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**A Choice Modelling Survey of Community
Attitudes to Improvements in
Environmental Quality in NSW Catchments**

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Abstract

A Choice Modelling (CM) survey was undertaken to acquire information about different community (local resident, distance rural and distance urban) attitudes and preferences for environmental improvements provided by a range of potential natural resource management (NRM) strategies in three NSW catchments (Lachlan, Namoi and Hawkesbury-Nepean). In total, 3,997 responses were collected from seven different locations in NSW. Fourteen split samples were established to allow for testing of incentive compatibility in CM, the impact of respondent location on values held, and scale effects. The survey was designed to estimate environmental values suitable for integration into MOSAIC, a bio-economic model for catchment and farm level planning. This Research Report describes the development of the CM questionnaires, the survey design and the data collection process.

Keywords: Nonmarket valuation, choice modelling, survey, questionnaire design

The research detailed in this Report is a component of the EERH funded project “An Optimisation Framework to Support Catchment Management Authorities Investment Decisions at a Catchment Scale”. Support for the Project is also being provided by the NSW Departments of Environment and Climate Change, Primary Industries and Water and Energy, the Namoi, Lachlan and Hawkesbury-Nepean Catchment Management Authorities and the Australian Bureau of Agricultural and Resources Economics.

1. Introduction

A choice modelling (CM) study was established to estimate the non-market values of NSW communities for improvements in environmental quality in NSW catchments. Information was sought on different communities' (local, distant rural and distant urban) attitudes and preferences for the environmental benefits provided by a range of potential NRM strategies. The results of the study are designed to assist Catchment Management Authorities (CMAs) with natural resource management (NRM) investment prioritization. The CM method was chosen as it can estimate both use and non-use values cost effectively (Bennett and Blamey, 2001). It is also suitable for considering policy options with multidimensional changes (Adamowicz et al., 1997). This Research Report describes the survey process undertaken for this study including questionnaire development, survey design and data collection.

Three catchments - the Lachlan, Namoi and Hawkesbury-Nepean- were chosen as case studies. The selected catchments represent a variety of NSW catchment characteristics and their NRM issues. Consideration of the differences and common characteristics between the catchments helps with the potential transfer of environmental value estimates to other NSW catchments.

The CM survey was conducted in two main towns in each of the selected case study catchments (Tamworth and Gunnedah in the Namoi, Moss Vale and Goulburn in the Hawkesbury-Nepean, Parkes and Cowra in the Lachlan) and in Sydney to capture any differences in values held by different communities. An analysis of communities' preferences and the socio-economic characteristics of the respondents allow for the extrapolation of value estimates to the population of the whole NSW. An extensive consultation process with scientists, the authors of MOSAIC and the PVP Developer¹ and TOOLS2² modellers was undertaken to ensure the suitability of the non-market values for use in a range of catchment planning instruments.

¹ Property Vegetation Plan Developer is a bio-physical information tool that projects salinity, water quality, land and soil capacity and invasive native species outcomes of different farm managements to provide guidelines for CMAs for the assessment of NRM actions (NSW Government 2007).

² TOOLS2 is a collaborative project between the CMAs, the NSW Departments, Environment and Climate Change and Primary Industries, and CSIRO that aims to develop a decision-support tool for the CMAs in NSW (Hill et al. 2007).

This report outlines the design of the study and describes the data collection process. The report is constructed as follows: Section 2 details the case study catchments. Section 3 outlines the design of the methodological tests (scale effect, location effect and incentive compatibility) and the questionnaire design and development process. The next section (4) explains the structure of the survey sub-samples. Section 5 describes the data collection process. The samples' characteristics are sets out in section 6. The last section (7) presents some concluding comments.

2. Case studies

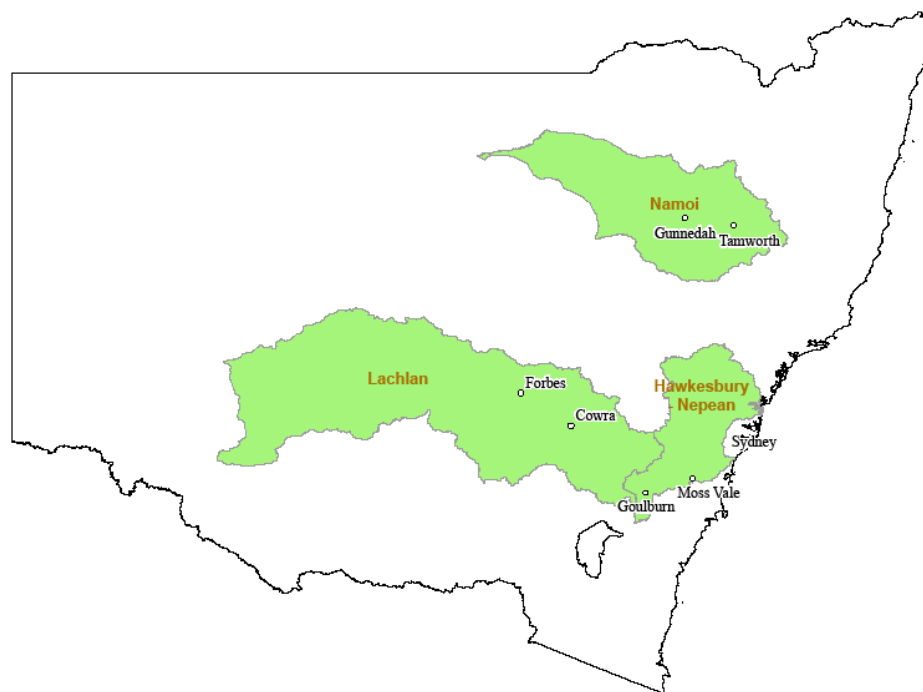
The Hawkesbury-Nepean, Namoi and Lachlan (see Figure 1 and Appendix E) catchments differ in land use, size and population. In terms of land use there are some similarities between the Namoi and Lachlan catchments. Both catchments are mostly used for agriculture (about 90 percent of the land) with a majority of area devoted to grazing. Native vegetation in both locations covers between 30 to 40 percent of the catchment area and national parks occupy less than five percent. Both catchments have similar populations of about 100,000 people. The Lachlan catchment (84,700 km²) is the largest of the three. It has twice the area of the Namoi (42,000 km²) and almost four times the area of the Hawkesbury Nepean catchment (22,000 km²). The Hawkesbury Nepean catchment has the greatest population (one million people). Over 50 percent of the area of that catchment is national park, only 30 percent of the area is used for agriculture and about 20 percent is urbanised.

Despite the many differences between these catchments there are also similarities in terms of the environmental issues faced. These include declining biodiversity, loss of native vegetation and reduced water quality. Across the total area of the three case studies, the area of native vegetation in good quality has declined by about 87 percent since pre-European settlement. The greatest area of native vegetation of good quality is in the Hawkesbury-Nepean (50 percent of the total) catchment but only five and seven percent respectively of the total area of Namoi and Lachlan catchments has native vegetation in good quality. Over 200 native species across the three catchments are endangered. Water quality has declined in 85 percent of the total waterways in the catchments. Currently about 20 percent of the waterways in Namoi's catchment, 15

percent of the Hawkesbury-Nepean's and 10 percent of the Lachlan's are of good enough quality for drinking, swimming and fishing.

NRM actions such as planting more trees, protecting existing vegetation, fencing and revegetating river banks and wetlands, pest and weed control are just some of the actions that can improve environmental quality in the catchments. More information about each catchment's characteristics is included in Appendix E.

Figure 1. Case study catchments areas.



3. Questionnaire development

3.1 Framing the issues

The first step in the development of the CM questionnaire was to understand the policy issues being addressed. This involved a literature review, consultation with specialists (scientists, policy makers, and local NRM planners) and community representatives. The survey was also designed to obtain value estimates that can be applied to a wide range of NRM investments in NSW. Therefore the value estimates need to:

- represent the views of people from across the whole NSW population;
- be easily transferable from farm level scale to the catchment scale and *vice versa* ;and,
- reflect the true preferences of respondents.

In order to meet these requirements, location, scale and incentive compatibility tests were conducted. For this purpose, six main versions of the questionnaire were designed to be used with respondents from both inside and outside the catchment areas. The different types of questionnaires are presented in Table 1.

Table 1. Questionnaires versions

Questionnaire	Purpose
LA	Lachlan catchment
HN	Hawkesbury- Nepean catchment
HI	Hawkesbury- Nepean catchment including a provision rule to test for incentive compatibility
NW	Whole Namoi catchment
NH	Half of the Namoi catchment
NF	Selected farms in the Namoi catchment representing 10 percent of the Namoi catchment area.

3.2 Location test

The location test was designed to capture the differences in non-market values held by people living at different locations relative to the catchment under consideration. A range of NSW communities' including local residents, distant-urban and distant rural residents were asked about their preferences for NRM actions. An understanding of the differences in preferences across various communities can allow for more accurate extrapolation of the estimated environmental values to the wider NSW society. This experiment involved eleven main split samples.

In the Namoi, Lachlan and Hawkesbury-Nepean catchments a sample of respondents were asked about their preferences for NRM in their own catchment. Other sub-sample respondents were asked about other case study catchments. For example, separate sub-samples of residents in the Lachlan catchment were asked about NRM in their catchment and in the Namoi catchment. Each respondent was presented with only one questionnaire type. In order to test how urban people value improvements in environmental quality in rural areas of NSW, residents of Sydney were asked about their preferences for resource allocation in all three selected catchments.

3.3 Scale test

In order to help CMAs with NRM prioritization at both the catchment scale where macro-level planning occurs and the farm level scale where the investment is directed (Mazur and Bennett, 2008a), environmental value estimates that are transferable across these differing ‘scales’ are needed. Therefore a test was designed to estimate a scaling factor for more accurate transference of environmental values between different scales. Three different scales were tested: investment across 100 percent, 50 percent and 10 percent of the area (specified as the group of selected farms) of the catchment.

The attribute levels for the second and the third questionnaire versions were scaled back to the relevant scale (50 percent and 10 percent respectively). For example, the attribute levels for the questionnaires scaled at 10 percent of the catchment area were one tenth of those for the whole catchment. The cost attribute levels remained constant across all three types of questionnaires. An example of each of these three questionnaires is included in Appendix D.

Five different split samples were used to test for scale effects. The Namoi catchment was chosen for this test. Two sub-samples of people in the Namoi catchment (Tamworth and Gunnedah) were asked how they value environmental investments in the whole Namoi catchment and in 10 percent of the catchment area. The other three sub-samples were drawn from the Sydney population and were presented with the 10, 50 and whole catchment versions of the questionnaire. This composition allowed a

combined location effect and scale test to be undertaken to investigate whether people's perception of the different scales change with their location.

3.4 Incentive compatibility

A number of design features were included in the questionnaire to ensure its incentive compatibility. Consultations with policy advisers and practitioners ensured that the questionnaire was credible, consequential and the scenarios presented in the choice sets reflected real life possibilities. The purpose of the survey and the importance of the issues were stated in the questionnaire allowing respondents to assess the relevance of this study. The credentials of the researchers and government organisations involved in the study were clearly displayed in the questionnaire. Consultations within the project team and focus group discussions ensured that the task presented in the questionnaire was transparent. In addition, follow up questions about the clarity of the task were included in the questionnaire for further verification. Some incentive compatibility issues can also be identified through analysis of protest responses. Therefore the questionnaire included additional questions regarding the reasons for not completing the CM choice sets or always choosing the *status quo* option.

In addition to these features, a specific incentive compatibility (IC) test was developed. This involved the inclusion in one questionnaire version a provision rule that makes a connection between survey choices and how the results will be used. The provision rule used for this study specified that “only options that are chosen by more than 50 percent of the people surveyed will be considered further for implementation by the Catchment Management Authority”. This IC test was conducted for the Hawkesbury-Nepean catchment case study. Two split samples in the local area and outside (Sydney) were used in order to investigate the IC issue and the potential impact of the location effect on IC.

3.5 Attributes and their levels

The next step undertaken in the CM study was to define the choice option attributes and their levels. It was important to ensure that the attributes are relevant to policy

makers, consistent with policy instruments, in line with the environmental variables that scientists use to predict outcomes of different NRM actions and suitable for use in NRM modelling tools (such as MOSAIC and PVP-Developer).

Consultations with policy makers from the NSW Department of Water and Energy, the NSW Department of Primary Industries (NSWDPI), the NSW Department of Environment and Climate Change (DECC), the NSW Natural Resource Commission (NRC) and NRM specialists (scientists, local planners, native vegetation specialists, GIS practitioners and economists) in the local areas (CMAs and NSWDPI), from the Australian Bureau of Agriculture and Resource Economics (ABARE) and the Bureau of Rural Science (BRS) were undertaken. These consultations assisted with the compilation of a shortlist of attributes that reflect the main environmental issues in the case study catchments. They also helped to establish the current levels of the attributes in the catchments.

Scientists and other specialists were then asked to predict future changes resulting from different management actions. Three different levels of each attribute were determined with the range of outcomes established and used in the choice sets. A draft of the questionnaire was developed and revised by the project researchers in consultation with CMA staff.

Further testing of draft questionnaire was undertaken during the focus group discussions. These discussions also ensured the relevance of the selected attributes to potential respondents. Eight focus groups were conducted in the three selected catchments and two in Sydney. Each focus group included participants representing the local community population. For a detailed description of these focus groups, see Mazur and Bennett, (2008b).

Three attributes that describe the main environmental benefits derived from NRM actions in the three catchments were selected: area of native vegetation in good quality, kilometres of healthy waterways, and number of native species. One additional attribute - people working in agriculture - was chosen to capture the social consequences of changes in NRM. The fifth attribute was a monetary attribute. The payment to be made by respondents for the new NRM actions was specified to be

made over five years. The payment vehicle was described as a mixture of increased taxes, council rates, prices and recreational charges. The combination of a number of different payment vehicles was used to ensure its broad acceptability (Mazur and Bennett, 2008b). The selected attributes and their levels for the different versions of the questionnaire are presented in Table 2.

Table 2. Attributes and their levels

Hawkesbury Nepean				
<i>\$ annual payment per household over 5 years</i>	<i>km² of native vegetation in good condition</i>	<i>Number of species</i>	<i>Km of healthy waterways</i>	<i>Number of people working in agriculture</i>
<i>status quo</i>	10500	3000	630	8000
\$0	10500	2970	600	7000
Outcomes in 20 years time				
\$50	11000	2980	650	7100
\$200	11500	2990	700	7200
\$300	12000	3000	750	7300
Lachlan				
<i>status quo</i>	5800	2100	330	9200
\$0	5800	2085	160	8500
Outcomes in 20 years time				
\$50	8000	2090	380	8600
\$200	10000	2095	450	8700
\$300	11000	2100	500	8800
Namoi				
<i>status quo</i>	1800	2130	2000	5800
\$0	1800	2100	1900	5000
Outcomes in 20 years time				
\$50	3000	2110	2300	5100
\$200	5000	2120	2700	5200
\$300	6000	2130	3000	5300
Namoi (50 percent of the catchment)				
<i>status quo</i>	900	1065	1000	2900
\$0	900	1050	950	2500
Outcomes in 20 years time				
\$50	1500	1050	1150	2550
\$200	2500	1060	1350	2600
\$300	3000	1065	1500	2650
Namoi (10 percent of the catchment)				
<i>status quo</i>	180	213	200	580
\$0	180	210	190	500
Outcomes in 20 years time				
\$50	300	211	230	510
\$200	500	212	270	520
\$300	600	213	300	530

3.6 Experimental design

A fractional factorial experimental design was employed to structure the combinations of attribute levels used to describe the outcomes of the alternative NRM actions presented to the respondents in choice sets. The levels of each attribute across the predicted range were used in an orthogonal design that produced 25 alternative NRM options. These alternatives were randomly blocked into five different versions, each with five choice sets for the six different versions of the questionnaire (see table 1). This resulted in 30 different versions of the questionnaire. Two change options and a *status quo* option were included in each choice set (see Figure 2)

3.7 Framing the choice scenarios

Respondents in a CM questionnaire are asked to make a sequence of choices between different options. In this case, these options represent potential outcomes of a range of NRM actions. All these outcomes were given a 20 year time frame as this was judged to be an appropriate time for the environment effects of new NRM strategies to occur. The *status quo* represented a scenario that describes the future consequences of no additional NRM actions being undertaken. The inclusion of a *status quo* option in each choice set allowed respondents to make choices between a current management strategy and a series of different proposed alternatives (Rolfe et al., 2004).

Respondents were informed that the scenarios presented were hypothetical but based on current scientific knowledge. They were asked to make their choices as if the options were real because their answers would be important in deciding the way that the natural resources of the catchment are managed. Respondents were reminded about their budget limitation and other expenses. They were also informed that other areas of NSW may need funding for environmental improvements. The respondents were asked to consider each choice set independently. An example of a choice set is presented in Figure 2.

Figure 2. Example of a choice set for the Hawkesbury-Nepean catchment

Question 4

Consider each of the following three options for managing natural resources in the Hawkesbury-Nepean catchment.

Suppose options A, B and C in the table below are the only ones available. Which one would you choose?

Area of native vegetation
in good condition



Native species



Km of healthy waterways



People working in
agriculture



Condition Now		10500 km ²	3000 species	630 km	8000	MY CHOICE Tick One
OPTIONS	My Household payment each year over 5 years	Condition in 20 years				
Option A - No new actions	\$0	10500 km ²	2970 species	600 km	7000	<input type="checkbox"/>
Option B	\$50	11000 km ²	2980 species	650 km	7200	<input type="checkbox"/>
Option C	\$200	12000 km ²	2990 species	750 km	7200	<input type="checkbox"/>

3.8 Questionnaire presentation

The presentation of the questionnaire was developed through consultations with the project team members and focus group discussions. The following elements of the survey material were developed:

- An invitation letter (see Appendix C) that describes the purpose of the study, the credentials of the people and organisations conducting the study and the agencies funding the project.
- Information Posters (see Appendix E) that contain background information about the catchment including maps, photos, a statement of the issues facing this catchment and a description of potential actions that may address these issues.
- Questionnaire booklets that include the five choice set and a number of socio-economic and attitudinal questions to assess the representation of each sub-sample and to investigate heterogeneity in preferences. An example of a booklet is included in Appendix D.

4. Survey sub-samples

Fourteen sub-samples were used in the study. Five split samples were used to test for scale effects, thirteen split samples were used to test for location effects and two split samples were used to test for incentive commutability. Some of the sub-samples were used for more than one test. The research design is presented in Table 3.

Table 3. Research design –split samples

Location of the Survey Type of questionnaire	Hawkesbury-Nepean (Goulbourn, Moss Vale) (839)	Namoi (Tamworth, Gunnedah) (893)	Cowra, Parkes (607)	Sydney (1650)
Hawkesbury-Nepean (HN)	Local (284)	Distant – rural (296)		Distant – urban (278)
Hawkesbury-Nepean for IC- test (HI)	Local (280)			Distant – urban (279)
Namoi for whole catchment (NW)		Local (268)	Distant – rural (284)	Distant – urban (255)
Namoi for 50percent of the catchment (NH)				Distant – urban (258)
Namoi for 10percent of the catchment (NF)		Local (272)		Distant – urban (249)
Lachlan (LA)	Distant – rural (275)		Local (314)	Distant – urban (275)

Note: Sample size reported in brackets

5. Data collection

The CM survey was implemented from July to September 2008. It was conducted in two towns and their surrounding areas in the three selected catchments. For the Namoi catchment Tamworth and Gunnedah were chosen, for the Lachlan catchment Cowra and Parkes, and Moss Vale and Goulburn represented the Hawkesbury-Nepean catchment. In addition, the survey was conducted in six Sydney districts (Inner North, Inner West, Eastern Suburbs, Fairfield-Liverpool, Bankstown, and St. George-

Sutherland). The size of each Sydney sub-sample was selected according to the size of the population in each district.

A total sample of 5200 respondents was targeted. The aim was to collect 300 questionnaires for each of the 14 split samples in order to be representative of the population. The actual number of questionnaires obtained from each sub-sample is presented in brackets in Table 3 and in most cases approached the targeted 300 responses. The lowest response of 249 questionnaires was for the Namoi (10 percent catchment scale test) split sample from Sydney. Each of Sydney's split samples recorded the lowest response rate in comparison to their counterparts in regional cities. This was mostly due to logistic difficulties experienced by survey collectors in Sydney. As the collectors did not always record rejections it is difficult to estimate the response rate. However, based on the recorded data from the information sheets and de-briefs with the survey collectors, a conservative estimate is that the overall response rate was about 45 percent. A total of 3,997 completed questionnaires were collected.

A drop-off – pick-up approach was used for the distribution of the questionnaire. This method is used for the Australian Bureau of Statistics (ABS) census. In this case, the survey collectors only visited a sample of houses. The survey collectors provided a short, neutral description of the survey to the household representative. Only people over 18 years old were asked to complete the questionnaire on behalf of the whole household. If the respondent agreed to participate in the survey then the questionnaire, invitation letter and poster were given to the household. An appropriate pick-up time for the questionnaire was arranged. A mailing back option for the return of the questionnaire was provided in case of any difficulties in arranging a suitable pick-up time.

The collectors were provided with training. They were asked not to provide any instructions for answering the questionnaire or any details about the purpose of the survey beyond those set out in the questionnaire and letter of invitation. Questionnaires were collected after a few hours or the next day. Community groups from each rural region were employed to distribute the questionnaires: Cowra Rugby Club, Parkes Men's Shed, Wildlife Information Rescue and Education Service

(WIRES) in Goulburn, Climate Action Now Wingecarribee (CANWin) in Moss Vale, Tamworth High School and Gunnedah Rotary Club.

Geographically stratified random sampling was applied to choose the households to ensure a representation of the NSW population in terms of gender, age, income etc. The survey collectors were provided with a map of the town/city with randomly selected streets and they were asked to select every fifth house on these streets. This approach provided a wide geographic spread across each sub-sample site and ensured a random selection of respondents (Bennett et al., 2007). The household selection guidelines and detailed instructions given to collectors are included in Appendix B.

6. The representation of sub-samples

6.1 Sample characteristics

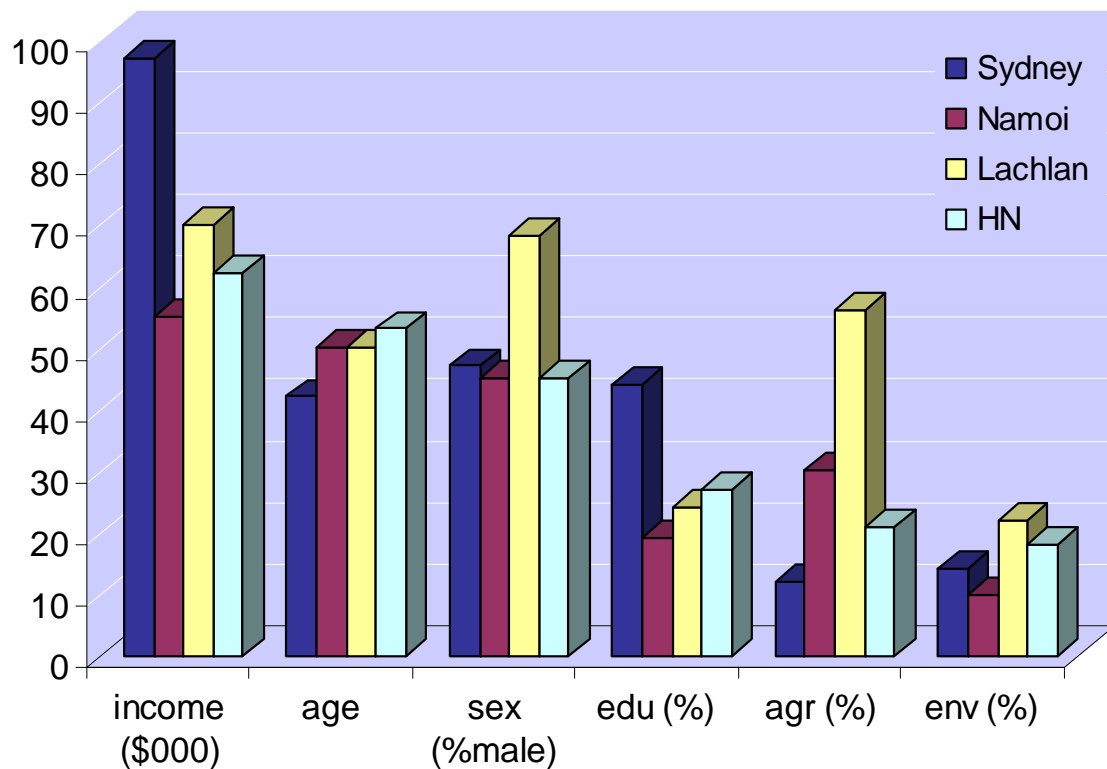
The socio-economic characteristics of the sample are presented in Table 4.

Table 4. Sample characteristics (all sub-samples).

Sample size	3997
Average age (years)	47
Gender (% male)	50
Tertiary degree and above (%)	32
Household income (\$ per annum)	74,333
People per household	3
Number of children under 18 per household	0.8
Association with environmental organisations (percent)	15
Association with the agriculture industry (percent)	24

The average household income for the whole sample was \$74,333 with the highest in Sydney of \$96,665 (see Figure 3). However, income varied across Sydney (see Appendix A), with the highest in the Eastern Suburbs (\$121,030) and Inner North (\$118,535) and the lowest in Fairfield/Liverpool (\$65,172). The second highest income for the sample was recorded in the Lachlan catchment in Cowra \$78,248 and the lowest in Tamworth recording \$51,488. Figure 4 presents the socio-economic differences between various regions where the survey was conducted.

Figure 3. Descriptive statistics of the sub-samples from each case study and Sydney.



Note: income- \$000 household annual income, edu – represents respondents with tertiary degree and above, agr- represents association with agricultural industry of the respondents and their close family, env- represents association with environmental organisations of the respondents and their close family.

The average age for the whole sample was 47 years. Across the entire sample Parkes and Moss Vale recorded the highest average age (56) and the lowest was recorded in Cowra (46) and Sydney (42). For the whole sample almost an equal proportion of answers came from both genders. However, in Parkes the male response rate was 77 percent and in Cowra it was 63 percent. In other areas, on average about 60 percent of the responses were from females. When analysing this variable it has to be remembered that the respondent represented the whole household preferences and not just their own. Therefore the gender classification may not represent particular gender preferences.

On average 15 percent of the respondents had an association with environmental organisations with the highest proportion in the Lachlan catchment (22 percent), and the lowest in the Namoi catchment (10 percent). An association with the agricultural

industry was held by 24 percent of the respondents from the whole sample with the largest proportion in the Lachlan catchment (56 percent) from which the Cowra sample represented 64 percent and Parkes 47 percent. The lowest level of association with the agricultural industry was recorded in Sydney (12 percent) and in Moss Vale (17 percent). The Hawkesbury Nepean catchment respondents had the lowest (21 percent) proportion of association with the agriculture industry from all three catchments.

6.2 Comparisons with ABS data

A comparison of the socio-economic characteristics of the sub-samples with ABS (2006) Census data was undertaken. A more detailed description of the socio-economic characteristics of each of the 14 sub-samples and a comparison with ABS Census 2006 data is included in Appendix A. The ABS data sets that were used for each of the sub-samples comparison are presented in Table 5.

The χ^2 test was used to compare the distribution of age, income and education level between the sub-samples and Census. Significant differences in the age distribution between the sub-samples and the population data was observed in Parkes ($\chi^2 = 38.12$ which was higher than the critical χ^2 value of 29.14 with 14 degrees of freedom at the 0.01 level), Cowra ($\chi^2 = 29.59$ at the 0.01 level), Moss Vale ($\chi^2 = 28.29$ with critical χ^2 of 23.68 at the 0.05 level). The observed differences between the samples distribution and the Census population distribution are not statistically significant for the Sydney ($\chi^2 = 5.09$) and Gunnedah ($\chi^2 = 15.87$), Tamworth ($\chi^2 = 12.66$), and Goulburn ($\chi^2 = 17.87$).

No significant differences in household size between the samples and the ABS census data were found. However, the proportion of people with a tertiary degree is significantly higher for some sub-samples than recorded by the ABS census. For example, the main differences were observed in Sydney, Moss Vale and Cowra where 30 to 40 percent of the respondents held a tertiary degree in comparison with approximately 10 percent stated in the ABS census. Also the education level recorded in the Namoi catchment was twice as high as that recorded by the ABS census. Only the education level recorded in Goulburn and Parkes was not significantly different

from the ABS census data. This was confirmed by the χ^2 test. χ^2 for the Goulburn sample were equal to 3.74 and for Parkes it was equal to 2.0 which were lower than the critical χ^2 value of 3.84 at the 0.05 level. The observed differences were not statistically significant at the 0.1 level for the Gunnedah sub-sample ($\chi^2=6.4$ with critical χ^2 of 6.63 at the 0.1 level). For the other sub-samples the χ^2 value was higher than the critical value indicating that there are significant differences between the average population and the sample's education level.

The income ranges presented in the questionnaire were consistent with ABS household ranges presented in the 2006 Census. Significant differences between the sub-samples and Census income were recorded in Cowra ($\chi^2=102.28$, with critical χ^2 of 27.69 with 13 degrees of freedom at the 0.01 level) and Gunnedah ($\chi^2=35.95$ at the 0.01 level), Moss Vale ($\chi^2=20.28$ at 0.05 level), Sydney ($\chi^2=23.86$ with critical χ^2 of 22.36 at the 0.05 level) and Goulburn ($\chi^2=19.86$ with critical χ^2 of 19.81 at the 0.1 level). No significant differences in the distribution of income were found between the Census and the Parkes ($\chi^2=14.90$), and Tamworth ($\chi^2=7.42$) sub-samples. A more detailed comparison of socio-economic characteristics of surveyed regions is presented in Appendix A.

Table 5. Census data sets used for comparison

Sample	ABS Census 2006 data set
Parkes	UCL164000
Cowra	UCL123200
Tamworth	UCL172000
Gunnedah	UCL136800
Moss Vale	UCL155200
Goulburn	UCL134800
Sydney	UCL171400

Source: 2006 Census QuickStats –www.census.abs.au

7. Conclusion

The large scale of this survey, the intensive choice modelling questionnaire design and complex survey logistics were undertaken to ensure an accurate estimation of the environmental values of NRM initiatives held by the NSW population. The study is designed to allow for the extensive use of the survey results across a wide range of catchment management processes and NRM investment prioritization tools. To ensure the appropriate use of the results, analysis will be undertaken to determine non-market value estimates for different scales of NRM investments, beneficiary locations and the socio-economic characteristics of the respondents. These value estimates are consistent with the principles of welfare economics and as such can be used in benefit cost analyses of NRM investments to test that actions proposed will generate net social benefits. Moreover, the values estimates have been based on a process that enable them to be transferred to similar studies elsewhere in NSW and potentially to other regions across Australia.

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Appendix A. Sub-samples socio-economic characteristics

Table 1. Sydney sample socio-economic characteristics.

	Total Sydney	Inner North	Inner West	Eastern Suburbs	Fairfield Liverpool	Canterbury- Bankstown	St. George Sutherland
Number of households surveyed	1650	285	273	227	295	294	276
Average age	42	48	41	41	37	37	47
Gender - percent of male	47	44	54	45	39	53	49
Tertiary degree and above (percent)	44	65	57	56	30	26	38
Tertiary degree and above (percent)(ABS)	11	13	11	15	11	11	9
Household income	\$96,665	\$118,535	\$114,691	\$121,030	\$65,172	\$85,943	\$85,459
Household income / Family income (ABS)	\$61,152 \$70,720	\$92,144 \$130,520	\$61,932 \$75,712	\$73,424 \$98,0824	\$51,480 \$54,964	\$46,072 \$54,184	\$61,048 \$73,632
People per household	3.5	3.2	3.3	3.3	4.0	3.3	3.2
Number of children under 18 per household	0.8	0.8	0.7	0.7	1.2	0.9	0.8
Association with environmental organisations (percent)	14	24	14	15	0	14	14
Association with the agriculture industry (percent)	12	21	12	11	0	11	0

Table 2. Sydney sub-samples socio-economic characteristics

Location	Sydney							
Type of questionnaire	Total Sydney (Survey)	Total Sydney (ABS)	HN	HI	LA	NW	NH	NF
Number of households	1650	1,255,408	278	279	275	255	258	249
Average age	42	35	41	41	42	41	44	40
Gender percent of male	47	49	46	47	47	47	47	46
Tertiary degree and above (percent)	44	11	45	38	43	43	52	17
Household income / Family income	\$96,665	\$61152 \$7072	\$98,066	\$93,593	\$94,200	\$98,467	\$95,800	\$100,159
People per household	3.4	2.7	3.2	3.2	3.4	3.2	3.9	3.5
Number of children under 18 per household	0.9		0.8	0.9	0.9	0.8	1	1
Association with environmental organisations (percent)	14		19	14	11	14	14	15
Association with the agriculture industry (percent)	12		13	11	10	9	13	14

Table 3. Hawkesbury – Nepean sub-samples socio-economic characteristics

Location	HN	Moss Vale		Goulbourn		HN		
Type of questionnaire	Total	Total (Survey)	Total (ABS)	Total (Survey)	Total (ABS)	HN	HI	LA
Number of households	839	338	2,496	501	7,621	284	280	275
Average age	53	56	39	50	37	52	53	53
Gender percent of male	45	49	47	43	50	42	48	46
Tertiary degree and above (percent)	27	39	8	19	12	26	29	27
Household income / Family income	\$62,410	\$67,547	\$43,472 \$55,484	\$59,042	\$41,080 \$54,808	\$60,865	\$62,758	\$63,638
People per household	2.7	2.7	2.5	2.8	2.4	2.8	2.7	2.6
Number of children under 18 per household	0.7	0.6		0.7		0.8	0.7	0.6
Association with environmental organisations (percent)	18	19		16		18	16	19
Association with the agriculture industry (percent)	21	17		23		18	22	21

Table 4. Lachlan sub-sample socio-economic characteristics

Location	Lachlan	Cowra		Parkes		Lachlan	
Type of questionnaire	Total	Total (Survey)	Total (ABS)	Total (Survey)	Total (ABS)	LA	NW
Number of households	607	400	3,245	207	3,755	314	284
Average age	50	46	40	56	37	50	49
Gender percent of male	68	63	49	77	49	67	70
Tertiary degree and above (percent)	24	30	9	12	8	23	25
Household income / Family income	\$70,051	\$78,248	\$34,320 \$46,384	\$53,512	\$37,388 \$52,104	\$70,775	\$69,314
People per household	3.0	3.3	2.4	2.6	2.4	2.9	3.2
Number of children under 18 per household	0.9	1.1		0.6		0.9	1
Association with environmental organisations (percent)	22	22		22		22	23
Association with the agriculture industry (percent)	56	64		41		57	56

Table 5. Namoi sub-sample socio-economic characteristics

Location	Namoi	Tamworth		Gunnedah		Namoi		
Type of questionnaire	Total	Total (Survey)	Total (ABS)	Total (Survey)	Total (ABS)	NW	NF	HN
Number of households	893	589	12,820	304	2,954	268	272	296
Average age	50	49	36	51	41	51	50	49
Gender percent of male	45	41	47	53	48	57	52	44
Tertiary degree and above (percent)	19	19	9	18	10	18	20	20
Household income / Family income	\$54,659	\$51,488	\$42,068 \$54,496	\$58,547	\$34,008 \$44,824	\$54,983	\$57,723	\$51,499
People per household	2.8	2.8	2.4	2.8	2.4	2.8	2.7	2.9
Number of children under 18 per household	0.8	0.8		0.7		0.8	0.7	1
Association with environmental organisations (percent)	10	10		12		11	11	8
Association with the agriculture industry (percent)	30	27		37		29	30	30

Appendix B. Survey Instructions

Survey Instructions for the Questionnaire Collectors

1. You need to pick up from the collection point:
 - the same number of questionnaires, posters and letters
 - a record sheet
 - a map of the area to be surveyed.
2. Please sign your name in the note book at the collection point, and indicate the number of questionnaires, posters, letters and record sheets you are taking with you.
3. Write on your record sheet your name, city/town and area, map number, number of sheets e.g. 1 of 5, number of questionnaires, posters and letters you are taking.
4. Go to the selected area on the map.
5. Choose the 5th house on the highlighted streets on the map.
6. Write on the record sheet the code of the questionnaire, poster and letter that will be delivered to the household.
7. Knock on the door and introduce yourself saying:
 - I am distributing a survey for a study conducted by Australian National University to help Catchment Management Authorities (CMAs) better manage our natural resources
 - This survey is asking your opinion on how you would like our natural resources to be managed?
 - You don't have to have any knowledge about natural resource management we just want your opinion
 - The survey is anonymous
 - Would you like to participate in this survey?.

(Where the householder is not in or refuses to be involved, say thank you and go to the next household).
8. Give them the information poster and tell them that this poster provides information about the area where the new natural resources management actions are being considered.
9. Remember you cannot do the questionnaire with the respondent.
10. Arrange a time (after a day or two) for picking up the questionnaire (the respondents can keep the poster).
11. If people persist that they prefer to post the questionnaire, give them an envelope.
12. Thank them for their time.
13. Write the delivery date, the expected date and time of collection and the address of the household and tick the right box for the way of collecting, and
14. Go to the next house and repeat the above 5 to 13 steps.
15. Pick up the survey at the agreed time.
16. Write in the box collected YES/NO: Y if the questionnaire was collected; N- if the questionnaire was not collected.
17. If people want to post back the questionnaire you write N in the box "Collected YES/NO".
18. If you return and the respondent postpones the date of collection you make a note of this in the "Note" box or if the way of collection was changed.
19. Continue delivering questionnaires until you have received the required number of promised questionnaires for the area.
20. Deliver all the completed and uncompleted questionnaire to the collection point.
21. Write how many completed and uncompleted questionnaires you have returned.

IMPORTANT

Things to REMEMBER when distributing the questionnaires in Cowra

Give each respondent 3 documents: the questionnaire, poster and letter.

CODES

Please remember there are 2 types of questionnaires and posters and 3 types of letters. You must give the respondent the questionnaire; poster and letter with a specific code as indicated in the table below (follow the rows).

Questionnaire	Poster	Letter
LA	LA	LA
NW	NW	NW or NWSE (please use NWSE letter for every 10 th NW questionnaire)

Each survey collector needs to have all of the types/codes of questionnaires, posters and letters. You must rotate the questionnaires, eg. you give the questionnaire LA (with the assigned letter and poster) to the first house then you give NW to the next house and then start the same process again. You cannot distribute only one type of questionnaire on one street you must rotate them. Please remember that the letter NWSE must be selected for every 10th NW questionnaire. Remember that is not every 10th questionnaire of any sort it must be every 10th of the questionnaire NW.

ENVELOPES

If required- if the respondent wants to post the completed questionnaire to the ANU you must give them a postage paid envelope (however this is not encouraged as they are unlikely to send this back and you may not be paid).

If the respondent for privacy reasons wants to return the questionnaire in a seal plain envelope you must give them the envelope and pick up the questionnaire the next day or arrange another time.

TIME TO PICK UP

The best time to pick up the questionnaire would be the next day or the day after, delaying this latter is not encouraged as people may forget to do it. Moreover, by picking up the questionnaires earlier you also know how much more you need to distribute to obtain the required number.

REQUIRED NUMBER

You (as a group for the region) need to distribute enough questionnaires for each code (as specified in the table below) to obtain 200 for each different code/type of questionnaire. You should receive 4 extra questionnaires for each 10 that need to be collected, you may not have to distribute all 14 to receive 10 back.

Questionnaire Cowra		
code	No Delivered	No Expected back
LA	280	200
NW	280	200

Please don't hesitate to contact me if you have any further queries:

Kasia Mazur 0431 -569-764

GOOD LUCK !

Appendix C. Information letter

Dear Respondent,

I would like to invite you to be a part of a survey about future natural resource management options for part of the Namoi catchment.

Your household was chosen at random. People from several areas in NSW are being surveyed.

The survey is being done in association with the Namoi Catchment Management Authority (CMA), the NSW Government and the Australian Bureau of Agricultural and Resource Economics. The CMA will use the survey results to develop strategies for natural resource management.

By being a part of this survey, you can have your say about how natural resources in the Namoi catchment will be managed.

You don't need to be an expert in natural resource management to do this survey – we are interested in your opinions.

Any member of your household (18 years or older) can complete the questionnaire. Please answer the questions on behalf of all members of the household. It should take about 20-30 minutes to complete. As well as the questionnaire, we are also providing you with an information poster. It describes the condition of part of the Namoi catchment. It also sets out some alternative future management actions. Please look at the information poster first and then answer the questionnaire.

Your answers are STRICTLY CONFIDENTIAL. Your name will NOT be linked to any information you provide.

If you have any enquiries please call me on (02) 61 25 01 54 or by e-mail: Jeff.Bennett@anu.edu.au or Kasia Mazur on (02) 61 25 13 00 or by e-mail: Kasia.Mazur@anu.edu.au

If you have any concerns regarding the way in which this survey was conducted please contact the ANU Human Research Ethics Committee on (02) 61 25 79 45 or e-mail: Human.Ethics.Officer@anu.edu.au

Yours sincerely

Jeff Bennett

June 2008

Appendix D

CM Questionnaires

Appendix E

CM survey posters

NATURAL RESOURCE
MANAGEMENT
IN
THE NAMOI CATCHMENT
A SURVEY OF COMMUNITY ATTITUDES



We would like to know how familiar you are with the Namoi Catchment.

Question 1

Have you visited the Namoi catchment in the last 10 years?

- ☐ Never visited → go to Q3
- ☐ Visited only once
- ☐ Visited between once and 10 times
- ☐ Visited more than 10 times
- ☐ I live in the Namoi catchment → go to Q3

Question 2

When you visited the Namoi catchment, which of the following things did you do?
(tick as many boxes as applies)

- | | |
|--------------------------------------|--|
| <input type="checkbox"/> Picnicking | <input type="checkbox"/> Birdwatching |
| <input type="checkbox"/> Camping | <input type="checkbox"/> Boating |
| <input type="checkbox"/> Bushwalking | <input type="checkbox"/> Fishing |
| <input type="checkbox"/> Sightseeing | <input type="checkbox"/> Other... please specify |
| <input type="checkbox"/> Swimming | |
-
-

Question 3

How interested are you in natural resource management in the Namoi catchment?

- | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Not interested
at all | Slightly
interested | Moderately
interested | Very
interested |

What Do You Think?

OPTIONS

In questions 4 to 8 we want you to make some choices between **alternative future options** for managing natural resources in the Namoi catchment.

- Option A involves no new actions
- Options B to K involve combinations of new actions including:
 - > tree planting,
 - > fencing to protect vegetation,
 - > controlling weeds and feral animals,
 - > buying land for re-vegetation.
- Options are described by their predicted outcomes in 20 years time:
 - > area of native vegetation in good condition,
 - > number of species protected,
 - > length of healthy waterways,
 - > number of people working in agriculture.
- Money to pay for the new actions would come from the people of NSW through a mixture of:
 - > increased taxes,
 - > higher council rates,
 - > recreation charges,
 - > higher prices for goods and services.

When making your choices please consider:

- each question involves only 3 options to make your choice easier,
- the different outcomes that scientists are predicting for the options in **20** years time,
- payments for the options would be made each year for **5** years,
- your income is limited and you have other expenses, and
- other areas of NSW may also need funding for environmental improvement.

Note:

- The choices are hypothetical but are based on current scientific knowledge.
- Your answers are important to deciding the way that the natural resources of the Namoi catchment are managed.
- Please make your choices as if they were real.
- Some of the option outcomes may seem strange to you. This is because each outcome depends on a different combination of actions that can lead to different outcomes.
- Each question should be considered **independently**.

For more information please see:

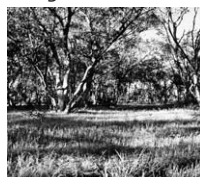
- <http://www.cma.nsw.gov.au/>
- <http://www.environment.nsw.gov.au/>
- <http://www.namoi.cma.nsw.gov.au/>

Question 4

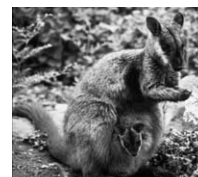
Consider each of the following three options for managing natural resources in the Namoi catchment.

Suppose options A, B and C in the table below are the **only ones available**. Which one would you choose?

Area of native vegetation
in good condition



Native species



Km of healthy waterways



People working in
agriculture



Condition Now		1800 km ²	2130 species	2000 km	5800	MY CHOICE Tick One
OPTIONS	My Household payment each year over 5 years	Condition in 20 years				
Option A - No new actions	\$0	1800 km ²	2100 species	1900 km	5000	<input type="checkbox"/>
Option B	\$50	6000 km ²	2130 species	2700 km	5100	<input type="checkbox"/>
Option C	\$50	3000 km ²	2130 species	3000 km	5300	<input type="checkbox"/>

Question 5

Consider each of the following three options for managing natural resources in the Namoi catchment.

Suppose options A, D and E in the table below are the **only ones available**. Which one would you choose?

Area of native vegetation
in good condition



Native species



Km of healthy waterways



People working in
agriculture



Condition Now		1800 km ²	2130 species	2000 km	5800	MY CHOICE Tick One
OPTIONS	My Household payment each year over 5 years	Condition in 20 years				
Option A - No new actions	\$0	1800 km ²	2100 species	1900 km	5000	<input type="checkbox"/>
Option D	\$200	3000 km ²	2120 species	2700 km	5100	<input type="checkbox"/>
Option E	\$200	5000 km ²	2110 species	2300 km	5200	<input type="checkbox"/>

Question 6

Consider each of the following three options for managing natural resources in the Namoi catchment.

Suppose options A, F and G in the table below are the **only ones available**. Which one would you choose?

Area of native vegetation
in good condition



Native species



Km of healthy waterways



People working in
agriculture



Condition Now		1800 km ²	2130 species	2000 km	5800	MY CHOICE Tick One
OPTIONS	My Household payment each year over 5 years	Condition in 20 years				
Option A - No new actions	\$0	1800 km ²	2100 species	1900 km	5000	<input type="checkbox"/>
Option F	\$200	3000 km ²	2120 species	2700 km	5200	<input type="checkbox"/>
Option G	\$300	3000 km ²	2120 species	3000 km	5300	<input type="checkbox"/>

Question 7

Consider each of the following three options for managing natural resources in the Namoi catchment.

Suppose options A, H and I in the table below are the **only ones available**. Which one would you choose?

Area of native vegetation
in good condition



Native species



Km of healthy waterways



People working in
agriculture



Condition Now		1800 km ²	2130 species	2000 km	5800	MY CHOICE Tick One
OPTIONS	My Household payment each year over 5 years	Condition in 20 years				
Option A - No new actions	\$0	1800 km ²	2100 species	1900 km	5000	<input type="checkbox"/>
Option H	\$50	6000 km ²	2130 species	2700 km	5200	<input type="checkbox"/>
Option I	\$200	6000 km ²	2110 species	2700 km	5100	<input type="checkbox"/>

Question 8

Consider each of the following three options for managing natural resources in the Namoi catchment.

Suppose options A, J and K in the table below are the **only ones available**. Which one would you choose?

Area of native vegetation
in good condition



Native species



Km of healthy waterways



People working in
agriculture



Condition Now		1800 km ²	2130 species	2000 km	5800	MY CHOICE Tick One
OPTIONS	My Household payment each year over 5 years	Condition in 20 years				
Option A - No new actions	\$0	1800 km ²	2100 species	1900 km	5000	<input type="checkbox"/>
Option J	\$300	5000 km ²	2110 species	2700 km	5100	<input type="checkbox"/>
Option K	\$300	6000 km ²	2120 species	2700 km	5100	<input type="checkbox"/>

We would now like to ask you some further questions about the options for natural resource management.

Question 9

When answering questions 4 to 8, did you always choose option A (no new initiatives)?

☐ Yes ☐ No → Go to Question 10

If you answered "yes", which of the following statements most closely describe your reason for doing so? Tick one box only.

- ☐ I support current natural resource management policies
- ☐ I support changing natural resource management, but could not afford a payment of any amount
- ☐ I support changing natural resource management but object to a payment of any amount
- ☐ I didn't know which option was best, so I stayed with the current management
- ☐ Some other reason. Please specify:

.....

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.....

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Question 10

Thinking about the information presented on the poster, please indicate how strongly you agree or disagree with each of the following statements. Tick the option that is closest to your view.

I understood all the information on the poster:

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

I needed more information than was provided:

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

I found answering questions 4 to 8 confusing:

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

In this last section, we would like to ask you a few questions to help us understand why respondents' opinions may differ.

We realise that some of these questions may be sensitive to you but please be assured that the information is confidential.

Question 11

What is your age?

Question 12

What is your gender?

☐

Male

☐

Female

Question 13

Do you have any children?

☐

Yes

☐

No

Question 14

What is the postcode where you live?

Question 15

What is the highest level of education you have obtained?

☐

Never went to school

☐

Diploma or certificate

☐

Primary only

☐

Tertiary degree

☐

Junior / year 10

☐

Postgraduate degree

☐

Secondary / year 12

☐

Other (please specify)

Question 16

How many people live in your household?

Question 17

How many people in your household are under 18 years of age?

Question 18

Annual household income - please indicate the approximate total household income (before taxes) earned last year. The ranges shown are consistent with those used in the 2006 Census.

As for all your answers, information provided here is strictly confidential.

- | | |
|--|--|
| <input type="checkbox"/> Under \$7,800 | <input type="checkbox"/> \$72,800 – 88,399 |
| <input type="checkbox"/> \$7,800 – 12,999 | <input type="checkbox"/> \$88,400 – 103,999 |
| <input type="checkbox"/> \$13,000 – 18,199 | <input type="checkbox"/> \$104,000 – 129,999 |
| <input type="checkbox"/> \$18,200 – 25,999 | <input type="checkbox"/> \$130,000 – 155,999 |
| <input type="checkbox"/> \$26,000 – 33,799 | <input type="checkbox"/> \$156,000 – 181,999 |
| <input type="checkbox"/> \$33,800 – 41,599 | <input type="checkbox"/> \$182,000 – 207,999 |
| <input type="checkbox"/> \$41,600 – 51,999 | <input type="checkbox"/> \$208,000 or more |
| <input type="checkbox"/> \$52,000 – 62,399 | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> \$62,400 – 72,799 | |

Question 19

When you have heard about proposed projects where there is a conflict between development and the environment, have you tended to:

- ☐ Favour protection of the environment
- ☐ Favour development and environmental protection about equally
- ☐ Favour development

Question 20

Are you, or a member of your close family, a member of an organisation that is associated with environmental conservation?

- ☐ Yes ☐ No

Question 21

Are you, or a member of your close family, associated with the agriculture industry?

- ☐ Yes ☐ No

If you would like to make any other comments about options for the natural resource management or about this questionnaire please make them in the following space.

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.....

Thank you for completing this questionnaire.

We hope that you enjoyed taking part in the survey.



NWG

NATURAL RESOURCE
MANAGEMENT
IN
PARTS OF THE NAMOI CATCHMENT
A SURVEY OF COMMUNITY ATTITUDES



We would like to know how familiar you are with the Namoi Catchment.

Question 1

Have you visited the Namoi catchment in the last 10 years?

- ☐ Never visited → go to Q3
- ☐ Visited only once
- ☐ Visited between once and 10 times
- ☐ Visited more than 10 times
- ☐ I live in the Namoi catchment → go to Q3

Question 2

When you visited the Namoi catchment, which of the following things did you do?
(tick as many boxes as applies)

- | | |
|--------------------------------------|--|
| <input type="checkbox"/> Picnicking | <input type="checkbox"/> Birdwatching |
| <input type="checkbox"/> Camping | <input type="checkbox"/> Boating |
| <input type="checkbox"/> Bushwalking | <input type="checkbox"/> Fishing |
| <input type="checkbox"/> Sightseeing | <input type="checkbox"/> Other... please specify |
| <input type="checkbox"/> Swimming | |
-
-

Question 3

How interested are you in natural resource management in parts of the Namoi catchment?

- | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Not interested
at all | Slightly
interested | Moderately
interested | Very
interested |

What Do You Think?

OPTIONS

In questions 4 to 8 we want you to make some choices between **alternative future options** for managing natural resources in parts of the Namoi catchment.

- Option A involves no new actions
- Options B to K involve combinations of new actions including:
 - > tree planting,
 - > fencing to protect vegetation,
 - > controlling weeds and feral animals,
 - > buying land for re-vegetation.
- Options are described by their predicted outcomes in 20 years time:
 - > area of native vegetation in good condition,
 - > number of species protected,
 - > length of healthy waterways,
 - > number of people working in agriculture.
- Money to pay for the new actions would come from the people of NSW through a mixture of:
 - > increased taxes,
 - > higher council rates,
 - > recreation charges,
 - > higher prices for goods and services.

When making your choices please consider:

- each question involves only 3 options to make your choice easier,
- the different outcomes that scientists are predicting for the options in **20** years time,
- payments for the options would be made each year for **5** years,
- your income is limited and you have other expenses, and
- other areas of NSW may also need funding for environmental improvement.

Note:

- The choices are hypothetical but are based on current scientific knowledge.
- Your answers are important to deciding the way that the natural resources of the Namoi catchment are managed.
- Please make your choices as if they were real.
- Some of the option outcomes may seem strange to you. This is because each outcome depends on a different combination of actions that can lead to different outcomes.
- Each question should be considered **independently**.

For more information please see:

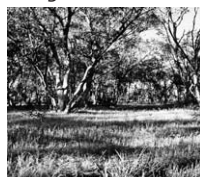
- <http://www.cma.nsw.gov.au/>
- <http://www.environment.nsw.gov.au/>
- <http://www.namoi.cma.nsw.gov.au/>

Question 4

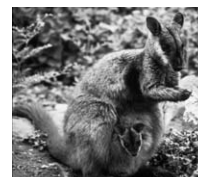
Consider each of the following three options for managing natural resources in parts of the Namoi catchment.

Suppose options A, B and C in the table below are the **only ones available**. Which one would you choose?

Area of native vegetation
in good condition



Native species



Km of healthy waterways



People working in
agriculture



Condition Now		900 km ²	1065 species	1000 km	2900	MY CHOICE Tick One
OPTIONS	My Household payment each year over 5 years	Condition in 20 years				
Option A - No new actions	\$0	900 km ²	1050 species	950 km	2500	<input type="checkbox"/>
Option B	\$50	1500 km ²	1055 species	1150 km	2600	<input type="checkbox"/>
Option C	\$200	3000 km ²	1060 species	1500 km	2600	<input type="checkbox"/>

Question 5

Consider each of the following three options for managing natural resources in parts of the Namoi catchment.

Suppose options A, D and E in the table below are the **only ones available**. Which one would you choose?

Area of native vegetation
in good condition



Native species



Km of healthy waterways



People working in
agriculture



Condition Now		900 km ²	1065 species	1000 km	2900	MY CHOICE Tick One
OPTIONS	My Household payment each year over 5 years	Condition in 20 years				
Option A - No new actions	\$0	900 km ²	1050 species	950 km	2500	<input type="checkbox"/>
Option D	\$50	1500 km ²	1055 species	1150 km	2650	<input type="checkbox"/>
Option E	\$300	2500 km ²	1065 species	1350 km	2650	<input type="checkbox"/>

Question 6

Consider each of the following three options for managing natural resources in parts of the Namoi catchment.

Suppose options A, F and G in the table below are the **only ones available**. Which one would you choose?

Area of native vegetation
in good condition



Native species



Km of healthy waterways



People working in
agriculture



Condition Now		900 km ²	1065 species	1000 km	2900	MY CHOICE Tick One
OPTIONS	My Household payment each year over 5 years	Condition in 20 years				
Option A - No new actions	\$0	900 km ²	1050 species	950 km	2500	<input type="checkbox"/>
Option F	\$50	2500 km ²	1060 species	1500 km	2550	<input type="checkbox"/>
Option G	\$50	1500 km ²	1060 species	1350 km	2600	<input type="checkbox"/>

Question 7

Consider each of the following three options for managing natural resources in parts of the Namoi catchment.

Suppose options A, H and I in the table below are the **only ones available**. Which one would you choose?

Area of native vegetation
in good condition



Native species



Km of healthy waterways



People working in
agriculture



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OPTIONS	My Household payment each year over 5 years	Condition in 20 years				
Option A - No new actions	\$0	900 km ²	1050 species	950 km	2500	<input type="checkbox"/>
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Question 8

Consider each of the following three options for managing natural resources in parts of the Namoi catchment.

Suppose options A, J and K in the table below are the **only ones available**. Which one would you choose?

Area of native vegetation
in good condition



Native species



Km of healthy waterways



People working in
agriculture



Condition Now		900 km ²	1065 species	1000 km	2900	MY CHOICE Tick One
OPTIONS	My Household payment each year over 5 years	Condition in 20 years				
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Option J	\$50	2500 km ²	1060 species	1500 km	2650	<input type="checkbox"/>
Option K	\$300	2500 km ²	1055 species	1500 km	2550	<input type="checkbox"/>

We would now like to ask you some further questions about the options for natural resource management.

Question 9

When answering questions 4 to 8, did you always choose option A (no new initiatives)?

☐ Yes

☐ No → Go to Question 10

If you answered "yes", which of the following statements most closely describe your reason for doing so? Tick one box only.

- ☐ I support current natural resource management policies
- ☐ I support changing natural resource management, but could not afford a payment of any amount
- ☐ I support changing natural resource management but object to a payment of any amount
- ☐ I didn't know which option was best, so I stayed with the current management
- ☐ Some other reason. Please specify:

Question 10

Thinking about the information presented on the poster, please indicate how strongly you agree or disagree with each of the following statements. Tick the option that is closest to your view.

I understood all the information on the poster:

☐

☐

☐

☐

☐

Strongly Disagree

Disagree

Neither Agree nor Disagree

Agree

Strongly Agree

I needed more information than was provided:

☐

☐

☐

☐

☐

Strongly Disagree

Disagree

Neither Agree nor Disagree

Agree

Strongly Agree

I found answering questions 4 to 8 confusing:

☐

☐

☐

☐

☐

Strongly Disagree

Disagree

Neither Agree nor Disagree

Agree

Strongly Agree

In this last section, we would like to ask you a few questions to help us understand why respondents' opinions may differ.

We realise that some of these questions may be sensitive to you but please be assured that the information is confidential.

Question 11

What is your age?

Question 12

What is your gender?

☐

Male

☐

Female

Question 13

Do you have any children?

☐

Yes

☐

No

Question 14

What is the postcode where you live?

Question 15

What is the highest level of education you have obtained?

☐

Never went to school

☐

Diploma or certificate

☐

Primary only

☐

Tertiary degree

☐

Junior / year 10

☐

Postgraduate degree

☐

Secondary / year 12

☐

Other (please specify)

Question 16

How many people live in your household?

Question 17

How many people in your household are under 18 years of age?

Question 18

Annual household income - please indicate the approximate total household income (before taxes) earned last year. The ranges shown are consistent with those used in the 2006 Census.

As for all your answers, information provided here is **strictly confidential**.

- | | |
|--|--|
| <input type="checkbox"/> Under \$7,800 | <input type="checkbox"/> \$72,800 – 88,399 |
| <input type="checkbox"/> \$7,800 – 12,999 | <input type="checkbox"/> \$88,400 – 103,999 |
| <input type="checkbox"/> \$13,000 – 18,199 | <input type="checkbox"/> \$104,000 – 129,999 |
| <input type="checkbox"/> \$18,200 – 25,999 | <input type="checkbox"/> \$130,000 – 155,999 |
| <input type="checkbox"/> \$26,000 – 33,799 | <input type="checkbox"/> \$156,000 – 181,999 |
| <input type="checkbox"/> \$33,800 – 41,599 | <input type="checkbox"/> \$182,000 – 207,999 |
| <input type="checkbox"/> \$41,600 – 51,999 | <input type="checkbox"/> \$208,000 or more |
| <input type="checkbox"/> \$52,000 – 62,399 | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> \$62,400 – 72,799 | |

Question 19

When you have heard about proposed projects where there is a conflict between development and the environment, have you tended to:

- ☐ Favour protection of the environment
- ☐ Favour development and environmental protection about equally
- ☐ Favour development

Question 20

Are you, or a member of your close family, a member of an organisation that is associated with environmental conservation?

- ☐ Yes ☐ No

Question 21

Are you, or a member of your close family, associated with the agriculture industry?

- ☐ Yes ☐ No

If you would like to make any other comments about options for the natural resource management or about this questionnaire please make them in the following space.

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Thank you for completing this questionnaire.

We hope that you enjoyed taking part in the survey.



NHK

NATURAL RESOURCE
MANAGEMENT
ON SELECTED FARMS
IN THE NAMOI CATCHMENT

A SURVEY OF COMMUNITY ATTITUDES



We would like to know how familiar you are with the Namoi Catchment.

Question 1

Have you visited the Namoi catchment in the last 10 years?

- ☐ Never visited → go to Q3
- ☐ Visited only once
- ☐ Visited between once and 10 times
- ☐ Visited more than 10 times
- ☐ I live in the Namoi catchment → go to Q3

Question 2

When you visited the Namoi catchment, which of the following things did you do?
(tick as many boxes as applies)

- | | |
|--------------------------------------|--|
| <input type="checkbox"/> Picnicking | <input type="checkbox"/> Birdwatching |
| <input type="checkbox"/> Camping | <input type="checkbox"/> Boating |
| <input type="checkbox"/> Bushwalking | <input type="checkbox"/> Fishing |
| <input type="checkbox"/> Sightseeing | <input type="checkbox"/> Other... please specify |
| <input type="checkbox"/> Swimming | |
-
-

Question 3

How interested are you in natural resource management on selected farms in the Namoi catchment?

- | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Not interested
at all | Slightly
interested | Moderately
interested | Very
interested |

What Do You Think?

OPTIONS

In questions 4 to 8 we want you to make some choices between **alternative future options** for managing natural resources on selected farms in the Namoi catchment.

- Option A involves no new actions
- Options B to K involve combinations of new actions including:
 - > tree planting,
 - > fencing to protect vegetation,
 - > controlling weeds and feral animals,
 - > buying land for re-vegetation.
- Options are described by their predicted outcomes in 20 years time:
 - > area of native vegetation in good condition,
 - > number of species protected,
 - > length of healthy waterways,
 - > number of people working in agriculture.
- Money to pay for the new actions would come from the people of NSW through a mixture of:
 - > increased taxes,
 - > higher council rates,
 - > recreation charges,
 - > higher prices for goods and services.

When making your choices please consider:

- each question involves only 3 options to make your choice easier,
- the different outcomes that scientists are predicting for the options in **20** years time,
- payments for the options would be made each year for **5** years,
- your income is limited and you have other expenses, and
- other areas of NSW may also need funding for environmental improvement.

Note:

- The choices are hypothetical but are based on current scientific knowledge.
- Your answers are important to deciding the way that the natural resources of the Namoi catchment are managed.
- Please make your choices as if they were real.
- Some of the option outcomes may seem strange to you. This is because each outcome depends on a different combination of actions that can lead to different outcomes.
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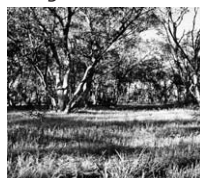
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Question 4

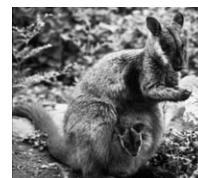
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Suppose options A, B and C in the table below are the **only ones available**. Which one would you choose?

Area of native vegetation
in good condition



Native species



Km of healthy waterways



People working in
agriculture



Condition Now		180 km ²	213 species	200 km	580	MY CHOICE Tick One
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Option A - No new actions	\$0	180 km ²	210 species	190 km	500	<input type="checkbox"/>
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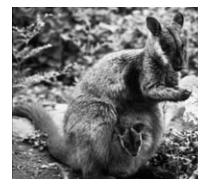
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☐ Yes

☐ No → Go to Question 10

If you answered "yes", which of the following statements most closely describe your reason for doing so? Tick one box only.

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Disagree

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I needed more information than was provided:

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☐

☐

☐

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☐

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Question 12

What is your gender?

☐

Male

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Question 13

Do you have any children?

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Question 14

What is the postcode where you live?

Question 15

What is the highest level of education you have obtained?

☐

Never went to school

☐

Diploma or certificate

☐

Primary only

☐

Tertiary degree

☐

Junior / year 10

☐

Postgraduate degree

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|--|--|
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Question 19

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Question 20

Are you, or a member of your close family, a member of an organisation that is associated with environmental conservation?

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Question 21

Are you, or a member of your close family, associated with the agriculture industry?

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If you would like to make any other comments about options for the natural resource management or about this questionnaire please make them in the following space.

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Thank you for completing this questionnaire.

We hope that you enjoyed taking part in the survey.



NFP

NATURAL RESOURCE MANAGEMENT IN THE HAWKESBURY-NEPEAN CATCHMENT

Background

The Hawkesbury-Nepean catchment covers 22,000 km². About 1 million people live in the Hawkesbury-Nepean catchment.

The Blue Mountains has World Heritage status and the six catchment wetlands are listed as Nationally Important.

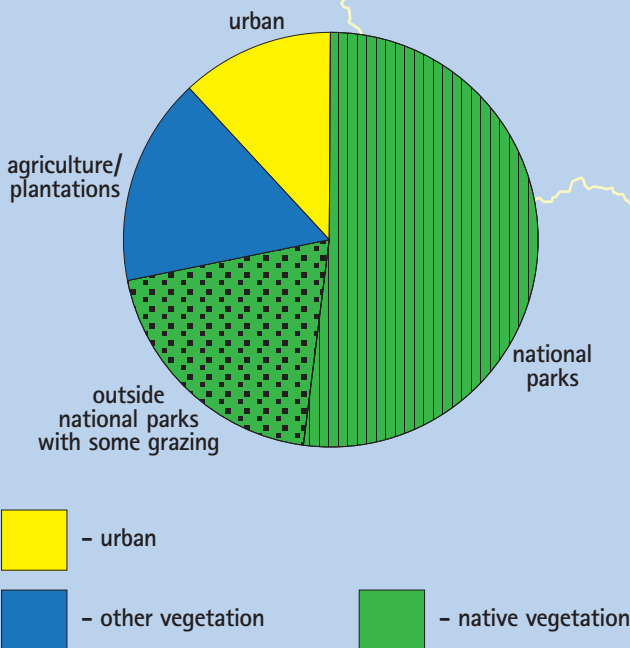
Natural resource management issues:

- > Weeds
- > Feral animals
- > Vegetation clearing
- > Urban expansion

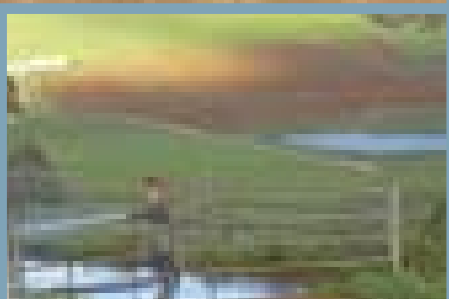
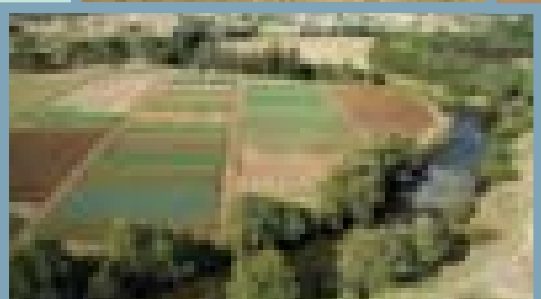
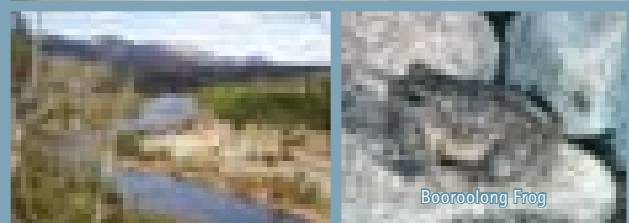
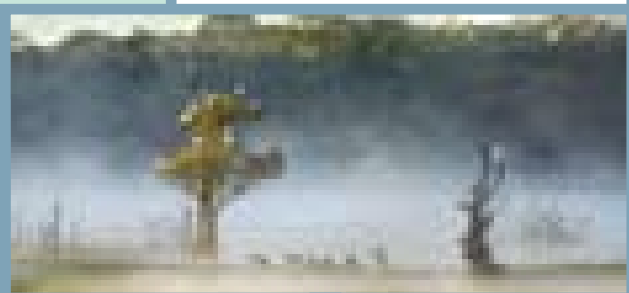
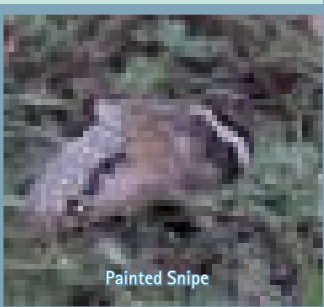
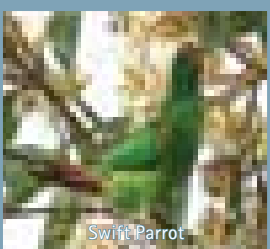
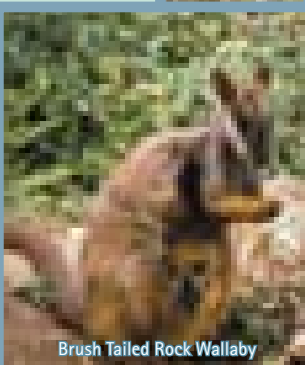
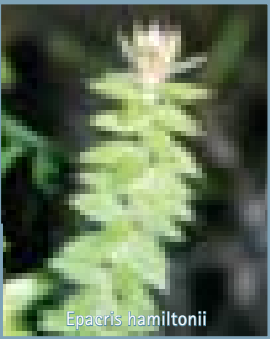
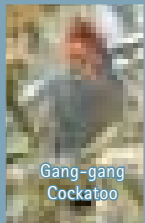
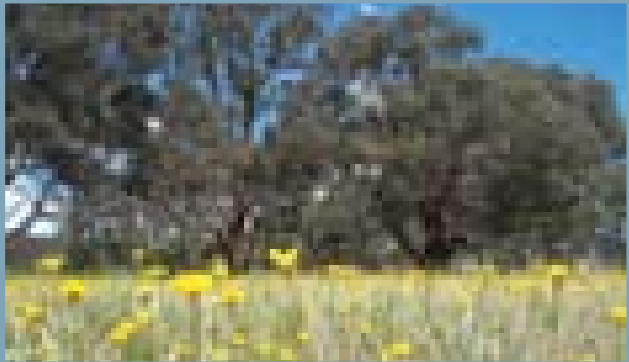
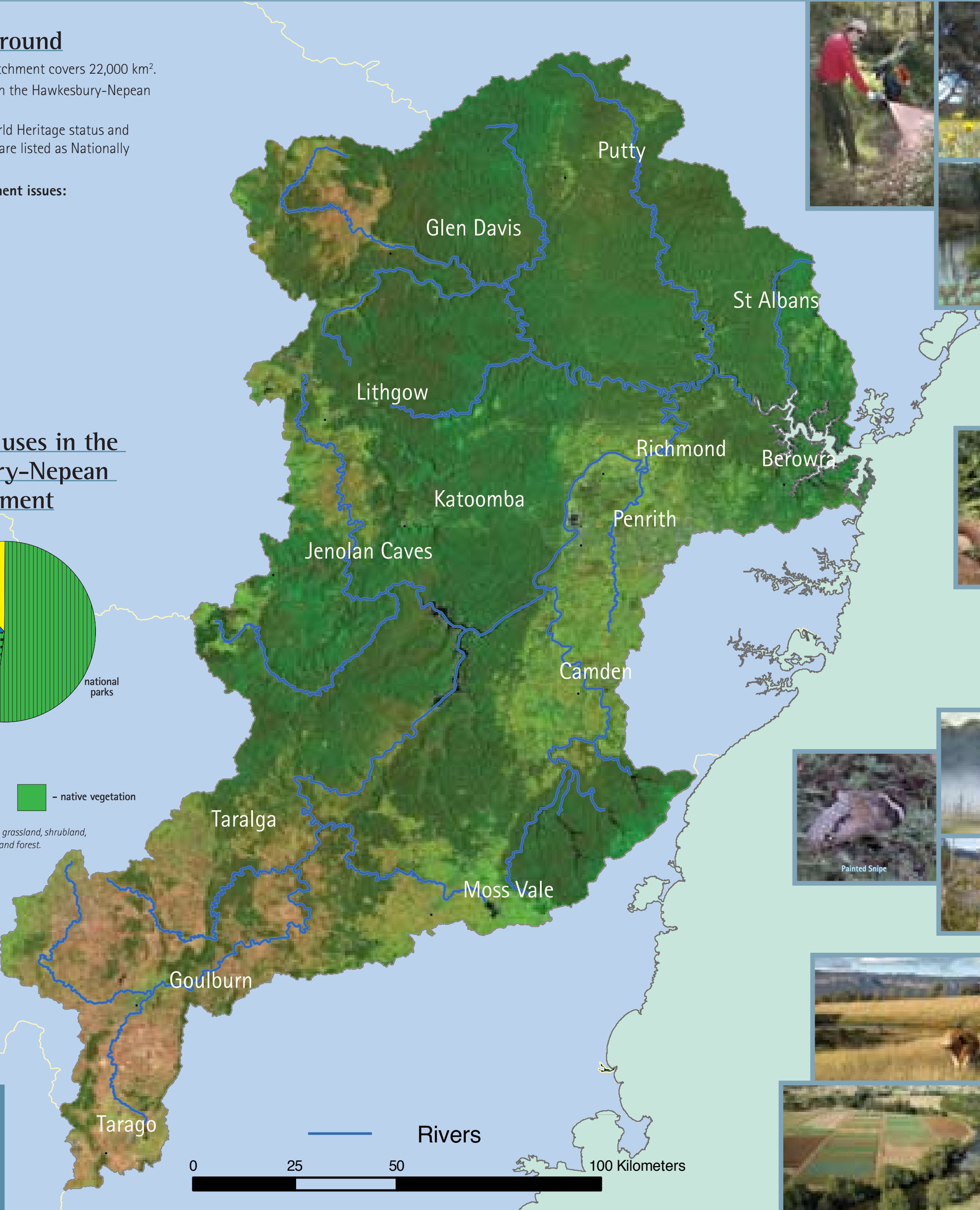
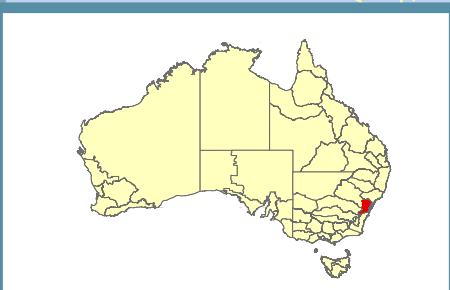
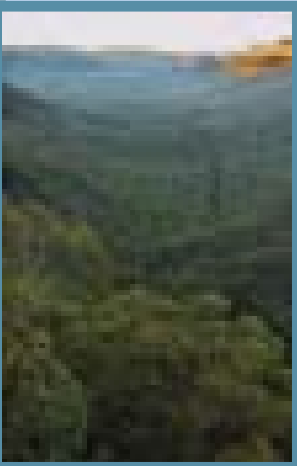
Impacts:

- > Poor river health
- > Reduced biodiversity
- > Loss of native vegetation
- > Soil erosion
- > Salinity

Major land uses in the Hawkesbury-Nepean catchment



Native vegetation incl. grassland, shrubland, woodland and forest.



Area of native vegetation in good condition

Native vegetation in good condition is similar to pre-European settlement vegetation

NOW:

> 10,500 km² of native vegetation in good condition

IN 20 YEARS TIME WITH NO NEW ACTIONS:

> 10,500 km² of native vegetation in good condition

POSSIBLE ACTIONS:

- > Protecting existing vegetation
- > Planting more trees
- > Weed control

Native species

NOW:

> 3,000 land animals and plant species
> 233 are locally endangered or vulnerable including: the Epacris hamiltonii, the Brush Tailed Rock Wallaby, the Southern Brown Bandicoot, the Gang-gang Cockatoo, the Swift Parrot, and the Regent Honeyeater

IN 20 YEARS TIME WITH NO NEW ACTIONS:

> 2,970 species

POSSIBLE ACTIONS:

- > Controlling weeds
- > Controlling feral animals

Healthy waterways

Healthy waterways including creeks, rivers, lakes and wetlands provide for water based biodiversity, have good water quality for drinking and are suitable for recreational use.

NOW:

> 630 km of the waterways are healthy (out of 4,200 km)
> 15 water species are locally endangered or vulnerable including: the Painted Snipe, the Trout Cod, the Booroolong Frog and the Giant Barred Frog

IN 20 YEARS TIME WITH NO NEW ACTIONS:

> 600 km of healthy waterways

POSSIBLE ACTIONS:

- > Revegetating and fencing wetlands and river banks
- > Creating buffer zones and controlling exotic pest plants
- > Weed control

People working in agriculture

NOW:

> 8,000 people employed in agriculture (total employment – 400,000)*

IN 20 YEARS TIME WITH NO NEW ACTIONS:

> 7,000 people employed in agriculture

POSSIBLE ACTIONS:

- > Establishing new rural industries
- > Employing farmers to manage conservation areas

*ABS 2001

NATURAL RESOURCE MANAGEMENT IN THE LACHLAN CATCHMENT

Background

The Lachlan River catchment is located within the Murray-Darling Basin and covers 84,700 km².

106,000 people live in the Lachlan catchment.

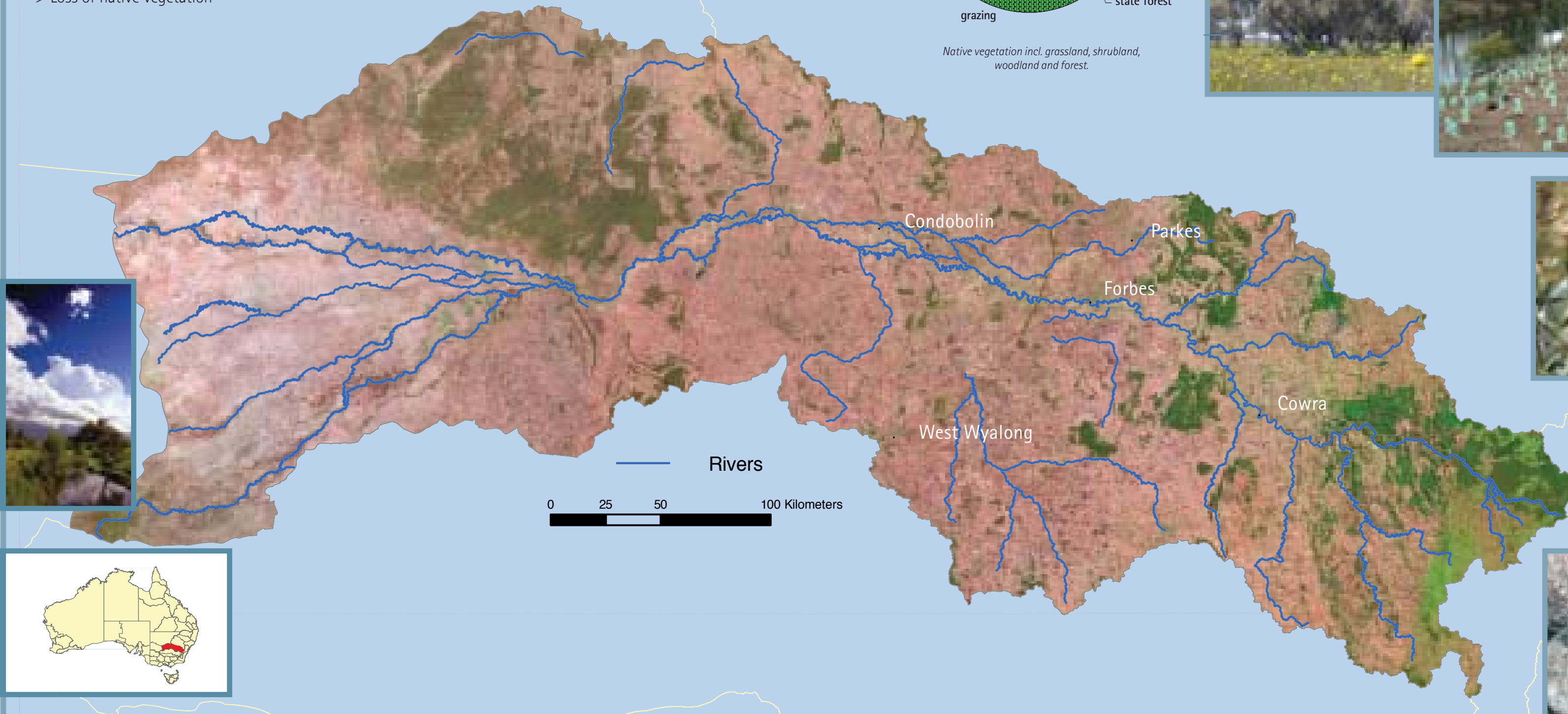
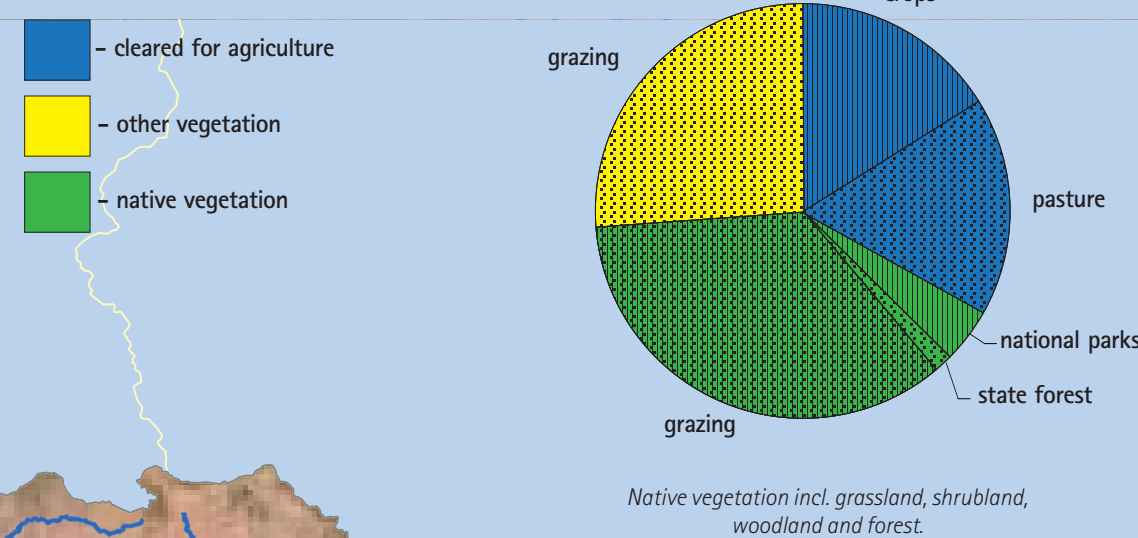
Natural resource management issues:

- > Weeds
- > Feral animals
- > Vegetation clearing

Impacts:

- > Poor river health
- > Reduced biodiversity
- > Loss of native vegetation

Land use in the Lachlan catchment



Area of native vegetation in good condition

Native vegetation in good condition is similar to pre-European settlement vegetation

NOW:

> 5,800 km² of native vegetation in good condition

IN 20 YEARS TIME WITH NO NEW ACTIONS:

> 5,800 km² of native vegetation in good condition

POSSIBLE ACTIONS:

- > Protecting existing vegetation
- > Planting more trees
- > Weed control

Native species

NOW:

- > 2,100 land animals and plant species
- > 100 are locally endangered or vulnerable including: the Grey-crowned Babbler, the Gang-gang Cockatoo, the Barking Owl, the Swift Parrot, and the Regent Honeyeater

IN 20 YEARS TIME WITH NO NEW ACTIONS:

> 2,085 species

POSSIBLE ACTIONS:

- > Controlling weeds
- > Controlling feral animals

Healthy waterways

Healthy waterways including creeks, rivers, lakes and wetlands provide for water based biodiversity, have good water quality for drinking and are suitable for recreational use.

NOW:

- > 330km of the waterways are healthy (out of 3,300km)
- > 14 water species are locally endangered or vulnerable including: the Silver Perch the Black-necked Stork, the River Snail and the Booroolong Frog

IN 20 YEARS TIME WITH NO NEW ACTIONS:

> 160 km of healthy waterways

POSSIBLE ACTIONS:

- > Revegetating and fencing wetlands and river banks
- > Creating buffer zones and controlling exotic pest plants
- > Weed control

People working in agriculture

NOW:

> 9,200 people employed in agriculture (total employment - 32,900)*

IN 20 YEARS TIME WITH NO NEW ACTIONS:

> 8,500 people employed in agriculture

POSSIBLE ACTIONS:

- > Establishing new rural industries
- > Employing farmers to manage conservation areas

*ABS 2001

NATURAL RESOURCE MANAGEMENT IN THE NAMOI CATCHMENT

Background

The Namoi River catchment is located within the Murray-Darling Basin and covers 42,000km².
100,000 people live in the Namoi Catchment.

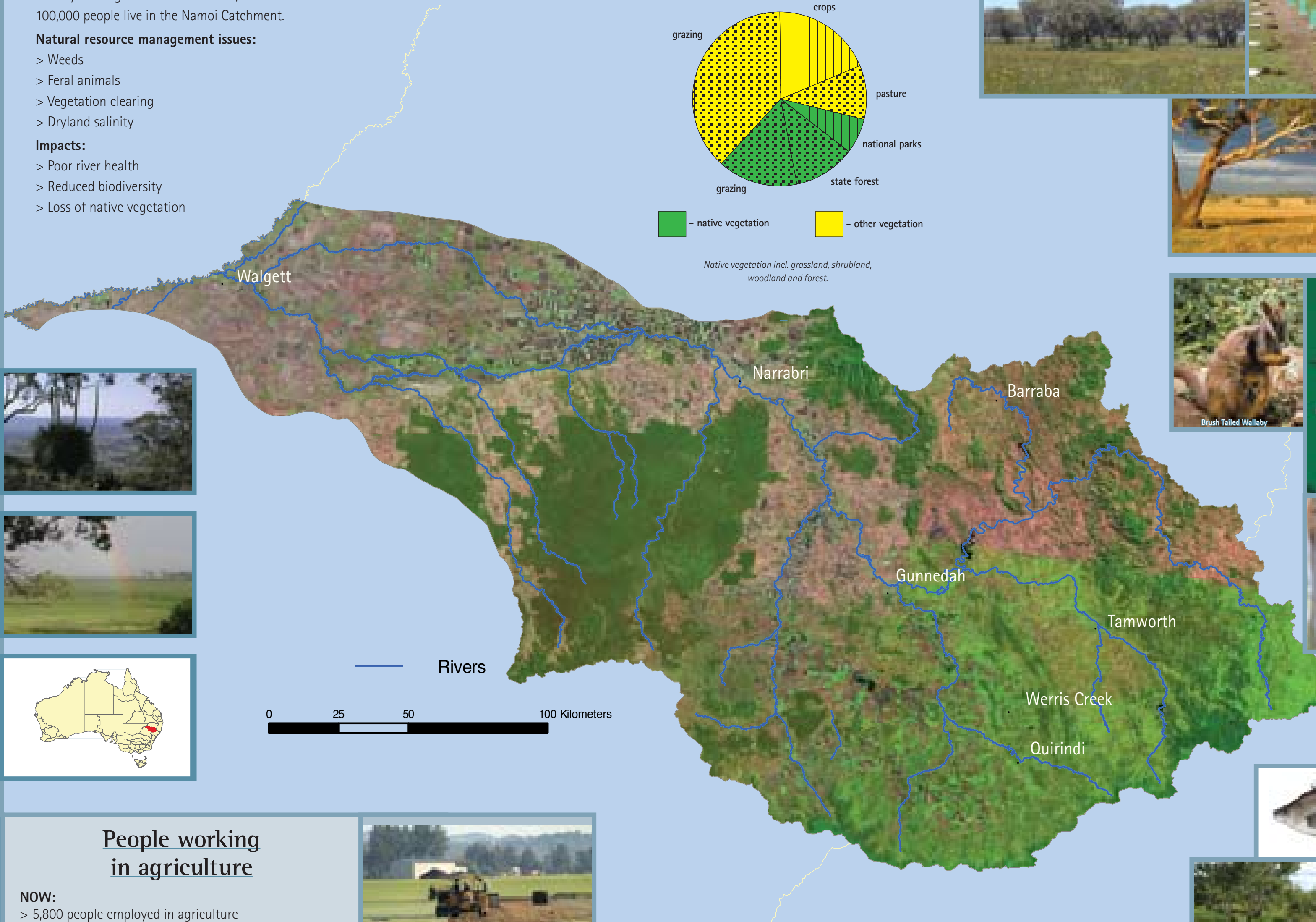
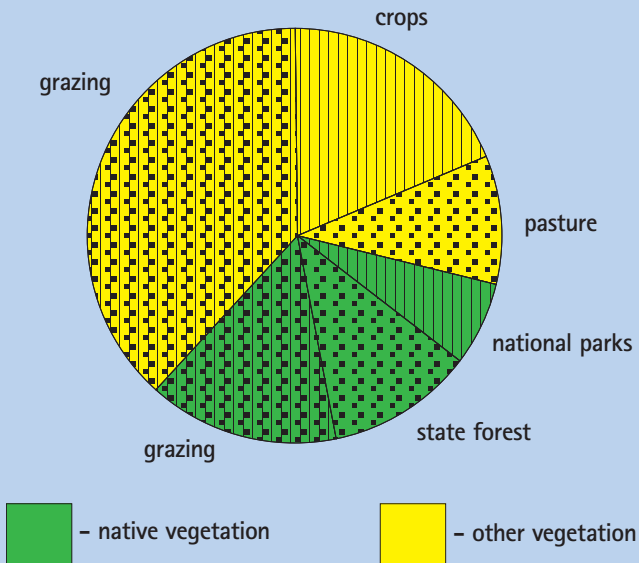
Natural resource management issues:

- > Weeds
- > Feral animals
- > Vegetation clearing
- > Dryland salinity

Impacts:

- > Poor river health
- > Reduced biodiversity
- > Loss of native vegetation

Land use in the Namoi catchment



Area of native vegetation in good condition

Native vegetation in good condition is similar to pre-European settlement vegetation

NOW:

- > 1,800 km² of native vegetation in good condition

IN 20 YEARS TIME WITH NO NEW ACTIONS:

- > 1,800 km² of native vegetation in good condition

POSSIBLE ACTIONS:

- > Protecting existing vegetation
- > Planting more trees
- > Weed control

Native species

NOW:

- > 2,130 land animals and plant species
- > 93 are locally endangered or vulnerable including: the Brush Tailed Rock Wallaby, the Swift Parrot, the Regent Honeyeater, the Gang-gang Cockatoo and the Barking Owl

IN 20 YEARS TIME WITH NO NEW ACTIONS:

- > 2,100 species

POSSIBLE ACTIONS:

- > Controlling weeds
- > Controlling feral animals

Healthy waterways

Healthy waterways including creeks, rivers, lakes and wetlands provide for water based biodiversity, have good water quality for drinking and are suitable for recreational use.

NOW:

- > 2,000 km of the waterways are healthy (out of 9,500km)
- > 12 water species are locally endangered or vulnerable including: the Silver Perch, the Painted Snipe, the River Snail and the Booroolong Frog

IN 20 YEARS TIME WITH NO NEW ACTIONS:

- > 1,900 km of healthy waterways

POSSIBLE ACTIONS:

- > Revegetating and fencing wetlands and river banks
- > Creating buffer zones and controlling exotic pest plants
- > Weed control

People working in agriculture

NOW:

- > 5,800 people employed in agriculture (total employment - 34,300)*

IN 20 YEARS TIME WITH NO NEW ACTIONS:

- > 5,000 people employed in agriculture

POSSIBLE ACTIONS:

- > Establishing new rural industries
- > Employing farmers to manage conservation areas

*ABS 2001

NATURAL RESOURCE MANAGEMENT ON SELECTED FARMS IN THE NAMOI CATCHMENT

Background

The Namoi River catchment is located within the Murray-Darling Basin and covers 42,000km². Farms making up 4,200km² of the catchment have been selected for natural resource management changes. About 580 people live on the selected farms.

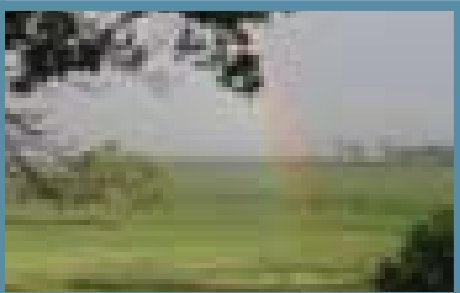
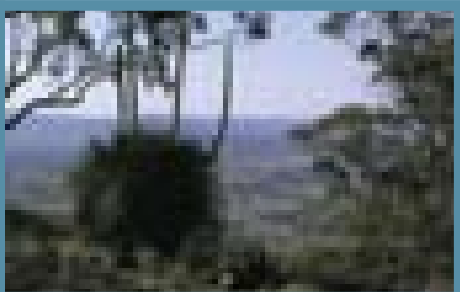
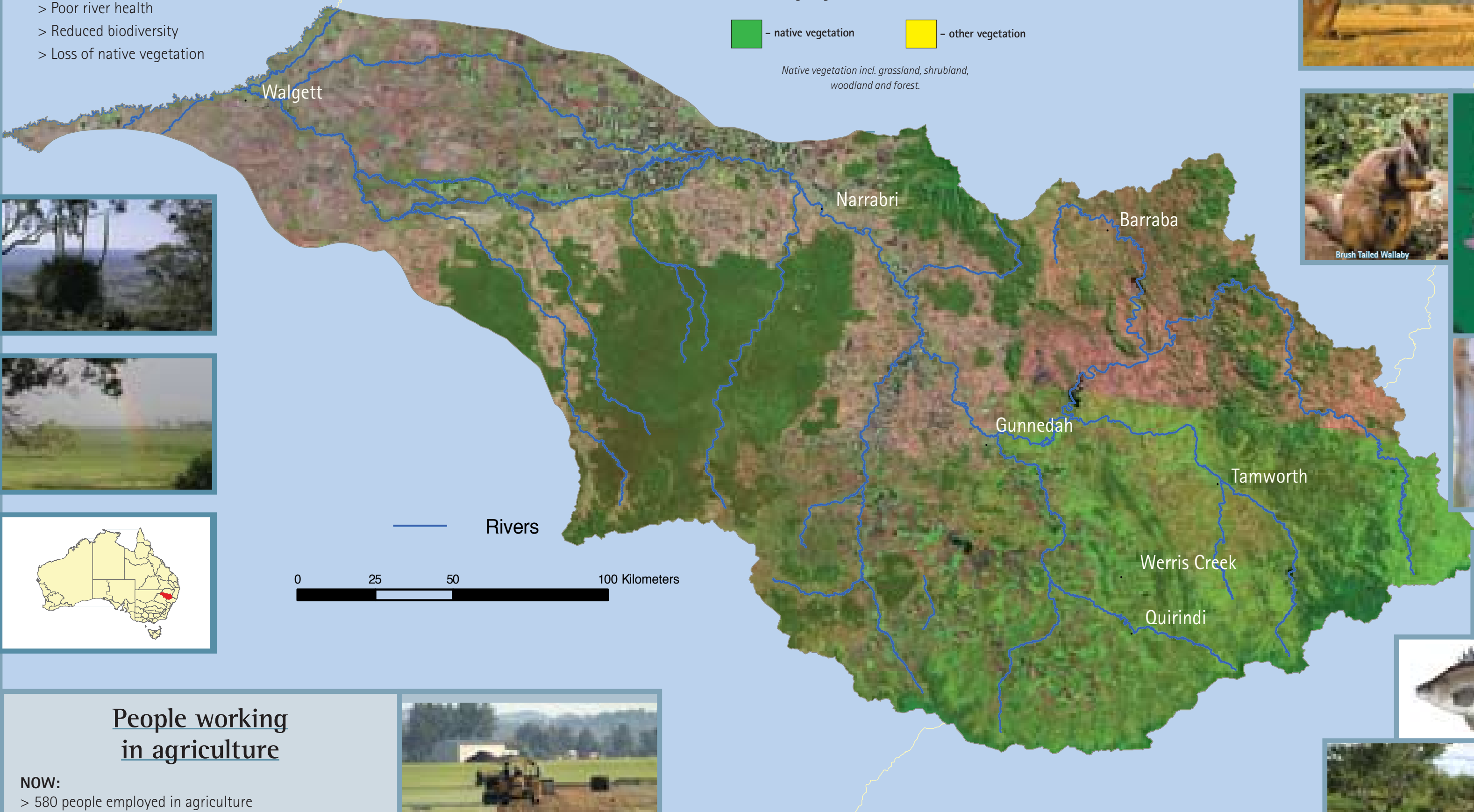
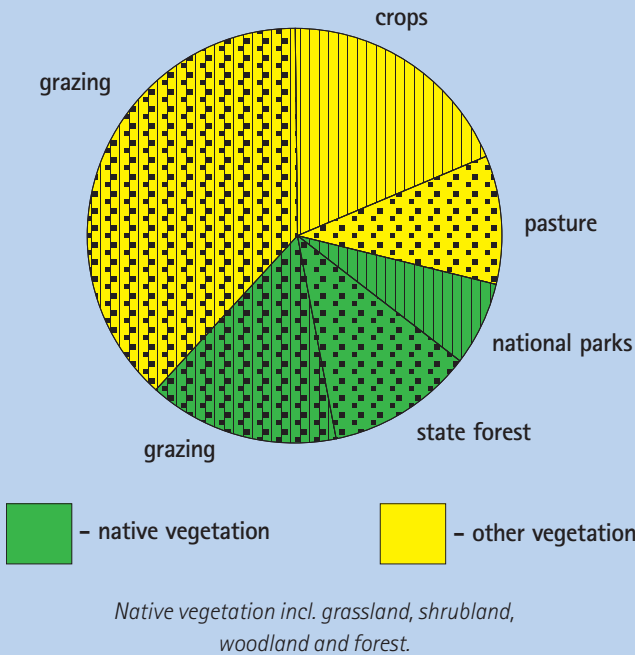
Natural resource management issues:

- > Weeds
- > Feral animals
- > Vegetation clearing
- > Dryland salinity

Impacts:

- > Poor river health
- > Reduced biodiversity
- > Loss of native vegetation

Land use in the Namoi catchment



People working in agriculture

NOW:

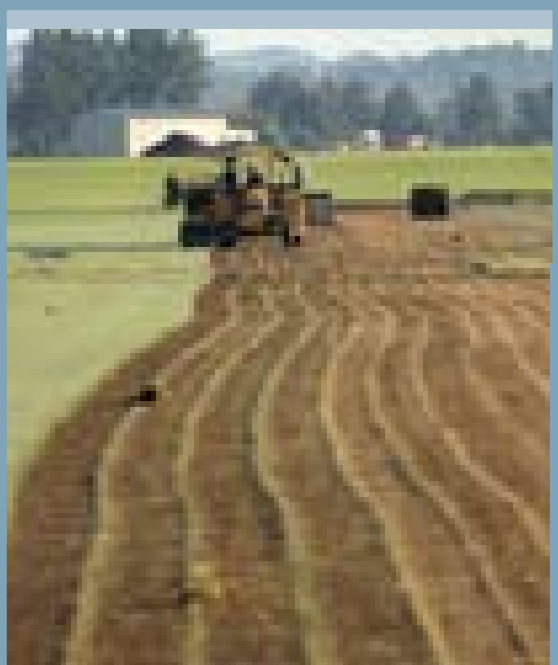
- > 580 people employed in agriculture

IN 20 YEARS TIME WITH NO NEW ACTIONS:

- > 500 people employed in agriculture

POSSIBLE ACTIONS:

- > Establishing new rural industries
- > Employing farmers to manage conservation areas



Area of native vegetation in good condition

Native vegetation in good condition is similar to pre-European settlement vegetation

NOW:

- > 180 km² of native vegetation in good condition

IN 20 YEARS TIME WITH NO NEW ACTIONS:

- > 180 km² of native vegetation in good condition

POSSIBLE ACTIONS:

- > Protecting existing vegetation
- > Planting more trees
- > Weed control

Native species

NOW:

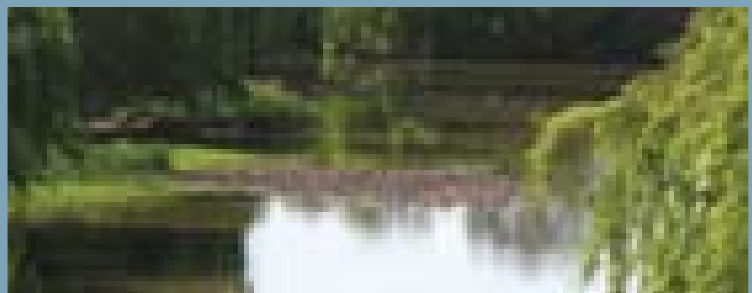
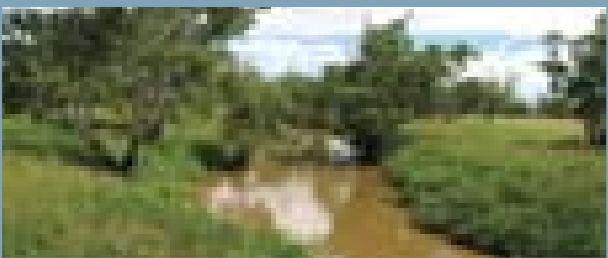
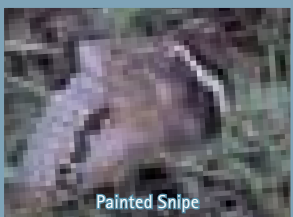
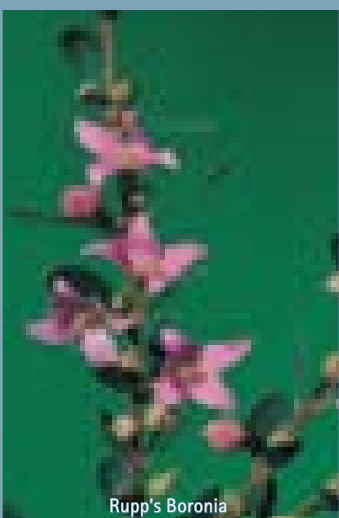
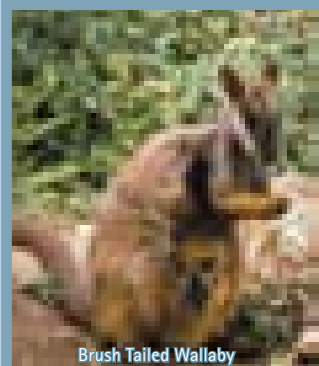
- > 213 land animals and plant species
- > 3 are locally endangered species

IN 20 YEARS TIME WITH NO NEW ACTIONS:

- > 210 species

POSSIBLE ACTIONS:

- > Controlling weeds
- > Controlling feral animals



NATURAL RESOURCE MANAGEMENT IN PARTS OF THE NAMOI CATCHMENT

Background

The Namoi River catchment is located within the Murray-Darling Basin and covers 42,000km². An area of 21,000 km² from across the catchment has been selected for natural resource management changes. About 50,000 people live in the area selected.

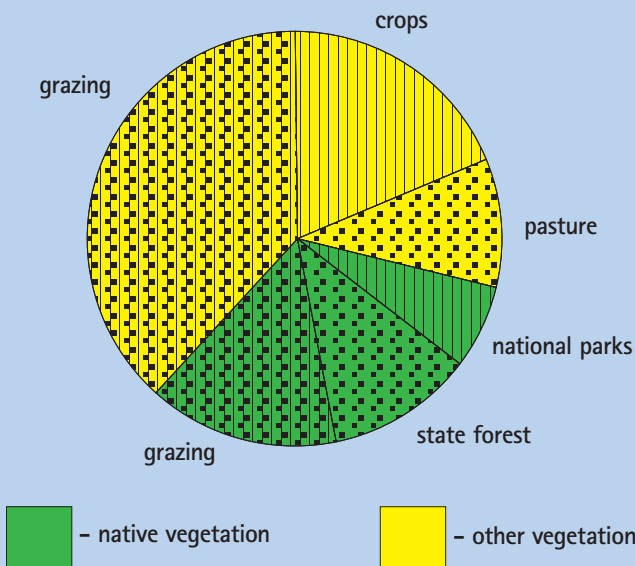
Natural resource management issues:

- > Weeds
- > Feral animals
- > Vegetation clearing
- > Dryland salinity

Impacts:

- > Poor river health
- > Reduced biodiversity
- > Loss of native vegetation

Land use in the Namoi catchment



Area of native vegetation in good condition

Native vegetation in good condition is similar to pre-European settlement vegetation

NOW:

- > 900 km² of native vegetation in good condition

IN 20 YEARS TIME WITH NO NEW ACTIONS:

- > 900 km² of native vegetation in good condition

POSSIBLE ACTIONS:

- > Protecting existing vegetation
- > Planting more trees
- > Weed control

Native species

NOW:

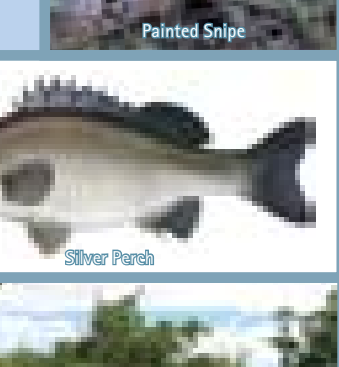
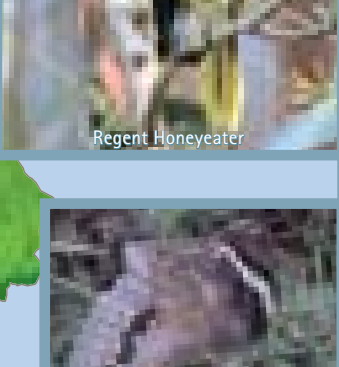
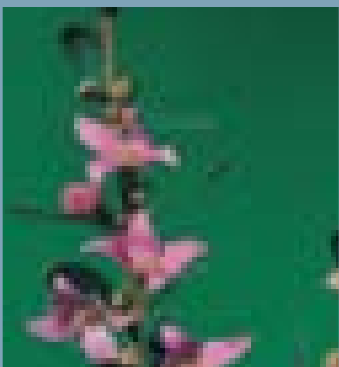
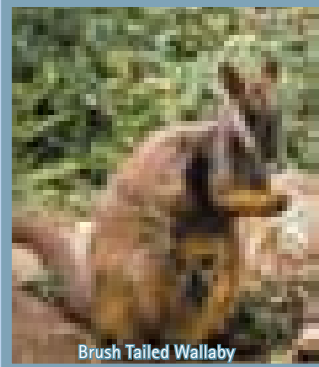
- > 1,065 land animals and plant species
- > 46 are locally endangered or vulnerable including: the Brush Tailed Rock Wallaby, the Swift Parrot, the Regent Honeyeater, the Gang-gang Cockatoo and the Barking Owl

IN 20 YEARS TIME WITH NO NEW ACTIONS:

- > 1,050 species

POSSIBLE ACTIONS:

- > Controlling weeds
- > Controlling feral animals



Healthy waterways

Healthy waterways including creeks, rivers, lakes and wetlands provide for water based biodiversity, have good water quality for drinking and are suitable for recreational use.

NOW:

- > 1,000 km of the waterways are healthy (out of 4,750km)
- > 6 water species are locally endangered or vulnerable including: the Silver Perch, the Painted Snipe, the River Snail and the Booroolong Frog

IN 20 YEARS TIME WITH NO NEW ACTIONS:

- > 950 km of healthy waterways

POSSIBLE ACTIONS:

- > Revegetating and fencing wetlands and river banks
- > Creating buffer zones and controlling exotic pest plants
- > Weed control

People working in agriculture

NOW:

- > 2,900 people employed in agriculture

IN 20 YEARS TIME WITH NO NEW ACTIONS:

- > 2,500 people employed in agriculture

POSSIBLE ACTIONS:

- > Establishing new rural industries
- > Employing farmers to manage conservation areas

