

Monitoring and reporting on sustainable forest management in Victoria, Australia

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Abstract

Publicly-owned forests in the Australian state of Victoria have been managed intensively for a range of values for more than 150 years (Turner et al., 2011). Over this time, the policy framework within which these forests are managed has evolved in line with changing community values and expectations. From the development of the first Forests Act in 1916, through to the Sustainability Charter for Victoria's State Forests in 2007, this evolution has seen an increased emphasis over the last 20 to 30 years on monitoring and reporting on sustainable forest management, consistent with global trends. The aim of this paper is to present Victoria's sustainable forest management monitoring and reporting framework and the recent advances in forest monitoring and reporting in the state, including the Victorian Forest Monitoring Program and the State of the Forests reporting program.

Introduction

Victoria has a long and rich history of forest management, from as early as 60,000 years ago by indigenous people to 150 years ago when Europeans commenced extensive forest clearing for farming and mining (Turner et al., 2011), through to now when public forest management has a level of community interest that is as high as it has ever been.

Victoria has approximately 7.1 million ha of forest on public land, including 4 million ha of parks and conservation reserve and 3.1 million ha of state forests (DEPI, 2014). These forests are important natural assets as they provide a wide range of values and services to the Victorian community (including biodiversity conservation, wood and non-wood products, recreation, water protection, carbon sequestration) and have significant cultural and spiritual value. Forestry is also a significant rural industry in Victoria, supporting over 21,000 direct and 40,000 indirect jobs and generating a net annual expenditure of approximately AUD1.4 billion dollars (Schrimmer et al., 2013).

In Australia, state and territory governments have primary responsibility for forest management. The Victorian Department of Environment, Land, Water and Planning (or DELWP) is the state agency responsible for the management of state forests in Victoria.

Victoria subscribes to sustainable forest management for the management of its state forests

estate, consistent with national and international agreements. This is achieved through an extensive policy framework, in which mechanisms are designed to regularly evaluate progress towards achieving sustainable forest management.

Policy context

In 1992, Australia endorsed the Global Statement of Principles on Forests at the United Nations Conference on the Environment and Development held in Rio de Janeiro. Based on this endorsement, the Commonwealth, state and territory governments developed a strategy for the ecologically sustainable management of Australia's forests. This strategy was embodied in the National Forest Policy Statement 1992 (or NFPS) signed by all participating governments. The Statement not only commits governments to broad sustainable forest management goals, but also to review the state of their forests every five years.

After the United Nations Conference on Environment and Development, Canada convened the International Seminar of Experts on the Sustainable Development of Boreal and Temperate Forests in 1993. This led to the signing of the Santiago Declaration in 1995, which included a criteria and indicator framework, known as the Montreal Process. Australia is one of 12 member countries with temperate and boreal forests in the Montreal Process, which spans five continents and accounts for 60% of the world's forests (Montreal Process Working Group, 2006).

The Montreal Process criteria and indicators are designed to reflect and provide a common understanding of the ecological, economic and social components of sustainable forest management. They also provide a common framework for describing, assessing and evaluating progress towards sustainable forest management at the national level (Montreal Process Working Group, 2006).

Seven criteria and 67 indicators were developed and agreed to by the member countries to assess trends in the condition and management of forests. The criteria represent values that society wants to enhance or preserve, while the indicators identify scientific values to assess the state of forests and measure progress (Montreal Process Working Group, 2006).

Australian state governments were quick to recognise the value of the Montreal Process framework



Andrew Clark, VFMP Ground Plot Operations Manager (Photo: Salahuddin Ahmad)

offered to forest management and reporting. They also realised that Australia's capacity to report nationally for many of the indicators depended on the way the individual jurisdictions monitored and reported forest-related information. To report meaningfully the framework had to be relevant to Australia's unique social, economic and ecological environments. As such, Australia developed the Montreal Process Implementation Group to coordinate the development and implementation of an Australian framework of criteria and indicators. In 1998, regional indicators were developed for use in Australia under the Framework of Regional (Sub-National) Level Criteria and Indicators of Sustainable Forest Management in Australia. This framework of seven criteria and 44 indicators formed the basis for measuring and reporting on sustainable forest management in Australia (Howell et al., 2008).

From 1997 to 2000, Victoria entered into five regional forest agreements (RFAs) with the Commonwealth government. An outcome of the National Forest Policy Statement, the RFAs aimed to settle conflict in the management of Victoria's state forests. These 20-year agreements, based on a comprehensive regional assessment involving substantial scientific

study, consultation and negotiation, sought a reasonable balance between conserving Australia's forest estate and its enduring use for economic production and recreation. Under the Regional Forest Agreements Act (the RFA Act) 2002, five-yearly RFA reviews reporting the performance of each agreement are tabled in the Australian Parliament.

Each RFA states that 'Victoria will report the results of monitoring of Sustainability Indicators', in line with the RFA Act that states 'the Minister [for Environment and Climate Change] must cause to be established a comprehensive and publicly available source of information for national and regional monitoring and reporting in relation to all Australia's forests.'

In 2002, the Victorian policy *Our Forests Our Future* resulted in a significant shift in how state forest commercial timber harvesting was administered. It separated the forest regulatory and commercial functions within government to ensure the effective management of Victoria's timber industry. Other associated initiatives included a 31% reduction in sawlog harvesting, a significant increase in parks and conservation reserves, new legislation for timber resource security, the independent auditing of forests,

and a commitment to regular reporting (Department of Sustainability and Environment, 2009).

These changes were legislated in the Sustainable Forests (Timber) Act 2004 (the SFT Act). VicForests was created as a state-owned enterprise and authorised under this Act to operate as the commercial harvest and sales manager for timber resources in the east of the state. The SFT Act also formally introduced the principles of ecologically sustainable development into Victoria's forest management. It provides a framework for sustainable forest management and sustainable timber harvesting in state forests.

To achieve the Victorian Government's commitment to improve openness, accountability and community engagement in forest management, the SFT Act also sets out reporting requirements to assess forest management performance. This resulted in the commitment to develop Victoria's criteria and indicators for sustainable forest management and to five-yearly State of the Forests reporting. Specifically, under section 6 of the SFT Act:

1. The Minister must determine criteria and indicators for sustainable forest management.
2. In determining criteria and indicators under subsection (1), the Minister may take into account any nationally or internationally agreed criteria and indicators for sustainable forest management.
3. As part of a determination under subsection (1), the Minister must also determine:

- a. the reporting requirements relating to each indicator determined under subsection (1);
- b. the frequency at which such reports are to be made, being a period not less than every 5 years.

To meet the requirements of the National Forest Policy Statement, the Victorian RFAs, the SFT Act, and for Victoria to demonstrate its commitment to sustainable forest management, the then Department of Sustainability and Environment (now the Department of Environment, Land, Water and Planning) determined a framework of sustainability criteria and indicators for Victoria's state forests and published the Sustainability Charter for Victoria's State Forest and the Criteria and Indicators for Sustainable Forest Management in Victoria in 2007. The seven criteria and 45 indicators in this framework are consistent with the criteria defined through the Montreal Process, and follow the Framework of Regional (Sub-National) Level Criteria and Indicators of Sustainable Forest Management in Australia.

Monitoring

Forest inventory activities have been occurring in Australian forests for over a century. These activities have mainly occurred on publicly-owned forests managed for timber production and to a lesser extent in nature conservation reserves (Howell et al., 2008), and have been primarily used for commercial purposes.



Will Guthrie and Mick Hodder at the installation of the 'final plot' (Photo: Salahuddin Ahmad)

This was certainly the case in Victoria until 2013 when reporting on sustainable forest management relied on information from various historic initiatives. Most notable was the State-wide Forest Resource Inventory (SFRI) data (NRE, 2000). This project commenced in 1994 and ceased in the mid-2000s and was designed to provide detailed information on state forests, set aside for timber production, rather than conservation parks and reserves. As such, it did not provide comprehensive or consistent information about the public native forest estate. More importantly, as a one-off inventory, measurements of change and thus prediction were not possible. It therefore became clear that this type of data could not meet the increasing demands for additional forest resource attributes, for policy, state and national reporting, and for reports on indicators of sustainable forest management.

This was highlighted by the Victorian Auditor General's Office's 2013 *Managing Victoria's Native Forest Timber Resources* report (VAGO, 2013) that concluded 'Until recently, the data that DEPI [Department of Environment and Primary Industries, now the Department of Environment, Land, Water and Planning] collected to measure and report against these criteria and indicators was poor. The 2003 and 2008 *State of the Forests* reports were undermined by data gaps and the lack of trend information for many indicators.' As a result Victoria required a new, strategic forest inventory and monitoring program that could provide accurate, timely and comparable forest information in response to state

and national concerns about the ecological sustainable development of Victoria's forests (Haywood et al., 2016).

To meet these challenges, in 2010 the then Victorian Department of Sustainability and Environment (now the Department of Environment, Land, Water and Planning) embarked on establishing a Victorian Forest Monitoring Program (VFMP) to provide the framework and services necessary to 'assess and monitor the extent, state and sustainable development of Victoria's forests in a timely and accurate manner.' This monitoring program would provide baseline data for long-term trend detection and prediction of the type and severity of future changes so that management options can be developed and evaluated in time to be effective (Haywood et al., 2016). These data would address three of seven criteria for sustainable forest management within the State of the Forests reporting in process: Criteria 1 (Conservation of biological diversity), 3 (Maintenance of ecosystem health and vitality) and 5 (Maintenance of forest contribution to global carbon cycles) (DEPI, 2014).

The VFMP is now Australia's most comprehensive state-wide public forest monitoring system. It includes a network of 786 permanent ground-monitoring plots in Victoria's state forests parks and conservation reserves (Figure 1), together with detailed aerial photography and satellite imagery. These datasets provide the basic attributes (including forest structure, species diversity, canopy condition and soil characteristics) that are used to derive indicators of sustainability and measure changes

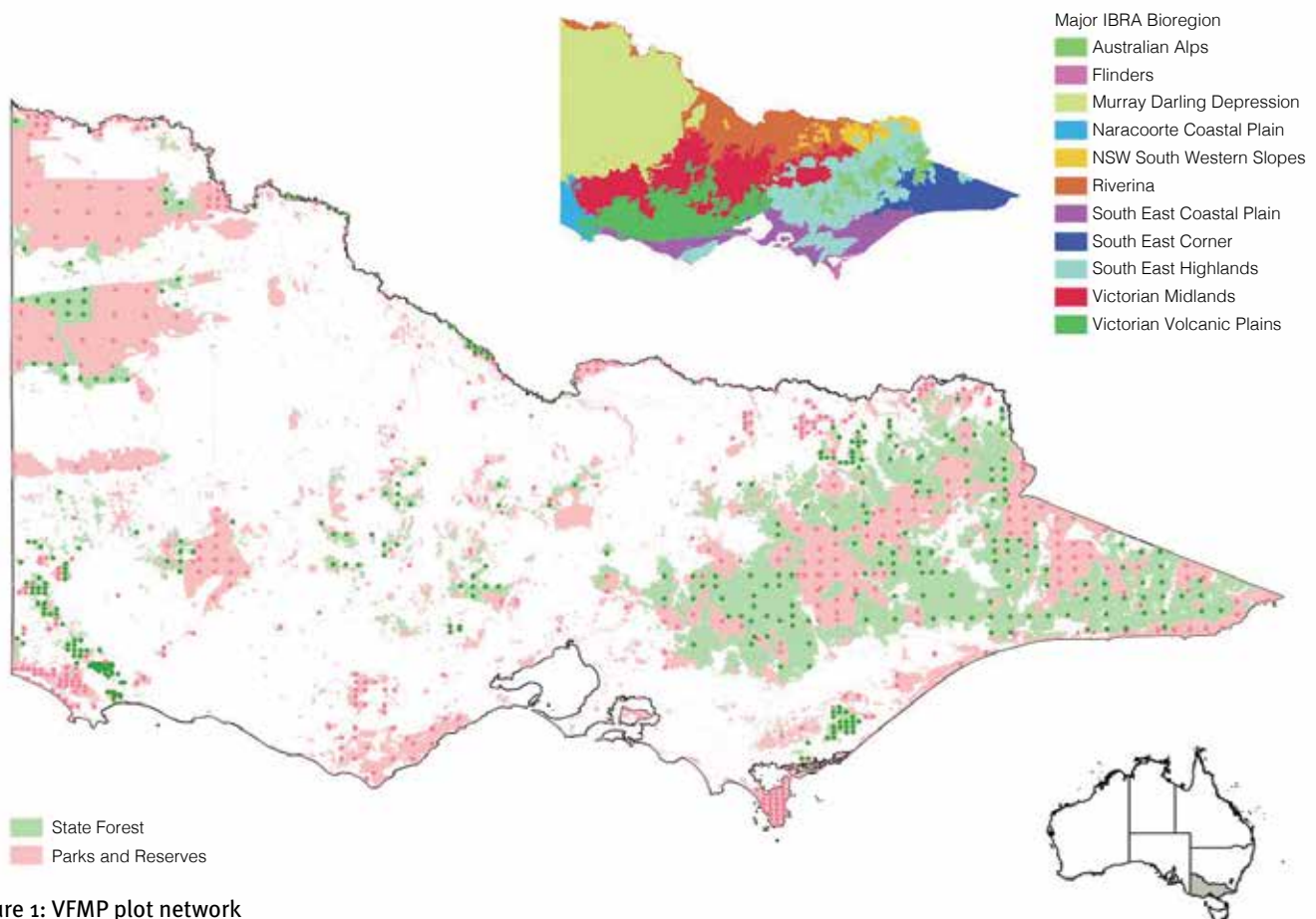


Figure 1: VFMP plot network

in the extent, state and condition of Victorian public forests. These changes are too subtle to monitor remotely and are not adequately collected by other monitoring programs at the state-wide scale (Haywood et al., 2016).

Each VFMP ground plot involves multi-stage fieldwork including tree, soil and ecological measures. The design of the plot network is based on systematic stratified sampling, comprising the Interim Biogeographic Regionalisation for Australia bioregions and Crown land category (parks and reserves, and state forest) (Haywood et al., 2016).

The ground plot design consists of a network grid of sampling points with a two-stage stratification of bioregions and tenure and varying the sampling intensity among strata, aiming for a target sample size of 30 for each stratum (Figure 1). This target is based on the assumption of a coefficient of variation for key traits such as biomass of at least 70% and a desired target precision of at most 12.5% (Haywood et al., 2016).

Sampling operates on a five-year cycle, where one-fifth of all ground plots are measured every year. The guiding principle in developing the VFMP design was that data resulting from the monitoring was to be consistent: the same attributes must be measured, using the same standards, in a statistically defensible manner and at an acceptable level of precision (Haywood et al., 2016).

Permanent ground plots are installed and measured by contractor field teams engaged by the Department of

Environment, Land, Water and Planning. These teams are comprised of a team leader/forest mensuration specialist and a qualified field botanist. All work is carried out according to the VFMP's comprehensive standard operating procedures (or SOPs) and a subset of the plots are audited to ensure that appropriate standards are met.

Ground plot data is supplemented with remote sensing and aerial photography. The latter is used in the VFMP as the primary source of land cover information. Detailed digital aerial photography is used to identify broad forest types and structure across 2 x 2 km photo plots centred on each VFMP ground plot.

The VFMP was designed in collaboration with international experts and based on components of other best practice international forest monitoring systems including the New Zealand Land Use and Carbon Analysis System, the Canadian National Forest Inventory, the US Forest Service's Forest Inventory and Analysis National Program and the (proposed) Australian continental forest monitoring program (Haywood et al., 2016).

VAGO (2013) also concluded '... in 2010 DEPI introduced a new monitoring program to comprehensively measure characteristics across all forested land in Victoria. The program has been designed well and represents a significant investment.'; '... it will be several years before meaningful trend data for some data sets can be reported.'; and 'This included monitoring outside state forests for the first time. This will provide information that has been lacking, including on how well the reserves system protects forest values.'

Reporting

The Criteria and Indicators for Sustainable Forest Management in Victoria provide Victoria with a framework with which to evaluate progress towards the objectives set out in the Sustainability Charter and to improve openness, accountability and community engagement in forest management. The publication of Victoria's State of the Forests report (or SOFR), every five years, is the means by which this is achieved.

Victoria has produced State of the Forests reports in 2003, 2008 and 2013 (Figure 2) with the next due in 2018. Since the 2008 report, Victoria's capacity to report trends has improved significantly. In 2013, almost 70% of indicators had data and information with which to report at least partial trends and nearly 60% to report complete trends. In the previous reporting period only 55% of indicators had sufficient data to at least partially report trends (DEPI, 2014). The 2013 State of the Forests report was the first exclusively digital report.

The State of the Forests report series has become the authoritative and trusted source of information on Victoria's forests. It is the only comprehensive compilation of data and information on them and as such is the best available snapshot of the state of these forests. The unchanged reporting framework since the 2008 State of the Forests report enables patterns and trends over time to be revealed. As a result, the State of the Forests report series



Figure 2: Victoria's three State of the Forests reports

and its data is a widely used resource by organisations including the United Nations Food and Agriculture Organisation Global Forest Resource Assessment Program and their own State of the Forests reporting program, the Commonwealth Government Australian State of the Forests reporting program, Victorian Government agencies and reporting programs, such as the State of the Environment Reporting program, policy-makers, forest managers (forest industry analysts, academics, students and non-governmental organisations).

Having a consistent, authoritative and trusted source of information on Victoria's forests means that this state can have informed policy and decision-making in relation to sustainable forest management. Victoria can provide reassurance and confidence to local, national and international communities about the management of Australia's forests, and so builds support for continued access to forest resources and continued active forest management. The publication of State of the Forests reports ensures that community debate about the role and management of Australia's forests can be based on appropriate data and raises community confidence in forest management.

Current status

In 2015, the VFMP celebrated its fifth birthday (see second photo), the completion of the instalment phase. The VFMP has now entered into the annual re-measurement phase of the program. By the time of publication of this paper the VFMP will have finished its sixth year of measurements, thus the first season of re-measurements. It is anticipated that the first annual change estimate will occur in 2017 (Haywood, 2016).

At the time of publication, 643 ground plots have been installed, 189 have been measured twice, and a number of plots have been excluded for safety and accessibility reasons, and close proximity to cultural and heritage sites. The feasibility of measuring these plots will be considered each time they arise in the re-measurement program.

Over 700 pages of thorough and comprehensive standard operating procedures for this work have been completed in close consultation with scientists and international forest mensuration experts. More than 70 people have been directly involved in the VFMP. Hundreds of thousands of measurements have been taken. Some 12,000 large trees have been individually measured. Also the Department of Environment, Land, Water and Planning has partnered with the Royal Melbourne Institute of Technology and the Cooperative Research Centre for Spatial Information to explore the integration of Landsat satellite time series with the VFMP plot data to improve change estimation (CRCSI, 2016).

As with most monitoring programs their worth grows with time and the VFMP will continue to collect data on sustainable forest management. These data will next be reported in the 2018 Victoria State of the Forests report and VFMP data will continue to be fed into those above-mentioned reporting programs. Cloud-based reporting access is being developed to allow

users to query the database and generate standardised reports. This will enable Victoria, Australia and the United Nations to continue to better support policy and decision-making and better understand progress towards the objectives of sustainable forest management at sub-national, national and international scales.

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