

South Australian River Murray Landscape Assessment Project



Report for the Department of Water, Land and Biodiversity Conservation
and the
South Australian Murray Darling Basin Natural Resources Management
Board

**Dr Andrew Lothian
Scenic Solutions**

2007

Cover photograph locations, from top:

Murtho forest over Chowilla area
Near Cadell
Purnong
Dairy flats – lower Murray
Murray Mouth
Coorong

Frontispiece: Murtho Park, Chowilla area

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© Dr Andrew Lothian
Principal
Scenic Solutions
PO Box 3158 Unley
South Australia 5061

ABN 55 275 407 146

E: lothian.andrew@gmail.com
P: 0439 872 226
I: www.scenicsolutions.com.au



**Swollen by the flow from its mountain headwaters,
joined by tributaries like the Murrumbidgee and Darling,
the great river spreads and wanders over its heavily silted floodplain
eventually to disperse among shallow lakes
before creeping through a sandy channel
into the Southern Ocean by the Coorong.**

Derek Whitelock, 1985
Conquest to Conservation
Wakefield Press

LANDSCAPE QUALITY OF THE RIVER MURRAY IN SOUTH AUSTRALIA

EXECUTIVE SUMMARY

The Landscape Quality of the River Murray in South Australia project was commissioned by the Department of Water, Land and Biodiversity Conservation and the South Australian Murray Darling Basin Natural Resources Management Board. It covered the River Murray floodplain in South Australia, Lakes Alexandrina and Albert (Lakes) and the Coorong. The project was undertaken between May 2006 and April 2007.

The objective was to undertake a valuation of landscape value (scenic quality) associated with the River Murray Floodplain Protection Area established under the *River Murray Act 2003*. The outcomes are intended to contribute to the development of policies, in particular a Landscape & Amenity Policy, to assist in achieving the *Objects* and *Objectives for a Healthy River Murray* as contained in the Act.

The project involved two surveys of community preferences, the first of scenic quality and the second of development along the River Murray.

Scenic Quality Survey

Landscape units in the study area were represented by 120 scenes and, together with 30 scenes from elsewhere in South Australia, comprised the survey. The survey was Internet based and available for one month. Invitations to participate were sent to 150 organisations in the region and throughout South Australia and the survey was placed on the Government Intranet. When the survey closed, 2138 had participated. After removal of incomplete surveys and those with strategic bias, 1673 were analysed, providing an excellent confidence interval of +/- 2.4%.

The survey found that scenic quality was enhanced by the presence of water, tall dense stands of native trees and high sheer cliffs. Water reflections, evening light, and wildlife further enhanced scenic quality. Dairy flats, bare areas, and samphire swamps rated poorly. Dead, drowned and dying trees diminished scenic quality. The Lakes rated low because of the flat terrain and lack of trees. The Coorong rated higher, the ratings strongly influenced by the tranquillity and naturalness. Quantification of the results enabled the development of models showing the influence of various factors on scenic quality. Based on the analysis, scenic quality was also mapped. The mapping showed that scenic quality was high from the Border to Mannum but diminished along the dairy flats below Mannum and remained low around the Lakes, rising slightly along the Coorong. Sections of the River lined with high cliffs provided the highest rated areas.

Development Survey

This survey used 80 scenes of houseboats, holiday houses, waterfront treatments, caravan and recreation areas and pumps. The Internet-based survey was available for five weeks and was sent to organisations and placed on the Government's Intranet. On completion, 1427 had participated and after removing those with less than 20% completed, 1259 surveys remained. The confidence interval was an excellent 2.8%.

The survey found that respondents *preferred*: houses to be set back rather than adjacent to the river; houses on the floodplain or above the floodplain (cliff tops houses were strongly disliked); houses surrounded by trees, preferably native; natural waterfronts (retaining walls and wharves were disliked); informal camping and recreation areas; and few houseboats moored together along the river. Unscreened marinas were not liked, possibly because of their environmental footprint. Permanently occupied houseboats along the river were strongly disliked. Irrigation pumps were regarded as essential infrastructure but the visual impact of pipes cut into cliffs was often severe. Extensive comments on development overall as well as on individual scenes were volunteered, providing a rich source of community opinion.

Recommendations

Based on the findings of the two surveys, 44 recommendations covering the management of scenic quality and of development are included.

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Maurice Green Planning Officer, Department of Water, Land & Biodiversity Conservation

Graham Goss Planning Officer, Department of Water, Land & Biodiversity Conservation

Kent Truehl Policy Officer, Department of Water, Land & Biodiversity Conservation

David Tonkin GIS Manager, Department of Water, Land & Biodiversity Conservation

Jan Rowland Senior GIS Officer, Department of Water, Land & Biodiversity Conservation

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GLOSSARY

DWLBC is the Department for Water, Land and Biodiversity Conservation.

Scenic quality, or landscape quality, refers to the aesthetic quality of the landscape. The two terms are regarded here as interchangeable. Scenic value and landscape values refer similarly to the aesthetic quality of the landscape.

Quality refers to the aesthetic value of a scene, generally on a high – low continuum.

Landscape comprises the physical characteristics that are present including land form, land use, land cover, the presence of water and other attributes.

Land form is the terrain of the landscape including cliffs, plains, sand dunes, hills, valleys.

Land cover refers mainly to the presence of vegetative cover, trees, shrubs and grasses, but may refer also to crops.

Land use covers human use of the land including agriculture and forests, but also non-uses such as national parks and conservation reserves.

Landscape units are areas of similar physical characteristics.

Landscape (or scenic) factors refer to the perceived significance of certain physical

features and qualities in the landscape. They include:

- The significance of trees, cliffs and water in the landscape.
- Naturalness: the appearance of the landscape being natural without human impact or presence being apparent. It is not the same as ecological naturalness which refers to the physical extent of human impact or presence, but rather the perception of naturalness.
- Diversity: the “busyness” of the scene, being the composite of the land forms, land uses, land cover, water and other features present in the scene.
- Tranquillity and awe. Tranquillity refers to the sense of peace and calmness engendered by the scene. Awe refers to the awe-inspiring feeling engendered by the scene.
- Landscape factors also included tree health, reflections off the water, and the presence of wildlife in the scene.

Landscape Characteristics and Landscape Factors

<i>Landscape characteristics or components are the physical characteristics of the landscape</i>	<i>Landscape (or scenic) factors refer to the perceived significance of certain physical features and qualities in the landscape including the following.</i>
Land form	The significance of trees, cliffs and water in the landscape.
Land cover	Naturalness
Land use	Diversity
Presence of water	Tranquillity and awe
	Tree health
	Water reflections
	Wildlife

LANDSCAPE QUALITY OF THE RIVER MURRAY IN SOUTH AUSTRALIA

PROJECT SUMMARY

PROJECT REQUIREMENTS (CHAPTER 1)

The objective was to undertake a valuation of landscape value (scenic quality) associated with the River Murray Floodplain Protection Area established under the *River Murray Act 2003*. The outcomes are intended to contribute to the development of policies, in particular a Landscape & Amenity Policy, to assist in achieving the *Objects and Objectives for a Healthy River Murray* as contained in the Act.

The project was commissioned by the Department of Water, Land and Biodiversity Conservation and the South Australian Murray Darling Basin Natural Resources Management Board. It was undertaken between May 2006 and March 2007.

The project involved two surveys of community preferences, firstly a survey of scenic quality and secondly a survey of developments along the River Murray.

APPROACH TO THE TASK

The approach to the scenic quality survey involved classifying the region into units of similar characteristics, sampling these by the use of photographs and selecting photographs for inclusion in an Internet-based survey. Scenic quality factors of these scenes were independently scored by participants. The results are analysed and modelled and used in the scenic quality of the River Murray, Lakes and Coorong.

The second survey of developments along the River Murray included shacks and holiday housing, waterfront treatment, houseboats, infrastructure, and recreation areas. The survey used photographs of these to assess community attitudes towards them.

Part A of the report covered the scenic quality survey, Part B covered the development survey and Part C covered the application of the findings from the two surveys to policy and planning.

PART A SCENIC QUALITY SURVEY

STUDIES OF AESTHETICS & RIVERINE LANDSCAPES (CHAPTER 2)

It is evident from previous studies that water has a profound effect on landscape preferences. These found that scenic value increased with:

- Water edge
- Water area
- Channel stability & depth
- Moving water

These studies also found that the scenic value of water decreased due to pollution and waterlogging, water colour, litter, erosion, water quality and structures.

Tranquillity contrasting with awe are psychological factors which derive from water bodies. Water was found to hold people's attention and had a stabilising effect on emotions. Possible reasons for water having such a significant influence on landscape preferences were examined but a definitive explanation is yet to be discovered.

Aesthetic preferences do not derive from cognitive analysis but rather from affective preferences. Theories of landscape aesthetics have an evolutionary perspective which argues that people's landscape aesthetics reflect what is survival enhancing. The influence of culture and individual differences (e.g. age, gender) on preferences was examined, it being shown that the similarities in preferences across cultures and individuals were greater than the differences.

Photographs to assess landscape aesthetics have been shown from a range of studies to produce results similar to field-based surveys, providing the photographs meet certain criteria (e.g. colour, common format, not-composed).

The role of scenic quality in natural resources management was examined together with the US Wild and Scenic Rivers designation.

ACQUIRING THE SCENIC QUALITY DATA (CHAPTER 3)

Photography of the region took three months through winter 2006, and apart from the

shortness of the days, the low elevation of the sun posed particular problems. Over 6000 photographs were taken covering all parts of the region, including nearly 3800 from land and 2500 from the water.

Observations from the field work cover the presence of rubbish, the issue of building on the floodplain, mooring of houseboats along the River banks, difficulties of access to the River, the provision of facilities, and subdivisional pressures particularly along the Coorong.

Classification of the region into landscape units of similar physical characteristics drew on a range of previous classifications. These are described.

Scenic Quality Survey

The scenic quality survey comprised 150 scenes of which 30 were scenes from elsewhere in South Australia to benchmark the ratings, and 120 were from the Study Area. Photographs were selected to sample the cliffs, floodplain, water bodies and trees and were distributed throughout the region. Scenes were rated on a 1 – 10 scale.

The survey was placed on the Internet and ran for one month from mid September to mid October 2006. Invitations to participate were emailed to 150 organisations and many individuals and through the Government's Intranet. A media release was issued by the Minister for the River Murray. By the survey's termination, 2,138 had participated.

The data set was compiled by removing incomplete surveys and those suspected of strategic bias (≤ 2 or ≥ 9) leaving a sample of 1673 surveys.

This sample provided an excellent confidence interval of 2.4, in other words, at a 95% confidence level, the responses would be +/- 2.4% of the true value.

In a separate process, scoring of the landscape factors was conducted with small groups of participants. They scored the presence or significance of a factor (e.g. trees, water, diversity) in each scene on a 1 – 5 scale.

The final data set for the scenic quality survey comprised the ratings of the 120 scenes and the scores for various landscape factors in the same 120 scenes.

Survey Participants

Of the 1673 participants, 5.4% (91) were located in the region, 1% from outside of the State and the remainder in Adelaide (78%) or the rest of South Australia (15%).

Participants were generally often more middle aged, better educated, more female and more often Australian born than the wider South Australian community. Ratings were similar across participant characteristics indicating that participant background had little influence on ratings.

A selection of comments by participants about the beauty of the region and concerns for the River is included.

ANALYSIS OF SCENIC QUALITY DATA (CHAPTER 4)

The mean rating of scenic quality over all the 120 scenes was 6.03, individual scene means ranging from 3.2 to 8.4. The majority of scenes were rated 5 (23%), 6 (33%) or 7 (22%).

For the highly rated scenes, opinion was more uniform than for low rated scenes. People know what they like but their opinions are more diverse for lower rated scenes.

The data set was analysed in respect of landscape features and areas.

Panoramas

In panoramic scenes of the River valley, water and cliffs were very strong influences on ratings. Trees also had a strong influence.

Water

The presence of water in a scene had a significant influence on ratings, lifting ratings by around 1.9 compared with those for scenes without water. For scenes with water, the influence of the amount of water present was slight on ratings; ratings increased from 5.8 where water was minimal, to 6.8 where water was abundant. This high rating reflected the strong influence that any water has on scenic quality. It was not so much the extent as the very presence of water which determined the rating. A glimpse of water elicited a response not dissimilar to an extensive view of water.

The naturalness and the tranquillity-awe factors had little effect on ratings of water scenes. The colour of the water, whether blue or tan, had little influence on ratings.

Ratings of the lakes, lagoons and ana-branches reflected the presence of water and trees both of which had a moderately strong and positive influence. Scenes of the river were highly rated provided the river was lined by trees. Similar scenes of extensive water without trees in the Lakes and Coorong rated substantially lower.

In contrast to the positive influence of the trees, reeds and rushes along the River did not rate highly.

River reflections had a significant influence on water scenes. Where mirror-like reflections were present, ratings increased by over 1 and even fair reflections enhanced ratings by around 0.6.

Trees

The presence of trees raised ratings by around 0.5 compared with scenes without trees. For scenes with trees, the ratings increased from around 5.4 where trees were minimal to 6.7 where trees were abundant. There was a reasonably strong relationship between the visual significance of trees in the scene and the scenic rating of the scene. A slight relationship between tree scores and naturalness was evident.

Tree health had a significant influence on ratings of those scenes with trees. Dead trees reduced ratings by 2.0, drowned trees by around 1.3 and unhealthy trees by around 1.0.

Cliffs

The presence of cliffs raised ratings by 1 compared with scenes without cliffs. The prominence of cliffs in scenes had a strong influence on ratings, lifting ratings from 4.9 for scenes where the cliffs were fairly insignificant, to 6.9 for scenes with very significant cliffs.

Sheer cliffs rated 0.9 higher than sloping cliffs, and high cliffs rated 1.2 higher than low cliffs. The presence of trees on sheer cliffs reduced ratings by 0.2. The sense of awe was strongest for barren sheer high cliffs and decreased in the sequence for sloping cliffs, cliffs with trees, and low cliffs. The ratings of cliffs corresponded to some degree with their naturalness. The height of cliffs followed by their steepness were the two strongest influences.

Dairy flats

Dairy flats on the lower Murray rated fairly low at 4.5 and scalded and barren flats rated even lower at 3.5.

Lakes Alexandrina and Albert

The Lakes rated fairly low, between 4.5 and 6.5, a narrow range. While the presence of water in the scenes had a slight influence on ratings, the tranquillity, diversity and naturalness landscape factors all had negligible influence on ratings. The barrenness of the Lakes region contributed to its low scenic quality.

Coorong

The Coorong's ratings ranged from 4.0 to 7.5, wider than the Lakes scenes. The landscape quality of the Coorong was influenced by the presence of water but not by the nature of the dunes (i.e. barren or vegetated). Its landscape quality derived mainly from the tranquillity of the Coorong together with its naturalness and, to a lesser degree, its diversity.

Wildlife

The presence of wildlife enhanced scenic quality ratings by around 0.9.

Regional means

As regions, the average rating for the scenes in the River Murray and Coorong were similar (6.2 and 6.0 respectively) and well above that of the Lakes (5.4).

Tranquillity – awe

Although the tranquillity – awe scale presented difficulties in this survey, the tranquil scenes averaged around 6.25 and the awe inspiring scenes around 7.25, a difference of 1.

Naturalness

Naturalness had a moderately strong influence on ratings with ratings increasing by 0.6 for each unit increase in the naturalness score.

Diversity

Diversity had a very strong influence on scenic quality ratings. Ratings increased by nearly 1 unit for each unit increase in the diversity score.

Models

Multiple regression analysis over the 120 scenes covering the River Murray, Lakes and Coorong generated a model incorporating eight factors with a high predictive capacity of 81% ($R^2 = 0.81$).

Models generated over the 89 scenes of the River Murray used six or seven factors and achieved over 85% predictive capacity. Over 40% of the ratings predicted by these models were within 0.25 units of the actual ratings and 70% were within 0.5 units.

The 15 scenes of the Lakes were difficult to model and achieved only moderate correlation coefficients. With this model, 93% of ratings were less within 0.5 units of the ratings. The model suggested that the lack of naturalness, possibly due to absence of trees, contributed to the area's low ratings.

The 17 scenes of the Coorong produced a model which explained over 80% of the variance. In nearly 60% of the scenes, the differences between predicted and actual ratings were less than 0.25 units.

The models with the best predictive capacities are summarised below.

All scenes Model 2
$Y = 2.956 + 0.543 \text{ diversity} + 0.591 \text{ cliffs} + 0.281 \text{ naturalness} + 0.231 \text{ tree health} + 0.214 \text{ water} - 0.619 \text{ tranquillity}$ $R^2 = 0.81$
River Murray Model 2
$Y = 1.811 + 0.463 \text{ diversity} + 0.469 \text{ cliffs} + 0.166 \text{ trees} + 0.303 \text{ tree health} + 0.255 \text{ water} + 0.263 \text{ natural} - 0.436 \text{ tranquillity}$ $R^2 = 0.85$
Lakes Model 2
$Y = 7.896 + 0.951 \text{ natural} + 0.117 \text{ diversity} - 0.21 \text{ trees} - 0.244 \text{ water} - 2.065 \text{ tranquillity}$ $R^2 = 0.49$
Coorong Model 2
$Y = 9.175 + 0.126 \text{ diversity} - 0.144 \text{ water} - 0.229 \text{ trees} + 0.988 \text{ natural} - 2.838 \text{ tranquillity}$ $R^2 = 0.82$

Diversity and cliffs were key factors in the River Murray scenes. Naturalness was important in the Lakes and Coorong scenes.

There was a small but significant difference in the ratings of respondents who resided in the study area compared with the ratings of those who did not. The strongest difference was for the scene of willows which was rated nearly a unit lower by locals. Scenes with extensive red gums or other native vegetation were rated higher by the locals than by other respondents.

MAPPING SCENIC QUALITY (CHAPTER 5)

The mapping process aimed to translate the ratings derived from the survey in a way that could be mapped using the GIS data sets available to the Department. A three stage process was adopted:

Firstly, generic ratings for each of the components were derived. For example, cliffs occurred as sheer or sloping, of high, moderate or low height, and with or without trees. In addition ratings for land outside the River valley were derived.

Secondly, a series of generic cross-sections of the River valley, Lakes and Coorong were developed covering the range of environments present. These indicated the ratings for each component within the cross-section.

Thirdly, ratings were mapped using GIS data sets.

Regional scenic quality

Overall scenic quality was high from the Border to Mannum until the dairy flats below Mannum where it diminished abruptly and remained relatively low around Lakes Alexandrina and Albert, rising slightly along the Coorong. The River itself provided the unifying thread of high scenic quality between the Border and Wellington.

The key elements in generating high scenic quality were the River and the presence of cliffs and trees. In the Riverland, the cliffs were impressive but scattered, however thick forests of tall red gums together with the broad River produced extensive areas of high scenic quality.

In the trench between Overland Corner and Mannum, there were many areas in which the River lay at the foot of sheer cliffs and was lined by tall red gums; these were concentrated areas of high scenic quality.

At Mannum the dairy flats appeared, and as the cliffs and trees were largely absent, scenic quality suffered.

Around Lakes Alexandrina and Albert were largely flat, barren landscapes which accordingly rated fairly low.

Along the Coorong, the high sand dunes together with the extensive water body lifted ratings except at the southern end. Here the

Coorong disappears into a series of dry lakes which rated poorly in terms of scenic quality.

Leaving aside the areas rated 5, which lay largely outside the River valley, the areas per rating were as follows:

Rating	Ha	%
3	32,158	26.2
4	21,628	17.6
6	66,638	54.3
7	2,295	1.9
Total area	122718	100.0

The highest rated area (7) mainly comprised the high sheer cliffs but also included the ocean beach adjacent to the Coorong.

The area rated 6 included the River between the Border and Mannum, the extensive forests of the Riverland and trench sections, and the Coorong's vegetated sand dunes.

The lower rated areas (3 and 4) comprised the barren and scalded areas of the floodplain and the dry lake beds of the Riverland. It also included the dairy flats between Mannum and Wellington and the extensive samphires and dry lakes areas adjacent to and extending out from Lakes Alexandrina and Albert.

PART B DEVELOPMENT SURVEY

ACQUIRING THE DATA (CHAPTER 6)

The survey of developments along the River Murray covered houseboats, housing (location, form and surrounds), waterfront treatments, caravan and recreation parks, and pumps. The survey used 80 scenes.

Forty-four of the scenes covered house developments, 17 waterfront treatments, 14 houseboats, 10 were of caravan and recreation areas, and 4 were of pumps.

A bipolar 1 – 9 grade (dislike – like) scale was used. Participants were asked to rate whether they liked or disliked the visual appearance of the development shown in the scene.

The survey was placed on the Internet and commenced on 13 November 2006 and ended on 22 December. A total of 1427 participated. Surveys less than 20% complete were removed, leaving 1259 surveys. No strategic bias was detected in the surveys. The data set

of 1259 surveys provided an excellent confidence interval of 2.76.

SURVEY PARTICIPANTS

Most of the participants, 75%, were from Adelaide, 18% from the rest of South Australia, and 1.5% from elsewhere in Australia. Only 5.8% (73 participants) were from the Riverland and lower Murray, Lakes and Coorong.

The participants were more middle aged and better educated, with a higher proportion of females, and with more born in Australia than the general South Australian community. Although the survey participants differed significantly from the community, as for the scenic quality survey, the ratings across the participant characteristics showed little variation.

The areas most familiar to participants were those closest to Adelaide – the Goolwa area and Lower Murray. The more distant areas – upper Murray and Coorong – were less familiar. Although close to Adelaide, Lakes Alexandrina and Albert were not familiar to participants.

The most popular activities in the region were houseboating, fishing and skiing/boating. Many respondents participated in a range of activities. Participation in activities was compared with familiarity with regions, and was found to differ according to the activity.

Over 300 participants offered comments about development on the River, and there were also over 1500 comments on individual scenes used in the survey. There were twice as many negative comments on individual developments as there were positive comments. The number of negative comments corresponded with the low rating of the scene. Examples of the comments are included in the report.

ANALYSIS OF DATA

The median of the 1 – 9 scale is 5 which represents a neutral view.

1	2	3	4	5	6	7	8	9
Disliked			Neutral			Liked		

Houses

Houses on the floodplain rated the highest followed by those above the floodplain with cliff top houses being the least preferred.

Housing that was set back from the water was preferred over housing along the waterfront or dense housing. Surprisingly, canal developments rated among the lowest, possibly due to their lack of integration with the existing environment.

Houses surrounded by native trees were preferred over exotic trees or barren surrounds.

Waterfront

The highest rated waterfront scenes were those with a natural bank. Sand beaches and jetties were not particularly liked while the presence of retaining walls and wharves were disliked and eroded riverbanks disliked even more. People preferred the waterfront to be left in a natural condition, jetties were tolerated but retaining walls and wharves less so.

Caravan and recreation areas

Both formal and informal areas were appealing for caravans and recreation, particularly the informal areas.

Houseboats

People regarded a few houseboats moored along the river bank positively but this turned negative with more houseboats.

Marinas for houseboats were rated slightly lower than for houseboats moored along the river.

Permanently occupied houseboats with their urban like fences, gardens, and lawns were perceived as inappropriate in the River setting and quite disliked.

Pumps

Irrigation pumps were seen as an essential form of infrastructure but their visual impact was regarded as quite severe.

Residents vs non-residents

River Murray residents rated the scenes slightly higher than non-residents but over 86% of the ratings were within +/- 0.3 of non-resident ratings. Both groups rated two-thirds of the scenes negatively.

The average rating by shack owners for all 80 scenes was 0.76 higher than by non shack owners. While non shack owners rated 75% of all scenes negatively (i.e. below a rating of 5), shack owners rated only 31% negatively.

For scenes of shacks and associated waterfront, shack owners were far more positive than non shack owners. The difference in overall means was nearly 1.0. Shack owners rated only 24% of scenes negatively compared with 82% by non shack owners.

Comments

Comments on individual scenes need to be considered along with the findings from the survey. The strength of the opinions given on some of the individual scenes was striking – participants felt strongly about what they regarded as desecration of the riverine environment. The language used and their condemnation of the impacts were evidence of the strength of their conviction.

Although not explicitly made, it was apparent that for many participants the survey represented their first view of shack developments on the River and also of pumps, and possibly houseboats. Many people were obviously not aware of the extent of these various developments along the River.

Many claimed the River as their own, by which they meant a publicly-owned resource, and many were appalled at the extent to which the river bank had been occupied by shacks. Similar opinions were expressed about houseboats appropriating stretches of the River bank.

Conclusions from development survey

From the survey's results, a set of 25 findings were identified which were considered in the preparation of recommendations.

PART C APPLICATION TO POLICY AND PLANNING (CHAPTER 7)

A brief overview of the River's development from settlement to the present is followed by the policy framework provided by the *River Murray Act 2003*. The relevant provisions of the Planning Strategy under the *Development Act 1993* were summarised along with the Development Plans of local government in the study area.

Participants valued the anabranches, lagoons and lakes of the River valley, the extensive stands of native vegetation, the natural appearance of the cliffs and the ubiquitous wildlife. The qualities of naturalness and visual diversity along the River valley, and

particularly along the Coorong, were highly valued.

Some holiday housing and waterfront treatments along with extensive moorings of houseboats were seen to have degraded the region's scenic quality. Irrigation pumps which has resulted in the cutting of cliffs for pipes have similarly created eyesores.

The absence of trees around Lakes Alexandrina and Albert and the barrenness of the dairy flats between Mannum and Wellington lower the scenic quality of these areas.

The following discussion and proposals are predicated on the basis that scenic quality matters; scenic quality is an environmental quality which the community values. Measures are required to protect scenic quality, to enhance it, and to better manage it. These proposals are directed towards these ends.

Recommendations were prepared covering the management of scenic resources and management of development. These were developed from the findings of the scenic quality survey and the development survey

The management of scenic quality covered water, trees and cliffs. The provision of environmental flows for the floodplain was considered critical.

The management of development focussed on protecting the area from adverse development impacts. This covered housing, the waterfront, houseboats, caravan and recreation parks, infrastructure, and the dairy flats.

RECOMMENDATIONS

Landscape quality

1. Protect within the National Parks system the following five areas of high quality landscapes:
 - Devlin Pound to Great Yarra Reach:
 - Cadell to Morgan
 - Murkbo to Roonka
 - Swan Reach pumping station to Swan Reach
 - Big Bend to Ngautgnaut

These could be considered suitable for the multiple use Regional Reserve designation.

2. Ensure the protection of scenic quality within existing parks and reserves of the National Parks system.

Floodplain scenic quality

3. Ensure tracks & roads on floodplains have culverts where they cross anabranches to maintain water flows to lagoons and backwaters.
4. Pursue artificial flooding of floodplains and the watering of riverine trees.
5. Initiate planting programs of floodplains using locally indigenous species.
6. Increase river flows in River Murray including environmental flows to regenerate and maintain trees and aquatic life in lagoons and anabranches on the floodplain.
7. Retain drowned trees for their habitat value.
8. Remove willows where possible and revegetate with native species.

Housing development

9. Prevent further housing development on the floodplain.
10. Limit conversion or replacement of small dwellings with large houses.
11. Require replacement houses to be set back a minimum of 30 metres from the landward edge of the riparian zone to maximise the area in front of the house.
12. Require screening of housing by locally indigenous vegetation and trees.
13. Ensure blending of housing with the environment through appropriate colour, size and design.
14. Avoid primary colours.
15. Protect existing indigenous trees
16. Avoid planting exotic vegetation.

Cliffs

17. Ensure careful planning, siting and design of developments to minimise their impact on scenic quality and character.

18. Site developments, including housing, well back from cliff top and screen with vegetation so that they are not visible from floor of River valley.
19. Prohibit development & infrastructure on high and moderately high sheer cliffs where it will be visible from the river and floodplain.
34. Require houseboats to be located in off-river marinas when not touring.
35. Locate off-river marinas in areas that minimise the loss of landscape quality.
36. After a phase in period, require permanently occupied houseboats to move to off-river locations with proper services.

Waterfront

20. Retain natural river bank and protect it where it remains.
21. Restore the natural river bank.
22. Remove existing retaining walls and/or wharves where practical unless of heritage value.
23. Prevent construction of further retaining walls & wharves except where absolutely necessary.
24. Ban use of large rocks in retaining walls on the waterfront.
25. Ban the use of imported sand, associated flattening of banks and creation of beaches along the river bank.
26. Ban the use of tyres on jetties.
27. Remove existing tyres from jetties.
28. Promote and establish common jetties for groups of houses and the public.
29. Ensure jetties conform to a design standard and are subject to approval and inspection.
30. Protect remaining rushes and reeds along river bank.
31. Initiate action to re-establish reeds & rushes along River bank.

Houseboats

32. Prohibit permanent occupation of houseboats on the River.
33. Screen marinas from view of the River using locally indigenous trees.

Caravan & recreation parks

37. Prohibit any form of camping within 30 metres of River.
38. Prohibit permanent living in recreation parks on the floodplain.
39. Provide environmentally sound toilets for recognised camping areas.
40. Ensure periodic supervision of informal parks during peak times.

Pumps

41. Tidy up, paint, cover irrigation pumps and screen with trees to blend with the surrounding environment.
42. Require the location & establishment of new irrigation pumps or replacements to be subject to approval, ensuring that they blend with the surrounding environment.

Dairy flats

43. Encourage planting programs around dairy flats using indigenous local species to enhance landscape quality.

Lakes Alexandrina and Albert

44. Enhance the scenic quality and character of the land surrounding of the Lakes Alexandrina and Albert by encouraging the planting of locally indigenous species.

REFERENCES

A comprehensive set of references is included.

APPENDIXES

The appendixes include the photographs used in both surveys and regional maps of ratings.

