THE NSW GOVERNMENT HAS ADOPTED 13 STATE-WIDE TARGETS FOR NATURAL RESOURCES MANAGEMENT. THIS IS THE NRC'S REPORT ON PROGRESS TOWARDS THIS TARGET.

REPORTING ON TARGETS 2009 | TECHNICAL REPORT

NATIVE VEGETATION EXTENT & CONDITION

TECHNICAL REPORT

"BY 2015 THERE IS AN INCREASE IN NATIVE VEGETATION EXTENT AND AN IMPROVEMENT IN NATIVE VEGETATION CONDITION"

natural resources commission

1

INTRODUCTION

The Natural Resources Commission (NRC) provides the NSW Government with independent, objective and practical advice on natural resource management issues. Recommendations are developed based on sound science, best practice management and listening to all stakeholders.

The NRC is required to report on progress towards the 13 natural resource management (NRM) targets adopted by the NSW Government and embedded in the NSW State Plan.

These targets aim to create healthy, functioning landscapes and communities by providing a common focus, guide investment, support accountability and allow for local input.

The first target to be reported on by the NRC is the Native Vegetation target. The target is part of the Biodiversity theme and is as follows:

"By 2015 there is an increase in native vegetation extent and an improvement in native vegetation condition"

This Technical Report presents a summary of the detailed analysis undertaken to evaluate progress towards the target. Detailed additional information is provided in an accompanying expert report.

To evaluate progress being made towards the target, information has been collated from state and federal agencies including NSW Department of Environment, Climate Change and Water (DECCW), the Native Vegetation Monitoring, Evaluation and Reporting Theme Team, Catchment Management Authorities (CMAs) and federal agencies. The collated information has been independently analysed and verified by a panel of recognised experts in NRM including Dr. Ronnie Harding (Chair), Professor Gary Jones, Dr. Michele Barson, Dr. Denis Saunders and Mr. Bruce Wilson.

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METHODS EMPLOYED TO ASSESS PROGRESS

THIS SECTION DESCRIBES THE STATE-WIDE DATASETS AND METHODOLOGY THAT WERE USED TO ESTABLISH THE BASELINE AND REPORT ON THE TREND IN NATIVE VEGETATION EXTENT AND CONDITION IN NEW SOUTH WALES.

To assess progress towards this target, the NRC utilised existing information from a variety of sources including information specifically developed to evaluate native vegetation extent and condition. Other lines of evidence that supported the assessment were also considered as part of the analysis.

The main sources of information are derived from the work undertaken by DECCW. This information is regarded as the best available data for the consistent measurement of vegetation extent and condition across NSW.

Examples of projects being undertaken by CMAs at a regional scale were analysed to highlight the programs underway in many parts of the state that have the potential to improve the ability to report on the native vegetation target in the future.

2.1 INFORMATION USED TO ASSESS PROGRESS TOWARD THE TARGET

RECENT WORK UNDERTAKEN BY THE DECCW NATIVE VEGETATION THEME TEAM USED SEVERAL CORE AND DERIVED DATASETS FOR THE ASSESSMENT OF VEGETATION EXTENT AND CONDITION.

2.1.1 VEGETATION EXTENT DATASETS

Three information sources have been used to determine vegetation extent in NSW. These sources are:

- The State-wide Landcover and Trees Study methodology (SLATS) developed by the Queensland Department of Natural Resources and Water (DNRW) and adapted for NSW
- Land use information developed by DECCW's Land Use Mapping program (Emery et al, in prep)
- Information on structurally intact vegetation generated by Keith and Simpson (2006).

The SLATS methodology uses Landsat TM and ETM images to determine the extent of woody vegetation. The methodology calculates Foliage Projected Cover (FPC) at a grid cell resolution of 25 meters identifying woody vegetation where the values are over a pre-defined threshold. Vegetation below the threshold is classified as non-woody vegetation.

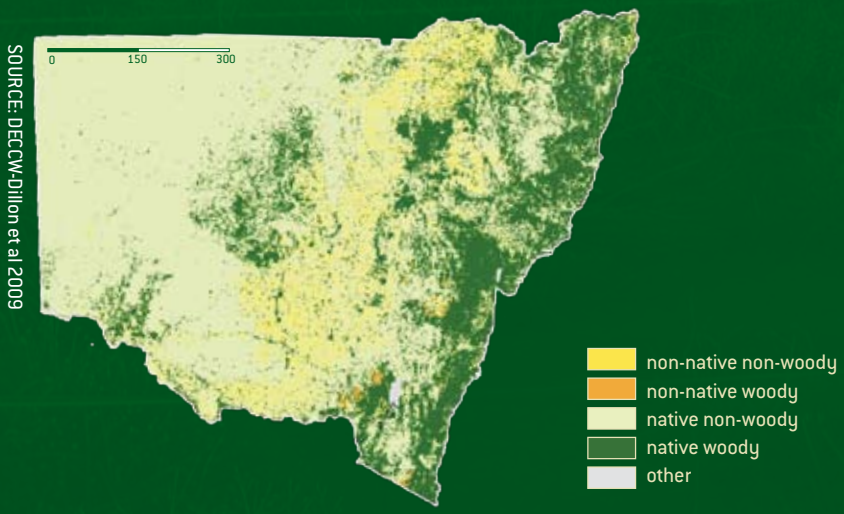
To establish a baseline for the extent of woody vegetation, the SLATS methodology used a 25% FPC as a threshold to classify vegetation. This figure has been recently revised down to 10% as the 25% level was found to under estimate the extent of woody vegetation.

The Land Use Mapping program converted information available from 184 land use types (DECC 2008a) into one of three categories used to report vegetation extent. The categories are native, non-native or indeterminate.

For example, areas of forest and woodland were classified as native, areas of exotic plantation forest and horticulture were classified as non-native and areas where nativeness could not be determined, such as grazing of non-woody vegetation were classified as indeterminate.

Information on structurally intact vegetation across the state was obtained by merging 42 existing vegetation datasets captured between 1970 and 2005. These datasets were merged based on their highest level of currency and reliability (Keith and Simpson 2006, 2008).

NSW INTERIM NATIVE VEGETATION EXTENT 2008



To determine the extent of native vegetation across the state, information from SLATS and the Land Use Mapping program was used to create the Interim Native Vegetation Extent dataset.

Structurally intact or derived vegetation was determined by combining the Structurally Intact Vegetation dataset with the Interim Native Vegetation Extent dataset (Dillon et al 2009 - Diagram in section 2.1.3).

2.1.2 METHODS EMPLOYED FOR THE ASSESSMENT OF TRENDS IN VEGETATION EXTENT

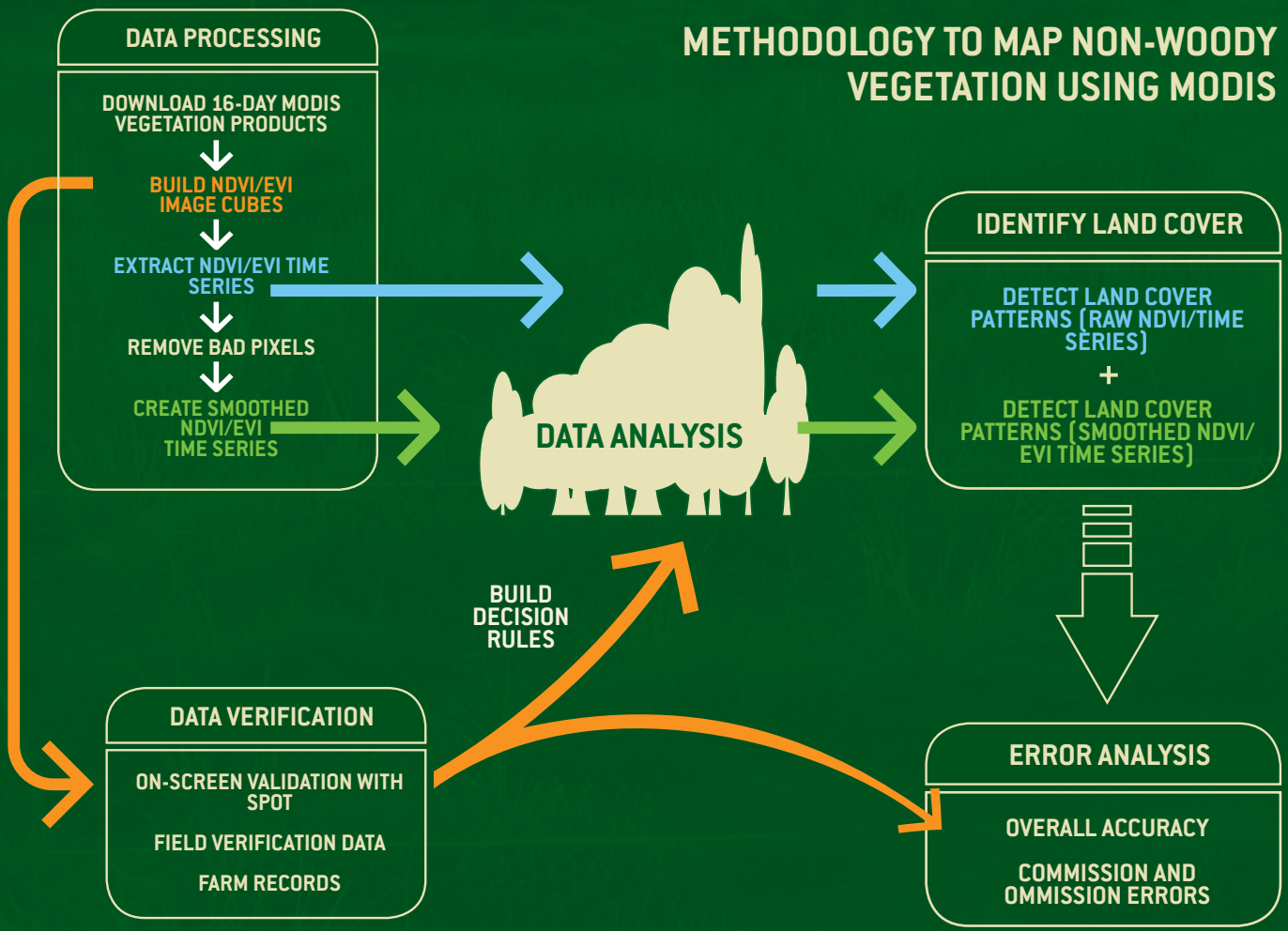
To evaluate progress towards the target, two programs that utilise satellite remote sensing have been implemented by DECCW. Remote sensing provides a robust and efficient method of monitoring trends over time. The two programs are:

- The Woody Vegetation Change Monitoring program evaluates woody vegetation extent using the SLATS methodology. This program is currently able to calculate the loss of woody vegetation for the state and CMA regions for the periods 2004-2006, 2006-2007 and 2007-2008
- A program that uses Moderate Resolution Imaging Spectroradiometer (MODIS) to evaluate non-woody vegetation extent is currently under way. This program is being developed to generate a layer of native and non-native non-woody vegetation cover which can be used to evaluate change. The MODIS methodology is outlined in the diagram below.

EXAMPLE OF WOODY VEGETATION CHANGE ANALYSIS UNDERTAKEN BY THE WOODY VEGETATION CHANGE MONITORING PROGRAM

THE SLATS METHODOLOGY IDENTIFIES THE AREAS OF THE STATE WHERE CHANGES IN VEGETATION HAVE BEEN DETECTED. THE AREAS WHERE CHANGE HAS OCCURRED ARE HIGHLIGHTED IN RED

METHODOLOGY TO MAP NON-WOODY VEGETATION USING MODIS



2.1.3 VEGETATION CONDITION DATASETS

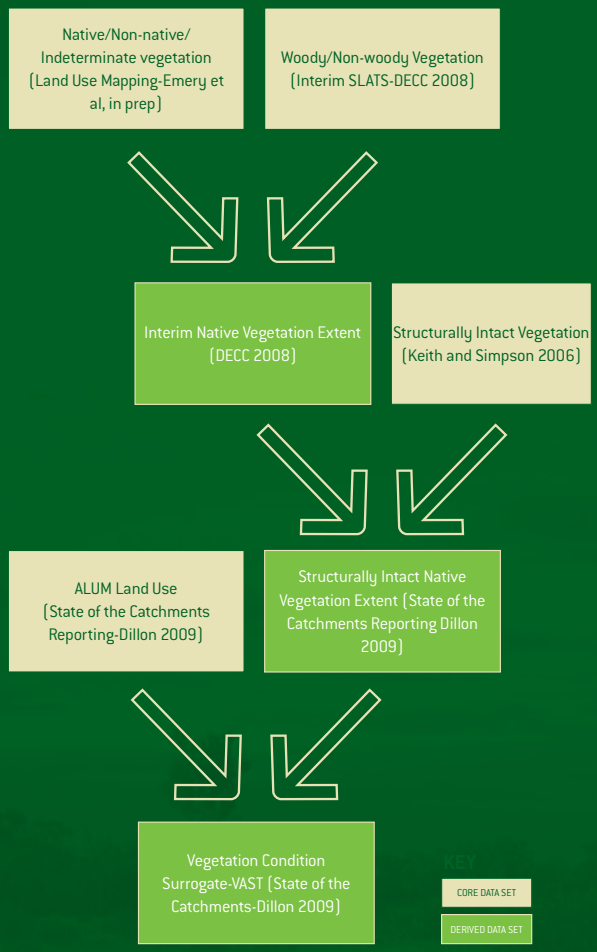
There are inherent difficulties in classifying and mapping vegetation condition. The State of the Catchments project undertaken by DECCW produced a vegetation "condition" surrogate using the Vegetation Assets, States and Transitions methodology (VAST - Thackway and Leslie 2005, 2006 and 2008)[1].

To generate the VAST vegetation "condition" data layer the Australian Land Use and Management classification categories (ALUM) was combined with the Structurally Intact Native Vegetation Extent dataset.

Vegetation condition was determined within a series of vegetation cover classes. These classes range from a "residual" state where the native vegetation community structure and composition is intact to a "removed" state where vegetation has been significantly modified or removed.

The following diagram describes the core and derived datasets used to generate the information for evaluating vegetation extent and some components of vegetation condition.

CORE AND DERIVED DATASETS USED TO GENERATE THE NATIVE VEGETATION EXTENT AND CONDITION INFORMATION



2.1.4 METHODS EMPLOYED FOR THE EVALUATION OF NATIVE VEGETATION CONDITION

To evaluate condition, native vegetation is assigned a VAST cover class that is based on the impacts of land use. Changes in vegetation condition are then determined by comparing changes in VAST classes over time.

Additional methodologies are currently being trialled to monitor the trend of vegetation

condition at a local and regional level. Currently there is no consistent program across all regions that is able to report on the trend of vegetation condition at the state scale. However, data collected at the local and regional level by CMAs when aggregated will contribute to the verification of vegetation condition at the state level.

2.2 ADDITIONAL INFORMATION

Evidence was gathered from additional sources to provide support for the assessment of progress towards the target. For example, information from the Native Vegetation Report Cards produced by DECCW was used to outline the amount of land in the state being cleared, managed, restored or under conservation since the introduction of the Native Vegetation Act 2003.

[1]For VAST methodology the following definitions of native vegetation modification states have been used:

I. Residual Vegetation: native vegetation community structure, composition, and regenerative capacity intact – no significant perturbation from land use/land management practice

II. Modified Vegetation: native vegetation community structure, composition and regenerative capacity intact – perturbed by land use/land management practice

III. Transformed Vegetation: native vegetation community structure, composition and regenerative capacity significantly altered by land use/land management practices

IV. Transformed/Replaced adventive: native vegetation replacement – species alien to the locality and spontaneous in occurrence

V. Replaced Managed: native vegetation replacement with cultivated vegetation

VI. Removed: vegetation removed – alienation to non-vegetated land cover

3

ASSESSMENT OF PROGRESS

THIS SECTION PRESENTS THE KEY FINDINGS OF THE ASSESSMENT OF THE BASELINE AND TREND FOR EXTENT AND CONDITION OF NATIVE VEGETATION.

3.1 NATIVE VEGETATION EXTENT

3.1.1 EXTENT BASELINE

It was not possible to establish a baseline for vegetation extent at the date the target was established in 2005 due to the unavailability of some datasets for that year. However a baseline was able to be established for 2006.

The extent of vegetation in NSW for 2006 was as follows:

- 61% Native Intact
- 8% Native Derived
- 20% Native/Non-native Mosaic
- 11% Non-native/other.

The DECCW State of the Catchment reporting found that in 2006 native woody vegetation covered 19-23% of the state, and non-woody vegetation covered 40-64% of the state.

Further analysis of native vegetation extent using the refined SLATS methodology found that in 2008, 37% of NSW was covered by native woody vegetation. The new results are considered more accurate due to the use of a revised FPC threshold for the classification of woody vegetation.

In 2006, Native woody vegetation covered

19-23%

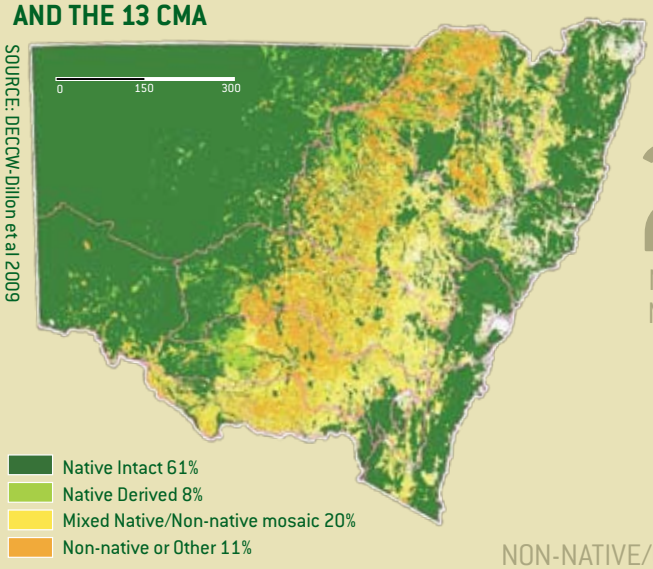
of the state

In 2006, Native non-woody vegetation covered

40-64%

of the state

VEGETATION EXTENT WITHIN NSW AND THE 13 CMA



SOURCE: DECCW-Dillon et al 2009

61%
NATIVE INTACT VEGETATION

8%
NATIVE DERIVED VEGETATION

20%
NATIVE/NON-NATIVE MOSAIC VEGETATION

11%
NON-NATIVE/OTHER VEGETATION.

3.1.2 EXTENT TREND

The analysis has determined that a trend for the overall extent of native vegetation (being the combination of woody and non-woody vegetation) cannot be established at this stage. The following however can be determined:

- A trend for woody vegetation extent has been established, showing that there has been no net change in the overall extent of native woody vegetation across the state between 2002-2008
- Analysis of satellite imagery of New South Wales between 2002–2008 detected that approximately 112,000 hectares of woody vegetation have been cleared. The losses due to clearing that have been reported within NSW have been offset by increases in woody cover in other areas
- Between January 2006 - June 2008 the area approved for clearing under the Native Vegetation Act 2003, Native Vegetation and Conservation Act 1997 and the Plantations and Reafforestation Act 1999 was 8,923 hectares, whilst 3,654,264 hectares of vegetation were conserved, managed or restored under various Government initiatives
- Analysis of the extent of Kyoto defined forests in NSW shows a 0.05% increase in woody extent between 2005 and 2006.

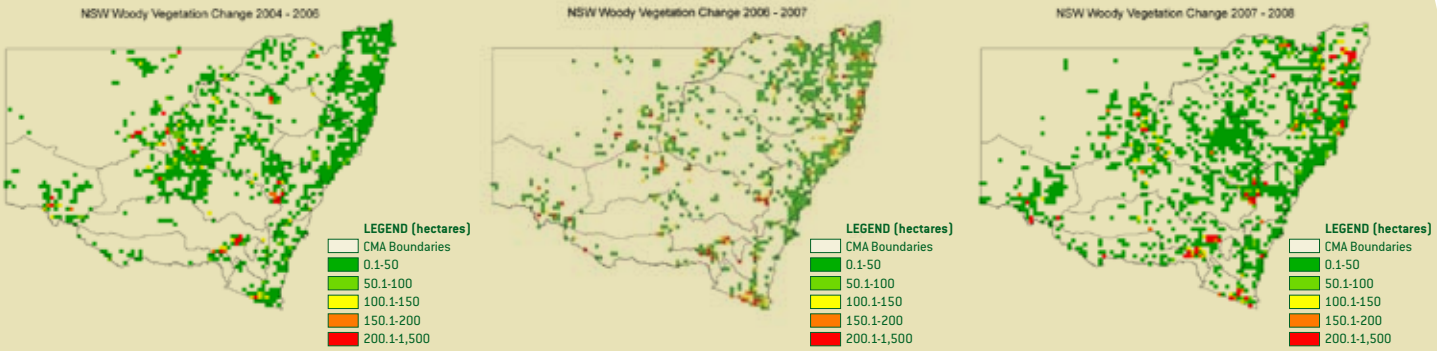
The data required to report on the trend in the extent of non-woody vegetation at the state-wide scale is not yet available. This is due to annual and seasonal changes in land use and land management practices. For example droughts or where cropping of land in one year is returned to native pasture in another.

[2]It is important to note that the vegetation clearing figure reported in the State of the Catchment Report Cards only captures the native vegetation approved to be cleared under the Native Vegetation Act 2003. The figure reported in the report cards is significantly less that the amount of woody vegetation clearing identified by the Woody Vegetation Change Monitoring program. This difference is due to the additional clearing as a result of thinning and other management actions under vegetation regulations, as well as illegal clearing and that which is not subject to the provisions of the legislation relating to clearing for infrastructure or regrowth.

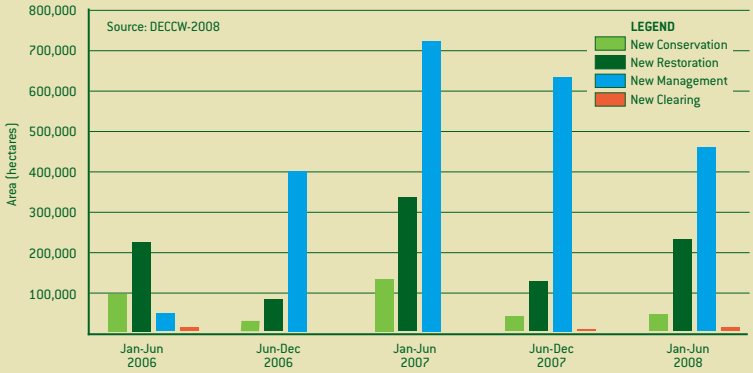
LOCATION OF WOODY VEGETATION CLEARING IN NSW-04/06, 06/07 AND 07/08

Source: DECCW-2009

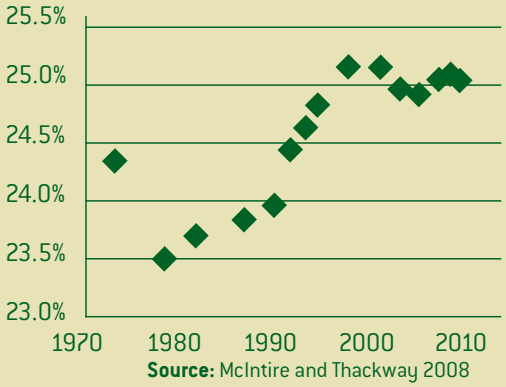
Note: The coloured areas of these graphs represent the location of clearing only and are not representative of the area being cleared.



NATIVE VEGETATION THAT HAS BEEN CONSERVED, RESTORED/REVEGETATED, MANAGED OR APPROVED FOR CLEARING IN NSW



PERCENTAGE OF NSW WITH KYOTO FOREST COVER 1972 TO 2006



Source: McIntire and Thackway 2008

3.2 NATIVE VEGETATION CONDITION

68%
NATIVE VEGETATION COVER

32%
NON-NATIVE VEGETATION COVER

3.2.1 CONDITION BASELINE

The vegetation condition baseline reported for 2006 is:

Native vegetation cover – 68%

- 9% Residual
- 52% Modified
- 7% Transformed

Non native vegetation cover – 32%

- 19% Transformed/Replaced-Adventive Mosaic
- 12% Replaced-Managed
- 1% Removed.

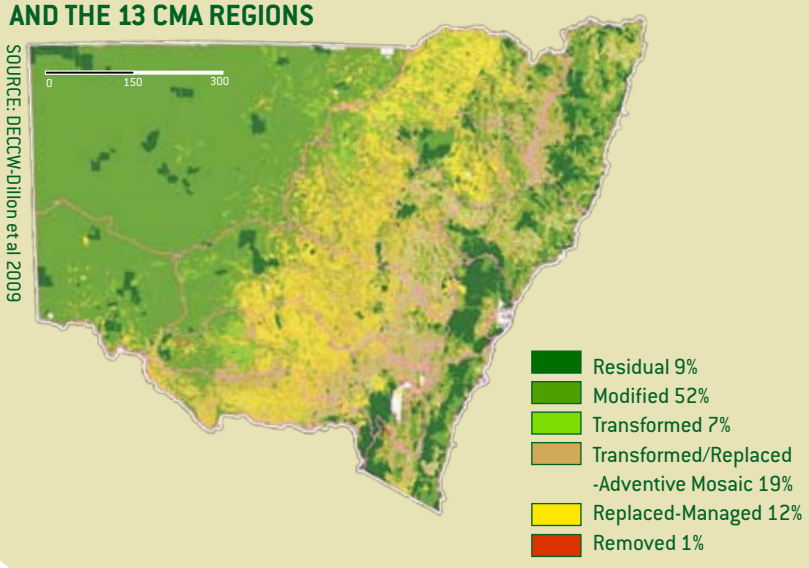
3.2.2 CONDITION TREND

It isn't possible to report a trend in native vegetation condition with the information that is currently available.

Methods being trialled at the regional and site scale may allow evaluation of a trend in condition by 2015. However anecdotal evidence suggests that the VAST methodology is too coarse to identify positive changes in condition over a relative short five year timeframe.

VEGETATION CONDITION STATES WITHIN NSW AND THE 13 CMA REGIONS

SOURCE: DECCW-Dillon et al 2009



3.3 CMA CASE STUDIES

The project reviewed a sample of the work being undertaken by Border Rivers Gwydir, Namoi and Murray CMAs to evaluate vegetation extent and condition in their catchments.

The objective of the review was to assess whether the information provided by CMAs could inform the progress being made towards the target at a catchment level, with the hope of identifying potential improvements in methodologies to monitor and evaluate vegetation extent and condition across the state.

Methods being developed by CMAs for regional reporting have the potential to contribute to state-wide reporting by providing more accurate and finer scale datasets that enable improvements in condition to be determined.

4 OVERALL OBSERVATIONS

To accurately map and evaluate the trend in non-woody vegetation extent, further refinements in the technology and methodologies used for this purpose are required. DECCW has noted that these refinements are currently under development.

The capability to report trends in native vegetation condition exist today. However, the VAST methodology used only allows reporting at a relatively coarse scale and in particular detecting negative changes in condition. Detection of improvements in condition are not easily identified using the VAST methodology.

As such there are challenges in determining vegetation condition using this methodology. The main challenge being that the timeframe required to measure improvement in the condition of native vegetation may extend beyond the 2015 reporting date.

As an example, by placing native vegetation under a land tenure focussing on conservation, say in a National Park, may not improve its condition sufficiently in the period to 2015 such that it can be classified into a more 'native' vegetation modification state.

There is an opportunity to more effectively integrate the work undertaken by CMAs, federal agencies including CSIRO, and the state-wide monitoring and reporting programs. All of this work across the sphere of natural resource management provides a valuable complement to the monitoring, evaluation and reporting work undertaken by NSW NRM agencies.

This being said, there are challenges to successfully integrating the work of these groups including the variations in methods of reporting, developing a robust and consistent approach to the collection of information at regional and state-wide scales including evaluation methods, reporting units and data analyses.

It should be noted that the process undertaken by the NRC to report on this target was subject to information limitations including:

- The ability to report on native vegetation was dependent upon information from other government programs including land use mapping and land tenure
- The assumptions made by various agencies during the development and implementation of the methodologies used to interpret the data.

5 CONCLUSION

It is clear that continued investment in data gathering, evaluation programs and refinement in methodologies is critical to being able to report on progress towards the Native Vegetation Extent & Condition state-wide target in 2015.

Recent advances in monitoring and evaluation programs and methodologies seem likely to improve the ability to report on progress towards targets in the future.

Significantly, we have been able to conclude that:

- A baseline for native vegetation extent and condition at 2006 and a trend for native woody vegetation trend for the period 2002-2008 have been established
- There has been no significant change in the extent of native woody vegetation across the state between 2002-2008, although there has been a measured increase in the clearing of woody vegetation
- The data required to successfully report against this target is currently being managed according to NSW Government information standards or is in the process of being arranged to being managed according to these standards.

For additional information about reporting on progress towards the Native Vegetation Extent and Condition state-wide target or the work of the Natural Resources Commission, go to www.nrc.nsw.gov.au or contact: (02) 8227 4300.

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