

### State Plan target

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

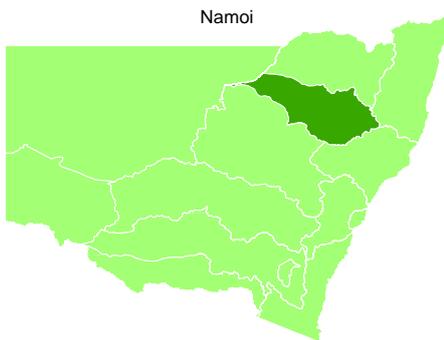
### Background

Native vegetation is fundamental to most natural ecosystems. It contributes to biodiversity and provides habitat and resources for native animals. This report makes significant advances in reporting the spatial extent and condition of native vegetation within the region, as well as providing information on current pressures affecting native vegetation extent and condition. This report has used additional state-wide data layers that have improved on current state-wide reporting products.

A detailed technical report describes the methods used to derive the information contained in this report. At the time of publication of the *State of the catchments (SOC) 2010* reports, the technical reports were being prepared for public release. When complete, they will be available on the DECCW website: [www.environment.nsw.gov.au/publications/reporting.htm](http://www.environment.nsw.gov.au/publications/reporting.htm).

**Note:** All data on natural resource condition, pressures and management activity included in this SOC report, as well as the technical report, was collected up to January 2009.

## Map of the catchment



## Assessment

The overall status of vegetation within the catchment combines assessments of vegetation extent and vegetation condition. Each assessment is summarised on a five-colour scale representing (from green to red) 'very good', 'good', 'fair', 'poor' to 'very poor'. As is commonly done in these kinds of assessments the reference condition to which these measures are compared is 'pre-European'. Given the fact that there is a history of 200 years of intervention in all NSW catchments, it cannot be expected that either vegetation extent or condition would correspond to the pre-European state. Nonetheless, it is useful to assess how far removed from that state the current situation is. Pressures on vegetation extent and condition are provided on a five-colour scale representing (from green to red) 'very low', 'low', 'moderate', 'high' to 'very high'.

Where available data allows for an assessment of a trend from 2006 to 2009, this trend is represented by arrows representing an increase in extent or condition ( $\uparrow$ ), or a decrease in extent or condition ( $\downarrow$ ), or no change (-). Where available data does not allow for an assessment of trend, the question mark symbol (?) is shown.

Confidence in the data used for assessments is shown as H (high), M (medium) and L (low).

## Vegetation extent

The status of vegetation extent is presented on a map of the catchment (Figure 1), where each of the four vegetation extent states is represented by a different colour. These states conform to the NSW Government definitions of native vegetation extent.

The vegetation extent states are:

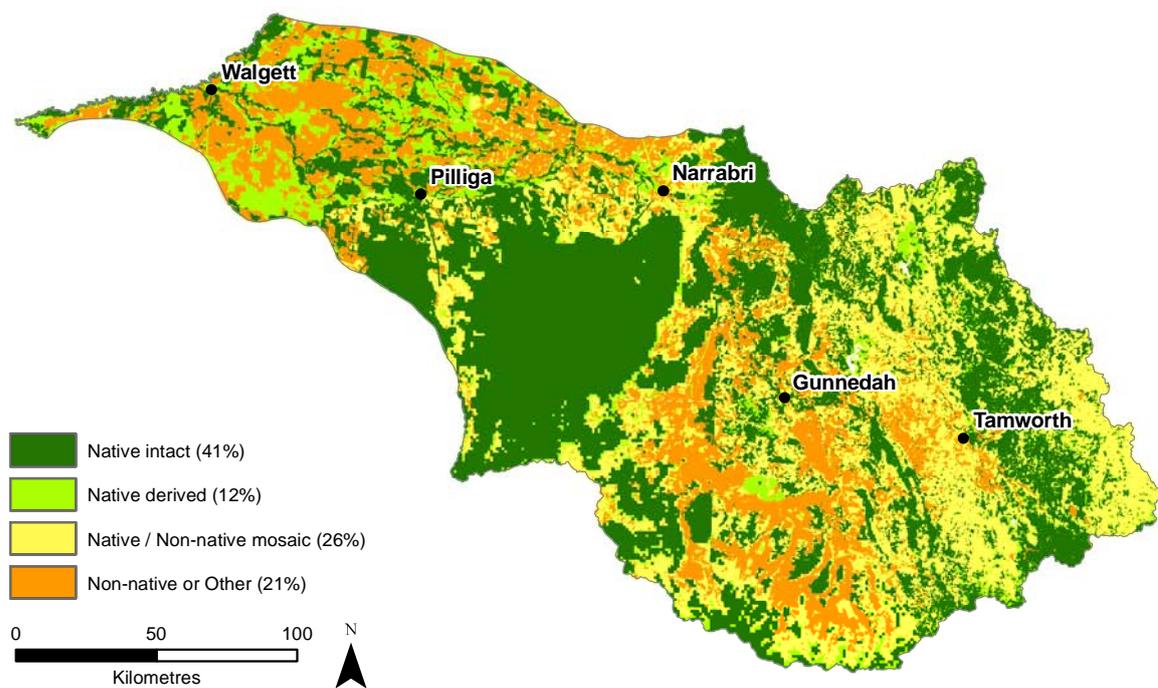
- native – intact: native vegetation in which the structure has not been substantially altered by human activities, or has been altered and has since recovered
- native – derived: vegetation that is predominantly native but has been substantially altered by human activities and is no longer structurally intact
- native/non-native mosaic: vegetation that cannot readily be classified as either native or non-native using current remote sensing methods

- non-native or other: non-native vegetation including crops, non-native plantations and non-native pastures, or other non-vegetation land cover types, including urban, industrial and infrastructure.

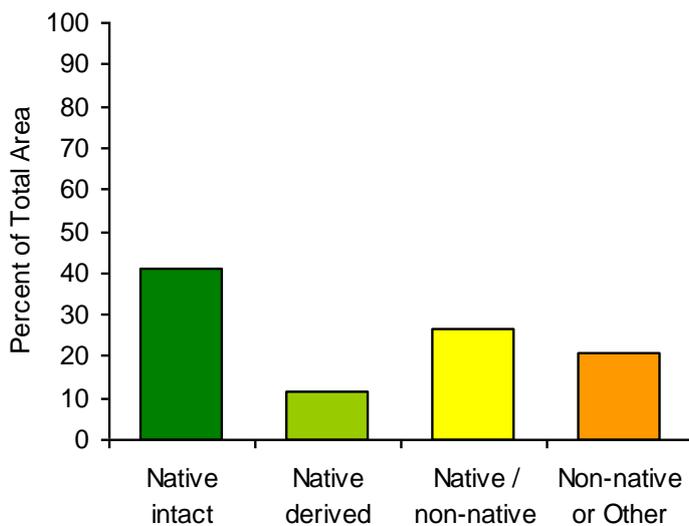
The map legend (Figure 1) indicates which areas of the catchment are represented by each of these four extent states. Also shown is a bar chart (Figure 2) that provides a visual summary of the percentage of the total catchment area represented by each of these four extent states. A separate bar chart (Figure 3) shows the percentage of the total catchment represented by native woody and native non-woody vegetation. For each of these bars, upper and lower limits (shown by cross-hatching) are determined by the extent of native/non-native mosaic vegetation unable to be accurately classified within each of the two categories.

**Table 1 Vegetation extent**

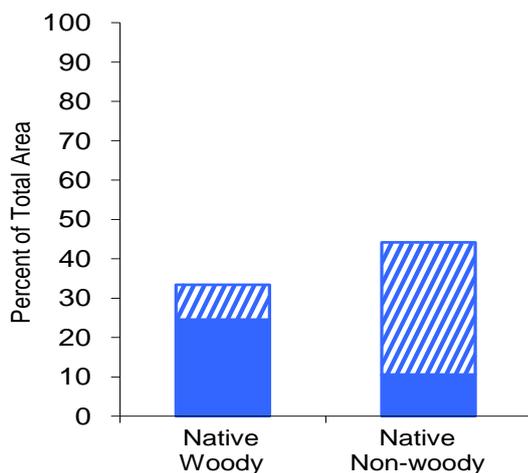
	Rating	Index	Trend	Confidence
State of NSW	Good	70/100	?	H
Namoi	Fair	54/100	?	H



**Figure 1 Coverage of extent states**



**Figure 2 Extent states as percentage of total catchment area**



**Figure 3 Native woody and native non-woody vegetation as percentage of total catchment area**

## Condition

The status of vegetation condition is presented on a map of the catchment (Figure 4), where each of the six vegetation condition states is represented by a colour. The six states conform to the modification states of the draft National Vegetation Condition Classification (VAST – Vegetation Assets, States and Transitions). Modification states are based on the impacts of human land-use and land management practices on vegetation relative to a vegetation condition benchmark. Assessments in future State of the catchments reports will use more direct measures of condition. There are current projects that are developing appropriate methodologies.

The vegetation condition states (from highest to lowest) are:

- residual: native vegetation community structure, composition and regenerative capacity is intact – no significant perturbation from land-use or land management practices

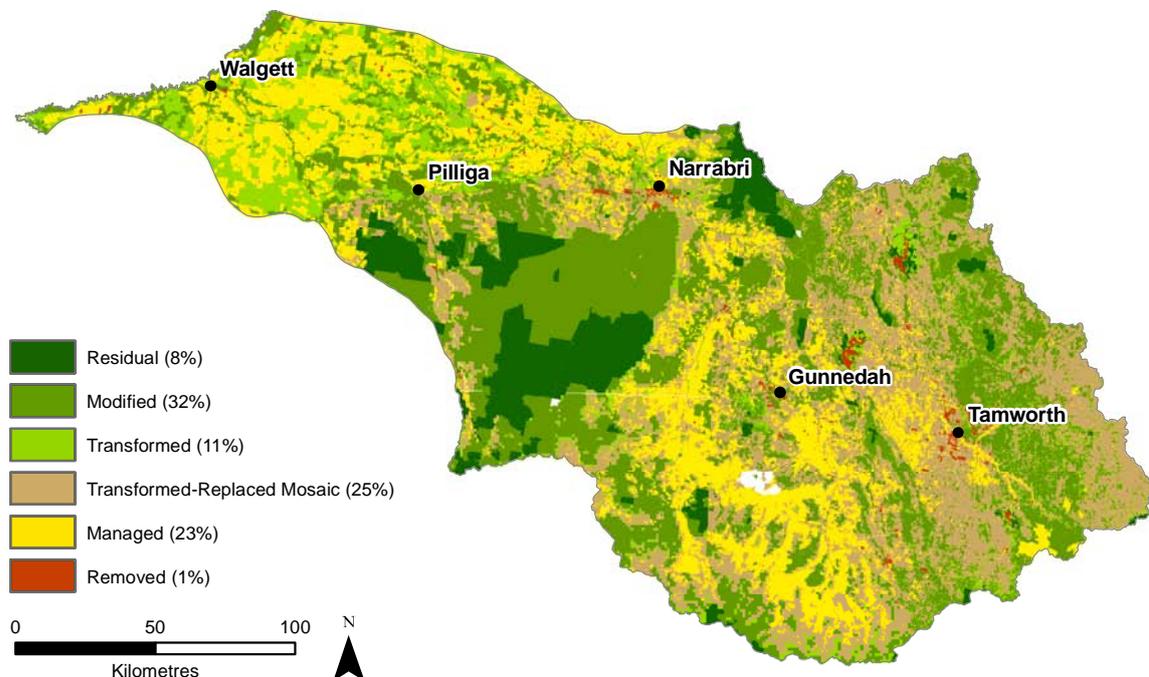
- modified: native vegetation community structure, composition and regenerative capacity is intact – perturbed by land-use or land management practices
- transformed: native vegetation community structure, composition and regenerative capacity is significantly altered by land-use or land management practices
- transformed/replaced-adventive mosaic: vegetation that cannot readily be classified as either transformed (native) or replaced-adventive\* (non-native) on the basis of available state-wide datasets
- replaced-managed: native vegetation is replaced with cultivated vegetation
- removed: vegetation removed to leave non-vegetated land cover.

The map legend (Figure 4) shows which areas of the catchment are represented by each of these six condition states. Also shown is a bar chart (Figure 5) that provides a visual summary of the percentage of the total catchment area represented by each of these six condition states.

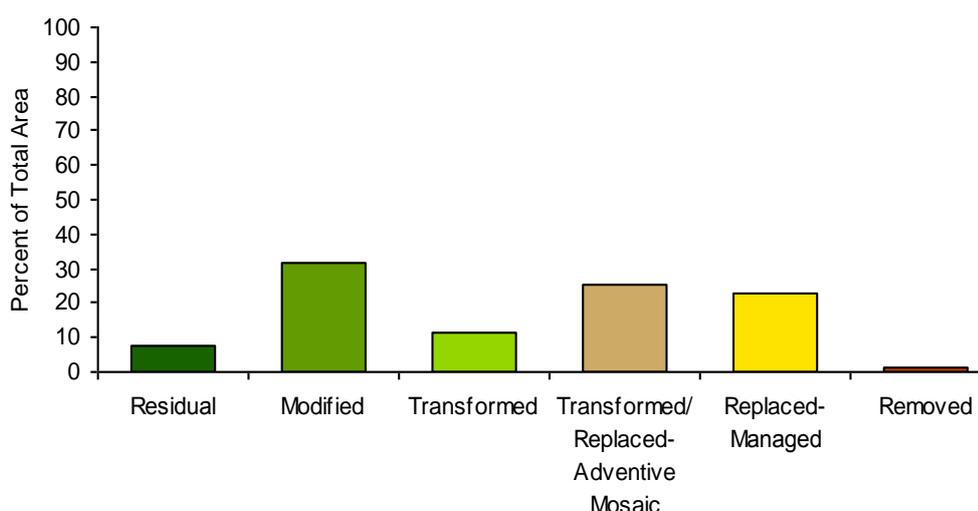
\* The replaced-adventive modification class represents vegetation that has had the dominant structuring species of the native vegetation community removed, predominantly cleared or extremely degraded. The combined transformed/replaced-adventive mosaic condition state represents the expression within the National Vegetation Condition Classification of the native/non-native mosaic (see 'vegetation extent'), which results from our incomplete state of knowledge.

**Table 2 Vegetation condition**

	Rating	Index	Trend	Confidence
State of NSW	Fair	51/100	?	M
Namoi	Fair	46/100	?	M



**Figure 4 Vegetation condition across the catchment**



**Figure 5 Condition categories as percentage of total catchment area**

### Pressures

The pressures on vegetation extent and condition are presented on a map of the catchment (Figure 6), where each of the five pressure classes is represented by a colour. The five pressure classes conform to the primary classes of the Australian Land Use and Management Classification. Primary pressure classes relate to the prime use of the land and are distinguished in order of generally increasing levels of intervention or potential impact on the natural landscape.

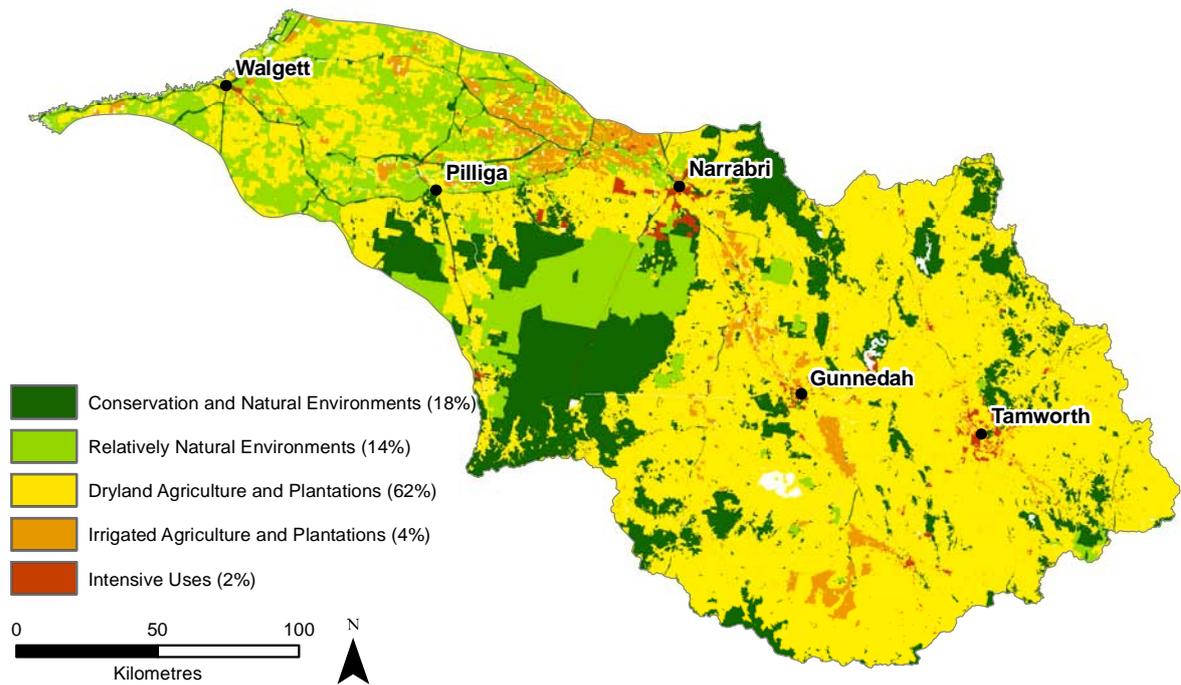
The five pressure classes are:

- conservation and natural environments: land used primarily for conservation purposes, based on the maintenance of the essentially natural ecosystems present
- relatively natural environments: land used primarily for primary production, with limited change to the native vegetation
- dryland agriculture and plantations: land used mainly for primary production, based on dryland farming systems
- irrigated agriculture and plantations: land used mostly for primary production, based on irrigated farming
- intensive uses: land subject to extensive modification, generally in association with closer residential settlement, or commercial or industrial uses.

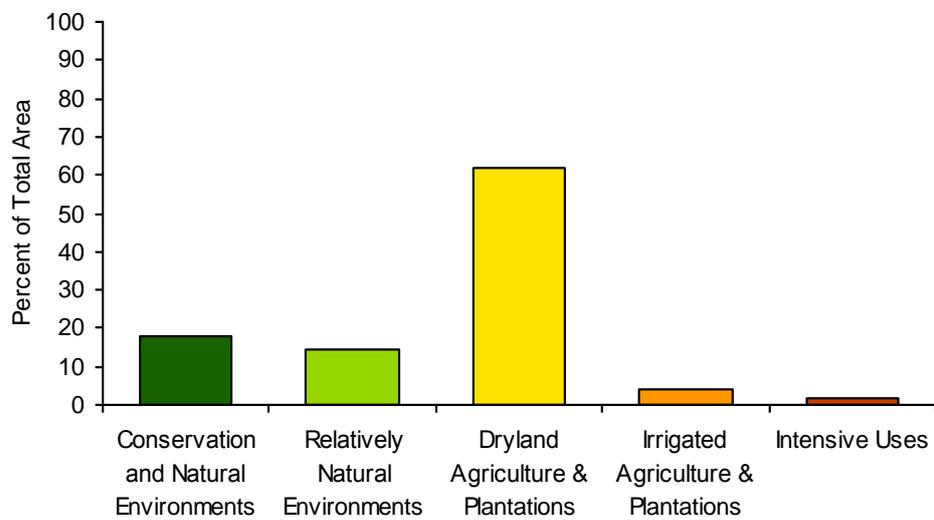
The map legend (Figure 6) shows which areas of the catchment are represented by each of these five pressure classes. Also shown is a bar chart (Figure 7) that provides a visual summary of the percentage of the total catchment area represented by each of these five pressure classes.

**Table 3 Vegetation pressures**

	Rating	Index	Trend	Confidence
State of NSW	Low	39/100	?	H
Namoi	Moderate	48/100	?	H



**Figure 6 Pressure classes across the catchment area**



**Figure 7 Pressure classes as percentage of total catchment area**

## Status

**Table 4 Overall status**

	Rating	Index	Trend	Confidence
State of NSW	Good	61/100	?	M
Namoi	Fair	50/100	?	M

The overall status of native vegetation within the state and the region was calculated as the average of the index scores for vegetation extent and vegetation condition.

## Index calculations

### Vegetation extent

This index was calculated as the sum of the following products:

- percentage of the total area of:
  - native – intact vegetation x 1.00
  - native – derived vegetation x 0.50
  - native/non-native mosaic vegetation x 0.25
  - non-native or other x 0.00

This index recognises that the first three vegetation extent states contribute to an overall assessment of native vegetation extent. However, it does weight each extent state relative to a benchmark of original or 'pre-1750' native vegetation extent. This is outlined below:

- Native – intact vegetation contributes to an assessment of the extent of original or 'pre-1750' vegetation types. Its extent contributes completely to the index.
- Native – derived vegetation contributes to an assessment of the extent of native vegetation as defined under the *Native Vegetation Act 2003*. Its extent contributes half as much to the index as native – intact.
- Native/non-native mosaic contributes to an assessment of the potential extent of native vegetation as defined under the *Native Vegetation Act 2003*. As current vegetation extent mapping and monitoring programs deliver greater certainty about native vegetation extent, the amount of mapped native/non-native mosaic will lessen. Greater knowledge gained from new vegetation mapping and improved remote sensing capabilities will see a significant proportion of this mapped area allocated to one of the other three categories. It is likely, however, that many areas will still remain in this category because of the native/non-native vegetation cycles common in some landscapes. Given this uncertainty, the extent of native/non-native mosaic contributes half as much to the index as native – derived.

### Vegetation condition

This index was calculated as the sum of the following products:

- percentage of the total area of:
  - residual x 0.80
  - modified x 0.60
  - transformed x 0.50
  - transformed/replaced-adventive mosaic x 0.40
  - replaced-managed x 0.20
  - removed x 0.05

The index recognises that the six different modification states of the draft National Vegetation Condition Classification (VAST) broadly represent degrees of impact on vegetation (relative to a vegetation condition benchmark) of human land-use and land management practices.



Areas were mapped to one of the six states based on decision rules applied to a range of state-wide datasets (see supporting technical report). Average condition values assigned to each state (six product terms above) in determining the index were based on expert opinion.

### **Vegetation pressures**

This index was calculated as the sum of the following products:

- percentage of the total area of:
  - conservation and natural environments x 0.0
  - production from relatively natural environments x 0.3
  - production from dryland agriculture and plantations x 0.6
  - production from irrigated agriculture and plantations x 0.9
  - intensive uses x 1.5

Areas were mapped to one of the above five primary land-use classes based on decision rules within the NSW Land-Use Mapping data (see supporting technical report). Average pressure values given above for each of the five primary land-use classes were chosen using expert opinion to show relative pressure indices state-wide. Land-uses that exhibited a greater pressure on vegetation received a higher average pressure value.

Indices were mapped to extent and condition states and pressure classes according to the following index ranges:

<b>Extent and condition</b>		<b>Pressure</b>	
0.0 – 0.2	very poor	0.0 – 0.2	very low
> 0.2 – 0.4	poor	> 0.2 – 0.4	low
> 0.4 – 0.6	fair	> 0.4 – 0.6	moderate
> 0.6 – 0.8	good	> 0.6 – 0.8	high
> 0.8 – 1.0	very good	> 0.8 – 1.0	very high

### **Additional information provided by Namoi CMA**

#### **Extent**

Namoi Catchment Management Authority (Namoi CMA) has invested in the identification and seamless mapping of regional vegetation community (RVC) extent across the Namoi catchment. The RVCs have been described in detail in a report to the CMA. Namoi CMA has also developed 'pre-1750' vegetation mapping for the catchment, which is mapped as RVCs. Namoi CMA will establish a benchmark of remnant vegetation extent for the catchment, based on comparisons between the two datasets, and will develop a measure of current extent versus 'pre-1750' extent for each RVC.

In future years, vegetation extent mapping will be updated with the latest land-use mapping and will provide an opportunity to measure changes in vegetation extent at the RVC scale.

It should be noted that within the mapping studies completed by Namoi CMA, grasslands are currently only mapped to a 'native/derived' description due to the difficulty in discerning between areas that have been cleared in the past and now mimic native grasslands and areas that are true native grasslands. Namoi CMA is moving to more accurately map areas of extant endangered grassland RVCs, as the first step in establishing the area of 'native' grassland as opposed to 'derived'.

### **Condition**

Namoi CMA prefers to use two basic classes of vegetation condition, which are 'remnant' and 'removed'. Again, the exception is in the case of the grasslands, which will eventually be split into 'native' and 'derived'. In Namoi CMA's view, as targets refer to native vegetation, not vegetation generally, terms like 'replaced-managed' are not useful and may mislead the public into thinking there is more native vegetation than there actually is.

Measures of ecosystem condition are being developed by Namoi CMA, and will be based on finer indicators of vegetation health including canopy cover, number of canopy species, amount of recruitment etc. It is the intention of Namoi CMA to provide condition information for each RVC, based on a suitable number of regularly monitored sites across the catchment. This assessment process will also include riparian vegetation condition, which is an important indicator of riparian health. Information from condition monitoring and project monitoring will be incorporated into a CMA Vegetation Condition Assessment database and linked to the NSW Land Management Database.

### **Pressure**

Namoi CMA is not suggesting any changes to the measure of pressure on vegetation for the Namoi catchment.

### **Limitations**

The vegetation mapping for the Namoi region has been built from 12 previously developed datasets, with air photo interpretation (API) and field validation used to fill gaps and confirm the accuracy of the compiled product. The accuracy of the vegetation mapping is only as good as the previously developed datasets that have been used for parts of the catchment. Details of the datasets and methodologies used in both the extant vegetation mapping study and the 'pre-1750' mapping study can be found in the final reports, available on the Namoi CMA website.

Other limitations to the vegetation mapping are the presence of large heterogeneous polygons, inferring that two or more RVCs may occur in the area. Furthermore, errors where the original line work contained spatial inaccuracies as a result of the small scale at which contributing datasets were captured, and a lack of coding for vegetation on some previously developed polygons, means that RVCs have been allocated to some polygons based on modelled results. Finally, 16 restricted RVCs known to occur in the Namoi region have not been mapped, as they were not able to be identified due to the small scale of the patches of vegetation.

## **Management activity**

### **State level**

At the state level, the native vegetation target is being addressed via the 2003 NSW native vegetation reforms and the *Native Vegetation Act 2003*. Actions include:

- regulatory actions such as:
  - ending broad-scale clearing unless it improves or maintains environmental outcomes
  - using a risk-based enforcement strategy to deter and act against illegal clearing
  - upgrading enforcement and monitoring, including annual inspections using high resolution satellite imagery



- developing a native vegetation compliance and enforcement strategy to provide strategic direction for compliance and enforcement decisions and activities to be carried out transparently and clearly
- conservation covenants imposed by the Land and Property Management Authority on the conversion of Perpetual Leases to freehold title, to complement controls under the *Native Vegetation Act 2003*. Where possible, additional covenants to enhance the conservation value of existing vegetation are negotiated with landholders, sometimes with the assistance of CMA incentive funding
- protection and rehabilitation, through:
  - offering land managers and businesses opportunities such as property vegetation plans
  - BioBanking (a scheme involving certification and incentives, which was set up to offset the adverse impacts of development on biodiversity)
  - agency support for landholders in restoring and conserving native vegetation on private land
  - protecting and conserving natural and associated cultural heritage on public and private land in priority bioregions across the state
  - tackling major threats to native vegetation such as invasive plants and pest animals through programs to prevent, contain and manage their introduction and spread
- education, including:
  - education campaigns aimed at improving awareness of legislative obligations, targeted at land clearing contractors, property developers and stock and station agents
  - providing information, training and decision support tools to landholders and land managers, including a tool kit incorporating benchmarks for assessing biodiversity benefits from vegetation managed or planted for salinity mitigation
  - a range of courses run by Industry & Investment NSW (I&I) in relation to native vegetation, with topics including the identification and management of native grass, private native forestry training course (pilot), paddock plants, and 'Prograze' (for more information see [www.dpi.nsw.gov.au/agriculture/profarm/courses](http://www.dpi.nsw.gov.au/agriculture/profarm/courses))
- monitoring, evaluation and reporting, including:
  - standardising NSW native vegetation data
  - developing Version 3 of the New South Wales Vegetation Classification and Assessment database (NSWVCA). This will classify and assess the status of over 120 plant communities in the mid to upper reaches of the Namoi region (NSW North Western Slopes and Western New England)
  - informing the public on the rate of clearing in NSW.

## Regional level

At the regional level, the Namoi CMA is undertaking the following activities in relation to the native vegetation target:

- funding projects in areas including:
  - biodiversity conservation
  - strategic native revegetation
  - managing regionally significant vegetation for conservation

- conservation of threatened species' habitat
- weed management for priority weeds of the Namoi catchment
- riparian vegetation protection, rehabilitation and enhancement
- managing riparian zones under best management practice
- native vegetation landscape planning
- developing a Namoi Nature Conservation Strategy to guide and prioritise investment in native vegetation and biodiversity
- developing seamless native vegetation maps
- developing 'pre-European settlement' vegetation maps
- riparian vegetation assessment
- establishing permanent monitoring points for vegetation assessment across the Namoi region
- producing a range of different publications regarding native vegetation for the catchment community, as part of community capacity-building
- supporting a series of workshops about the propagation of native plants
- educating land managers about the importance of native vegetation on their properties (eg through property management planning courses run by the CMA).

### **Local level**

There are a number of other groups undertaking significant work in the region that is contributing to better outcomes for native vegetation. These groups include:

- Aboriginal organisations, particularly with guidance from the Namoi Aboriginal Advisory Committee, which is convened by the Namoi CMA
- Livestock Health and Pest Authorities (LHPAs) (a number of sites across the Central North LHPA area are under conservation management)
- many organisations that are undertaking their own work within the catchment using their own resources (eg Nature Conservation Trust, which is looking at investing in further properties in the Namoi catchment for in-perpetuity covenants)
- universities in the region, which are undertaking a range of research and management projects
- local government, which is undertaking a range of projects and programs (interacting and coordinating with the CMA through the Namoi Local Government Group)
- Landcare groups that are active in the catchment, and the Liverpool Plains Land Management Committee, which collaborate with Namoi CMA in various ways depending on the project.

## Further reading

Bureau of Rural Sciences 2006, *Guidelines for land-use mapping in Australia: principles, procedures and definitions. A technical handbook supporting the Australian Collaborative Land-use Mapping Programme* Edition 3, Australian Government, Canberra.

Native Vegetation Technical Working Group 2008, Definition of native vegetation (combined definition) and operational terms for reporting its extent, Department of Environment and Climate Change NSW, Sydney.

Thackway R & Leslie R 2005, *Vegetation assets, states and transitions: accounting for vegetation condition in the Australian landscape*, BRS Technical Report, Bureau of Rural Sciences, Australian Government, Canberra.

Thackway R & Leslie R 2008, Describing and mapping human-induced vegetation change in the Australian Landscape, *Environmental Management*, Volume 42, Number 4/2008, [www.springerlink.com/content/w318w7221202v2v8/](http://www.springerlink.com/content/w318w7221202v2v8/).

Thackway R & Leslie R 2005, *Vegetation assets, states and transitions: accounting for vegetation condition in the Australian landscape*, BRS Technical Report, Bureau of Rural Sciences, Australian Government, Canberra.

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Ph: (02) 9995 5000 (switchboard). Ph: 131 555 (environment information and publications requests).

Ph: 1300 361 967 (national parks, climate change and energy efficiency information and publications requests).

Fax: (02) 9995 5999. TTY: (02) 9211 4723.

Email: [info@environment.nsw.gov.au](mailto:info@environment.nsw.gov.au) Website: [www.environment.nsw.gov.au](http://www.environment.nsw.gov.au)

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