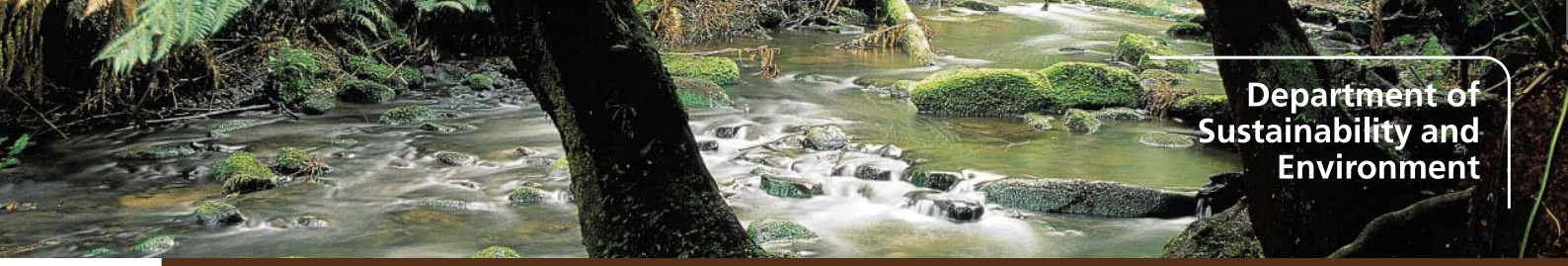

Department of Sustainability and Environment

Research Results for 'Wood and Water' project

using the latest science to develop a future management plan for State forests supplying water to Melbourne

The Department of Sustainability and Environment (DSE) is conducting a project that will provide information for the Victorian Government to develop a future management plan for the State Forests that supply water to Melbourne. It's called the 'Harvesting in Water Catchments' study — sometimes referred to more simply as the 'Wood and Water' study.

The project team has now completed its extensive research. Experts studied State forest within the Thomson, Tarago, Bunyip and Yarra Tributaries catchments, which supply Melbourne with water. The results update our knowledge of water and timber yield cycles in light of climate change and reductions in the area of forest available for timber harvesting that occurred during the 1990s.

What we found – research results

Hydrological studies

The hydrological studies were divided into two parts. The first part established models to estimate water yields for the Thomson, Tarago, Bunyip and parts of the Yarra Tributaries catchments. Estimates of water yield over time were generated for each catchment and for different sites which vary by topography, vegetation type[1], age of the forest and rainfall.

In part two of the studies the project team tested:

- the impact of bushfire and climate change on water yield.
- the impact of forest management regimes on water and timber yield.

These second part studies considered the Thomson Catchment, Armstrong Creek (Main) and Starvation Creek, applying three climate change scenarios that were developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO). A range of bushfire scenarios were also used. Climate change was predicted to have a greater impact than bushfire on water yields based on these scenarios.

The moderate and extreme climate change scenarios are realistic considering that rainfall has declined by approximately 10% within Melbourne catchments during the past ten years. This reduced rainfall input has been factored into the analysis of the impact of a range of potential forest management regimes on water yield.

Table 1: Percentage (%) change in average water yield (streamflow) (mm/yr) over 250 years for three climate change scenarios and an extreme bushfire event.

CATCHMENT	SLIGHT CLIMATE CHANGE 1.6% reduction in rainfall, 0.93°C increase in temperature	MODERATE CLIMATE CHANGE 7.1% reduction in rainfall, 1.5°C increase in temperature	EXTREME CLIMATE CHANGE 13.8% reduction in rainfall, 2.4°C increase in temperature	EXTREME BUSHFIRE 100% mortality
Thomson	-12.6	-27.2	-41.8	-22%
Armstrong Ck (Main)	-17.1	-33.1	-54.1	-26%
Starvation Ck	-20.4	-37.9	-61.9	-30%

1 The classification of vegetation type is based on the dominant tree and plant types within a given area. The following vegetation types were used – Alpine Ash, Mountain Ash, Shining Gum, Rainforest, Leptospermum species (e.g. Tea Tree), Snow Gum, Grassland, Nil vegetation, Heath, Silvertop Ash, Acacia and Mixed Species.

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Water and timber yield — impacts of a range of potential future management regimes

Water yield is increasing due to the natural ageing of the forest within the catchments as much of the catchment forests regrew after the 1939 bushfires.

This means that water yield will increase naturally even if there are no changes to the harvesting regime.

If the existing harvesting regime continues, the base line water yield is:

1. Almost an average 27 GL higher per annum than the current yields if reduced rainfall patterns continue and assuming there are no bushfires; or
2. 40 GL higher per annum under historic rainfall patterns, assuming there are no bushfires.

The modelling estimates that the maximum water yield that could be generated if the ten year average low rainfall pattern continues is 15 GL of water per annum at 2050 if timber harvesting were stopped during 2009/10. This assumes no bushfires. This option was modelled to provide a maximum water yield benchmark. It does not allow timber supply commitments to be met.

This estimate of 15 GL equates to an approximate 5% increase in water yield in comparison to status quo forest management. The estimates made by the modelling based on historic rainfall figures, indicate the maximum impact on water yield is a 16GL (or approximate 4%) increase at 2050 following cessation of timber harvesting at 2009/10.

Climate change has the greatest potential for impact on water yield in Melbourne catchments in comparison to either bushfire or timber harvesting.

Can we increase water yield?

Scientific evidence indicates little additional water would be gained in the short term if forest management was changed.

Over time water yield gains can be made without major impact on timber supply commitments. For example, modelling predicts that timber harvesting over a 120 year rotation could increase water yield by 5 GL (2%) per annum in 2050 while reducing sawlog yield by 3,000 m3 (2%) per annum at 2050 in comparison to the status quo rotation.

Forest management options	Water yield GL/a in 2050	Change relative to Scenario A	Cumulative sawlog yield 103m3 2005-2050	Change relative to Scenario A %
All-A-Status Quo	296	0.0%	6786	0.0%
All-B-80yr Rotation With No Thinning	297	0.3%	6780	0.0%
All-D-120yr Rotation With No Thinning	301	1.7%	6686	-1.4%
All-E-150yr Rotation With No Thinning	302	2.0%	6513	-4..0%
All-G1-80yr Rotation with Uniform Thinning at 27	298	0.7%	6916	2.0%
All-G4-150yr Rotation with Uniform Thinning at 27	303	2.4%	6521	-3.9%
All-HI-150yr Rotation With One Off Late Age Uniform & Strip Thinning At 27	306	3.4%	6436	-5.1%
All-J-cease by 2009/10	311	5.1%	4890	-27.9%
All-L-cease at 2030	300	1.4%	5912	-12.8%
All-M-Phase down to 150yr Rotation With Uniform At 27 and One Off Late Age	302	2.0%	6671	-1.6%
All-N-Cease at 2030 with Status quo to 2030 and Uniform Thinning at 27 & late Age	301	1.7%	5910	-12.9%

Comparison and Ranking of Options and Scenarios – Reduced rainfall

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Timber substitution studies

Could plantation-grown timber replace native forest timber harvested from Melbourne's catchments? The studies found this was not feasible from existing plantations in the short term, particularly for appearance grade timber.

The studies consider current markets and timber commitments, supply from existing and potential plantations and the availability and suitability of land for plantation establishment. This includes consideration about the impact of plantations on water resources.

In order to achieve plantation substitution for all of the timber currently harvested from within Melbourne catchments the key requirements are:

- Land development and plantation establishment across 21,000 hectares in Gippsland.
- Approximately 30 years to establish a substitute sawlog supply.
- Establishment of large sawmills equipped with appropriate technology to process plantation sawlogs.
- An investment of $170 million in land purchase and plantation development plus additional investment by government and industry.
- Market drivers to attract investment.

Water quality review

This part of the project used a literature review and environmental audits of timber harvesting in Melbourne's catchments. The main impacts of timber harvesting on water quality relate to sediment contamination from unsealed road runoff. These impacts are localised and short-term and most often negligible or minor or occasionally moderate. Best management practices applied in the catchments are effective in managing impacts.

Consultation with practitioners and experts

The Selection of Future Potential Forest Management Regimes

These ten potential future forest management regimes were assessed for their impact on water and timber yields within Melbourne catchments:

- Status Quo
- 80 year clearfall rotation
- 120 year clearfall rotation
- 150 year clearfall rotation
- 80 year clearfall rotation with uniform thinning[2] at 27
- 150 year rotation with uniform thinning at 27
- 150 year rotation with one off late age uniform thin and strip thinning at age 27.
- Cease 2030. Status Quo to 2030 then cease timber harvesting.
- Cease 2030. Prior to 2030, uniform thin Age 27 and undertake a thin during 2009-2014 for forest at age 72 in the Thomson catchment.
- Phase down between 2010 to 2030. The phase down is achieved by lengthening the rotation length from an 80 year rotation in 2010 to a 150 year rotation by 2030.

Regimes were selected based on professional advice from across government agencies, including the forestry and water sectors, scientists and practitioners. Peer review also recommended these regimes.

The regimes were selected because they theoretically increase water yield, produce high-grade sawlogs and there is existing data on them. The phasing out of timber harvesting is modelled by considering phase down and ceases timber harvesting regimes.

2 Thinning is the harvesting of a selection of some of the trees in a forest stand in order to increase the growth rate, health or wood quality of the remaining trees and in some water catchments is used as a means of increasing water yields from forests.

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Peer review

The Wood and Water research for the Part 1 and Part 2 hydrological and timber substitution studies has been reviewed by independent experts who are leaders in their fields of hydrology and the science of wood and plantation forestry, which has ensured the research is to a very high standard.

Definitions used in the modelling

The Status Quo forest management regime is the harvesting of a maximum of 340 hectares of State forest per annum within Melbourne catchments. The modelling estimates that under a low rainfall pattern in 2050:

- Average annual water yield is 296 GL per annum from the Thomson, Tarago, Bunyip and Yarra Tributaries catchments.
- Cumulative water yield (2005-2050) is 18,687 GL.
- Annual sawlog timber yield from the Central Gippsland and Dandenong Forest Management Area which includes Melbourne catchments is 174,000m^3.

Annual water yield is the estimate (based on modelling) of the average annual water yield (GL/annum) for all catchments at 2050. Cumulative water yield (GL) is the sum of all the estimates (based on modelling) of average annual water yield for each year over the period 2005-2050.

Further Information:

General inquiries
Visit the DSE website www.dse.vic.gov.au or call the DSE Customer Service Centre on 136 186.

Media inquiries
Contact the DSE Communications office on (03) 9637 8911.

www.dse.vic.gov.au

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