

- absorb embers that might otherwise accumulate around doors and windows or blow into roof cavities
- shelter the house from damaging winds and flying debris, especially from nearby burning houses
- absorb radiant heat and thus provide protection to residents actively defending the property
- release moisture that reduces radiant heat to people defending the house.

7. Box, ironbark, sugar gum, red gum and similar local species are all acceptable in the building code for use in higher BAL-rated sites.
8. Copper chrome arsenate, notably green in colour, and used to treat pine for external construction.
9. Lead has not been used in paints for some decades, but the vast majority of all treated timber was CCA-treated until recently. Monterey cypress is an ideal sustainable alternative to treated pine in gardens, but is not as fire retardant as hardwoods.
10. The optimal gap size is 12 mm (less than 12 mm and greater than 20 mm are ineffective).
11. While winds can potentially exceed what current building codes project as the maximum, these requirements are still relatively low-cost to implement, and well short of cyclone standards required for housing in northern Australia.

Roof spray systems for more at risk buildings and places, Melliodora 'Tea House'.

Limiting the size and type of large trees in gardens (as suggested for optimising food production) reduces the load of fine fuels during the fire season and the chances of damage to buildings in firestorm conditions.

Controlling fine fuels such as dry foliage, twigs and dead grass by collection, compaction and/or chipping and composting during the winter should also be part of your fire safety strategy. Freshly chipped woody green waste, saturated and formed into a pile of one cubic metre, can compost enough to create a mulch that will mat down to be a low hazard over the fire season.

Melliodora food garden in fire season.

Food plants naturally have high cell moisture and mineral content. They also have relatively little in the way of flammable essential oils, resins, phenols and other plant chemicals that make most Australian native species so combustible.

Soil fertility strategies that increase the depth, tilth, **humus** and mineral content of soil contribute to fire safety by increasing water storage in the soil thus reducing stress on plants in droughts and severe bushfire weather. This moisture allows plants to transpire water[12] and resist being desiccated enough to burn. Furthermore, higher and better balanced mineral fertility in the soil (and thus plant tissue) acts as a fire retardant.

Fuel reduction by animals

On rural properties, fuel reduction is one of the most essential services animals provide, especially grazing animals. By eating, trampling and adding manure, animals digest, rearrange and break down grass, shrub and tree foliage, bark, litter and other biomass that can sustain or enhance a fire threatening a property. At the suburban scale this is less essential because people with mowers, chippers and other tools do much of this work but animals can still be useful in this regard. **Chooks**

ranging under hedges and food forests help break down litter through their scratching and manure. Rabbits and guinea pigs maintain fire safe lawns without the need for mowing. Backyard goats' demand for tree fodder is a strong incentive to keep shrubs and trees pruned back to maintain free space, stimulate new, green, fire-safe foliage and avoid litter accumulation.

Water systems working all summer

Water systems designed to irrigate gardens and supply houses can double as firefighting capacity. The regular use of water systems in dry seasons for irrigation keeps firefighting systems functional and familiar. The amount of water needed in reserve for effective firefighting is quite modest compared with irrigation needs through dry periods.

Town water can be used to refill drought-depleted tanks, so long as it's done in advance of imminent fire threat.[13]

Ponds, outside baths, sinks, **greywater** systems and even liquid manure barrels can all provide backup emergency water storage. Rosemary Morrow's property retrofits in the Blue Mountains included large water ponds taking overflow from tanks and greywater treatment ponds. These help to reduce hazard and provide backup water for firefighting in one of the most fire-prone regions of Australia.

Tidy enough for safety

Tidying up each season will reduce obstacles to firefighting in difficult conditions, hazards in strong winds and fuel that can burn and release toxic fumes.[14] The tendency of DIY, self reliant permaculturists to store materials and use organic mulches and have wild, unkempt gardening styles are downsides for bushfire safety. Balance your tidy-up in spring and summer by a degree of mess and overgrowth once the fire season has passed in autumn and winter. But don't take this to extremes; the perfectly tidy site is also low in biodiversity and habitat, and sterile without surprise and seasonal change.

A well designed 'resource area' allows useful materials to be stored in an accessible, but relatively sheltered space. You'd ideally locate it so that if stored materials do start to burn, they don't threaten more valuable resources, such as the house.

Managing adjacent public land

The same strategies used in managing gardens apply to public land but the techniques will vary because of the scale and the public ownership.

The main ways to manage public land are through:

- appropriate management of ground fuels and understorey vegetation (mostly with mowing or grazing animals),
- judicious harvesting of fire-prone eucalypts and replacement with fire-retardant deciduous trees and
- rehydration of slopes and watercourses to absorb urban stormwater.

12. Transpired water vapour absorbs infrared radiation, the greatest threat to a person caught outside when a firestorm hits.
13. During a fire event, town supplies can lose pressure and flow because of excess demand, loss of power and other factors.
14. This is especially true of plastics such as polystyrene.

Garden pond taking tank overflow provides firebreak and emergency water supply at A Good Home Forever, Blue Mountains retrofit by Rosemary Morrow.

Using animals, and hand and power tools, to shred, rearrange, process and compost biomass for fire safety, Hepburn, central Vic.

In a **permaculture** zoning sense the public land is either Zone 3 (managed planted parkland) or Zone 4 (wild landscapes) where gardening techniques generally won't work beyond very small fringing areas. The public ownership creates ambiguous situations that you need to navigate with other neighbours and the 'responsible authorities'. In 'Bushfire Resilient Communities and Landscapes',[15] I discussed these issues and made recommendations to our local community and shire council that have been taken up to some degree.

Also see Chapter 23, *Beyond the boundaries*, for more detailed discussion of the systems that create productive and fire-safe residential landscapes.

Vision

Comedians[16] and cultural critics used to target the careful maintenance of homes and properties, and the home-based lifestyle of the early decades of post–World War II suburbia, as parochial and insular. As climate change escalates bushfire threat to suburban landscapes, seasonal maintenance and home-based lifestyles may become a defining characteristic of retrosuburbia, expressing responsible, self-reliant and civic-minded behaviour. Those that extend the area of mown grass, collect branches and litter for fuel and graze animals on the commons will be recognised as contributing to a fire-safe neighbourhood.

15. In Holmgren (2018).
16. Most notably Barry Humphreys.

33. Household disaster planning

In Chapter 11, *Retrofitting for bushfire defence*, I identified a pattern of small and modest events being easily addressed by centralised systems, while large events lead to failure. For example, many people choosing to have an air conditioner just for the very hottest days increases the chances of a grid failure when they all turn on their appliances. The reliability of the grid, like the reliability of centralised fire services, gives people the false sense of security. Another example is the dependability of the centralised food system, leading to ignorance about the just-in-time logistics[1] – only a few days' worth of food is stored in most communities. The adverse practical impacts of failure of grid power, fire fighters or food are amplified by the ***psychosocial*** impacts of losing what was previously reliable. This explains why rich and well-resourced communities and nations seem to suffer so much stress from relatively minor disasters, while poorer but more self-reliant communities in less 'developed' nations seem to cope with much bigger disasters.

Dave Parker in front of his house and garden that he successfully defended from the 2009 Black Saturday fires that burnt out much of Kinglake.

To suggest that all households should have a disaster plan used to invite the scorn reserved in the media for 'preppers'[2] focused on how the world is about to end. But in areas subject to a higher risk of natural disasters, the official recommendation is that households have a relevant plan. In recent years, the information on, and awareness of, bushfire threat in Victoria has extended that recommendation from rural areas to include small towns and hilly, forested residential areas of major cities.

Similarly, the floods of 2010/11 led to a greater focus on household disaster planning. For an example of a comprehensive household focused toolkit see the *Gympie Get Ready Resilience Toolkit*.[3]

Rising threat levels

Energy descent futures increase the threat to households from a range of disaster scenarios even if the likelihood of very serious events remains low. We have house insurance against fire because we recognise the severity of fire's consequences, rather than a belief that a fire is likely. Similarly, household disaster planning is part of the process of building greater self-reliance and resilience. It takes back responsibility that has been progressively outsourced to central authorities over several generations.

Without wanting to be melodramatic about the absolute threat, I believe the following factors are all contributing to an increasing disaster threat:

- climate change increasing the threat of natural disaster from bushfire, wind, flood, storm surge, etc
- increased infrastructure dependencies on 24/7/365 electricity and the internet
- increased systemic dependencies on credit, to allow the material economy to function
- an increased threat of pandemics due to novel environmental factors and global mobility
- increasing geopolitical instability and its symptomatic offshoot, global terrorism
- an increasing culture of fear, breakdown of community-level trust and greater dependence on authority to resolve relatively minor problems

- the political value of disasters, both natural and otherwise, for governing elites threatened by symptoms of energy descent
- the economic stimulus value of disasters providing capital and conditions for reliable investment for business elites threatened by contracting economies.

While it is tempting to enlarge on these diverse and interlocking threats, it is important to keep awareness at a level that leads to proactive planning without succumbing to a culture of fear and an obsession with everything that could go wrong.

General principles and strategies

Many, if not most, of the built, biological and behavioural retrofits advocated in this book contribute to greater household self-reliance and resilience in a diverse range of disaster scenarios. For example:

- Buildings that are strong and secure, provide at least their own heating, cooling and power, and collect and treat water are generally a better base to weather a disaster than more vulnerable and dependent buildings.
- Biological systems that buffer environmental and other stresses, capture and store water and nutrients, and provide critical food and

Although bushfires remain the biggest disaster threat at Melliodora, the property is also designed to cope with storm-water flash flooding events (see page 83).

other resources, greatly increase capacity to ride out disasters compared to landscaping that does none of these.

- Behavioural habits that foster a physically active, environmentally aware,[4] home-based lifestyle, with strong connections in the local community, are perhaps the strongest factors in the ability to cope with disasters and reflect the principle *Observe and interact.*
- Having stores of everything from food and water to fuel and cash was normal before the 'just-in-time' revolution made most people dependent on 24/7/365 access to reticulated water, electricity, gas, internet, ATMs and supermarkets. Rebuilding these habits of storage reflects the principle *Catch and store energy.*
- An independent ability to consider and assess risk without being unduly influenced by social norms and habits is another behaviour that allows the 'goats' to walk quietly away when the 'sheep' are flocking in response to either reward or fear. This reflects the principle *Use edges and value the marginal.* The internet has greatly empowered people to make their own judgments at the same time that it has reinforced some of the effects of mass media in concentrating and reinforcing mass responses to events.

Household audits can be used to help evaluate disaster preparedness, while any generic disaster plan should cover the built, biological and behavioural fields.

Tips for household disaster planning

- Hold stocks of food, water, fuel, cash and other essentials.
- Cycle food stocks through the normal seasonal cycles to ensure proficiency in use and avoid degradation through age.
- Keep buildings, vehicles and communication systems in good working order.
- Routinely use head torches, battery powered radios and other independent methods to maintain essential capabilities.
- Maintain fitness and health.

- Maintain awareness of seasonal, local and geopolitical threats.
- Involve all household members in plan development, testing and ongoing evolution.
- Induct any new household members or longer-term visitors into understanding the plan.
- Document the household plan to ensure common understandings and shared responsibility.
- Test the plan regularly to identify any shortfalls or other issues.

1. The highly-coordinated and timed flow of goods through supply chains with very little in the way of storage.
2. Survivalists preparing for natural and other disasters.
3. Rowe (2013); available from gympie.qld.gov.au or retrosuburbia.com/book/33-3.
4. By 'environmentally aware', I mean awareness of what is happening with the weather and the neighbourhood rather than 'progressive attitudes' on environmental politics.

Author testing fire hose on Black Saturday, despite no fires in the district.

Bushfire planning

The phrase 'stay and defend or leave early' coined in the 1960s by Joan Webster, Australia's foremost bushfire educator, encapsulates the most strategic decision for household bushfire planning. The authorities recognised that the situation for each household is different, but since 2009 the message has swung back towards encouraging people to leave. While the logic of this shift can be debated in terms of a mass audience, it makes little sense for people committed to a self-reliant home-based lifestyle to adopt this new message.

Staying and actively defending makes sense for the following reasons:

- There is a greater likelihood that households will have two or more people at home gives greater capacity to actively defend.[5]
- An outdoor focused self-reliant lifestyle increases the odds of success in actively defending and being able to provide greater confidence for less able household members (children and elderly) to contribute to the household team in appropriate ways. This reflects the permaculture principle *Use and value diversity.*
- Water systems to sustain home food production and autonomy that are in regular use are more likely to function and be understood by household members.

- A greater sense of autonomy and preparedness for energy descent turns the threat of bushfire into an opportunity to test household and community responses. Such conditions encourage novel and creative strategies in the absence of social and economic norms.
- A scepticism about the reliability of authorities to manage disasters and provide the right advice reinforces a confidence in one's own judgment and personal responsibility.
- There is a stronger emotional attachment to the home as a 'family castle' rather than just another piece of real estate that can be replaced with an insurance payout.

While these factors do not automatically translate into being well prepared to 'stay and defend', they do provide practical and psychological predisposition to do so.

The neighbours as asset and/or threat in bushfire

When bushfires enter residential areas, the greatest threat is uncontrolled fire in adjacent houses rather than threat from more distant forest or farmland. This threat is greatly increased when houses are undefended. Where the event is on a limited scale, fire services are likely to make a fair effort at defending houses, but in large scale and rapidly unfolding events affecting different residential areas, the presence (or absence) of residents will

be the strongest factor in determining whether a house burns. With the shift of advice to leaving rather than defending, more houses are burning even in bushfires of only modest intensity.[6]

Consequently, having neighbours with an adequately prepared property can be as important as reducing the fuel levels in adjacent bushland. Having neighbours planning to 'stay and defend' substantially reduces the threat. This reality is a strong incentive for collective street and neighbourhood level preparedness such as that facilitated by 'Community Fireguard' groups.[7]

The 'leave early' policies and options do not stand up to any serious evaluation in energy descent scenarios either for the householder or for society at large. Consequently I suggest that being prepared to 'stay and defend' in the face of bushfire is an essential aspect of household resilience and autonomy in Victoria and other fire vulnerable regions of Australia. Those not prepared to face bushfire should be much more circumspect considering any forested outer suburban locations and smaller country towns, especially those in steeper hill country.

The level of bushfire hazard we are prepared to live with is a personal question, but bushfire may be one of the most rational reasons why most Australians planning for energy descent futures should stay in the suburbs.

Those of us who choose higher risk residential locations should have a stronger commitment to household self-reliance with little expectation of support from the authorities, reliability of communication or on-demand vehicle mobility.

Safe houses

In Bushfire Resilient Communities and Landscapes; a discussion paper for Daylesford and Hepburn Townships,[8] I said:

The harsh divide between the full implications of the 'stay and defend' or 'leave early' options raises the question of whether some middle options may exist for residents who seriously find both options unworkable.

'Shelter safely'

Joan Webster has pointed out in her books and presentations that although the full application of 'stay and defend' requires active defence of the property, a less demanding option is that of 'sheltering safely' in the knowledge that it is possible to survive and then, if necessary exit a house once the fire has passed and if necessary, watch it burn

5. Research into large bushfires in Australia shows that the presence of one 'able bodied' person is between two and four times more significant than any other factor in determining whether a house burns or not in a severe bushfire; see Wilson & Ferguson (1984) 'Fight or flee? – a case study of the Mount Macedon bushfire' *Australian Forestry 47.4:230–236.*
6. This creates the self-reinforcing illusion by residents and the public in general that the fire must have been so severe that it was a good decision to leave.
7. See 'Community Fireguard' at cfa.vic.gov.au or retrosuburbia.com/book/33-7.
8. Holmgren (2009) in Holmgren (2018).

When we chose to buy and build in Hepburn, I had already assessed the town as one of the most bushfire vulnerable in Victoria (which is the same as saying one of the most bushfire vulnerable in the world). Within that context we chose a site with less than extreme risks and good water catchment options, and we made bushfire-resistant and resilient design a foundational and on-going consideration in our lives.

We have a 'stay and defend' plan in all circumstances, especially on the most severe bushfire threat days. Every summer our patterns of activities are determined by the level and nature of the bushfire risk and every severe day, our bushfire plan gets a brush-up, even if there are no fires in the region. We accept this as an integral part of living in the most bushfire hazardous region in the world. This is no different from the same way people who live on active fault lines or slopes of active volcanoes have to accept that Mother Nature's more violent expressions shape their lives, one way or another.

from the safety of burnt ground without any active attempt to save the house. For many residents, especially elderly ones and single parents with young children, this option may be more realistic and safer than either 'stay and defend' or 'leave early'.

The recognition that small towns and outer suburban areas are vulnerable to bushfire should see the focus of Community Fireguard shift to include these areas where a new set of options may naturally develop as residents in a street or neighbourhood seriously consider the need to have their own bushfire plans.

'Safe house' concept

While it is reasonable in well serviced urban areas for residents to consider 'leave early' to be when there is the first sign and/or notice of fires in the area, in some small towns and bushland suburbs this may still be too late. Further, residents choosing the 'leave early' option substantially increases the likelihood of loss of large numbers of houses, not due to the fire-front, but instead, because of the intensity of embers from each house fire leading to the next house burning. This situation was well illustrated in the [Canberra, Kinglake, Marysville and Bendigo] urban fires…. The fact is that unless those choosing to leave do so after preparing their property (gardens well maintained, gutters clean and full of water, all materials safe from wind, all doors and windows closed, internal doors closed, etc) then they are making it much more likely that their neighbours' houses will burn as a result of their own burning.

In some Community Fireguard groups in Kinglake township and other urban groups, the neighbours knew each others' places and equipment, so could help save neighbours' properties more effectively than rural residents separated by kilometres. This denser settlement makes possible another option that I call 'safe house'. Within a street, residents with a strong commitment to 'stay and defend' could invite specific neighbours not confident to do the same, to, by arrangement, join them in the 'safe house'. This would be particularly relevant to the elderly or single parents with young children. To be effective and safe, the parties would need to agree on the trigger point for moving to the 'safe house' and the role that the visitors would have in the fire plan and some discussion about conditions for safe return to check the visitors house.

Clearly, for this to work, the 'safe house' must be close and the parties must know each other well enough to have confidence in each other's behaviour under stress. This raises many difficult issues, but for many single and elderly residents this may be a better option than 'stay and defend', 'shelter safely' or 'leave early'. For many residents without any personal or family experience of self-reliance, a neighbouring 'safe house' could be a pathway to building confidence towards a greater degree of self-reliance in the future.

This 'safe house' concept emphasises the value of self-organised community responses to disaster threats and reflects the permaculture design principle *Integrate rather than segregate*. In cases where it is hard to find common ground with the neighbours, bushfire preparedness can be one of the best pathways to do so. Believing in climate change, let alone understanding energy descent, is not necessary. Environmental awareness or even much interest in community are not essential in order to see the benefits in street level preparedness, even if the 'safe house' idea might not be the first option.

At Melliodora, we have had a bushfire plan since the early 1990s[9] that has evolved over time. After the very severe 2009 bushfire season[10] we included better ways of using 'severe,' 'extreme' and 'code red' days to test various aspects of the plan even though no fires were in the region. Testing the plan in realistic weather conditions, when others might be keeping cool with air-conditioning, is part of keeping ourselves well-prepared, both physically and psychologically. Our habit of cancelling any appointments away from home on these high-risk days has gone from being considered an idiosyncratic obsession to an understandably sensible reaction to real hazard. Many aspects of that plan would be very useful in other types of disaster that we haven't specifically planned for.

More generally, our minimum dependence on external sources of basic needs of food, water, energy, healthcare and other essentials would be of great value during any short-term interruptions or longer-term degradation of centralised systems.

Some of this independence comes from our autonomous systems and storage, but the psychological preparation that comes from living in tune with seasonal cycles is also important. For example, during spring, when the range and quality of vegetables is at its lowest ebb, we commonly eat a wide range of edible weeds and marginal foods that most people would find very challenging. Similarly, routinely using newspaper instead of toilet paper[11] means we would avoid the absurd situation in a disaster where people go to great lengths and risks to secure toilet paper as an 'essential item'. This pattern of choosing a slightly lower level of comfort and convenience builds psychological resilience for facing the stresses of disasters in the same way that doing varied, and at times hard, physical work keeps us fit and able to push ourselves without undue stress when the need is there.

Contributing to community capacity

The more self-reliant and prepared we are for disasters, the greater the likelihood that we won't need outside help or to attendance at disaster recovery centres set up by authorities. This has many advantages for us, and society generally:

- It frees up the capacity of centralised recovery services for those in desperate need.
- It allows focus on efficiently getting our own systems back in order.
- It allows us to selectively use our surplus capacity to help and support neighbours, family or others, further reducing stress on centralised systems.
- It avoids becoming dependent on time consuming, resource extravagant, bureaucratic and paternalistic disaster recovery processes that are inevitably focused on conventional norms and needs that we find distasteful and disempowering.

- It avoids risks associated with crowds, ranging from infectious disease to riots or more dysfunctional repression by authorities.[12]
- The more households in a community with this capacity, the greater the chances that the community will be able to self-organise its own recovery rather than becoming dependent on centralised services.

The experiences of community activist and Kinglake bushfire survivor Daryl Taylor reflect the observations made in other situations of trauma from natural disasters, which suggest that about a quarter of the affected population become so traumatised that they are virtually catatonic, while half are in a state of shock, struggling to find balance. The remaining quarter become super-empowered by the experience, a sort of longer,

9. See 'Melliodora bushfire plan' (1995) at retrosuburbia. com/book/33-9.
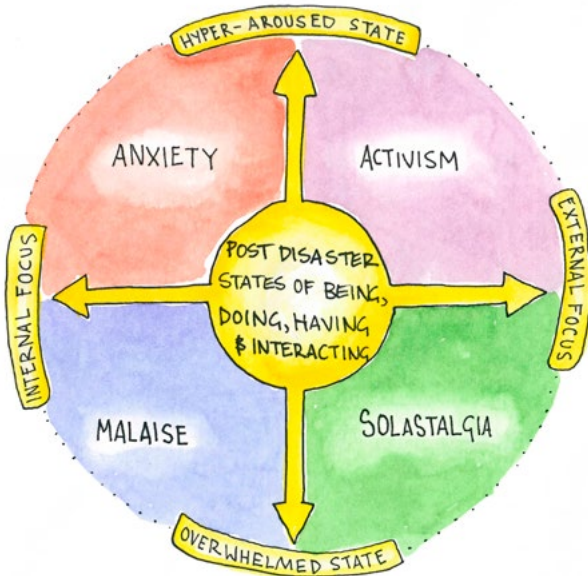10. See 'Melliodora bushfire plan' (2012) at retrosuburbia. com/book/33-10.
11. To minimise unnecessary resource consumption.
12. Such as occurred to survivors of Hurricane Katrina.

slower adrenalin response that, in the best situations can help pull the majority back from the brink and so provide the capacity to look after the disabled.

Unfortunately, the same experience and research suggest that the helping professionals who flood into natural disaster scenes (in affluent countries at least) focus resources on the catatonic and tend to attract the majority to the honeypot of handouts, while the bureaucrats experience the super-empowered as threats to process and order. Rebecca Solnit's *Paradise Built In Hell*,[13] in which she documents this pattern, describes situations where communities are self-organising, but recovery and empowerment is undermined, rather than assisted, by helping professionals and bureaucrats in what she calls 'elite panic.'

More recently, Taylor[14] has characterised how people respond quite differently to the same disaster event with the following chart. 'Solastalgia' is a term coined by philosopher Glenn Albrecht to describe a form of existential distress caused by environmental change.[15]

Taylor describes surviving the bushfire recovery process as more traumatic than the bushfire itself: 'As bad as the bushfire was, the recovery was so much worse.'

Hopefully these insights help us all understand how we might respond, not just to disaster, but also the aftermath, which can be as confusing and challenging as the event.

Daryl Taylor, Kinglake community activist, bushfire survivor and permie, 2009.

Vision

One of the signs of a resilient retrosuburbia will be neighbourhoods that self-organise to deal with bushfire and other natural disaster threats, reducing the dependence on centralised responses and resisting the tendency of authorities to resort to command and control strategies. When retrosuburban resilience becomes the norm in a neighbourhood, the authorities can concentrate their resources on those places where residents don't have the capacity to actively defend homes and neighbourhoods from nature's wilder forces. With a combination of well-prepared households and 'safe houses', and support for the frail and less prepared, any suburban neighbourhood could be defended by the residents against bushfire threat.

While we cannot necessarily ensure that authorities help rather than hinder, cohesive and self-reliant communities are more likely to be able to direct outside help in ways that serve the community's needs, while less cohesive and self-reliant communities become more disabled by the machinery of centralised recovery. In any case, self-reliant and resilient households are both the building blocks and the lifeboats to support community level response to disasters whether they are of natural or human origin.

13. Solnit (2009); an overview of *A Paradise Built in Hell* is available at onthecommons.org or retrosuburbia.com/book/33-13.
14. Personal communication, Daryl Taylor.
15. See Albrecht (2012) 'The age of solastalgia' at theconversation.com or retrosuburbia.com/book/33-15.

RETROSUBURBIA – BEHAVIOURAL FIELD – HOUSEHOLD DISASTER PLANNING