NATIONAL PARKS ASSOCIATION OF NSW
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Regional Forest Agreements have failed to protect our water supplies

Regional Forest Agreements (RFAs) are 20-year agreements between the state and federal governments that remove the federal government from day-to-day regulation of native forests by providing accreditation for logging under the *Environmental Protection and Biodiversity Conservation Act 1999.* There are three RFAs in NSW, North East, Eden and Southern, and they expire between 2019 and 2021.

The RFA aims that are most relevant to water supply are:

1. [Providing] for the ecologically sustainable management and use of forested areas in the regions;
2. [Having] regard to studies and projects carried out in relation to Principles of Ecologically Sustainable Forest Management

Ecologically Sustainable Forest Management (ESFM)

The principles of ESFM accepted by Australia's National Forest Policy Statement[1] are:

1. Maintaining the ecological processes within forests (the formation of soil, energy flows and the carbon, nutrient and **water cycles**);
2. Maintaining the biological diversity of forests and;
3. Optimising the environmental, economic and social benefits to the community within ecological constraints.

Forests are important for water supply around the world

Globally one third of the world's largest cities rely on forested areas for their water supply—including metropolises such as Mumbai, Tokyo, New York, Rio de Janeiro and Los Angeles. Sydney, Perth and Melbourne also rely on forested catchments to deliver reliable, clean water supplies[2], as do many smaller settlements on the eastern seaboard of Australia. However, only in the case of Perth is the forested area entirely protected in a national park: mining is permitted in the Sydney catchment and much of the Melbourne catchment is available for logging. Logging has documented impacts on both the quantity and quality of water supplies. This has serious implications for many settlements on the Australian coastal fringe where logging occurs as most Australian streams and rivers have their headwaters in forested catchments which are, in many cases, open to logging[3]. **Forests are our best water sources.**

The impact of logging on water yields

Given Melbourne's reliance on forested catchments for water supplies, about half of which are logged, lots of the research on water yields from logged catchments has taken place in the mountain ash (*Eucalyptus regnans*) forests of the Victorian Central Highlands RFA region. Here, catchments covered in old-growth stands of forests yield about twice the volume of water on an annual basis than those catchments covered in regrowth younger than 25 years[4]. The reason for this is that older forests, because they have fewer trees which are not growing vigorously, transpire less water which is then available to enter creeks as stream flow[*1]. In addition, the canopy is less dense (the leaf-area index is lower) which results in less rainfall being interception by the canopy[4]. **Logging reduces water yields.**

In the Goulburn Broken catchment of Victoria, modelling has shown that ending logging would deliver an increase of 3807 gigalitres (I gigalitre = I billion litres) of water over 100 years—six times the annual water use of Melbourne, or 165 times the annual water use of Bendigo. This water was valued at $1.68 billion, and was worth over twice the estimated timber value over the same period[5]. **There are hidden costs to logging that are worth more than timber.**

The relationship between forest age and water yield in mountain ash forests is shown by the graph below:

*[1]https://mickresearch.wordpress.com/2012/12/21/effects-of-timber-harvesting-on-water-yield-from-mountain-ash-forests/

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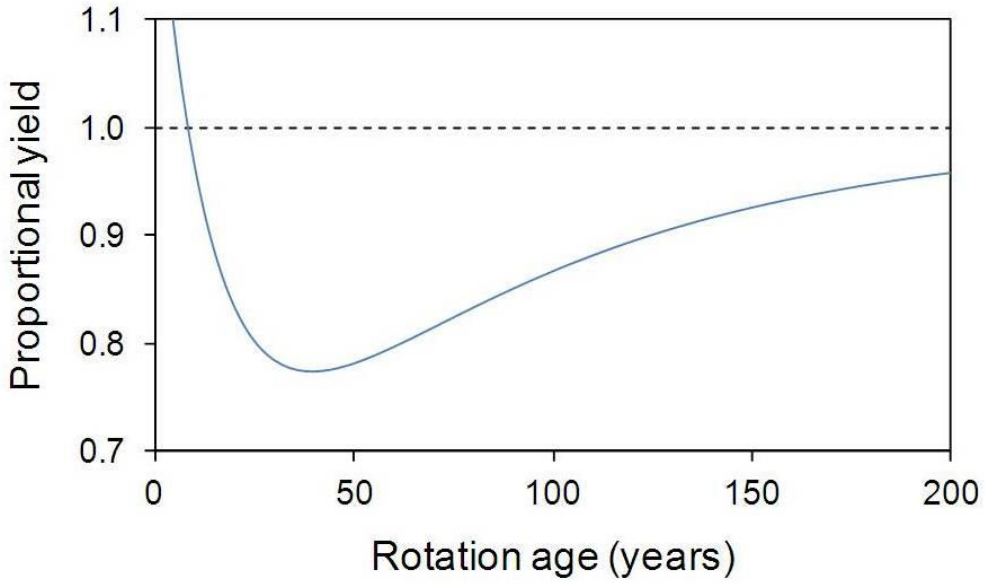

Figure 1: A Kuczera curve describing the relationship between water yield and rotation age (= time since harvest) in mountain ash forests in the Victorian Central Highlands RFA region. Source: Michael McCarthy's Research[*1]*

Immediately following logging, water yield is high because there are few live trees (they have been cut down) and water enters creeks and rivers easily. As the time since logging increases beyond about eight years, there is a sharp decrease in water yield as the rapidly regrowing forest uses lots of water and decreases water yield. After approximately 40 years, self-thinning (competition between trees that results in some trees dying) begins to occur which lowers stem density and increases water yield. But recovery of water yields to pre-logging levels takes centuries. **Logging leaves a legacy that our grandchildren will still encounter.**

The eagle-eyed will spot that it is theoretically possible to maintain high water yields by shortening rotation lengths to under 8 years. But such short rotation lengths would yield very poor timber, be catastrophic to forest wildlife and in the case of mountain Ash forests that regenerate from seed (not, like many eucalypts, from re-sprouting) compromise the ability of the forest to regenerate.

Does this pattern apply in NSW too?

More research is needed to clarify whether these relationships for mountain ash forests apply to forests that don't contain mountain ash. But increases in stream flow following logging have been documented in NSW forests[6] and models predicting a similar initial water yield decrease followed by a steady increase in yield post-logging[7] have been supported by field observations in non-mountain ash forests in NSW[8]. **The absence of definitive research means that the precautionary principle should be applied and logging halted until the impacts on water are better understood.**

The impact of logging on water quality

Soil compaction resulting from logging decreases water infiltration rates, increases runoff rates and therefore increases erosion[9]. Because the 'duplex soils' (those with contrasting textures in the soil profile) of south-eastern Australia are particularly prone to sealing (becoming impermeable) when vegetation is removed and they are exposed to rain, the risk of erosion is greater in south-east Australia than for other areas[3]. Logged areas may contribute up to five times more sediment to water bodies than undisturbed catchments[10] and runoff from cable logging in Tasmania (not currently practiced in NSW) has been shown to increase fine sediment loads in streams which takes five or more years to recover[11]. Road building associated with logging practices can also increase turbidity in streams in certain circumstances[12]. **Logging practices can increase erosion and reduce water quality.**

In light of climate change predictions of increasing temperatures, more frequent droughts and decreased rainfall[13] in south-eastern Australia ensuring sustainability of water supplies by protecting forested catchments should be a priority.

References

1 Commonwealth of Australia. *National Forest Policy Statement. A new focus for Australia's forests*, <http://www.agriculture.gov.au/SiteCollectionDocuments/forestry/australias-forest-policies/nat_nfps.pdf> (1992, 1995).

2 Dudley, N. & Stolton, S. in *Protected areas in today's world: their values and benefits for the welfare of the planet* (eds L. Janishevski, K. Noonan-Mooney, S.B. Gidda, & J.K. Mulongoy) (Secretariat of the Convention on Biological Diversity, 2008).

3 Campbell, I. & Doeg, T. Impact of timber harvesting and production on streams: A review. *Marine and Freshwater Research* **40**, 519-539, doi:http://dx.doi.org/10.1071/MF9890519 (1989).
4 Vertessy, R. A., Watson, F. G. R. & O'Sullivan, S. K. Factors determining relations between stand age and catchment water balance in mountain ash forests. *Forest Ecology and Management* **143**, 13-26, doi:http://dx.doi.org/10.1016/S0378-1127(00)00501-6 (2001).
5 Australian Conservation Foundation. *Woodchipping our Water: A case for reassessing the the use of Victoria's Goulburn Cathcment's wet montane forests*, <https://www.acfonline.org.au/sites/default/files/resources/woodchipping_our_water-Goulburn_Catchment_Report.pdf> (2009).
6 Webb, A. A., Dragovich, D. & Jamshidi, R. Temporary increases in suspended sediment yields following selective eucalypt forest harvesting. *Forest Ecology and Management* **283**, 96-105, doi:http://dx.doi.org/10.1016/j.foreco.2012.07.017 (2012).
7 Webb, A. A. Can timber and water resources be sustainably co-developed in south-eastern New South Wales, Australia? *Environment, Development and Sustainability* **14**, 233-252, doi:10.1007/s10668-011-9319-3 (2011).
8 Webb, A. A., Kathuria, A. & Turner, L. Longer-term changes in streamflow following logging and mixed species eucalypt forest regeneration: The Karuah experiment. *Journal of Hydrology* **464–465**, 412-422, doi:http://dx.doi.org/10.1016/j.jhydrol.2012.07.034 (2012).
9 Croke, J., Hairsine, P. & Fogarty, P. Runoff generation and re-distribution in logged eucalyptus forests, south-eastern Australia. *Journal of Hydrology* **216**, 56-77, doi:http://dx.doi.org/10.1016/S0022-1694(98)00288-1 (1999).
10 Motha, J. A. Determing the source of suspended sedimentin a forested catchment in southeastern Australia. *WaterResources Research* **39**, 1056, doi:10.1029/2001WR000794 (2003).
11 Davies, P. E. & Nelson, M. The effect of steep slope logging on fine sediment infiltration into the beds of ephemeral and perennial streams of the Dazzler Range, Tasmania, Australia. *Journal of Hydrology* **150**, 481-504, doi:http://dx.doi.org/10.1016/0022-1694(93)90122-P (1993).
12 Cornish, P. M. The effects of roading, harvesting and forest regeneration on streamwater turbidity levels in a moist eucalypt forest. *Forest Ecology and Management* **152**, 293-312, doi:http://dx.doi.org/10.1016/S0378-1127(00)00611-3 (2001).
13 CSIRO. *Climate Change in Australia*, <http://www.climatechangeinaustralia.gov.au/en/> (2015).