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# Fire, water and everyday life: Bushfire and household defence in a changing climate



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## ABSTRACT

This paper examines how the availability or scarcity of water influenced the survival related decisions of households during the October 2013 State Mine Fire in the Blue Mountains, New South Wales, Australia. Narrative analysis of semi-structured interviews with 18 households impacted by the bushfire revealed that drought conditions in the months preceding the bushfire left many households dependent on non-reticulated water supplies vulnerable at the time the fire threat became apparent. Despite considerable preparations for water storage and usage during the fire, “weak links” in planning (e.g., top-ups, failure of pumps, generators and hoses) meant water was not accessible when needed most. This paper discusses a gap in bushfire safety scholarship on water usage and everyday trade-offs amongst residents in areas independent of reticulated (mains) water supplies. Findings suggest a need for more detailed and consistent information in official bushfire safety advice on storing water prior to a bushfire and effective water distribution systems for household defence and fire fighting.

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## 1. Introduction

Bushfires (wildfires) are an integral and defining part of the history, ecology and culture of Australia [49]. Residents in at-risk communities have traditionally been encouraged to make a considered choice to either prepare to stay and defend their property or else prepare to leave early [23,36]. This policy position recognises situations where fire authorities are unable to provide timely or sufficient fire fighting resources to prevent loss of life and property [7]. Official advice to residents was subject to critical review following the 2009 “Black Saturday” bushfires in Victoria (VIC) where 173 people died, 113 of which perished in their homes [4,5]. The ensuing Victorian Bushfires Royal Commission concluded that, with the exception of “catastrophic fire events” where no property is considered defensible [56], the central tenets of the “Prepare, Stay and Defend, or Leave Early” (PSDLE) policy were theoretically sound but difficult to enforce in practice [22]. The Commission's recommendations led to a revised approach – “Prepare. Act. Survive.” (PAS) – with similar core principles but with a greater emphasis on the importance of both physical and

mental preparedness, and that leaving early is always the safest option [7]. As such, it remains common practice in Australia for residents to stay and defend their property from bushfire. Central to households' preparations is the maintenance of an ample water supply and an appropriate water delivery system with which residents may actively attempt to suppress the ignition of vegetation and buildings by firebrands in the advance and aftermath of a fire front [46].

Australia's climate is characterised by highly variable rainfall patterns between regions, seasons and years. In recent decades, Australia's water resources have been placed under immense pressure as a result of periods of prolonged drought, increased industrial water use, expanding urban populations and irrigation [16]. Projected climatic models suggest that overall Australia will be faced with a drier climate as a result of climate change [19]. These conditions are increasing the likelihood of extreme fire danger weather, especially in the southwest and southeast of the continent [17,29]. Given the imperative of water for fighting bushfire, the increasing demand on water resources in everyday contexts coupled with the predicted increase in drought and extreme fire danger weather poses considerable challenges for managing the persistent threat of bushfires. Understanding what factors are influencing water use and retention in Australian households in bushfire-prone landscapes is therefore important. An awareness of these factors can assist emergency managers and policy makers with the promotion of water conservation practices

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**Table 1**  
NSW Domestic Water Use Water Restrictions Levels 1–6 (adapted from [39]).

Level	1	2	3	4	5	6
<b>Garden watering</b>	Sprinklers allowed 2 h a day	Sprinklers banned; hand held hoses allowed 2 h a day	Hand held hoses 2 h a day	Hand held hoses 1 h a day	Buckets only	Reused water only
<b>Swimming pools (private)</b>	Filling of pools prohibited; topping up of pools allowed		Filling and topping up of pools prohibited			
<b>Wash paved areas and roofs</b>	No restrictions	Buckets only (except as required by law)				

**Table 2**  
Water Wise Rules (adapted from [53]).

<b>Water Wise Rules:</b>
<ul style="list-style-type: none"> <li>• Watering with hoses, sprinklers and irrigation systems is allowed before 10am and after 4 pm on any day</li> <li>• All hoses must have a trigger nozzle</li> <li>• Generally there is no hosing of hard surfaces such as pathways and driveways</li> <li>• Washing of vehicles and boats is allowed</li> <li>• Swimming pools can be filled or topped up</li> <li>• Recycled water and bore (well) water can be used for any purpose at any time of day</li> <li>• Water from rainwater tanks (rain harvesting cisterns) can also be used as long as it is not connected to or topped up with drinking water</li> <li>• Water can be used to test fire systems or for fire-fighting, at any time. Fire hoses may be used for fire-fighting activities only</li> </ul>

given annual, seasonal and localised variations and needs. Despite the imperative of water conservation for household bushfire preparedness, little is known about household water conservation practices and usage in the context of bushfire in Australia. This study seeks to address this gap by examining how the scarcity or availability of water influenced the survival related decisions of households during the October 2013 State Mine Fire, which impacted large parts of the Blue Mountains in New South Wales (NSW). Notably, these households were in areas not serviced by reticulated<sup>1</sup> (mains) water supplies and, as such, represent a part of the 23% of households outside capital cities in Australia that rely on rainwater tanks for both subsistence and fire fighting purposes [6].

The following sections provide an overview of literature relevant to water, everyday life and bushfire safety in Australia. We contextualise how everyday water consumption and conservation practices impact on bushfire preparedness and outline key legislative constraints necessitating the provision of water for both domestic use and fire fighting purposes on designated bushfire-prone land. This is followed by an outline of the research methods to contextualise the results section. The paper concludes with a discussion of the challenges of coexisting with bushfire in areas independent of reticulated water supplies.

### 1.1. Water restrictions, everyday usage and bushfire safety needs

Water supply and demand is a global issue, but as a regional resource it requires varied policy solutions. Since 2002, parts of Australia have been subject to mandatory water restrictions in response to protracted periods of drought [6]. The “Millennium Drought”<sup>2</sup> – Australia’s longest period of rainfall deficit on record [30] – triggered an irrevocable breakdown of longstanding political and public belief in “endless supply”, or “Big Water” [3]. The

<sup>1</sup> “Reticulated” water is the Australian term for the piped town-water network (i.e. the water grid).

<sup>2</sup> Although the dates vary between sources, in southeast Australia the Millennium Drought is generally defined as the period 2001–2009, although in some areas the drought began as early as 1997 and broke between 2010 and 2012.

drought prompted the implementation of clearly defined water restriction regimes, as a means of regulating household mains (municipal) water consumption [45]. In 2007, 80% of people in urban areas nation-wide were subject to some level of water restrictions [2].

Variations of water restriction regimes established in the 2000s are still enforced today. Typically, these restriction measures target discretionary domestic water use in the outdoor area of the home [38], and govern the type of water use activity, the time-of-day of activities and the technologies permitted. Water restriction rules vary throughout Australia due to local requirements and are set by the governing water utility<sup>3</sup>. Although the classification levels of water restrictions in NSW vary widely, the restrictions regime outlined in Table 1 is comparable to many imposed on households throughout NSW during the Millennium Drought.

Even with the recent easing of drought conditions and, consequently, water restriction regimes in many parts of Australia, permanent water saving measures remain in place across many local government areas (LGAs) to help reduce the demand for water and promote sustainable water consumption practices [6]. These permanent water saving measures (Table 2) are typically on par with the Level 1 water restrictions outlined in Table 1, although the extent of the regulations are by no means homogenous across water jurisdictions. Permanent water saving measures are generally less rigorous and aimed at long term changes in water attitudes and behaviours.

While it is known that the public is generally supportive of water conservation measures [26,45] (although for a contradictory argument see [48,28]), little is known about the dependence of water conservation attitudes and behaviour for bushfire preparedness and response at the rural–urban interface. With the exception of Harman et al. [24], research on household water conservation behaviour has not focused on its connection with bushfire as an influencing factor. Harman et al. [24] found that over half of survey respondents (53%) in the Ballarat Water Supply System, VIC were concerned by the impact of water restrictions on bushfire safety. However, the study did not expand upon this particular point nor did it delineate whether households in the survey were reliant solely on non-reticulated water sources. Houses without mains water supply are typically rural or peri-urban in nature, with non-reticulated water resources, such as rainwater (e.g. tank water), ground water (e.g. bore water), surface water (e.g. river, lake, private dam) or trucked water (e.g. water carrier) stored in water tanks onsite. These households are exempt from the rules and restrictions outlined in the tables above, and water use is typically at the discretion of the household (although there is some variation between states/territories).

People without access to reticulated water are perhaps less vulnerable to bushfire than those on mains water, as power outages during a fire event often interrupt mains water supply.

<sup>3</sup> The Bureau of Meteorology’s [12], *Water Restrictions* website summarises the water restrictions and water savings measures currently in place across the States and Territories of Australia.

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