Landscape-Level Planning in the upper Hunter Valley, Australia
Case Study

April 2007

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1 Overview

The upper Hunter Valley region is situated in rural New South Wales (NSW), in south-east Australia, approximately 200 km north-east of Sydney, and 100 km from the large regional centre and port of Newcastle. The area covers approximately 16,400 km², and has a population of around 55,000 people (NSW Department of Local Government). The region encompasses the headwaters and upper reaches of the Hunter River, one of Australia's ‘iconic’ rivers and the major source of water for the region. The region, like many other parts of eastern Australia, has been in the grip of a prolonged drought which is placing increasing stress on the catchment.

Traditionally, the region was a largely rural-based economy, with cropping and grazing playing a significant part in establishing the region. The Hunter is also well known for its equine and wine industries. The area around Scone is recognised as the second largest thoroughbred nursery in the world, producing about 70% of Australia’s thoroughbred foals (Planning Workshop Australia 2006). In addition, the region is one of Australia’s premier wine growing areas.

Over the last three decades, coal mining, energy production and associated businesses have become major industries in the region. The upper Hunter has 19 mines currently in operation (12 open cut; 4 underground; 3 both open cut and underground), and produced a total of 106.87 Mt of raw coal in 2004-05. This represents around two-thirds of total coal production for NSW and 40% of total Australian black coal production (Australian Coal Association). Production has nearly doubled since the mid-1990s, with further growth expected over the next few years. The region is also home to two large coal-fired power stations which burn around 13 Mt of coal annually and supply 40% of the power needs of the state.

The juxtaposition of intensive mining activity and high value agriculture in an area with high environmental and natural resource values has presented significant challenges for local and regional planners. As discussed in more detailed below, there have been several initiatives designed to promote a region-wide approach to issues such as the management of the Hunter River and its catchment, planning and approval of new mines, and post-mining land use. These initiatives have been of variable effectiveness to date, but there is growing recognition within the state government and amongst key stakeholders of the need to adopt a more integrated approach to regional planning, as evidenced by recent wide-ranging amendments to NSW planning legislation.

2 Context

2.1 Environmental

The catchment of the Hunter River is the largest coastal catchment in NSW, covering an area of 22,000 km² (NSW Environment Protection Authority 2003). The upper Hunter region includes the Barrington Tops mountain range, from which the headwaters of the Hunter River flow. This area is characterised by rolling hills and large valleys, with a large flood plain adjacent to the meandering Hunter River.

The upper section of the catchment includes a major storage dam, Glenbawn (870,000 ML), and other major catchments of Lake Liddell (148,000 ML) and Lake St Clair/Glennies Creek Dam (283,000 ML) (Hunter River Management Committee 1998). The major tributaries of the upper reaches of the Hunter River are the Isis River, Pages River, Dart Brook, Goulburn River, Glennies Creek and Wollombi Brook.

The climate of the upper Hunter region is temperate, with warm summers and no dry season. The native vegetation of the region includes large tracts of open woodland including white box, forest red gum, spotted gum and swamp oak. River oak and river red gums are found along the watercourses. However, since European settlement, approximately 140 years ago, the region has undergone intensive clearing for agriculture.

European settlement, agriculture, building of dams, and use of water have resulted in major changes to the natural flow of the Hunter and damaged its health. Indicators of poor river health observed in the Hunter include algal blooms, increased salinity and nutrient levels, decreased population of native fish (Hunter River Management Committee 1998).
A 1998 inquiry into the health of the Hunter River system found that the river system was showing signs of ‘high stress’ (NSW Department of Land and Water Conservation 1998). The loss of native woodlands and grasslands to agriculture and development has increased the extent of runoff and soil erosion. Lacking the strength provided by riparian vegetation, many watercourses have become wide and shallow with unstable banks. Healthy riparian vegetation is known to act as a buffer between agricultural land and watercourses, as well as providing the watercourse with stabilising woody debris, shade for temperature moderation and leaf litter for food (Hunter Catchment Management Trust 2003). The extraction of large amounts of water for irrigation, industry and household use have reduced the flow of the river, and development around the river banks has altered the natural flooding patterns; in some cases, separating the natural floodplains and wetlands from the river (Healthy Rivers Commission of NSW 2002).

The environmental impacts of changes to the Hunter River system are also indicated in the status of macroinvertebrates and native fish. Macroinvertebrate populations are a useful indicator of how well an aquatic ecosystem is functioning as they are highly sensitive to water quality changes. Macroinvertebrates also form a part of the river food chain, supporting populations of fish and platypus (Hunter Catchment Management Trust 2003). The Hunter River Inquiry (Healthy Rivers Commission of NSW 2002) reported that, at 40% to 70% of locations examined in the Hunter Catchment, macroinvertebrate populations were in poor condition. Similarly, the diversity of native fish has dropped by about 30% and a number of dominant feral species (particularly European Carp) are present (Healthy Rivers Commission of NSW 2002).

The upper Hunter Valley region contains a number of significant natural environments, including part of the World Heritage listed Barrington Tops National Park (740 km²). This area, in the north-east of the region, contains declared wilderness and is known to be a significant wildlife area. On the Liverpool Range approximately 25 km north of Scone, the Towarri National Park and the adjoining Wingen Maid and Cedar Brush Nature Reserves form a block of approximately 66 km² of land preserved for conservation. The area is known for its significant vegetation communities, as well as for the landmark rock formation of the Wingen Maid. Nearby is the well known Burning Mountain Nature Reserve, where the only naturally burning coal seam in Australia can be seen (NSW Department of Planning 2005).

Wollemi National Park lies to the south of Denman, extending from the southern escarpment of the Hunter Valley to the Blue Mountains National Park more than 100 km further south, forming part of the Blue Mountains World Heritage Area. The total area of the Wollemi National Park is 4,886 km² although only a section of that is within the shires of the upper Hunter. The National Park preserves the largest remaining wilderness area in NSW, and is home to the ancient Wollemi pine, *Wollemia nobilis*, as well as other threatened and endangered species (NSW National Parks and Wildlife Service 2001).

The region also contains smaller parks and reserves, including Mount Royal, Goulburn River and Yengo National Parks; Manobalai Nature Reserve; Lake Glenbrawn State Park and Parr State Recreation Area. These areas form important links between conservation areas in the Hunter, Sydney and Central Tablelands regions (NSW Department of Environment and Conservation 2005).

### 2.2 Social

The upper Hunter region comprises three Local Government Areas (LGAs): Upper Hunter, Muswellbrook and Singleton Shires. The Upper Hunter LGA was formed in 2004 by the amalgamation of Merriwa, Murrurundi, and Scone Shires. Singleton Shire is the most populous of the three LGAs (Table 1). The largest centre in the region is the town of Singleton (approximately 13,000 people) followed by Muswellbrook (10,000) and Scone (4,500). These three towns account for over half the population of the region. Smaller towns include Aberdeen (1,700) and Denman (1,400) (Australian Bureau of Statistics 2001).
Table 1: LGAs in the upper Hunter region

<table>
<thead>
<tr>
<th>LGA name</th>
<th>Estimated resident population at June 2006 (preliminary)</th>
<th>Median age at June 2005 (revised)</th>
<th>Area of the Shire (km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muswellbrook</td>
<td>15 236</td>
<td>34.1</td>
<td>3 406</td>
</tr>
<tr>
<td>Singleton</td>
<td>22 538</td>
<td>34.7</td>
<td>4 896</td>
</tr>
<tr>
<td>Upper Hunter Shire</td>
<td>13 552</td>
<td>39.9</td>
<td>8 071</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>51 326</strong></td>
<td></td>
<td><strong>16 373</strong></td>
</tr>
</tbody>
</table>

Source: ¹Regional Population Growth, Australia, 2005-06 (ABS cat. no. 3218.0) and Population by Age and Sex, New South Wales (ABS cat. no. 3235.1.55.001) ²(NSW Department of Local Government)

Mining is a major source of employment within the region. In June 2006, the total workforce in the upper Hunter region was around 25,000 people. Based on data from the 2001 census, around 13% of the regional workforce is directly employed in coal mining or electricity supply. It is likely that this figure would now be higher, given the growth that has occurred in the industry since 2001. This makes the sector the largest employer in the local economy. The ABS monthly Labour Force Survey shows that in the wider Hunter region, the trend over the last decade has been towards an increase in mining-related employment and a decline in employment in agriculture, forestry and fishing (Hunter Valley Research Foundation 2006). Mining is also a significant driver of business activity in the region. For example, an audit of 88 local businesses conducted by the Muswellbrook Shire in 2005 found that 24 businesses (27%) relied primarily on providing support services for the mining or power industries (Muswellbrook Shire Council 2005).

2.2.1 Indigenous communities

The original inhabitants of the upper Hunter area were the Wonnarua Aboriginal people. Aboriginal occupation of the area extends back some 30,000 years and European settlement dates from the 1820s. The proportion of the population identifying as Aboriginal or Torres Straight Islander is slightly higher in Muswellbrook Shire (3.4%), than in Singleton (2.2%) or Upper Hunter Shires (2.3%) (Australian Bureau of Statistics 2001). Most of the Indigenous population of the region now live in urban centres.

While the Indigenous people of the region no longer lead traditional lifestyles there are many cultural heritage sites in the region and many people have retained some connection with ‘country’. An Upper Hunter Aboriginal Heritage Trust was established in 2000 to undertake cultural heritage projects for and with the Traditional Owners of the region. The Trust is funded by contributions from newly approved mines in the region. The Trust’s heritage projects aim to provide a broad ranging regional study and provide a strategic context to consider the significance of Aboriginal objects found on future development sites. Management plans for national parks in the region also address Indigenous heritage (NSW Department of Planning 2005).

2.3 Economic

2.3.1 Coal

The major coal reserves in NSW are located in the Hunter coalfield (Figure 1), with estimated recoverable reserves totalling 4,330 Mt (NSW Department of Primary Industries 2006). Due to the location of the coal strata at relatively shallow depths, open cut mining is very common. The region has 19 mines currently in operation (12 open cut; 4 underground; 3 both open cut and underground), and produced a total of 106.87 Mt of raw coal in 2004-05 (NSW Department of Primary Industries 2006). Coal mining in the region is rapidly expanding with 9 developments proposed (5 open cut; 1 underground; 3 both open cut and underground). At current rates of mining, it will take approximately 40 years for reserves in the region to become exhausted, assuming no further discovery of resources or improvements in recovery techniques. However, it is a widely-held view, including within the government, that large scale mining will continue will beyond this time frame.
Figure 1: Coal fields of New South Wales

Source: (NSW Department of Primary Industries 2006)
To date, coal mining has been restricted to the area south of Scone: in Muswellbrook and Singleton Shires. There have been some recent investigations into extending mining into the Upper Hunter Shire, but large-scale mining in this area in the near to immediate future seems unlikely. In 2004, the NSW Department of Planning initiated a strategic assessment of coal mining potential in the Shire, in response to community concern about proposals to take a 25,000 tonne bulk sample of coal from a deposit at Bickham, south of Murrundi. That assessment concluded that:

There is strong competitive advantage for mines further down the Valley to continue to expand, due to existing infrastructure in the form of mineworks, coal preparation plants, and rail loops. Considering this competitive advantage and also potential new projects outside of the Hunter coalfield, it is unlikely that other coal mine development opportunities will be proposed in the Study Area [Upper Hunter Shire] over the next 15 years.

(NSW Department of Planning 2005, pp 1-2)

Most of the coal produced in the region is exported, with Japan being the single largest customer. Around 80% of the coal that is exported is steaming coal. In 2005-06, the total value of NSW coal exports was $6.7 billion. On a pro rata basis, the value of coal exported from the upper Hunter region was around $5 billion (NSW Department of Primary Industries 2006).

2.3.2 Transport
The region is generally well served by roads and there is also a large regional airport at Williamtown, near Newcastle. Coal for export is shipped through the Port of Newcastle and delivered to the port by means of an extensive rail network.
2.3.3 Power generation

Australia's largest power generator, Macquarie Generation, operates two power stations in the upper Hunter region. The state-owned company owns and manages the Liddell and Bayswater Power Stations, located between Muswellbrook and Singleton. Together, they consume approximately 13 Mt of coal and produce 27,000 GWhs of electricity per year, generating enough electricity to power 3 million average Australian homes (Macquarie Generation 2006). Being located inland, away from suitable salt water supplies for cooling, Liddell and Bayswater require water from the Hunter catchment. Lake Liddell and Plashett Reservoir were created to store and supply water for the power stations, and are now both recreational and environmental features of the region.

2.3.4 Agriculture

The fertile alluvial soil attracted early industries of dairy farming, horse breeding and more recently, viticulture; however, the continuing drought is impacting on these industries. The most extensive use of land in the upper Hunter region is for grazing and cropping. Together, these industries cover 60% of the land (NSW Department of Urban Affairs and Planning 1997).

In 1999, dairy farming contributed about $90 million to the economy (Hennessy and Jones 1999) although this may since have declined as a consequence of industry re-structuring and the impact of the drought.

2.3.5 Wine

A report by the Hunter Valley Research Foundation (2005) calculated that the grape and wine industry in the Hunter Valley had an economic value of over $350 million in 2003-4 (including wine sales, wages and investment expenditure). The majority of wine production occurs in the shires of Upper Hunter, Muswellbrook, Singleton and Cessnock.

2.4 Legal, institutional and policy instruments for LLP

2.4.1 The general planning framework

In Australia, planning laws and policy are primarily the responsibility of state governments, although the federal government is becoming increasingly active in catchment management and biodiversity protection. The key regulatory instruments for planning and development in NSW is the Environmental Planning and Assessment Act 1979 (EPA&A Act), as amended, and the Environmental Planning and Assessment Regulation 2000. The Act creates a hierarchy of state environmental planning policies, regional environmental plans and local environmental plans. State policies and regional plans are formulated and administered by the Minister for Planning and the Department of Planning, and local plans are the responsibility of LGAs. Regional and local plans are meant to be consistent with state policies; local plans, in turn, should be consistent with the relevant regional plan. However, many of the regional plans, including the Hunter Regional Environment Plan, which dates back to 1989, are now substantially out of date and have limited utility as a reference point for planning decisions. The NSW Government has indicated that it is committed to ensuring that all existing local and regional plans are revised, systematised and updated over the next few years.

Prior to the introduction of major legislative and procedural reforms in 2005, there were some significant structural impediments to the consistent implementation of LLP approaches. A notable limitation was that the Department of Planning was responsible for granting planning approvals for new mines, but control of rehabilitation and post-mining land use was the responsibility of another area of government, the Department of Primary Industries. Similarly, approval and regulation of biodiversity offsets was the responsibility of the Department of Conservation and Environment. Not surprisingly, this division of responsibility presented some significant coordination challenges.

The 2005 reforms have removed these impediments by clearly defining the Department of Planning as the pre-eminent planning body for NSW. In the case of mining, the powers of the Department now include the right to determine what offsets and rehabilitation will be required for new mining developments and the shape of final voids. The reforms were also designed to simplify planning controls and improve development assessment processes.
Approval of new mines and other major projects is governed by Part 3A of the EPA&A Act (as amended in May 2005). There are detailed requirements in the Act relating to public consultation processes and the issues that must be addressed in assessing project proposals. Matters to be considered in deciding whether or not to approve a project include:

- whether the development is likely to have a significant impact on preferred land uses (current and future) in the vicinity of the development
- impacts on significant water resources
- impacts on threatened species and biodiversity
- whether greenhouse gas emissions are minimised to the greatest extent practicable
- plans for rehabilitation of the site
- the efficiency of the development in terms of resource recovery and the minimisation of waste.

Aspects specific to the mining sector are addressed by the State Environment Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007, which replaces two earlier policies covering mining and extractive industries. Stated aims of this policy are:

a) to provide for the proper management and development of mineral, petroleum and extractive material resources for the purpose of promoting the social and economic welfare of the State, and

b) to facilitate the orderly and economic use and development of land containing mineral, petroleum and extractive material resources, and

c) to establish appropriate planning controls to encourage ecologically sustainable development through the environmental assessment, and sustainable management, of development of mineral, petroleum and extractive material resources.

The policy includes a provision empowering the relevant planning authority to require the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated. It also specifies that consent conditions for developments must ensure that:

- impacts on significant water resources, including surface and groundwater resources, are avoided, or are minimised to the greatest extent practicable
- impacts on threatened species and biodiversity, are avoided, or are minimised to the greatest extent practicable
- greenhouse gas emissions are minimised to the greatest extent practicable.

In the view of a senior official from the Department of Planning, these new regulatory provisions provide the basis for taking a more holistic approach to regional planning in the future. However, there is still not an overarching strategic plan in place for the Hunter Valley and that it would take some time before the full potential of the new regulatory framework is realised.

2.4.2 Regional level initiatives

Over the years, a broad range of reports, strategies and blueprints of relevance to the upper Hunter region have been produced by state and local government authorities, regional organisations and private consultants. A recent report prepared for the Upper Hunter Shire Council listed no less than 13 plans and strategies of various ages which had the potential to impact on development at a regional scale (Planning Workshop Australia 2006). A modified version of the table is reproduced in Table 2.
Table 2: Regional plans and strategies relevant to the upper Hunter

<table>
<thead>
<tr>
<th>Year</th>
<th>Title</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>Hunter Regional Environmental Plan</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>Upper Hunter Cumulative Impact Study and Action Strategy</td>
<td>NSW Department of Urban Affairs and Planning</td>
</tr>
<tr>
<td>1999</td>
<td>Strategic Study of the NSW Northern Coalfields</td>
<td>Minerals Consultative Committee</td>
</tr>
<tr>
<td>1999</td>
<td>Synoptic Plan: Integrated landscapes for coal mine rehabilitation in</td>
<td>NSW Department of Mineral Resources</td>
</tr>
<tr>
<td></td>
<td>the Hunter Valley of NSW</td>
<td></td>
</tr>
<tr>
<td>2000 onwards</td>
<td>Water Sharing Plans under the Water Management Act 2000</td>
<td>NSW Department of Natural Resources</td>
</tr>
<tr>
<td>2002</td>
<td>Hunter River: Independent inquiry into the Hunter River system</td>
<td>Healthy Rivers Commission of NSW</td>
</tr>
<tr>
<td>2003</td>
<td>Integrated catchment management plan for the Hunter Catchment</td>
<td>Hunter Catchment Management Trust, with the NSW Department of Land and Water Conservation</td>
</tr>
<tr>
<td>2003</td>
<td>Hunter River salinity trading scheme: Working together to protect</td>
<td>NSW Environment Protection Authority</td>
</tr>
<tr>
<td></td>
<td>river quality and sustain economic development</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>Better Futures: Hunter region youth plan 2003-2006</td>
<td>NSW Department of Community Services</td>
</tr>
<tr>
<td>2003</td>
<td>Hunter Means Business: Regional Economic Development Strategy, 2003/04-05/06</td>
<td>Hunter Economic Development Corporation, with the NSW Department of State and Regional Development</td>
</tr>
<tr>
<td>2003</td>
<td>Upper and Northern Hunter Regional Environmental Management Strategy</td>
<td>Local government areas of Singleton, Muswellbrook, Scone, Murrurundi, Merriwa, Dungog, Gloucester and Great Lakes</td>
</tr>
<tr>
<td></td>
<td>for Local Government</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>Hunter Region Strategic Tourism Plan 2005-2008</td>
<td>Hunter Regional Tourism Organisation and Tourism New South Wales</td>
</tr>
<tr>
<td>2005</td>
<td>Coal mining potential in the Upper Hunter Valley: Strategic assessment</td>
<td>NSW Department of Planning</td>
</tr>
<tr>
<td>2006</td>
<td>Draft Situation Analysis prepared for the Upper Hunter Shire Council,</td>
<td>Planning Workshop Australia</td>
</tr>
<tr>
<td></td>
<td>Newcastle</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>State Infrastructure Plan</td>
<td>NSW Department of Planning</td>
</tr>
<tr>
<td>2007</td>
<td>Hunter-Central Rivers Catchment Action Plan</td>
<td>Hunter-Central Rivers Catchment Management Authority</td>
</tr>
</tbody>
</table>

Source: based on Planning Workshop Australia (2006), pp7-9

The above table shows that considerable activity has been directed towards developing strategies to guide the long-term development of the upper Hunter region. However, the various documents that have been produced have generally focused on specific themes (water, environment, mine rehabilitation, mining resources, health, infrastructure, etc.) rather than taking a more integrated approach. The number of different organisations involved in the preparation of these various documents also illustrates why it has been difficult to develop and implement a coordinated response.

2.4.3 Catchment management

In the Hunter Valley, as in other parts of Australia, there has been an increasing focus on catchment management in recent years. This is an area in which the federal, as well as state and local levels of government have had a strong interest, with the federal government playing a key role through the resourcing of regional level catchment management authorities. As indicated in the above table, the Hunter Catchment Management Trust (since 2004, the Hunter-Central Rivers Catchment Management Authority) is responsible for catchment-wide natural resource and water plan preparation. The planning is formalised in the Integrated catchment management plan for the Hunter Catchment (ICM Plan) – a document which
describes the values of importance in the region and sets targets for natural resource condition. It also deals with water allocation on a 10 year timeframe. Notably, the ICM Plan was developed with little input from the Department of Planning and planning approval process in relation to mines in the region make little or no reference to the document.

The overall framework for catchment management is summarised in diagrammatic form in Figure 3.

Figure 3: NSW planning framework for catchment management

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An important initiative specific to the region is the Hunter River Salinity Trading Scheme. The geological composition of the upper Hunter Valley is naturally high in salt, and the potential for mining to increase the salinity of Hunter catchment has been a cause for concern in the local community. The disturbance of ground containing salt increases the potential for that salt to become dissolved in groundwater, and later enter the catchment system (NSW Department of Planning 2005). Due to the pressures on the Hunter catchment from mining, agriculture and electricity generation, a comprehensive monitoring and regulation framework, the Salinity Trading Scheme was trialled in 1994. Following a pilot scheme, in operation from 1995, the Hunter River Salinity Trading Scheme was implemented in 2003 through a NSW Environment Protection Authority regulation (NSW Environment Protection Authority 2003).

2.4.4 The role of Local Government

LGAs are the key planning authority at the local level operating within a framework of regional plans and state policies set by the state government. Under current planning laws, LGAs do not have a formal role in the approval of new mines, but they must be consulted on issues such as impacts on infrastructure and undoubtedly have some capacity to bring pressure to bear on the process.

Traditionally, LGAs have focused on issues specific to their own geographic area, but some efforts have been made to take a more coordinated approach. For example, in 2003 several councils in the wider Hunter region came together to develop the Upper and Northern Hunter Regional Environmental Management Strategy for Local Government (Hunter Councils 2003). This was prepared with the assistance of funding from the Federal Government’s Department of Transport and Regional Services. The strategy includes an action plan, but it has no legal force, and the extent to which there has been follow-through is not known. Somewhat surprisingly, there is very little reference in the strategy document or the action plan to the presence of a large coal industry in the valley.
2.4.5 The involvement of the coal industry

In the upper Hunter region, as elsewhere, mining companies have traditionally been mainly concerned with ensuring that their own operations are complying with licence conditions, rather than engaging with broader issues relating to LLP or the management of multi-mine and regional level impacts. In fact, where existing mines were concerned, efforts to implement LLP objectives (e.g. by requiring vegetation corridors to be established on mined land) were sometimes resisted because they were seen as ‘shifting the goal posts’ for satisfying rehabilitation criteria.

In recent years, the industry has become more responsive to the philosophy of LLP. There is now more awareness within the mining sector of the importance of planning for closure from the outset of mining and of protecting – and ideally enhancing – biodiversity. Particularly in the Hunter Valley, an important driver of this shift in stance has been growing community concern about the impact of intensive coal mining on the landscape (see below). A senior planning official noted that this has made it easier than in the past to negotiate with companies about issues such as offsets and post mine land use (including the shape of spoil heaps and final voids).

There is still only limited cooperation amongst companies at the local and regional level, but here too there are signs of change. For example, several companies operating in the Muswellbrook area are participants in a project to re-establish the riparian environment in a seven kilometre stretch of the Hunter River. The local industry has also supported a study, funded through the Australian Coal Association Research Program, to improve the measurement and management of the cumulative impacts of mining (Brereton, Moran et al. forthcoming).

2.5 Key challenges and issues

Notwithstanding the undoubted economic importance of coal mining to the upper Hunter Valley and the wider Hunter region, there is increasing community division around the issue of whether further expansion of the industry is desirable. This is illustrated by findings from an environmental attitudes survey conducted in the upper Hunter region by the Hunter Valley Research Foundation (HVRF) in December 2006. According to the survey, 41% of respondents agreed or strongly agreed with the statement that ‘the benefits of the coal industry for our region outweigh the negative impacts’ and a roughly equal proportion disagreed. The proportion of respondents agreeing with the statement had fallen significantly since the 2005 survey (Hunter Valley Research Foundation 2007).

The HVRF noted that a contributing factor was ongoing debate over the proposed Anvil Hill mine in Muswellbrook Shire as well as the increasing focus on climate change and coal’s role in that process (Hunter Valley Research Foundation 2007). An interesting aspect of the Anvil Hill controversy is the emergence of a coalition between climate change activists opposed to coal mining in general, and community members who are opposed to mining in their local area. This is likely to further ‘raise the bar’ for the approval of new mines in the region and lead to increased scrutiny of the performance of existing mines.

More generally, the results of the survey show a relatively high level of environmental awareness amongst respondents, with 69% disagreeing with the statement that ‘threats to the environment are exaggerated’ and 80% agreeing that ‘climate change will have a direct impact on my life in the next 20 years’.

Another issue of growing importance for the region is water, or rather the scarcity of it. A combination of a long-term drought and growing demand has led to a situation where the demand for water in the region now exceeds what is available for allocation. The point is being reached where critical choices will need to be made about the relative priority to be given to the water needs of various industries (coal vs. viticulture, horse breeding and dairying) and the balance between industry, community and environmental requirements.

A longer term issue for the region is the form of the post-mining landscape and the shape of the post-mining economy. The Synoptic Plan: Integrated landscapes for coal mine rehabilitation in the Hunter Valley of NSW (1999) was designed to address the first of these aspects and is still used as a reference point in the planning process, but is in need of up-dating, given the number of new projects and extensions which have commenced in recent years. There is considerable discussion at the regional and state level about diversifying the economic base of the region to facilitate a transition to a post-mining economy when coal
production eventually starts to wind-down, but as noted earlier in the discussion, the trend in recent years has been towards more, rather than less, economic dependence on mining.

3 Implementation of Landscape-Level Planning

3.1 Temporal criteria

Several of the planning documents prepared for the region reflect a long-term focus. These include: the **Upper Hunter Cumulative Impact Study and Action Strategy** (NSW Department of Urban Affairs and Planning 1997), the **Synoptic Plan** (NSW Department of Mineral Resources 1999) and the recent strategic assessment of **Coal Mining Potential in the Upper Hunter Shire** (NSW Department of Planning 2005). According to a senior official of the Department of Planning, efforts have been made to ensure that, where possible, planning decisions are aligned with documents such as the **Synoptic Plan** and **Cumulative Impacts** study, by requiring development applications to consider the long-term and cumulative aspects of the development. However, this has been difficult to achieve in practice because, until recently, responsibility for implementation has been divided amongst different agencies. Also, as noted, these documents have not been up-dated for several years and may be losing some of their currency, especially in light of the number of new developments and expansions coming on line.

In relation to water, regular reviews are required for the **Hunter River Salinity Trading Scheme** (NSW Environment Protection Authority 2003). The review process is conducted approximately every six months (Bennett 2007) by the Operations Committee (includes stakeholders from industry, government and community). The functions of the Committee are determined by NSW Government Legislation entitled **Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002**, which include:

- to advise the EPA on such matters as are referred to it by the EPA in connection with the operation of the scheme
- such other functions as may be conferred or imposed on it by this Regulation or by the EPA in connection with the scheme.

The **Integrated Catchment Management Plan (ICM Plan)** for the Hunter catchment is another planning document which is subject to a solid review process. Every year, the Hunter Catchment Management Trust are required to submit a report to the Minister for Land and Water Conservation outlining the progress of implementation (Hunter Catchment Management Trust 2003). A full review of the **ICM Plan** is conducted by the Trust every five years. Where necessary, recommendations may be made to the Minister to amend targets and or/supporting management actions to ensure that the **ICM Plan** remains relevant.

3.2 Spatial criteria

Some of the planning instruments for the Upper Hunter Valley have attempted to identify landscape boundaries by considering ecosystem functions. For example, the **Upper Hunter Cumulative Impact Study and Action Strategy** extends beyond the core LGAs to include some regions within the Goulburn Valley. Although these regions are not within the Hunter Valley catchment, they are recognised for their potential cumulative impacts. The **Hunter River Salinity Trading Scheme** also reflects a holistic approach; rather than focussing on minimising discharge from individual sites, this scheme aims to manage the overall salinity within the river. Under the trading scheme, salty water can only be discharged when the salt concentration in the river is low. These conditions may be summarised as followed (NSW Environment Protection Authority 2003):

- **Low flow**: no discharges are allowed
- **High flow**: limited discharges are allowed, as determined by a system of salt credits
- **Flood flow**: unlimited discharges are permitted, so long as the salinity does not exceed 900EC.

Under the salt credit system, the scheme’s operators monitor the flow rate and salinity within different ‘blocks’ of the river. This is then used to calculate the allowable discharge of salty water to each block, such that salinity remains below the limit of 900EC (Electrical Conductance Units). Stakeholders hold a licence for a certain number of credits which permits them to discharge salt into a river block in proportion to the number of credits they hold (1 credit allows the holder to contribute 0.1% of the total allowable discharge). There are a total of 1000 credits in the trading scheme; these may be traded among stakeholders in the marketplace (NSW Environment Protection Authority 2003).
3.3 Stakeholder engagement criteria

Over the years there has been substantial stakeholder engagement with the planning processes for the study area. One such example is the ICM Plan which was developed with the involvement of local Aboriginal communities, the wider community, local government, industry groups and other stakeholders. Another example is the Upper Hunter Cumulative Impact Study and Action Strategy, which was compiled through cooperation of local government, community, business, environmental and scientific groups (NSW Department of Urban Affairs and Planning 1997).

The Hunter River Salinity Trading Scheme provides an excellent example of how partnerships can be developed between key stakeholder groups to encourage cooperation and prevent future conflict. This scheme was initiated in an attempt to restore the Hunter Valley waterways to an ‘unprecedented level of freshness’ (NSW Environment Protection Authority 2003, p2). Stakeholders recognised that they would all benefit through cooperating to control the salinity in the Hunter River; environmental outcomes would be able to be achieved at the least cost to the community. As discussed in the preceding section, the trading scheme operates such that salty water can only be discharged to the river under certain conditions. Licences are issued by the Environment Protection Authority, which specifies the degree of discharge permitted subject to conditions of the agreement.

New coal mines within NSW are ultimately approved by the Minister for Planning (at state level), but must first undergo a rigorous approvals process (NSW Department of Planning 2005, p10). In the case of major projects, there is normally a public hearing process, plus opportunities are provided for interested parties to make submissions. Proponents of new projects are required to undertake public consultation as part of the preparation of an environmental impact assessment. Recent legislative changes have strengthened these provisions to facilitate earlier involvement through consultation on concept plans. In addition, all operating mines are required to establish community consultative committees, although the effectiveness and usefulness of these bodies has been questioned by some community and industry representatives.

3.4 Socio-economic benefits criteria

A number of the regional planning processes for the Hunter Valley have sought to take account of socio/economic issues. For example, the ICM Plan considered the environmental, social and economic costs which would be incurred due to an increase in Hunter River salinity (e.g. loss of productive land, reduction in low salinity water for irrigation). This information was used to establish salinity targets for the region. Similarly, the targets for preventing soil degradation were clearly justified based on environmental benefits (e.g. improvements in catchment water quality), economic benefits (e.g. reduction in water treatment costs), and social benefits (e.g. improvement in health and safety). This cost/benefit approach was replicated throughout the document to set targets for the management of other natural resources including aquatic health and native vegetation/biodiversity.

The recently completed assessment of Coal Mining Potential in the Upper Hunter Valley considered the environmental, economic and social values which could be derived from various land use options (NSW Department of Planning 2005, p1) In doing so, it aimed to identify how conflicts of interest could arise in the future due to competing land uses. The report highlighted the particular importance of agriculture within the Upper Hunter region, and discussed how an expansion of mining may threaten the region’s reputation as the ‘Horse Capital of Australia’ (NSW Department of Planning 2005, p112). This study demonstrates that planning processes within the Hunter Valley are attempting to account for the socio/economic benefits that a landscape offers. The utilisation of economic models may have been a useful extension within this project to predict how new mining developments may directly impact the local economy. This would bring the planning system in line with a landscape level approach, which recognises economic models as effective ways for governments to anticipate the impacts of new developments on the economy, the use of resources and supply and demand in general.

Under Department of Planning guidelines, proponents of new mining developments are also required to include in the Environmental Impact Assessment (EIS) an evaluation of the social impacts of the project, including health and amenity impacts, impacts arising from changes in employment practices, impacts on social and physical infrastructure, and the economic costs and benefits to the region (NSW Department of Urban Affairs and Planning 2000). However, these assessments typically form a small part of the overall EIS and appear to receive only limited consideration in the decision-making process.
3.5 Ecosystem based criteria

The *Integrated Catchment Management Plan for the Hunter Catchment* recognises the need for careful consideration of ecosystems within the region. This is demonstrated in the discussion about native vegetation biodiversity, with an aim to ‘increase the amount of native vegetation…and to conserve regionally significant vegetation communities’ (Hunter Catchment Management Trust 2003, p25). The targets set out in this document aim not just to protect, but also to enhance the biodiversity within the region, thereby improving nature’s ability to provide ecosystem services such as clear air and water.

The NSW government is among a number of Australian states which have made a formal commitment to improving regional biodiversity. This is demonstrated through adopting a biodiversity offset scheme, which requires mining companies to buy offsets to compensate unavoidable vegetation clearing (Department of Industry Tourism and Resources 2006). The NSW government has also proposed a Green Offsets scheme to encourage sustainable development within the region (NSW Environment Protection Authority 2004), though it is intended that this scheme will be extended to include offsets for air, biodiversity, and natural vegetation clearing (NSW Environment Protection Authority 2002).

The Hunter Valley *Synoptic Plan* (1999), while in need of updating, is a notable attempt to conserve ecosystem diversity. In the past, rehabilitation policy for the region has focussed on returning mined land to grazing land, and tended to neglect opportunities for enhancing biodiversity. Using Mining Operations Plans for companies within the Hunter Coalfield, the *Synoptic Plan* provides a likely snapshot of the region’s landscape in 2020 based on proposed rehabilitation efforts. This allows advance efforts to be made to mitigate potential social, economic and environmental issues. For example, the analysis indicates that native vegetation on mine holdings is likely to reduce by approximately 19% between 1998 and 2020 (NSW Department of Mineral Resources 1999). This issue has therefore been flagged as an important consideration for mine rehabilitation and is being addressed in the rehabilitation plans for individual mines. In addition, the Plan aims to facilitate the creation of vegetation corridors between Wollemi National Park in the west of the region and Barrington Tops in the north-east.

Consistent with an LLP approach, planning processes also have demonstrated some consideration of abiotic factors. For example, the 1997 *Upper Hunter Cumulative Impact Study and Action Strategy* outlines potential changes to the environment due to land uses such as mining, agriculture, forestry and infrastructure (NSW Department of Urban Affairs and Planning 1997, p110). A number of impacts on air, water, terrestrial and socio-economic indicators are considered including particulates, bacteriological, nutrients, soil structure and biodiversity. The *Action Strategy* also represents a key example of how the Hunter Valley has embraced the concept of cumulative impact assessment. The document provides clear guidelines as to how this technique can be incorporated into planning, policy development and environmental assessment.

3.6 Coordination/integration criteria

The *Hunter River Salinity Trading Scheme* is a good example of a horizontal approach to decision-making. Although the EPA is the sole legislative body for this scheme, the management is undertaken by the Hunter River Salinity Trading Scheme Operations Committee, which consists of:

- A member nominated by the Hunter River Catchment Management Trust;
- Four license holders;
- One irrigator;
- One member to represent environmental interests;
- One member from an organisation concerned in the management of a river in the catchment; and
- One member from the Department of Planning (NSW government).

(NSW Environment Protection Authority 2003, p7)

As discussed earlier in the paper, recent reforms to planning legislation have removed some of the impediments to coordination and integration by consolidating the position of the Department of Planning as the pre-eminent planning authority. However, there continues to be a disconnect in relation to the strategic management of water. The Department of Planning is charged with ensuring that mines minimise their impact on significant water resources (including groundwater) but decisions about the allocation of water are
managed by the Department of Natural Resources under general guidance of the principles established under the National Water Initiative (NWI). In 2004, the NWI was signed by the Australian Commonwealth Government and all States and Territories (with the exception of Western Australia and Tasmania (Department of the Prime Minister and Cabinet 2006). Under the agreement, water rights now have effectively the same legal status as property rights (Allens Arthur Robinson 2003). In effect, this provides investors in the water industry with more secure water access entitlements, which is intended to bring about more profitable use of water (Council of Australian Governments 2004). The initiative also involved removing barriers to water trade within the Murray-Darling Basin (which runs through the entire state of NSW). To monitor the NWI, a National Water Commission has been established. This body will ensure that the NWI is implemented such that it is in line with objectives of the original agreement.

The ICM Plan and associated supporting documents set out the water sharing arrangements in the Hunter for a 10-year period. This defines the quantities of water available at various levels of security, i.e. high security water is expected to be available nearly every year and general security water is more influenced by the prevailing conditions. The water rights for the catchment are thereby defined as are the rules by which water can move between owners and users. In the Hunter, water rights can be bought and sold within the quantity and infrastructure confines of the allocations in the 10-year plan. Water can also be traded on a temporary basis without the seller having to relinquish the property right. This is a direct analogy with renting versus ownership of a house, for example. If a water right is to be traded between different uses, e.g. irrigation to mining, then a formal exchange must be applied for and granted by the Department or the trade cannot occur. In this way, the Hunter meets the objectives of the National Water Initiative in that water is sustainably allocated (within the water availability of the catchment) but the price is set by demand and supply in the water market.

3.7 Technques and tools used

Various tools and techniques have been employed in the aforementioned studies. For example, the Synoptic Plan used Geographic Information Systems (GIS) to predict the likely future landscape of the Hunter Valley Region at 2020 based on multiple Mine Operations Plans (NSW Department of Mineral Resources 1999).

Another tool which was designed at a regional level is the diffuse water pollution estimator (DWPE), which was developed for the NSW Environment Protection Authority to aid in its Green Offset Scheme (NSW Environment Protection Authority 2004). The tool may be used by potential developers and consent authorities to estimate likely pollution loads based on the type and size of proposed developments.

The Land Use Options Simulator (LUOS) developed by the then Department of Infrastructure, Planning and Natural Resources provides an excellent example of how modelling may be used to predict outcomes for the future based on present decision making. The LUOS is indicative of an LLP approach, with its key aims being to:

- evaluate the environmental benefits and dis-benefits arising from changes in land use
- evaluate economic costs of undertaking land use change
- prioritise land use decisions based on environmental merit and cost-effectiveness.

(NSW Department of Infrastructure Planning and Natural Resources 2003)

The LUOS may be used by Catchment Management Authorities (such as the Hunter-Central Rivers Catchment Management Authority) in regional planning decision-making, and individual landholders may use the modelling tool to aid in environmental management decisions. For example, the Ulan Mine in the Goulburn River catchment used LUOS to predict the increase river salinity for various salty water disposal options. The model helped the mine to develop a strategy to minimise its environmental impacts on the surrounding catchments (NSW Department of Infrastructure Planning and Natural Resources 2003).

3.8 Obstacles to implementing LLP

As discussed, historically, the fragmentation of responsibility amongst multiple agencies made it difficult to achieve a coordinated and integrated approach to LLP. While this has been alleviated by recent regulatory changes, the lack of integration between the catchment management framework and the broader planning system remains a concern.
Another problem is that a considerable number of mines were approved well before integrated management became a major focus of the planning process and at a time when the requirements were less onerous than currently enforced. For a range of reasons, regulators may not be able to impose retrospective conditions on these operations. The quality of the rehabilitation undertaken and the offsets created has been highly variable and it will be difficult, if not impossible, to bring some existing sites ‘up to standard’.

A more general obstacle to achieving full implementation of LLP is the sheer complexity of the tasks involved. Planners and regulators are operating in a highly dynamic environment and it has proved difficult for them to find the ‘space’ – and resources – to develop a higher level strategic plan for the region, or to update key documents such as the Synoptic Plan. There is also no single regional-level mechanism for bringing together all the disparate groups from Government, industry and the community sector who have an interest in the future of the region.

### 3.9 Summary

The overriding impression that emerges from the above description of the upper Hunter region is of a landscape under immense pressure, generating significant wealth for the state and endowed with a magnificent natural environment. This leads to the conclusion that the upper Hunter Valley simply must work out how to perform effective landscape level planning, and action to resolve these multiple pressures.

Significant achievements in LLP across all of the criteria are evident in the region, as has been detailed above. The strategic and legislative framework for managing LLP issues seems to be maturing – moving from individual treatment of issues, toward integrated management and a longer-term focus. However, the current situation indicates more potential than observable progress in implementation. The most significant limitations are that the various plans are not integrated, some key documents are in need of updating and adoption/implementation is, in the main, ad hoc. Monitoring actions and accountability, for example, fall to a number of stakeholders without any overall coordination and/or data aggregation, management and reporting. This highlights a critical issue: landscape level planning is of only marginal benefit if it is not linked to a process of landscape level implementation and accountability.

A number of planning processes have demonstrated stakeholder involvement with a highlight being the 1999 *Upper Hunter Cumulative Impact Study and Action Strategy*. This strategy demonstrates so-called horizontal integration by indicating actions and owners across a range of the stakeholders. Whilst this illustrates the potential for the stakeholders to work together to solve problems, there is little documentation of actions and resulting outcomes.

The *Synoptic Plan*, the *Integrated Catchment Management Plan for the Hunter Catchment*, the *Hunter River Salinity Trading Scheme* and the recent study of *Coal Mining Potential in the Upper Hunter* deal with environmental management for the region. Unfortunately, an integrated picture only emerges by studying the collection of plans. This is an indication of the difficulty of achieving coordination of various planning bodies and processes, and ultimately hinders implementation. Rather than being seen as a criticism this should be taken as an indication of the true scale of the integration challenge.

The *Integrated Catchment Management Plan for the Hunter Catchment* is the most integrative plan. Stakeholders have been brought together to establish the priority environmental and social needs and have set targets in specific areas to make progress. The implementing body receives funding from the higher level government bodies and so the actions can be reasonably resourced. Unfortunately, *ICM Plan* only covers a subset of the social, environmental and economic issues for the region. For example, the integration of rehabilitated mined lands into *ICM Plan* goals is less than it might be, and infrastructure is not addressed. Further, there has been no declaration that the *ICM Plan* is the primary planning document for the region.

Finally, individual mines face a challenge when it comes to investment in space and time. Off-lease investments, for example, designed to contribute to an outcome as agreed to by all stakeholders (such as biodiversity protection), may be more difficult to justify than on-lease investments. The trade-off becomes more difficult when prioritising of investment on-lease is in line with environmental compliance and/or corporate sustainability goals. Similarly, the timing of investments by other stakeholders in an off-lease issue may not match well with mine planning and consequent availability of funds to support the additional expenditure. Further, it is not clear that individual mines gain more reputational benefit by contributing to joint
investment priorities than by delivering to their local community and seeking to differentiate themselves from competitors.

Overall, the upper Hunter has a planning history, community involvement and a set of plans that could position it well for effective LLP. The main challenges are to integrate the intentions, ensure that planning is comprehensive and develop effective implementation and accountability processes. All plans must up-to-date to achieve this and effective regional-level coordinating mechanisms established.
References

Department of Industry Tourism and Resources (2006). Leading practice sustainable development program for the mining industry: Biodiversity management handbook. Canberra, Department of Industry Tourism and Resources.
NSW Department of Infrastructure Planning and Natural Resources (2003). The Land Use Options Simulator (LUOS): A tool to support better land use management decisions, NSW Department of Infrastructure Planning and Natural Resources.
NSW Department of Urban Affairs and Planning (1997). Upper Hunter cumulative impact study and action strategy. NSW Department of Urban Affairs and Planning.


*Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002 (NSW).*