

# Assessing Conservation Outcomes: Integrated Regional Planning in the Jervis Bay Region, Australia<sup>1</sup>

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## Abstract

In many areas native habitats and species are under widespread and in some cases severe stress from the effects of historic and present land management practices. Sustainable development and the role of vegetation information in land use planning are examined in the Jervis Bay region. In the mid to late 1980s and early 1990s increasing community concerns were raised over continuing piecemeal and unchecked urban development which was seen as a threat to the region's significant natural and cultural values. In response to these concerns a number of studies called for, and examined the need for, a strategic approach to planning and management in the region. In 1990 the New South Wales Government initiated a Regional Planning Exercise to guide future planning policies and to establish a balance between conservation and development. Sound consultative planning in the early 1990s, based on available scientific information, and highlighted the need to conserve the region's significant native habitats and species. In 1997, policies were proclaimed to protect the region's significant natural and cultural values. Gains for biodiversity management since 1992 are assessed in terms of strict protected areas and through 'off reserve' mechanisms for conserving biodiversity. Vegetation information has played a key role in influencing science-based policies that have led to conservation management of 32 of the 33 natural Vegetation Communities in the region.

## Introduction

Biodiversity can be defined as the pattern, and variety, of life and its processes. These patterns relate patterns in environmental gradients. At a landscape level biodiversity can be mapped and described using the type and extent of patterns of native vegetation. Because of the relationship between environmental gradients and species, information on vegetation can provide an effective surrogate for understanding complex interactions between habitat and species. Vegetation information also provides a key information layer in planning and managing the sustainable resource use and biodiversity conservation of landscapes (Saunders et al. 1987, Noss and Cooperrider 1994, Bradstock et al. 1995, Hale and Lamb 1997).

Natural habitats and their associated species are under widespread and sometimes severe stress, primarily from the loss and modification of structure, composition and function of natural ecosystems. These changes result from direct and indirect anthropogenic land management practices, including historic and present land uses. Changes to native vegetation at a landscape or regional level are

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<sup>1</sup> Thackway, R. (2000). Assessing Conservation Outcomes: Integrated Regional Planning in the Jervis Bay Region, Australia. UNESCO Institute of Bioregional Resource Management, University of New England. D. J. Brunckhorst and D. A. Mouat (Eds). Proceedings of the conference on Landscape Futures: Advances in Research for Natural Resource Planning and Management across Regional Landscapes. First International Symposium on Landscape Futures, (Sept. 1999). University of New England, Armidale, NSW, Australia.



largely driven economic development pressures. Individual land holders, industry groups, the wider community and all levels of government respond variously to these changes by regarding them as either having positive or negative effects. Unless land management practices are sustainable, the environmental consequences can be the gradual run-down of the health of ecological systems that humans depend on for maintaining quality of life.

Given the lack of a widely accepted whole of landscape or bioregional approach to planning (Brunckhorst In Press), conservation of biodiversity, through establishing strict protected areas, has generally been a reaction to environmental threats (Stolton and Nigel 1999). Increasingly, other effective conservation processes or 'off reserve' measures are being used either in their own right or in combination with strict protected areas to achieve optimum outcomes for biodiversity conservation (Hale and Lamb 1997, Thackway and Olsson 1999).

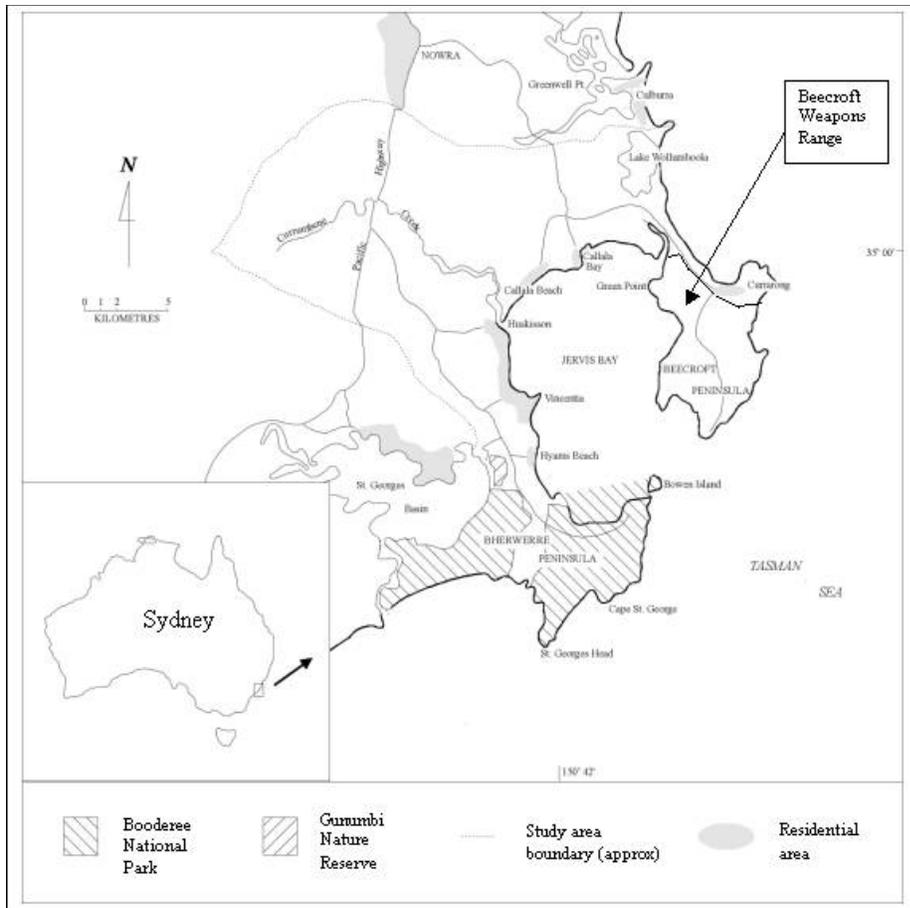
A sound approach to planning the future of biodiversity requires the development of an integrated regional planning framework that has a number of components: access to a consolidated and agreed body of scientific information, the formation of strategic alliances between key stakeholders, an agreed planning process for engaging key stakeholders, a clear statement of the future land use options for the region, and a framework for implementing and reviewing decisions (Possiel et al. 1995). Without such a framework decision-making will be piecemeal and unchecked, and the future of the elements of biodiversity (genes, species and ecosystems or habitats) will be highly vulnerable to development pressures.

This paper discusses the issues of *ad hoc* planning decisions, the application of environmental information (in particular native vegetation information) and strategic regional planning in the Jervis Bay region over the last 10 years. A regional planning exercise commenced in the early 1990s (Centre for Coastal Management 1992) and finalised in 1996 (New South Wales Department of Planning and Urban Affairs 1997). The aim of that exercise was to achieve a balance between biodiversity conservation and urban development. Recent planning decisions are reviewed to assess whether that aim was achieved. The influence vegetation information played in determining the landscape future of the region is also discussed.

### **Jervis Bay region**

Jervis Bay is situated on the southeast coast of New South Wales, Australia, approximately 200 kilometres south of Sydney (Figure 1). The Jervis Bay region occupies an area of 42,688 hectares. A number of studies have recognised the area as having high natural and cultural values (Australian Conservation Foundation 1990, Centre for Coastal Management 1992, New South Wales Department of Planning and Shoalhaven City Council 1992, Cho et al. 1995). The area is inherently rich in the diversity of biotic communities and also supports a diversity of species that are either rare or close to their geographic range limits (Mills 1993). Mills (1993) mapped 33 Vegetation Communities and grouped these into six Vegetation Complexes (Appendix 1). These natural values derive from the region's natural geomorphology and biogeography, and from historic land use that left the region with much of its native vegetation intact. The region's predominantly natural landscape values, its proximity to large population centres, the availability good quality roads and accommodation have been some of the reasons for Jervis Bay attracting almost one million tourists annually (Cho 1995).





**Fig. 1.** The extent of conservation management mechanisms and urban areas in the Jervis Bay region in the early 1990s.

### Regional planning issues

The region has historically provided a focus for forestry, agricultural enterprises, tourism and defence land use activities (Australian Conservation Foundation 1990). Despite these uses the region has largely remained undeveloped except for the environs of Nowra located 20 kilometres to the north.

Since the early 1980s increasingly larger numbers of visitors have come to the region for recreation, holiday accommodation and opportunities for permanent urban settlement. In addition, there has also been a number of major development and infrastructure proposals including a steel mill, nuclear power station and relocation of naval facilities, although these developments did not proceed (Australian Conservation Foundation 1990, New South Wales Department of Planning and Shoalhaven City Council 1992). A number of sites have been proposed for conservation management largely as a reaction to the ongoing threat of urban expansion in the region. Although a number of protected areas have been established they protect only small elements of the rich variety of species and habitats in the region (Mills 1993). While these efforts were positive for biodiversity conservation, they lacked a context within an integrated regional planning framework and hence did little to balance the increasing pressure to meet the demand for urban expansion in the region.

In the late 1980s there was also a growing national awareness that pressures of piecemeal development were threatening the natural and cultural values of Australia's coastal zone (House of Representatives Standing Committee on Environment, Recreation and the Arts 1991). Taken in the national context, Jervis Bay represented yet another example of *ad hoc* development activities along the coastal margin. Jervis Bay was the focus of a number of major infrastructure development

proposals and ongoing and unchecked urban expansion (Australian Conservation Foundation 1990). Pressures like those experienced at Jervis Bay triggered a national Commonwealth-State inquiry into the use of the coastal zone. That inquiry identified a fundamental need for an integrative approach to planning and managing the nations coastal resources (House of Representatives Standing Committee on Environment, Recreation and the Arts 1991). In the mid to late 1980s the Federal Government also undertook an extensive investigation of the Jervis Bay region with a view to relocating the Naval Fleet Base and Armaments Depot from Sydney to the region (House of Representatives Standing Committee on Environment and Conservation 1986, Sinclair, Knight and Partners 1990).

In the late 1980s the region had three protected areas: Gurumbi Nature Reserve, Abrahams Bosom Reserve, and Bherwerre Peninsula (now Booderee National Park) (Table 1). The region also had a number of other 'off reserve' conservation measures including State Environmental Planning Policies (SEPPs) for wetlands and rainforests (Mills 1993) and Beecroft Peninsula Weapons Range (Department of Defence Estate Organisation 1999) (Table 1). Mills (1993) noted that while these measures contributed to conservation these protected areas were inadequate for the long-term protection of the region's variety of habitats (Vegetation Communities) and species. What was needed was integrated framework for sustainable development within the region.

**Table 1.** Conservation management outcomes arising from strategic environmental planning in the Jervis Bay before and after 1992.

Year	Conservation Management Mechanisms	Number of Mills (1993) Vegetation Communities in each land management category	Total areas (Ha)
	<b>Strict Protected areas</b>		
Pre 1992	a) Gurumbi Nature Reserve	2	156
	b) Abrahams Bosom Reserve	7	197
	c) Bherwerre Peninsula (now Booderee National Park)	13	6297
1992-95	d) Stage 1 NSW Jervis Bay National Park	17	1155
1998-99	e) Stage 2 NSW Jervis Bay National Park	23	2600
	<b>'Off reserve' mechanisms for conserving biodiversity</b>		
Pre 1992	g) Beecroft Peninsula Weapons Range	19	4576
	h) SEPP14 Coastal Wetlands	18	1373
	i) SEPP 26 Littoral Rainforests	1	51
1997	j) Habitat corridors (Clause 14) JBREP 1996	12	4172
	k) Habitat corridors (Clause 15) JBREP 1996	8	330
1999	<i>Natural vegetation not managed for conservation</i>		7300
1999	<i>Non natural vegetation</i>		13137
	Total		42,688

JBREP = Jervis Bay Regional Environmental Plan 1996

SEPP = State Environmental Planning Policies



At the regional level the burgeoning demand for urban development led the community to raise concerns about the lack of an integrated approach to regional planning in the Jervis Bay region (Australian Conservation Foundation 1990, Centre for Coastal Management 1992).

### **Integrated regional planning: the process used**

In response to the continuing threats to the future maintenance of species and habitats (vegetation) posed by the threat of rapid urban expansion, the Commonwealth, State and local governments in consultation with industry groups, indigenous peoples and the wider community undertook an extensive planning exercise between 1990 – 1996. During this period three planning processes played a major role in determining the future landscape of the region: the 'Jervis Bay Conservation Strategy' (Centre for Coastal Management 1992); the Jervis Bay Regional Planning Exercise (New South Wales Department of Planning and the Shoalhaven City Council 1992); and the Jervis Bay Regional Environmental Plan 1996 (New South Wales Department of Urban Affairs and Planning 1997).

The first planning process, the 'Jervis Bay Conservation Strategy' was funded by the Commonwealth Government in 1990, which had as its aim compilation of the available scientific information and the discussion of a range of future management scenarios (Centre for Coastal Management 1992, Dutton et al. 1994). A key outcome of the project was to identify a preferred option, and a planning and management framework for achieving a balance between conservation and development. The preferred option was that of 'Sustainable Multiple Use' (Option 5 in Centre for Coastal Management 1992).

The second planning process, 'Our Heritage our Future', was part of the Jervis Bay Regional Planning Exercise (New South Wales Department of Planning and the Shoalhaven City Council 1992). The State Minister for Planning initiated this in response to the vigorous public debate that ensued in the community over concerns about issues of threats to the region's natural and cultural values. The aims of that planning process were to resolve these land use issues and develop clear future planning policies for the region. The Planning Exercise involved the three levels of government (Commonwealth, State and local) working together with other stakeholders to establish a comprehensive framework for future land management. This process invited public submissions on the discussion paper 'Our Heritage our Future'. Information from the Jervis Bay Conservation Strategy (Centre for Coastal Management 1992) was made available during the Regional Planning Exercise.

The discussion paper 'Our Heritage our Future' highlighted the need to establish a future vision for the region, to adopt agreed planning objectives and to use existing land management mechanisms to establish an acceptable regional management strategy. The discussion paper suggested that adopting two approaches could protect the region's natural and cultural heritage values. First, manage the region as a watershed or catchment (see study area boundary in Figure 1) to ensure that the quality of its waters is maintained, and second protect and manage areas identified as "land containing natural features of intrinsic value". These values were set in the context of people needing to continue to use the region's natural resources and to enjoy the environment of the region.

Information compiled during the 'Jervis Bay Conservation Strategy' was included in the discussion paper 'Our Heritage our Future'. In particular there was a close relationship between the 'Proposed Areas for Conservation and Urban Development' (map 18 in New South Wales Department of Planning and the Shoalhaven City Council 1992) and the preferred option in the Conservation Strategy (Figure 36 in Centre for Coastal Management 1992). The "Proposed Areas for Conservation" in map 18 were delineated using two strategies.

The strategy underlying the proposal to conserve land containing natural features of intrinsic value was aimed at expanding the system of protected areas (i.e. Beecroft Peninsula Weapons Range (managed as a defacto protected area) and Jervis Bay National Park (now Booderee National Park)) by identifying additional areas of natural vegetation and sites of high habitat conservation value for species (Nodal Reservation in Centre for Coastal Management 1992). Nodes were identified using maps of natural vegetation and data on flora and fauna (Mills 1991, Centre for Coastal Management 1992). These areas coincided with State Environmental Planning Policies (SEPPs 14 and 26) and Crown Lands for which the preferred land-use was conservation management were delineated as



potential future protected areas.

The strategy underlying the proposal to manage parts of the region as Habitat Corridors was aimed at complementing the system of protected areas. The management of these areas was to be regulated multiple-use with conservation being an important but not the primary management objective.

Information on natural vegetation and riparian “buffer” strips along all perennial creeks and the Bay foreshore were used to delineate Habitat Corridors (Mills 1993). Corridors were accepted as a major element in the overall conservation strategy for Jervis Bay as they provided the linkages within the landscape matrix between lands managed primarily for conservation values and land managed for other purposes (New South Wales Department of Planning and the Shoalhaven City Council 1992).

The third planning process ‘Jervis Bay Regional Environmental Plan 1996’ (New South Wales Department of Urban Affairs and Planning 1997) represents a negotiated solution among the region’s stakeholders to many of the issues raised in the discussion paper ‘Our Heritage our Future’. That Plan formally zoned much of the land identified as having natural features of intrinsic value that were held either in a few freehold ownerships or by the Crown and certain Vacant Crown lands (Zone 8b), as Proposed National Park. In March 1985, just prior to the New South Wales State elections, the State Government gazetted as National Park some areas of the Crown lands. These lands were shown as National Park (Zone 8a) in the Regional Environmental Plan (New South Wales Department of Urban Affairs and Planning 1997). The Plan also identified the area and the future management requirements for the habitat corridors. Ownership of the land identified as potential habitat corridors was held amongst public authorities, private landholders and by the local government.

### **Measuring the conservation outcomes**

Gains for biodiversity conservation can be measured by tracking over time the beneficial changes in land tenure and planning controls that result in the protection of planning targets e.g. vegetation complexes and species (Noss and Cooperrider 1994). For example a beneficial change in land tenure is where the ownership changes from freehold to National Park. A positive change for conservation would also include the introduction of planning controls, which prevent large areas of vegetation cover/habitat from the being damaged, degraded or removed on freehold land.

The following section discusses the progressive gains for biodiversity management that have been made in the region before and after 1992. Gains are discussed using strict protected areas and other effective means for conservation management (IUCN 1994). Gains are assessed using the 33 Vegetation Communities mapped by Mills (1993) where each Community listed in **Appendix 1** represents a target for conservation.

### **Strict protected areas**

National Parks and other reserves before 1992

Prior to 1992 three protected areas had been established in the region: Gurumbi Nature Reserve; Abrahams Bosom Reserve, and Bherwerre Peninsula (now Booderee National Park). Table 2 shows these three protected areas contain 12 of the 33 Vegetation Communities.



**Table 2.** Number of Vegetation Communities protected before and after 1992 in strict protected areas.

Vegetation Complexes and number of Vegetation Communities *	Representation of Vegetation Communities	Pre 1992 (a, b, c)	1992-95 Stage 1 NSW JBNP (d)	1998-99 Stage 2 NSW JBNP (e)	Total number of Vegetation Communities protected in each Vegetation Complex
Coastal Complex (6) [1.1/1.2, 1.3, 1.3/1.4, 1.4, 1.5, 1.6]	First sampled	1.3, 1.4, 1.6		1.1/1.2, 1.5	5 out of 6
	Resampled		1.4, 1.6	1.3, 1.4	
Estuarine Complex (5) [2.1, 2.2, 2.3, 2.1/2.3, 2.2/2.3]	First sampled	-	2.1, 2.2, 2.3	2.1/2.3	4 out of 5
	Resampled			2.1, 2.2, 2.3	
Coastal Lowland Complex (9) [3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9]	First sampled	3.1, 3.2, 3.4, 3.9	3.3	3.7, 3.8	7 out of 9
	Resampled		3.2, 3.4, 3.9	3.1, 3.2, 3.3, 3.4, 3.9	
Sandstone Complex (6) [4.1, 4.2, 4.3, 4.4, 4.5, 4.6]	First sampled	4.2, 4.3, 4.4, 4.5	4.1	4.6	6 out of 6
	Resampled		4.2, 4.3, 4.4,	4.2, 4.3, 4.4, 4.5	
Hinterland Forests Complex (6) [5.1, 5.2, 5.3, 5.4, 5.5, 5.6]	First sampled		5.2, 5.3, 5.4		3 out of 6
	Resampled			5.2, 5.3, 5.4	
Beach Sand/ Rock Platform	First sampled	1			1 out of 1
	Resampled		1		
Totals		12	8 (new) 9 (resampled)	6 (new) 17 (resampled)	26 of 33

a) Gurumbi Nature Reserve, b) Abrahams Bosom Reserve, c) Bherwerre Peninsula (now Booderee National Park)

\* Appendix 1 for a description of the Vegetation Communities in each Vegetation Complex.

NSW JBNP = New South Wales Jervis Bay National Park

#### National Parks and other reserves after 1992

In late 1992 land identified as having intrinsic natural value (New South Wales Department of Planning and Shoalhaven City Council 1992) formed the strategic basis on which the New South Wales Government moved to establish the Jervis Bay National Park (NSW). The proposed national park was approximately 6000 hectares and included vacant crown lands and freehold land. In the mid-1990s the New South Wales Government commenced negotiations with the primary freehold landowner in the region with the aim of purchasing about 3,000 hectares.

In March 1995 the New South Wales Government gazetted 1155 hectares. This area comprised vacant crown lands and incorporated Gurumbi Nature Reserve (Table 1). Table 2 shows that Stage 1 added 17 Vegetation Communities, 8 of which were not previously represented in protected areas. In June 1998 the New South Wales Government acquired a further 2,600 hectares of freehold land. These land parcels were gazetted as additions to Jervis Bay National Park in September 1999. Table 2 shows that Stage 2 added 23 Vegetation Communities, 6 of which were not previously represented in protected areas.

The system of strict protected areas established represents the core strategy for conserving biodiversity in the region. Protected areas are where the land tenure is secure and the primary management objective is the protection of biodiversity. Strategic reserve selection over the period 1992-1999 has added 14 new vegetation communities to the 12 that were represented in 1992. The total number of vegetation communities represented in strict protected areas in 1999 stands at 26 of the 33 Vegetation Communities (Table 2). Additional areas of Crown lease lands (zoned as 8b lands) are being negotiated for inclusion in the Jervis Bay National Park but are the subject of an Aboriginal land claim. As such these lands, and the vegetation communities they contain, have not been included in these analyses.

### **Other effective mechanisms for conservation management**

#### Planning controls before 1992

Prior to 1992 the region lacked a spatially integrated policy framework for regulating land management practices which had the potential to modify or remove native vegetation / species habitats. Without such a framework the risk over time was that excessive clearing and modification of the natural vegetation for urban and rural development could isolate the strict protected areas from the surrounding habitats and species populations. Through the Jervis Bay Conservation Strategy (Centre for Coastal Management 1992) an integrated series of habitat/ wildlife corridors were proposed to overcome this deficiency.

Prior to commencing the Jervis Bay Conservation Strategy the region had three 'off reserve' mechanisms for managing biodiversity including the majority of Beecroft Peninsula Weapons Range, managed essentially as a protected area to provide a public safety buffer around the target areas, SEPP 14 Coastal Wetlands and SEPP 26 Littoral Rainforests. Table 1 shows that these three mechanisms each represented 19, 18 and 1 Vegetation Communities respectively. Several of the vegetation communities listed as SEPP 14 and 26 management measures are the same wetlands and rainforest patches found on Beecroft Peninsula Weapons Range.

#### Planning controls after 1992

Through the Jervis Bay Regional Environmental Plan 1996 (New South Wales Department of Urban Affairs and Planning 1997), land identified as habitat corridors were proclaimed in 1997. This planning mechanism provides another effective means for managing the region's natural vegetation and habitats and species populations. The Plan identifies two types of habitat corridors: those which have a high level of biological integrity and those which have potential to act as a habitat corridor but which contain disturbed vegetation (see Clause 14 and Clause 15 Table 1).

Under Clause 14 land parcels zoned as habitat corridors require a developer/ landholder who proposes to clear, thin or modify the natural vegetation to apply to the Shoalhaven City Council for a 'development application'. Where a development proposal is approved the developer is required to minimise damage to the natural vegetation cover and species composition both at the site and in the vicinity of the development. Where the vegetation has been disturbed during the construction phase the developer is required to rehabilitate the site with species which naturally occur in the local area. Corridors defined under Clause 15 require additional rehabilitation because some of the corridor has been degraded prior to the Plan being proclaimed.

Table 3 shows that habitat corridors established under Clause 14 contain 13 Vegetation Communities, 4 of which were not previously represented by the existing 'off reserve' mechanisms. Habitat corridors established under Clause 15 contain 8 Vegetation Communities, none of which were previously represented by the existing 'off reserve' mechanisms.



**Table 3.** Number of Vegetation Communities managed before and after 1992 by 'off reserve' mechanisms.

Vegetation Complexes and number of Vegetation Communities *	Representation of Vegetation Communities	Pre 1992 (g, h, i)	After 1997 Habitat Corridors		Total number of Vegetation Communities managed in each Complex
			Clause 14#	Clause 15#	
Coastal Complex (6) [1.1/1.2, 1.3, 1.3/1.4, 1.4, 1.5, 1.6]	First sampled	1.1/1.2, 1.3, 1.3/1.4, 1.4, 1.6			5 out of 6
	Resampled		1.4		
Estuarine Complex (5) [2.1, 2.2, 2.3, 2.1/2.3, 2.2/2.3]	First sampled	2.1, 2.2/2.3, 2.2, 2.3,			4 out of 5
	Resampled		2.1, 2.2, 2.3,		
Coastal Lowland Complex (9) [3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9]	First sampled	3.1, 3.2, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9	3.3		9 out of 9
	Resampled		3.2, 3.9	3.2, 3.3	
Sandstone Complex (6) [4.1, 4.2, 4.3, 4.4, 4.5, 4.6]	First sampled	4.2, 4.3, 4.4, 4.5			4 out of 6
	Resampled		4.2	4.2, 4.3	
Hinterland Forests Complex (6) [5.1, 5.2, 5.3, 5.4, 5.5, 5.6]	First sampled	5.2, 5.4	5.1, 5.3, 5.5		5 out of 6
	Resampled		5.2, 5.4	5.2, 5.3, 5.4	
Beach Sand/ Rock Platform	First sampled	1			1 out of 1
	Resampled				
Totals		24	4 (new) 9 (resampled)	0 (new) 8 (resampled)	28 of 33

g) Beecroft Peninsula Weapons Range, h) SEPP14 Coastal Wetlands, i) SEPP 26 Littoral Rainforests

\* Appendix 1 for a description of the Vegetation Communities in each Vegetation Complex.

# New South Wales Department of Urban Affairs and Planning (1997)

Proclamation of the habitat corridors has added 4 new vegetation communities to the system of 'off reserve' mechanisms for managing biodiversity in the region. 'Off reserve' mechanisms manage 28 of the region's 33 vegetation communities.

### Integrating conservation management mechanisms

Prior to 1992 approximately 42 per cent of the region's natural vegetation Jervis Bay region was set aside for the conservation of biodiversity through strict protected areas (22 per cent) and by 'off reserve' mechanisms for biodiversity conservation (20 per cent). By 1999 this had increased to 75 per cent (29,550 hectares) of the region's natural vegetation which is managed through strict protected



areas 40% (11,801 hectares) and via 'off reserve' mechanisms cover 35 per cent (10,450 hectares).

In terms of Mills (1993) Vegetation Complexes, Table 4 shows that all six Vegetation Complexes, including Beach Sand/ Rock Platform, were represented in strict protected areas in 1999 compared with only four in 1992. This compares with all six Vegetation Complexes being represented in 1992 by 'off reserve' mechanisms for biodiversity conservation.

**Table 4.** Progressive accumulation of the 33 Vegetation Communities before and after 1992 via strict protected areas and 'off reserve' mechanisms for managing biodiversity.

Vegetation Complexes	Strict Protected Areas				'Off reserve' mechanisms for managing biodiversity			Vegetation Communities managed by either mechanisms
	Pre 1992	92-95 Stage 1 NSW JBNP	98-99 Stage 2 NSW JBNP	Cumulative Total Strict Protected Areas	Pre 1992	1997 Habitat Corridors	Cumulative Total Other Mechanisms	
1. Coastal Complex (6)	3	0	2	5	5	0	5	6
2. Estuarine Complex (5)	0	3	1	4	4	0	4	5
3. Coastal Lowland Complex (9)	4	1	2	7	8	1	9	9
4. Sandstone Complex (6)	4	1	1	6	4	0	4	6
5. Hinterland Forests Complex (6)	0	3	0	3	2	3	5	5
Beach Sand/ Rock Platform (1)	1	0	0	1	1	0	1	1
Total	12	8	6		24	4		
Cumulative Totals	12	20	26	26	24	4	28	32

NSW JBNP = New South Wales Jervis Bay National Park

In terms Vegetation Communities mapped by Mills (1993), Table 4 shows that of the 33 Vegetation Communities, including Beach Sand/ Rock Platform, 12 were represented in strict protected areas in 1992, 20 in 1995 and 26 in 1999. These compare with 24 Vegetation Communities represented in 1992 and 28 in 1999 by 'off reserve' mechanisms for managing biodiversity. Only one Vegetation Community 5.6 is not represented by either strict protected areas or by 'off reserve' mechanisms.

## Discussion

The natural values of the Jervis Bay region are significant and have been recognised at international, national, regional and local levels (New South Wales Department of Planning and the Shoalhaven City Council 1992, Cho et al. 1996). Threats to the integrity of these values in the 1980s and early 1990s caused by unchecked and piecemeal urban development resulted in prolonged and vigorous public debate in the community. The much-needed impetus to move the debate to a more rational planning process came in 1990 when the State Minister for the Department of Urban Affairs and Planning intervened and initiated a regional planning exercise (New South Wales Department of Planning and the Shoalhaven City Council 1992). The purpose of that planning exercise was to seek a balance between conservation and development, without compromising the region's intrinsic natural and cultural values.

Where development pressures and land use decisions emphasise economic values over natural values, generally there are losses and/or declines in habitat and native species (Brunckhorst In Press). Where community stakeholders take a stand against piecemeal development pressures,

natural and cultural values are more likely to be protected. The future of biodiversity conservation must be linked to sustainable development at regional levels (Dudley et al. 1999).

Possiel et al. (1995) and Steinitz et al. (1996) outline components for developing an integrated approach for regional planning. These components include: access to a consolidated and agreed body of scientific information, the formation of strategic alliances, an agreed planning process for engaging key stakeholders, a clear statement of the future land use options for the region, and a framework for implementing and reviewing decisions. Stakeholders communities are already starting to exercise a preference for working together to implement such strategic regional planning frameworks to achieve sustainable futures for their land and water resources, and in many cases this includes protected areas (Bradstock et al. 1995, Hale and Lamb 1997, Thackway and Olson 1999). This philosophy of approach stresses the concept of bioregional planning – which includes social, cultural and economic values alongside ecological ones (Dudley et al. 1999, Brunckhorst In Press).

The Jervis Bay case study described above involves an integrated regional planning framework, the components of which include:

- the consolidation of an agreed body of scientific information (Braithwaite et al. 1988, Australian Conservation Foundation 1990, Centre for Coastal Management 1992, New South Wales Department of Planning and the Shoalhaven City Council 1992, Mills 1993);
- a clear statement of the future land use options for the region ('Our Heritage Our Future', New South Wales Department of Planning and the Shoalhaven City Council 1992);
- the formation of strategic alliances between key stakeholders. Stakeholders across all sectors were committed to developing appropriate strategies, policies and plans to protect the significant natural qualities of the area and to achieve a balanced approach to development and conservation (New South Wales Department of Planning and the Shoalhaven City Council 1992). Stakeholders included all levels of government (Commonwealth, State, Territory and local government), community groups and indigenous people;
- an agreed procedure for engaging key stakeholders through public submissions on the discussion paper 'Our Heritage Our Future';
- the development of a Regional Environmental Plan in 1996 (New South Wales Department of Urban Affairs and Planning 1997);
- a framework for implementing and reviewing land development proposals and decisions, through the 'The Environmental Plan 1996'; and
- acquisition of freehold land to further increase the representativeness of the vegetation complexes and vegetation communities in protected areas

This consultative process has established an integrated policy framework for achieving sustainable development in the region and a balance between conservation and urban development. The pending threat of creating 'islands' of protected habitat on the two peninsulas, Beecroft and Bherwerre that appeared likely in the late 1980s and early 1990s has been averted. 'The Environmental Plan 1996' has established the mechanisms for resolving conflicts in the future which threaten the survival and maintenance of the region's significant habitats (vegetation complexes) and native flora and fauna. All the key stakeholders have supported development of that policy framework, and the conservation outcomes that have arisen as a result of its implementation.

The system of protected areas is still being established in accordance with the 'Jervis Bay Regional Environmental Plan 1996'. These conservation planning activities involve resolving issues associated with those vacant Crown Lands (approximately 2,200 hectares) which are subject to Aboriginal Land Claims. In addition the representation of forest communities of the Jervis Bay area are being examined within a larger regional context of the New South Wales South Coast Regional Forest Agreement.

Through an integrated approach to the conservation of a comprehensive sample of all vegetation



communities and significant species in the region, the two headlands (Beecroft Peninsula and Bherwerre) have been linked through the establishment of the NSW Jervis Bay National Park. The network of habitat corridors not only also links these habitats but provides the landscape matrix, to facilitate the movement of species from the core-protected areas to the large areas of natural forests to the west of the Bay. The corridors include internationally significant wetlands that provide habitat and feeding areas for a number of birds protected by international agreements.

Because the system of protected areas and the system of 'off reserve' mechanisms represent most vegetation communities there is extensive complementarity in the two systems. Some Vegetation Communities are represented at least 4 times, either in the system of protected areas and/or through 'off reserve' mechanisms including, Vegetation Communities 1.4, 2.1, 2.2, 3.4, 3.9, 4.2, 4.3, 4.4, 5.2 and 5.4.

The high level of protection afforded 32 of the 33 Vegetation Communities both in strict protected areas and in the system of 'off reserve' mechanisms demonstrate the commitment of stakeholders including governments and the community to achieving a sustainable future for the region.

### **Influence of vegetation information on planning outcomes**

The influence vegetation data and information has had on determining the policies documented in the 'The Regional Environmental Plan 1996' cannot be underestimated. Vegetation and species information has played a major role in determining the conservation decisions and outcomes for the region. Regional vegetation mapping has provided much of the scientific basis used in the design of a bioregional approach to conservation of the habitats and species in the region in concert with sustainable development. Other vegetation surveys, which have also been undertaken in the region, include more detailed surveys in selected areas (Skelton and Adams 1994, and Braithwaite et al. 1996), and the larger study area of the south coast of New South Wales as part of the Regional Forest Assessment process. While these other vegetation information products have been used to address particular biodiversity and sustainable development objectives in the region, none have influenced the future landscape of the region as much as Mills (1993).

Vegetation information has been vital for identifying areas of the region, which should be included in the proposed New South Wales Jervis Bay National Park and Habitat Corridors. References in 'The Regional Environmental Plan 1996' to vegetation cover, habitats and species composition can be traced back to the 'Jervis Bay Conservation Strategy' (Centre for Coastal Management 1992), where vegetation related information provided a major input in designing future land use options for the region. Examples of these linkages include:

- A strong linkage between the "Proposed conservation areas" (New South Wales Department of Planning and the Shoalhaven City Council 1992) and the sound ecological analyses underpinning the need to protect representative samples of the vegetation and to provide a continuity of habitat between the two headlands and linkages to the hinterland 9 Strategy' (Centre for Coastal Management 1992).
- A demonstrated link between science and policy where the vegetation information presented in the preferred land use option in the 'Jervis Bay Conservation Strategy' (option 5 in Centre for Coastal Management 1992) mirrors the "Proposed conservation areas" in the 'The Regional Environmental Plan 1996' (Map 18 in New South Wales Department of Urban Affairs and Planning 1997).

The gains made for conserving biodiversity within the context of sustainable development are consistent with the principles of Ecologically Sustainable Development (Commonwealth of Australia 1992) and the National Strategy for the Conservation of Biological Diversity (Commonwealth of Australia 1996). The Jervis Bay region case study demonstrates that these principles have been effectively and efficiently implemented through the development of the 'The Regional Environmental Plan 1996'. The Plan also makes provision for the establishment and effective management of conservation reserves and complementary management of adjoining areas has been realised. The planning exercise has had strong stakeholder support. Awareness of the stakeholder support in 1992



saw the New South Wales Government move to establish Stage 1 of the New South Wales Jervis Bay National Park five years before the 'Plan' was gazetted in 1997.

### **Conservation management**

Selection and designation of areas for biodiversity conservation are only the start of a long process towards effective management and protection of a region's natural values. A recent review of management effectiveness of areas set aside for their natural values shows that many areas are protected in name only (Dudley et al. 1999). Many of these areas referred to include both strict protected areas and 'off reserve' mechanisms. Many areas set aside for conservation continue to be degraded by illegal use or because governments do not have the resources required for managing these areas effectively (Dudley et al. 1999). These authors show that there is a constant need for government agencies and community groups to be on guard against unchecked and piecemeal decision making which can reduce the ecological contribution of areas set aside for protecting wildlife habitat and the migration routes of species. This requires active on-ground management and regular monitoring of the effectiveness of the designation/s and the management practices. While the issue of the effectiveness of conservation management was beyond the scope of this paper, there is clearly a need to ensure that fragmentation of habitats and inadequate monitoring of on-ground management do not erode gains described above. Potentially the greatest risks to the future maintenance of biodiversity occur in those areas that do not have plans of management that are publicly accountable. An obvious gap in this regard are the areas designated as habitat corridors because these designations occur largely on private land and are not required to develop publicly accountable plans of management.

Through the region's system of protected areas and 'off reserve' mechanisms for conserving biodiversity, and the strong alliances between stakeholders, the region is ideally suited as a Biosphere Reserve. A proposal to establish the region as a Biosphere Reserve was put forward in 1995 in the *Southern Highlands/Illawarra Regional Ecotourism Workshop* (Pollard and McClymont 1996). The Biosphere Reserve concept was formulated to wed conservation and sustainable development and has been developed and championed under the UNESCO Man and the Biosphere Program (MAB). A regional conference is planned in 2000 to explore developing the Jervis bay Region as a biosphere reserve. The combination of the Biosphere Reserve concept with the protected area categorisation of the IUCN protected areas provides a powerful tool for further enhancing the region's valuable natural and cultural values.

### **Conclusions**

The Jervis Bay Regional Environmental Plan 1996 is an example of a successful partnership between multiple stakeholders who have worked together over a ten year period to establish a policy framework for balancing the future needs for biodiversity conservation and urban development. Scientific data and information, in particular vegetation and species information have played a key role in determining these outcomes.

The Jervis Bay region represents of a bioregional approach where the protected areas have been established along with a network of habitat corridors. Through implementing a strategic planning process the risk that the two peninsulas, Booderee National Park and Beecroft Peninsula Weapons Range, would become isolated as a result of piecemeal urban expansion around the Bay has been prevented. The complementary conservation management between the Booderee National Park, New South Wales Jervis Bay National Park (located adjacent to the foreshore of the Bay) and Beecroft Peninsula Weapons Range is a successful and valuable outcome of this planning process. These core conservation areas have been connected through a series of habitat corridors with the forests to the west of the region.

A key issue to face the region's stakeholders will be whether the areas set aside to conserve significant natural and cultural values are effectively managing the values for which these areas were established. One option for integrating these values and ensuring sustainable resource management is to establish the region as a Biosphere Reserve. Investigations are under way to transfer the



management of the New South Wales Jervis Bay National Park to the local indigenous people. Establishing the region as a Biosphere Reserve would provide an effective mechanism for integrating the range of social, cultural, economic and biodiversity issues that face the future of the region.

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## Appendix 1

Six Vegetation Complexes and Vegetation Communities mapped and described for the Jervis Bay Region (Mills 1993).

### Map unit and structure

#### Coastal Complex

- 1.1/1.2 Grassland – Shrubland
- 1.3 Woodland Shrubland
- 1.3/1.4 Woodland Shrubland / Open Forest – Woodland

1.4 Open Forest – Woodland

1.5 Low woodland

1.6 Woodland

#### Estuarine Complex

- 2.1 Herbland – Shrub (saltmarsh)
- 2.1/2.3 Herbland – Shrub (saltmarsh)/Forest – Woodland
- 2.2 Woodland – Shrub (mangrove)
- 2.2/2.3 Woodland – Shrub (mangrove)/Forest- Woodland

2.3 Forest – Woodland

#### Coastal Lowland Complex

3.1 Closed Forest (Littoral Rainforest)

3.2 Forest – Woodland

3.3 Forest Woodland

3.4 Forest to Tall Forest

3.5 Forest with Closed forest

3.6 Open Forest

3.7 Low Woodland

3.8 Shrubland-Heathland

3.9 Heathland – Sedgeland

#### Sandstone Complex

4.1 Closed Forest (Rainforest)

4.2 Woodland – Open Woodland

4.3 Heathland – Mallee

4.4 Sedgeland – Heathland

4.5 Open Heathland – Shrubland

4.6 Heathland

#### Hinterland Forest Complex

5.1 Tall Forest

5.2 Tall Forest - Forest

5.3 Tall Forest- Forest

5.4 Open Forest

5.5 Open Forest

5.6 Low closed forest-scrub

#### Beach Sand/Rock Platform

### Main species

Spinifex sericeus - Acacia sophorae  
Banksia integrifolia - Leptospermum laevigatum  
Banksia integrifolia - Leptospermum laevigatum /  
Eucalyptus botryoides

Eucalyptus botryoides  
Eucalyptus botryoides Banksia serrata  
Eucalyptus gummifera Banksia serrata

Sarcocornia, Suaeda, Sporobolus, Wilconia  
Sarcocornia, Suaeda, Sporobolus, Wilconia /  
Casuarina glauca  
Avicennia marina – Aegiceras corniculatum  
Avicennia marina – Aegiceras corniculatum /  
Casuarina glauca  
Casuarina glauca

Ficus obliqua, podocarpus, Acemia smithii  
Eucalyptus robusta, Casuarina glauca  
Eucalyptus longifolia, Melaleuca species  
Eucalyptus pilularis  
Syncarpia glomulifera  
Eucalyptus paniculata, Eucalyptus longifolia,  
Angophera floribunda  
Eucalyptus gummifera, Banksia paludosa  
Callistemon linearis, Kunzea ambigua  
Melaleuca ericifolia

Ceratopetalum apetalum, Backhousia myrtifolia,  
Tristaniopsis laurina  
Eucalyptus sclerophylla, Eucalyptus gummifera  
Banksia ericifolia, Allocasuarina distyla  
Gymnoschoenus, Restio complanatus,  
Chorizandra  
Allocasuarina distyla, Banksia ericifolia  
Leptospermum epacridoideum, Acacia  
subtilinervis

Eucalyptus saligna  
Eucalyptus maculata, Eucalyptus paniculata  
Eucalyptus pilularis  
Eucalyptus sclerophylla, Eucalyptus gummifera  
Eucalyptus tereticornis, Angophera floribunda  
Tristaniopsis laurina, Backhousia myrtifolia

