SUPPLEMENTARY
STATE OF THE ENVIRONMENT REPORT
FOR THE CITY OF BLUE MOUNTAINS

Looking After Our Biodiversity, Land and Atmosphere

2005-2006

blue mountains City Council

Blue Mountains City Council acknowledges that the City of the Blue Mountains is located on the traditional lands of the Darug and Gundungurra Nations

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Why report on the state of the environment?

Many communities locally and globally now recognise that humans and their activities impact on the **state** of their immediate environment and their natural surroundings. These human activities place **pressure** on our natural environment and therefore require a **response,** so that we can maintain and enhance the natural assets on which our quality of life depends. Monitoring and reporting on the **state** of the environment over time increases our understanding of these **pressures** and their impacts, which enables us to **respond** more appropriately and effectively.

Reporting on the state of the environment ensures that important information is made available to those people and organisations whose activities impact on the environment positively or negatively. Local councils have an important responsibility and are required under the Local Government Act to prepare State of the Environment Reports and to show in their Management Plans and Annual Reports how they, as stewards of their local communities, are addressing the issues raised in the State of the Environment Reports.

Comprehensive State of Environment reports are required every four years, with supplementary reports providing updates in the intervening years. The following table outlines Reports that are now available and those Reports that are planned for the next few years.

Reporting Year	**Type of Report**	**Available**
2003-2004	Comprehensive	Now available
2004-2005	Supplementary *Looking After Our Water*	Now available
2005-5006	Supplementary *Looking After Our Biodiversity, Land and Atmosphere*	February 2007
2006-2007	Supplementary *Managing Our Heritage, Waste and Noise*	December 2007
2007-2008	Comprehensive	December 2008

Who can use the State of the Environment Reports?

Individuals and communities, councils, government agencies and industry can all gain access and use the reports. That is, all the people and organisations whose activities impact on the environment positively or negatively can use this report to make informed, environmentally responsible decisions.

About this Report

This supplementary Report focuses on our Biodiversity, Land and Atmosphere. Information on each of these natural assets is presented in the context of the State – Pressure - Response model. Each resource is described in its current state along with the associated pressures and responses, as outlined in the table below.

Section 1 – Biodiversity as a Natural Asset	What are biodiversity resources (Asset description)? What are the pressures on biodiversity (Pressure)? What is the current state of biodiversity (State)? Making a difference (Response). Trend data.
Section 2 – Land as a Natural Asset	What are land resources (Asset description)? What are the pressures on land (Pressure)? What is the current state of land (State)? Making a difference (Response) . Trend data.
Section 3 – Atmosphere as a Natural Asset	What are atmosphere resources (Asset description)? What are the pressures on atmosphere (Pressure)? What is the current state of air (State)? Making a difference (Response). Trend data.

The following information is contained in each section of this Report.

Item	**Description**
Asset description	Describes the natural asset in general and as it occurs in the Blue Mountains Describes why the natural asset is important in terms of values and services
Pressure	Provides a summary overview / analysis of pressures on the asset and where relevant is backed up by reference to trend data
State	Describes the current state or condition of the natural asset
Response	Describes the responses of Council, the community and other agencies towards mitigating the effect of human pressures
Trend data	Trend data to build our understanding of the condition of natural assets and the pressures and responses on our natural assets

Please refer to the comprehensive 2003-2004 State of Environment Report, particularly the Technical Appendix, for more detailed information on Biodiversity, Land and Atmosphere.

Increasing our understanding

Using indicators

State of the Environment reports require councils to identify and apply appropriate environmental indicators where the state – pressure - response model has been used. The model has some acknowledged shortcomings, such as, the implied cycle of cause and effect is simplistic and often there is not clear evidence linking pressures with changes in environmental state or condition. In addition, it is not always easy to categorise indicators as they may reflect aspects of 'pressure', 'state' or 'response' depending on the way the issue is approached.

Understanding trends over time

State of the environment monitoring and reporting in the Blue Mountains is now a key component of the State of City monitoring and reporting, which aims to build understanding about the environmental, social and economic trends (pressure and response) that potentially might influence the condition (or state) of our City over time.

The selected trends in this Report begin to tell some of the story about what's happening to the environment in our City.

Environmental data
"It is still not possible to give a comprehensive national picture of the state of Australia's environment because of the lack of accurate, nationally consistent environmental data. Therefore, the need for an enduring environmental data system remains a high priority if Australia is to measure progress and make sound investments in the country's environmental assets."
From Australia State of Environment 2006 at a Glance

Contents

Acknowledgements

In recent community surveys, our community identified that the environment is of greatest importance to Blue Mountains people. We acknowledge the commitment of those people who for years have dedicated their time and effort to looking after the Blue Mountains environment and we thank those who are making choices to live more sustainably every day.

We also thank those who have contributed to this report.

Introduction

Biodiversity, land and atmosphere are natural assets that are fundamental to the quality of life on earth. Reviewing the State of the Environment reports for the Blue Mountains over a number of years highlights that there have been consistent pressures on these assets, including urban development, stormwater runoff, weed invasion and our increasingly high dependence on cars. These pressures have a negative impact on the condition of these important assets, which are outlined throughout the Report.

Human actions that rely on the burning of fossil fuels (coal, oil and natural gas) and activities like land clearing are increasing the concentrations of greenhouse gases in our atmosphere, which means more heat is trapped around the earth leading to changes in climate. This is known as the greenhouse effect which contributes to global warming. Global warming is widely perceived as one of the most significant international environmental concerns. A discussion about climate change and effective local responses are outlined in Sections 3 and 4 of this Report.

2005-2006 was the first year of the Environmental Levy Program. In recognition of the significant pressures on the unique Blue Mountains environment, Council introduced an Environmental Levy, which raised an additional $1.2 million dollars annually through rate payments. These additional funds allow the implementation of a 10-year remediation and restoration program in addition to existing environmental programs and projects. Tracking the resulting positive environmental outcomes of the Environmental Levy Program will be an important component of State of Environment reporting into the future.

We still have much to learn about complex ecosystems. However, we do know that the way in which we look after our essential natural resources affects the quantity and quality of the environment we and our children will have to survive as healthy human beings.

SECTION 1 BIODIVERSITY AS A NATURAL ASSET

Our Biodiversity Resources

What are biodiversity resources?

The planet contains a vast array of living organisms interacting in complex ways with the natural and built environment. Adjusted to their environments over millions of years, living organisms display an incredible diversity of physical forms, life histories, approaches to survival and roles in relation to each other. Life on earth is intrinsically connected, with human life being dependant on the existence of **diversity and abundance of other organisms – plants, animals and micro-organisms** (biodiversity) functioning in healthy systems (ecosystems). Biodiversity and ecosystems are dynamic even in natural systems. Species evolve and vegetation changes in response to climatic and natural events like fire or flood. Populations of individual species increase and decrease in numbers, in accordance with natural rhythms. Important processes take place at scales and locations that we may not be aware of and may then, undervalue.

The Greater Blue Mountains World Heritage Area … relates an extraordinary story of Australia's antiquity, its diversity of life and its superlative beauty. This is the story of the evolution of Australia's unique eucalypt vegetation and its associated communities, plants and animals. The area does not contain mountains in the conventional sense but is described as a deeply incised sandstone plateau rising from less than 100 metres above sea level to 1300 metres at the highest point. There are basalt outcrops on the higher ridges. This plateau is thought to have enabled the survival of a rich diversity of plant and animal life by providing a refuge from climatic changes during recent geological history. It is particularly noted for its wide and balanced representation of eucalypt habitats from wet and dry sclerophyll, mallee heathlands, as well as localised swamps, wetlands, and grassland. Ninety-one species of eucalypts (thirteen percent of the global total) occur in the Greater Blue Mountains Area. Twelve of these are believed to occur only in the Sydney sandstone region. (From the Greater Blue Mountains Area World Heritage Inscription, 2000)
http://www.deh.gov.au/heritage/worldheritage/sites/blue/

The different geology, soil types, climates and altitudes of the Blue Mountains have combined to produce a high level of diversity among the flora and fauna within the region. An assessment of flora and fauna within the Local Government Area (excluding the National Park) found at least 327 species of native animals and 946 species of native plants present (Smith and Smith, 1995).

There is a large area of protected bushland within the city, with 74% existing as National Park and a total 88% of the land area of the Local Government Area (LGA) protected in some way (including National Park). There are seven distinct habitat types in the Blue Mountains with characteristic associated flora and fauna. These are open forest, woodland, swamp, heath, scattered trees, closed forest (warm temperate rainforest), and open forest. These habitat types occur in distinct locations across the municipality with distribution closely linked to aspect, exposure to the elements, soil types and proximity to water.

Why is biodiversity important?

A diversity of life existing in healthy ecosystems provides a number of 'services' that we rely on - from creating the food we eat, generating the oxygen that we breathe, cleansing water as it passes through streams and rivers, capturing carbon dioxide from the air, keeping soils fertile and balanced, to creating new soil. In fact, our economy and social values which influence our daily life are heavily reliant upon diversity and the environment. The values of biodiversity extend beyond the City boundaries providing national and international benefits. A summary of biodiversity services and values is provided below (EPA, 2003).

Biological control and pollination
Ornamental plants and breeding stock
Genetic diversity
Ecological services
Pest and biological control
Water quality and flow eg salinity control
Clean air and water
Nature-based recreation
Health and lifestyle
Spiritual and cultural traditional owner values
Future resources
Food, medicines, timber and industrial products
Eco-tourism
Nutrient cycling, filtration and storage
Stabilising processes eg weather, climate
Seed dispersal and pollination
Carbon sinks and greenhouse gas absorption
Healthy soils
Visually pleasing aesthetics
Science and education
Cultural identity associated with key species
Record of natural history

What are the pressures on biodiversity?

Land clearing

Many species of plants and animals rely on specific habitats in order to survive. Once these habitats are lost or degraded as a result of development, weed invasion or inappropriate fire regimes, there is usually a significant effect on biodiversity. In recent years, land clearing in the Blue Mountains has been limited to smaller subdivisions and clearings within particular land lots.

All land mangers in the Blue Mountains, including Blue Mountains City Council, have a responsibility under the *Rural Fires Act 1997* to manage bush fire hazards on land under their care and control. This results in land being cleared through prescribed burning and by mechanical means. Council achieves this by mechanical means and through a prescribed burning program, undertaken in co-operation with fire fighting agencies such as NSW Rural Fire Service and National Parks and Wildlife Service.

During the reporting period, Council conducted mechanical fuel reduction works on a total of 299,650m^2 of public land across the City.

Clearing of canopy

The removal of individual trees on private property contributes to changing the character and viability of urban bushland and can dramatically affect the urban landscape and local amenity. The majority of native trees removed under the Tree Preservation Order are remnant habitat. Under Council's Tree Preservation Order (TPO) during 2005/06, there were 1,156 tree removal applications of which 956 applications were approved, 29 refused, 8 cancelled and 112 part-approved. It should be noted that an application can be for more than one tree. Information on total number of trees removed is not currently recorded by Council.

Fragmentation

Localised clearing which fragments vegetation also has a significant impact on ecosystem condition. For example, the edge of remnants commonly suffer from pest and weed invasion, and from changes to microclimates. These 'edge effects' can often extend hundreds of metres into a patch of vegetation, significantly reducing the condition of the total area. Small patches and thin corridors of vegetation are

also more vulnerable to the impacts of disease, fire, inappropriate clearing and other forces, and tend to be less genetically diverse (NSW SOE 2003).

Clearing and fragmentation of urban areas has resulted in isolated pockets of remnant vegetation, usually of minimum size, poor quality and under great pressure. When habitats decline, faunal species compete for the remaining resources, causing their populations to decline and lose genetic diversity. This reduces their ability to compete, fight disease or adapt to changing conditions. Habitat loss, and specifically habitat fragmentation, continues to be the major cause of species extinction.

A major transport corridor (road and railway) dissects the Blue Mountains local government area and the majority of townships. This corridor interrupts the continuity of bushland habitat and wildlife corridor.

Predation

Irresponsible pet owners contribute to the rapid decline of wildlife. Cats and dogs are numerous in numbers and create many problems for the natural environment.

Cats are hunters by nature, hunting at all hours, especially at dusk and night. Their prey commonly consists of bats, possums, bandicoots, native rats and mice, birds, lizards and snakes. Cats have been implicated in the decline and possibly the local extinction of a number of species and compete with native predators, such as the threatened Spotted-tailed Quoll. They can also carry bacteria and blood parasites which can be passed on to wildlife that have little to no resistance.

Dogs also have a direct impact on bushland by preying on and harassing wildlife and disturbing burrowing fauna. Dogs regularly urinate on trees to mark out territory, sending out warning signals to native animals to keep away. Dog's faeces are very high in phosphorous, promote growth of exotic weeds, are unpleasant to walkers, are a health hazard, and can carry parasites.

Weeds

Weeds are plants whose growth and habit results in the loss of environmental, economic or social values. In the natural environment, weeds out compete with the native flora for resources including water, nutrients and sunlight, and can displace a range of biodiversity. Weeds vary in their impact upon the environment and are broadly grouped into two categories – environmental or noxious weeds.

594 weed species were identified in the City as part of the Blue Space weed-mapping project. This represents well over half the number of native plant species present in the LGA. The Blue Mountains LGA has 102 declared noxious weeds, of these 36 are known to occur in the Blue Mountains at present.

Background information on introduced plants and a definition of and detailed list of noxious weeds is provided on the Weeds of the Blue Mountains website (www.weedsbluemountains.org.au).

Effects of Stormwater

Stormwater can transport nutrients from sewage related effluent and from fertiliser run-off from gardens. Stormwater often seeks to collect and concentrate urban waters, generating large volumes with a high velocity, which is efficient at eroding exposed soil that is carried into streams. Elevated nutrients in water and soil generally favour the growth of introduced plants (weeds) over native plants in bushland environments. This can encourage weed infestations and make it harder for local species to compete and survive. Blue Mountains streams are rich in aquatic macro-invertebrates and poor water quality and sediment derived from stormwater can decrease stream biodiversity and bury habitats.

Fire regimes

Most ecological communities that occur in the Blue Mountains region are adapted to the periodic occurrence of fire. Many species require fire to stimulate and facilitate life cycle processes. Each community will have optimal fire regime thresholds that are influenced by the species and that occur within it. The sustainability of both the community and individual populations can be dramatically influenced by the intervals at which fire occurs in those environments. As such, high frequency fire is listed as a Key Threatening Process under the NSW *Threatened Species Conservation Act (1995)*.

Banksia after fire

During the reporting period, there were 33 incidences of fire involving vegetation attended by the NSW Rural Fire Service within the City. Unfortunately, estimates of the total area of burnt land is not available. However, it is known that none of these fires were of significance. It is also unknown where these fires occurred and whether any of them occurred in areas where recurrent fire at short intervals is placing pressure on biodiversity.

What is the current state of biodiversity in our region?

Threatened ecological communities

Six communities present within the local government area have been listed under the NSW *Threatened Species Conservation Act (1995)* as Threatened Ecological Communities, they are: Blue Mountains Shale Cap Forest, Shale Sandstone Transitional Forest, Sydney Turpentine Ironbark Forest, Sun Valley Cabbage Gum Forest, Riverflat Eucalypt Forest, Newnes Shrub Swamp, and Montane Peatlands and Swamps.

Four of these communities are listed as Nationally Threatened under the Commonwealth *Environment Protection and Biodiversity Conservation Act (1999)*. This represents an additional four listed communities in the Blue Mountains since publication of SoE Report 1999/2000. Further threatened ecological communities are likely to be listed in the Blue Mountains as a result of increased quality and extent of vegetation mapping.

Threatened animal and plant species

At least 33 species of plants found in the local government area are listed under the NSW Threatened Species Conservation Act (1995). Since the SoE report 1999/2000, an additional 4 plants and one plant population, which occur in the Blue Mountains have been listed as threatened under the Act.

There are 36 threatened animal species known in the local government area, which are listed under the NSW Threatened Species Conservation Act (1995) and Fisheries Management Act (1994). Since the 1999/2000 SoE report a further 8 animals, which occur in the Blue Mountains have been listed as threatened under these Acts.

Blue Mountains Water Skink

Forty species of plant and animal are listed under the Commonwealth Environment Protection and Biodiversity Conservation Act (1999). This identifies the Blue Mountains as a biodiversity hotspot with high speciation and locally restricted populations.

It is unclear whether increasing number of ecosystems and species being listed as threatened in recent years represents recent changes in their threatened status, or whether instead it represents an increase in our awareness of their reduced population size and vulnerability.

Making a Difference

Response from households

Weed control on private land

There are currently 16 Landcare groups operating on non-Council land across the Mountains. Landcare groups are supported by Council. Landowners can access help through the resident weed support service which offers individual site visits to their properties and on-site discussion and demonstration of sustainable weed control and conservation strategies. 46 landowners have been provided with on-site weed control and property planning advice during 2005-2006.

A higher level of Council support is provided to individual residents who join the Bush Backyards network, which is a Council assisted network of landowners committed to significant conservation works on their land. The scheme provides detailed property management plans, regular on-site visits, workshops and potential for small amounts of support funding. There are currently 18 participants in the network. In 2005-2006, 6 properties in the network have successfully obtained grant funding from the Hawkesbury Nepean Catchment Management Authority to complete significant bush regeneration and creekline restoration works. Council has assisted with the formulation and management of these projects.

A project of intensive work to support landowners in the North Katoomba catchment to reinstate native habitat and protect creeklines has been completed. As part of this project two Mountain Living courses delivered by the Council's Natural Systems and Waste and Resources teams were conducted for local residents to promote sustainable lifestyles and property management. In addition, 750 native plants have been provided to residents for rehabilitation of creek line vegetation and 300m of creek line has been fenced to exclude stock from the creek and revegetated. In total 50 residents in the North Katoomba catchment have participated in this project. Council has been assisted in this work by grant funding from the Environmental Trust NSW.

In rural areas, Council has assisted landowners with planning for sustainable weed control through detailed weed mapping and providing 3 - 5 year weed management plans for their properties. Subsidised participation in land management workshops and courses and facilitation of grant applications for sustainable pasture management, fencing, weed control and revegetation were other Council assisted activities. This year, Council has assisted 7 properties in the Megalong Valley to receive grant funding for sustainable weed control covering 10kms of creeklines flowing into the Cox's River.

Response from schools

The 11th Blue Mountains School Environment Awards were held on 25 November 2006. The following is a summary of the awards and the winners. School environmental and sustainability programs and projects contribute to positive outcomes for not only our biodiversity assets but all natural assets.

1. CARING FOR CATCHMENT AWARDS

Runner Up - Katoomba High School

Katoomba High school is almost on the cliff-edge in Katoomba adjacent to the National Park. Chris Yates and his students are working hard to deal with bushland and weed issues on-site and to manage the litter and weeds moving off-site. The school has a greenhouse for propogating seedlings with the intention to regenerate the bush areas of the school. A working permaculture vegetable, herb and fruit garden maintained by composting of food scraps and collecting rainwater is also an educational resource favoured by the school. Most importantly – the students recognise the unique situation of their school next door to a national park and World Heritage Area.

Winner – Mt Riverview Public School

Mt Riverview has been a 'sustainable school' for a long time and they are still hard at it – on top of paper recycling, composting and planting they are now embarking on a project to rehabilitate the school's Nature Trail so it can be used as a teaching resource. This project will include walking track restoration; stormwater control and water polishing measures, planting native trees, marking out study stations for students.

2. ENVIRONMENTAL EDUCATION AWARDS

Winner – Ellison Public School

Ellison is involved in the Earth Journeys project in the Blue Mountains. This is a cross-curriculum project about "sense of place" in a World Heritage Area. The Earth Journey helped the students discover local history, conservation and significant vegetation communities in their area with a series of excursions and guest speakers and creative art projects.

Winner – Lapstone Public School

Lapstone Public School is using their school grounds as an interactive classroom! The children are involved in hands-on learning about life cycles, the seasons and natural processes in their permaculture garden. Teachers use the garden for Science, English, Art and Maths. A number of committed parents are involved and the Lower Mountains Gardening Club, making learning at Lapstone Public a community effort.

3. PLANNING AWARDS

Runner Up – Winmalee Public School

Winmalee Public School has a 2-year plan to rejuvenate the school's entrance. This will include a passive play area and increase the native plants and biodiversity on the school grounds.

Winner – Our Lady of Nativity, Lawson

The school is planning a nature and sensory trail and a second prayer garden. The students will be involved in the research and design of the trail and it will be used for all Key Learning Areas. This project involves teachers, parents, school students and students from the University of Western Sydney.

4. WASTE MANAGEMENT AWARDS

Runner Up – Mt Victoria School

Mt Victoria Public School is working towards closing the waste loop by reducing packaging in the canteen, conducting a waste audit, participating in waste education, recycling paper and cardboard and even growing their own vegetables, which are used in cooking classes and in the canteen! The school is also promoting the message every day with pens/pencils/rulers with a green message!

Winner – Wentworth Falls Public School

Students from different classes coordinate paper and cardboard recycling; composting of food scraps, shredded paper from local businesses, corn packaging and tree leaves. The school's P&C committee recycle second-hand uniforms through the clothing pool. New for 2005 is the recycling of PET bottles sold at the canteen. The school uses an innovative reward-based program aimed at reducing litter in the playground.

5. SUSTAINABLE TECHNOLOGY AWARD

There were no projects up and running in relation to the use of sustainable technology however an Encouragement Award was awarded to a school starting such a project.

Encouragement Award – Katoomba High School

Katoomba High School is commencing an innovative GIS (computer mapping) project to help provide information and identify priorities for their School Environmental Management Plan which focuses on dealing with water quality and weed issues. This project involves students learning to identify the environmental problem followed by identifying ways to design and implement a solution. The Environmental Management Plan will allow them to be able to see trends and patterns over time and provide a facility by which senior students will be able to mentor junior students in this emerging technology.

6. SUSTAINABLE SCHOOL AWARDS

The Sustainable School Award category aims to recognise those schools that have an integrated approach to environmental management and education at their school.

Runner Up – Lapstone Public School

Lapstone have worked hard over the last 4 years to achieve:

- A shade house
- Installation of a water tank
- A number of composting systems
- A no-dig garden as part of an Earthworks course
- A bio-dynamic vegetable and herb garden
- An open air classroom
- Plant propogation
- Paper recycling
- Aluminium can recycling; and
- Landcare project in the adjacent bushland

To make this happen, the school involves the parents and community groups such as the Lower Mountains Garden Club and Lapstone Out of School Hours centre. All of these resources are used by the teachers for all Key Learning Areas and students are part of the design and management of the projects.

Winner –Wentworth Falls Public School

Wentworth Falls Public has continued to expand their list of sustainability projects. The school has fantastic initiatives, such as: bush regeneration, stormwater and litter controls, sensory trails and catchment education, paper and cardboard recycling, energy and water reduction projects, composting and more.

Wentworth Falls Public School has worked hard to regenerate degraded bushland in the school backyard. Students have learnt to recognise native species and to remove weeds. Students have also been involved in researching two endangered species endemic to the area.

The Bushcare site is used creatively as a learning tool for all classes and encourages critical thinking and student ownership of the work.

The school's P&C committee is planning to build a solar passive, mud brick room in the school grounds for special reading groups. This project is ambitious and inspiring as a model of sustainability, which incorporates eco-design, material and energy use.

The whole school community is involved in the work and the students are given the opportunity of action-based learning.

Response from the general community

National Tree Day

In July 2005, 22 schools and 12 community groups planted trees on public land to increase biodiversity and improve urban habitat values.

Bushcare

There are 45 Bushcare and 16 Landcare groups in the Blue Mountains supported by Council. The program completed 7,437 of community hours assisting in the management of bushland reserves through bush regeneration and other biodiversity management activities across the entire Blue Mountains local government area.

The program also contributes significantly to environmental education through the Blue Mountains area and beyond through its weeds website http://www.weedsbluemountains.org.au: which has continued positive response with over 13,000 visits a month. The website, in its fourth year, is widely accepted as the benchmark for weed education on the Internet.

Response from Blue Mountains City Council

Threatened Species Recovery Plans


Epacris hamiltonii

For the 69 threatened species occurring in the City, 12 have Recovery Plans in preparation, 5 have Draft Plans and 10 have Approved Plans. Preparation of Recovery Plans for the endangered population, or seven endangered ecological communities mentioned earlier in the report have not commenced. Council is an active participant in recovery programs for a number of species, undertaking actions including the facilitation of the Blue Mountains Recovery Team, on-ground recovery actions (eg. weeding and habitat management) and through extension and education programs delivery by Council's Threatened Species Officer.

Protecting Threatened Ecological Communities


Giant Dragonfly

Council's detailed vegetation mapping, Local Environmental Plan (LEP) and Bushland Management Order enable a high level of protection to be afforded to threatened ecological communities and other significant vegetation types in the City.

Urban (Noxious) Weeds

The Council's weed control programs are aimed at controlling significant noxious and environmental weeds across the Blue Mountains on both private and public lands. This program saw 97,813 m^2 of key urban weed species being treated on public lands. These weeds include Gorse, Scotch Broom and Willows. The introduction of the Environmental Levy provided for additional capacity in the Urban Weeds program and resulted in a record year for inspections with 2,090 notices being issued. Changes to the Noxious Weeds Act saw the need to develop Weed Control Plans for Class 4 weeds which are now being completed with minor improvement suggested by community consultation.

Bush Regeneration

The Council's Bush regeneration program delivered 9,613 hours of programmed work resulting in 18,999m^2 of weeds removed from bushland. This work included maintenance of 11 Urban Runoff Control Program sub-catchment based weed control programs throughout the Blue Mountains, and an additional 4 comprehensive sites. The program also provided direct on-ground support to Bushcare and Landcare groups through the Bushcare support program, targeted bush regeneration works focused on highly invasive weed species, as well as weed control works in near intact systems that contain areas of high conservation value.

Other restoration projects

Council supported and was a partner agency for Two (2) Green Corps Teams focussed on the restoration of walking tracks and the protection of Blue Mountains swamp along Jamison Creek Wentworth Falls.

Improving Stormwater Infrastructure

Council is progressively improving stormwater infrastructure by installing a range of devices that improve quality and reduce velocity before they reach natural areas.

Managing Bushfire Risk

Fire is used as a key tool in managing bushfire risk. Fire may be applied to carefully selected areas under prescribed conditions to reduce the availability of bushfire fuels and hence, modify bushfire behaviour in the event of an uncontrollable wildfire. Given the community's perceptions and expectations regarding bushfire threat, and the need for management actions, there is significant pressure from certain stakeholders to burn for bushfire protection. The Blue Mountains Bushfire Management Committee, of which council is a member agency, acknowledges that the use of fire is a single strategy in a multi-faceted approach to bushfire risk management, and aims wherever possible to balance the need for bushfire hazard reduction and ecological sustainability. The principles of ecologically sustainable development are an object of both the NSW *Rural Fires Act 1997* and a key consideration of the Blue Mountains Bush Fire Risk Management Plan.

Prior to undertaking fire mitigation works land managers such as Council undertake an Environmental Assessment under the NSW Bushfire Assessment Code 2006 and set conditions for works so as to minimise the impact upon the environment.

Response through the Environmental Levy Program

2005-2006 was the first year of the Environmental Levy Program - a 10-year remediation and restoration program. In recognition of the significant pressures on the unique Blue Mountains environment, Council introduced an Environmental Levy, which will raise an additional $1.2 million dollars annually through rate payments. The following table summarises 2005-2006 projects addressing biodiversity issues.

ENVIRONMENT LEVY PROGRAM	ENVIRONMENT LEVY PROJECT	OBJECTIVE	ACTIONS	ASSET	WHO
Aquatic Systems Monitoring and Catchment Health	Creekline Restoration – Magdala Creek Springwood	Stabilise and rehabilitate streams impacted by stormwater runoff, sedimentation and erosion.	• 3-stage log flume constructed to stabilise silt plug, Magdala Creek Springwood • Restoration of surrounding native vegetation by planting	Biodiversity (Aquatic)	Council and Community
	Creekline Restoration – Glenbrook Lagoon	Improve aquatic and riparian biodiversity Remove noxious weeds and nutrients.	• Mechanical harvesting of aquatic weeds from the Lagoon surface yielded approximately 160 tonnes (wet weight) of material. • Spraying of *Salvinia* on the margins of the Lagoon was undertaken where there was no access for the Harvester - approx 95% of *Salvinia* removed. • Stabilisation and restoration of the "beach" area undertaken. • Community engagement in catchment day, new Bushcare Group and catchment newsletter.	Biodiversity (Aquatic)	Council and Community
	Creekline Restoration – Jamison Creek	Stabilise and rehabilitate streams impacted by stormwater runoff, sedimentation and erosion.	Stream redirected to original channel using natural logs. Concrete flume constructed to stabilise head cut and prevent in-stream erosion.	Biodiversity	Council and Community
Stormwater Management	Stormwater control - Kubya Street Blackheath	Prevention of sediment, nutrients and weeds from moving downstream to bushland and drinking water catchment. Prevent further erosion occurring on private land. Restore a natural flow path for stormwater. Improved stormwater infrastructure to reduce Council's stormwater and road maintenance costs.	Installation of reinforced concrete drainage system and velocity discharge completed.	Biodiversity	Council
	Stormwater control - Yosemite Creek	Prevention of nutrients, weeds, sediment and rubbish from moving to the creekline and downstream to council bushland reserve, National Park / World Heritage Area. Prevent further erosion	120 tonne of rock was used to armour an erosion gully generated by fast flowing stormwater. The Levy-funded gross pollutant trap was installed to compliment the previous work by reducing flow rates, whilst capturing sediment,	Biodiversity	Council

ENVIRONMENT LEVY PROGRAM	ENVIRONMENT LEVY PROJECT	OBJECTIVE	ACTIONS	ASSET	WHO
		and on-going sedimentation of a hanging swamp, an endangered ecological community. Improved stormwater infrastructure, and reduce Council's maintenance costs.	rubbish and weed seed. Intensive weed control in the creek has now commenced.		
Noxious and Environmental Weed Control	Noxious weed control - Broom	Prevent Scotch broom from seeding on Council-managed land.	Contractors engaged to kill mature broom plants on Council land.	Biodiversity	Council
	Resident Weed Control Support	Improved weed control on non-Council managed land. Improved protection of bushland on non-Council managed land Greater continuity of weed control and bushland management across land tenures.	• 46 individual property site visits. • North Katoomba Catchment Private Land project completed, including fencing of creeklines to exclude grazing animals and provision of 750 plants to 50 landowners for riparian vegetation rehabilitation.	Biodiversity	Households / Council
	Bushcare groups	Increased area of bush regeneration on Council-managed land. Improvements to stormwater control; erosion control works and track maintenance on Council-managed reserves. Encourage community responsibility for local bushland management.	Expand the volunteer Bushcare Program in response to high-level community interest - Medlow Bath Bushcare group established. Increase capacity of Bushcare groups to undertake projects.	Biodiversity	Community / Council
	Comprehensive bush regeneration	Healthy resilient bushland protecting the head of catchments throughout the Blue Mountains. Creekline restoration.	Comprehensive bush regeneration undertaken on 10 Urban Runoff Control Program sites in the Local Government Area.	Biodiversity	Council
Bushland Interface	Habitat Conservation Network	Improved weed control on non-Council managed land. Improved protection of bushland on non-Council managed land. Greater continuity of habitat conservation across land tenure and urban-bushland interface. Improved protection of Endangered Ecological Communities and other significant vegetation.	On-going support for existing participants. Four new participants join Bush Backyards Network (total of 18 participants). Successful grant funding for bush regeneration projects on six Bush Backyard properties Facilitated Greencorp volunteer work on two Bush Backyard properties.	Biodiversity	Households/ Council
	Landcare Stage 2	Improved weed control on non-Council managed land. Improved protection of bushland on non-Council managed land. Greater continuity of habitat conservation across land tenure and urban-bushland interface. Improved protection of Endangered Ecological	New Landcare groups at Rawson Parade, Leura and Long Angle Creek, Warrimoo. On-going support for existing 16 Landcare groups. On-going project management of external grants on Landcare sites.	Biodiversity	Households / Council

ENVIRONMENT LEVY PROGRAM	ENVIRONMENT LEVY PROJECT	OBJECTIVE	ACTIONS	ASSET	WHO
		Communities and other significant vegetation.			
	Rural Practice Improvements	Improved weed and feral animal control in rural lands. Adoption of best practice pasture management strategies. Protection of significant remnant native vegetation communities in rural areas.	On-going support for individual landowners. On-going administrative and technical support for Harry's Creek Landcare Group.	Biodiversity	Households/ Council
	Rehabilitation of Endangered Ecological Communities (EECs)	Reduction in extent and density of weed infestation in EECs. Natural regeneration of EEC vegetation communities.	Restoration work on 3 EECs continues in partnership with community bushcare and Landcare groups: Cabbage Gum Forest, Sun Valley; Sydney Turpentine Ironbark Forest, Springwood Golf Course; and Button Grass swamp, Katoomba Creek. Contract bush restoration commenced in Shale Sandstone Transitional Forest at Summerhayes Park and Temperate Highland Peat Swamp (hanging swamp), Katoomba Creek.	Biodiversity	Council / Community

Increasing our understanding

Selected time series data (trends) for our biodiversity resources

Pressures on our biodiversity resources

What are we monitoring	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Number of declared noxious weeds which occur in the City of Blue Mountains	30				30		36
Amount of public land subject to mechanical fuel reduction works m^2			235,600	285,345	286,500	314,299	299,650

The State of our biodiversity resources

What are we monitoring	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Number of threatened ecological communities	2	3	4	4	4		6
Number of threatened plant and animal species	55	67	67	67	70		69

Responses in looking after our biodiversity resources

What are we monitoring	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Number of Landcare and Bushcare groups	35	42	46	46	52	52	61
Total Bushcare volunteer hours	5,040	6,000	7,000	7,100	7,200	6,517	7,437
Council's Environmental Weeds Team (Bush Regeneration Team) – total area weeds removed m^2				15,629	30,384	21,553	18,999
Number of noxious weeds notices issued (private property)	440	755	831	1,355	1,454	1,818	2,260

SECTION 2 LAND AS A NATURAL ASSET

Our Land Resources

What are land resources?

Land as a natural asset can be considered to consist of: a diversity of geological forms, top soil availability, soil health, land that supports natural systems and land available to support a variety of human uses (including open space for public access).

The Blue Mountains LGA is situated on the Great Dividing Range in the west of the Greater Sydney Region. The area of the LGA is 1431 km^2, two thirds of which is National Park. A sandstone plateau rises sharply from approximately 15m elevation at the Nepean River to 220m at Blaxland, then rises steadily to an altitude of 1,111m at Mount Victoria, 41 km West of the Nepean River. At Mt Victoria the plateau drops down to Lithgow and the Cox's River. This plateau defines the Blue Mountains region.

There are seven major geology types throughout the City, dominated by the Hawkesbury Sandstone formation in the east and the Narrabeen Sandstone formation in the west.

There are three major landforms present within the City: ridgelines and plateau surfaces, cliffs, and valleys.

Most soils in the Blue Mountains originate from the parent sandstone rock formations. The plateau landform, with its steep slopes and shallow, infertile, porous and friable sandstone soils provides further constraints to development. These soils typically support heath and sclerophyll vegetation communities. Combined with relatively heavy rainfall, these soils are highly susceptible to erosion.

Other soil types, such as those derived from basalt rock, support distinctive vegetation communities. Examples of this geology is found in Mount Tomah, Mount Irvine and Mount Wilson.

Why is land important?

Land resources provide a number of 'services' that we rely on including food production, rural / urban lifestyles and work and recreation opportunities that ultimately support human health. Land resources also provide a range of environmental 'services' (see Section 1 – Biodiversity).

What are the pressures on land?

Erosion

Erosion is a significant factor determining the water quality in our streams, weed invasion and habitat degradation. Erosion generally occurs where land has been disturbed or where water concentrates, such as unsealed roads and driveways, construction sites, disused quarries and areas near stormwater outlets.

Recreational activities such as rock climbing, abseiling, canyoning, four-wheel driving, trail bike riding and BMX style dirt jump bike riding are increasingly popular in the Blue Mountains and often take place in steep terrain in sensitive environments, which can cause soil disturbance and erosion. The four approved

interim sites for BMX and Mountain Bike dirt jumping are still in use as per Council's Dirt Jump Strategy (October, 2002).

Contamination

The major concern relating to contaminated land is its potential for immediate or long-term adverse effects on human health and the environment. Land contamination is most often the result of past land use such as, service stations, fuel depots, horticultural facilities, orchards, gasworks etc. A site is classified as contaminated when hazardous substances occur at concentrations that are above normal background levels, posing a potential risk to community health or the environment.

Urban development

As a population grows, the demands for infrastructure, such as housing, energy, water, transport and waste disposal also increases. Supplying this infrastructure results in land-use changes and other impacts on the environment. Increased urban density may have advantages over urban sprawl however, with economies of scale, decreased impact on surrounding bushland and increased access of facilities by walking, riding and public transport.

The development potential in the Blue Mountains is very limited due to land availability and land capability. However, the majority of development applications presented to Council are for the redevelopment of existing properties and for urban consolidation in existing urban centres. It is important for Council to ensure responsible and appropriate decisions are made relating to land use in the City, in accordance with the LEP 2005 and the City Strategy.

Generally, the subdivision applications received by Council are mainly small scale, that is, 1 into 2 or 3 lot subdivisions. A minority of applications are boundary adjustments and there may be 2-3 large-scale developments a year.

Impervious surfaces

Impervious surfaces such as roads and rooftops are an unavoidable feature of the urban environment. Impervious surfaces do not allow infiltration of rainfall and increase the velocity and volume of water run-off, or stormwater from the urban environment. Stormwater run-off typically drains into the many streams of the Blue Mountains, placing additional pressure on these environments. An investigation by the NSW Department of Environment and Conservation found that damage to the environment, including erosion, weed invasion and loss of aquatic biodiversity, occurs with as little as 10% of a catchment having impervious surfaces. Many of the Blue Mountains larger towns have impervious surfaces greater than 10%.

What is the current state of land in our region?

Land use

Land use within the City is a mixture of National Park, bushland reserves, parks and sports fields, residential, commercial, industrial and rural areas and roads/railways.

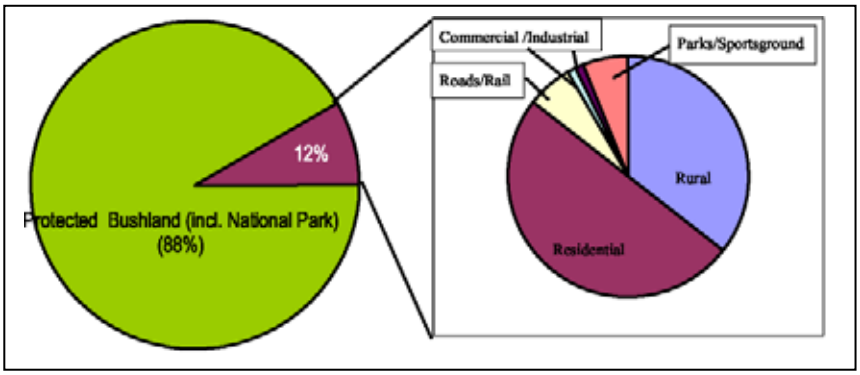


Figure 1: Land use in the Blue Mountains Local Government Area

Of these, the National Park dominates, covering approximately 74% of the total area of the City. A further 14% of protected land, which is predominately native vegetation, brings the total protected bushland area to 88%.

Rural land use, comprising 3.6% of the City's area, falls predominately within the Megalong Valley. Commercial land uses are largely restricted to the town centres particularly in Springwood and Katoomba.

The landform of the Blue Mountains constrains possible land uses of the City. The City's two LEPs include planning constraints that are based on the environmental constraints to ensure that land use does not result in ongoing degradation and is sustainable. The amount of land available for urban development is virtually static.

Protected land

The significance of the natural environment of the Blue Mountains has been recognised at the regional level by the definition of much of the City as Conservation Area sub catchments, under the Sydney Regional Environmental Plan for the Hawkesbury Nepean River (SREP 20).

Substantial areas of the sensitive natural environment have been protected, not only by the inclusion of large areas within the National Park and other reserves, but also by the creation of Environmental Protection zones and Protected Areas within LEP 2005. The zones and protected areas have been based on city-wide vegetation mapping, comprehensive slope mapping and the application of a riparian (riverbank) buffer model.

Community land

Community Land is owned by Council or the Department of Information, Planning and Natural Resources (DIPNR) and must be retained for public use, in accordance with the provisions of the Local Government Act 1993. The Community Land stock within the City is a significant public resource, with approximately 1640 hectares owned by Council and a further 220 hectares managed by Council. Council also manages 4000 hectares of Crown Reserves, which include sporting fields, parks and natural areas such as Mt Piddington and Mount York.

Eroding and contaminated sites

In 1998, the then Department of Land and Water Conservation identified 11 sites across the Mountains, which are of the highest priority for soil conservation works. They include the decommissioned landfills at Blackheath and Lawson, and quarries at Blackheath, Katoomba and Leura.

Making a difference

Response from Blue Mountains City Council

Soil conservation and stream restoration works

These projects have focussed on addressing highly degraded sections of stream or swamp that have been affected by urban run-off, in otherwise high conservation sites. This year's program has focussed on Fairy Dell Reserve Silt Flat located in Springwood and the Jameson Creek Tributary at Sandbox Road, Wentworth Falls. A stream bed erosion control structure was installed at both of these sites. These works reduce the risk of excessive erosion of the stream bed and allow revegetation and stabilisation of the site. Both project sites were externally funded by Hawkesbury Nepean Catchment Management Authority (HNCMA) and works were supplemented by the Environmental Levy.

Local Environmental Plan 2005

The new town plan for a major portion of the City finally came into effect on the 7th of October 2005 when Frank Sartor, MP, Minister for Planning made the Plan. The Plan, which has been under preparation since 1993, covers the majority of the settled areas of the City.

The aim of the plan is to provide a comprehensive and explicit framework for the development of land within the City, as the 'City within a World Heritage Park', in a manner that is consistent with and promotes the principles and practices of ecologically and sustainable development. The plan comprises a significant step in the implementation of Council's 25 year vision for the City – Towards a More Sustainable Blue Mountains.

A feature of the plan has been the extensive community consultation and setting of specific objectives for each locality, which occurred during preparation. The plan is also accompanied by a complimentary Development Control Plan known as the 'Better Living' DCP which contains extensive development guidelines. A feature of this plan is the amalgamation of most other development controls into a single document which has been written in a 'plain English' style.

Development controls

Council's planning controls seek to minimise the environmental impact of built structures and land uses on the environment. There is a requirement for construction sites to limit soil erosion and to undertake stormwater management.

Restoration of degraded sites

The former Katoomba Leura Gasworks site in Megalong Street Katoomba was subject to partial remediation works in 2005/2006. The priority remediation areas comprising the old tar well, secondary tar well and an area between the tar well and along the verge of 29 Megalong Street was remediated, in accordance with the agreed Remediation Action Plan and Development Application approval. Approximately 1,500 cubic metres of the priority remediation material was treated and removed from site as a result of the works. The site will require further assessment to establish the extent of any further remediation works that may be required in the future.

Former Lawson Tip

Addressing unhealthy land

Progressive development of Flood Plain Management Studies in the City is likely to identify further parcels of land that are geographically low-lying. Council actively seeks funding for flood mitigation works to reduce the number of parcels subject to flooding.

Plans of Management

Plans of Management:

- Are prepared by Council in consultation with the community, other stakeholders and relevant agencies;
- Identify the important features of the land;
- Clarify how Council will manage the land; and
- Indicate how the land may be used or developed (including leasing and licensing).

The minimum requirements under the Local Government Act, 1993 are that a plan of management must:

- Contain core objectives for the management of the land,
- Contain performance targets,
- Specify the means of achieving the objectives and performance targets, and
- Specify how achievement of the objectives and performance target is to be assessed; and
- Categorise the land

The Plan of Management for recreational facilities at Lapstone Oval (Tunnel Gully Reserve) was completed and adopted by Council during 2005-2006.

Reserve Fencing and Gating

Unauthorised access into bushland reserves has been restricted through the maintenance and installation of fencing and gating at 16 sites across the mountains. Some of the sites that received significant works include Bluff Reserve and Tunnel Gully Reserve in Glenbrook and Mike Eades Reserve, Katoomba. Assessment of

Fencing at Bluff Reserve, Glenbrook

signage requirement was carried out for 7 walking track networks in the Mountains and will be fabricated and installed during the 2006/07 financial year.

Walking Tracks

The capital works program for walking tracks is focused on the replacement of critical infrastructure along Council's walking tracks and at lookouts, which includes: fencing, foot bridges and board walks. The 2005/06 Budget was $40,000 which funded the replacement and extension of fencing at Eagle Hawk Lookout, Katoomba. The $40,000 budget also provided funding of materials for the replacement of 40m of board walk along Darwin's Walk, Wentworth Falls and the work was collaboratively managed with the Wentworth Falls Green Corp Team.

Response through the Environmental Levy Program

2005-2006 was the first year of the Environmental Levy Program - a 10-year remediation and restoration program. In recognition of the significant pressures on the unique Blue Mountains environment, Council introduced an Environmental Levy, which will raise an additional $1.2 million dollars annually through rate payments. The following table summarises 2005-2006 projects addressing land issues.

ENVIRONMENT LEVY PROGRAM	ENVIRONMENT LEVY PROJECT	OBJECTIVE	ACTIONS	ASSET	WHO
Closure and remediation of former Lawson and Blackheath Waste Disposal Depots	Remediation of former Lawson Waste Disposal Depot	Landfill slope is stabilised and the risk of slope failure is removed and the landfill does not cause significant environmental harm or loss of amenity.	Preparatory studies underway and almost complete. Preparation of a remediation plan continues including requirements relating to Environment Protection Authority and development consent.	Land	Council
Bushland Reserve Management	Walking tracks and Lookouts	Reduced impact of track infrastructure on creek bank through improved design and location of foot-bridges. Improved aesthetic appeal of local natural assets. Reduced erosion and sedimentation. Improve public access and safety. Diversion of stormwater from walking track to reduce erosion and sedimentation of creeks.	Restoration of degraded walking tracks; installation of track infrastructure; replacement and repair of fencing and foot bridges; installation of signage and stormwater mitigation undertaken at Picnic Point Magdala Creek Springwood, Glenbrook Lagoon and Cataract Falls Lawson.	Land	Council
	Reserve Access management	Restriction of illegal access to Council-managed bushland reserves, protecting vegetation and habitat. Reduced incidence of illegal dumping. Protection of other project work such as soil conservation earth works, revegetation and weed control sites. Improved condition of service and fires trails.	Closure of duplicate tracks; conservation earthworks and revegetation at Knapsack Reserve, Glenbrook and Bluff Lookout, Lapstone. Fencing; closure of illegal tracks and formalise carparking, Bluff Reserve, Lapstone. Gate repair /replacement and the installation of boulders at multiple bushland reserves to restrict illegal vehicle access.	Land	Council

ENVIRONMENT LEVY PROGRAM	ENVIRONMENT LEVY PROJECT	OBJECTIVE	ACTIONS	ASSET	WHO
	Degraded Land restoration	To restore and protect lands impacted by significant vegetation loss and soil erosion and to ensure sustainable long-term use of nature-based infrastructure such as tracks in natural areas and reserves.	Conservation earthworks and assisted bush regeneration at Knapsack Reserve.	Land	Council
	Nature-based recreation	Improve control of access to natural areas by commercial operators and organised users. Minimise degradation of escarpment ecosystems. Minimise damage to bushland access to nature-based recreation sites. Improved management of camping sites in natural areas Track maintenance and reserve infrastructure improvements to be developed with licensing revenue.	The start of 2006 marked the commencement of the Licensing of commercial operators and organised users of Council managed reserve for nature based recreation. This system has licensed 12 commercial operators and other regular users. The program provides for input from industry into the long term management of nature based recreation sites, and in turn contributes to the sustainability of the nature based Tourism industry in the Blue Mountains.	Land	Council / Business

Increasing our understanding

Selected time series data (trends) for our land resources

Pressures and responses on our land resources

No trend data is currently available.

The State of our land resources

What are we monitoring	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Number of sites registered as contaminated	140		175	175			
Number of land parcels listed on the unhealthy land register				55			

SECTION 3 ATMOSPHERE AS A NATURAL ASSET

Our Atmosphere Resources

What are atmosphere resources?

The atmosphere is the layer of gases that surrounds the earth. The air we breathe contains a mixture of gases including nitrogen (78%), oxygen (21%), carbon dioxide (0.04%); trace amounts of other gases (argon, helium, xenon, neon and krypton); and water vapour (Commonwealth, 1996). In addition, air contains a variety of pollutants from both natural and human sources.

Why is the atmosphere important?

The atmosphere is an essential natural asset that supports the health of the planet and our quality of life. Our atmosphere regulates the type and amount of radiation that hits the earth's surface from the sun (the ozone layer), regulates temperature (through the greenhouse effect) and provides the specific gases (air) that plants need to grow and animals including people need to breathe.

Air quality can have a large impact on human and environmental health. Poor air quality can cost the community financially through loss of productivity and increased health care costs, as well as a lowering of human well being cost. On days of high air pollution in NSW, daily mortality increases by 2-3% and hospital admissions increase 6-7% for heart disease, 5-6% for asthma, and 2-3% for respiratory diseases in the elderly (EPA, 1997).

What are the pressures on the atmosphere?

Solid fuel heaters

In the absence of bushfires, hazard reduction burning, domestic wood heating and diesel vehicles become the major sources of primary particles in urban areas (EPA 2003). The total number of wood fuelled heaters in the LGA and the number of air pollution complaints relating to wood heaters is currently a data gap.

Backyard burning

Open burning is a significant source of particle pollution (EPA 2003). Until 1 September 2006, Councils were able to regulate the level of open burning in their municipality under the Protection of the Environment Operations (Control of Burning) Regulation 2000. This regulation has now been repealed, however the provisions of that regulation have now been incorporated into the Protection of the Environment Operations (Clean Air) Regulation 2002. The Regulation prohibits burning of certain articles and vegetation in urban areas and restricts it to appropriate levels in rural areas. The burning of dead and dry vegetation in the Blue Mountains may be permitted in some circumstances after an application is made to Council.

During the reporting period, council received 564 applications to light and maintain an open fire. Of these applications, only 39 approvals to burn dead and dry vegetation were issued, which represents approximately 7% of all applications.

Prescribed use of fire for bushfire management

Bushfire management activities involving the prescribed use of fire (for hazard reduction) are highly regulated, both operationally and with regards to potential environmental impacts. The Blue Mountains Bush Fire Risk Management Plan contains references to smoke management, and the need for operational plans to consider the effects of smoke on nearby residences, and sensitive locations such as hospitals, aged care facilities, schools and tourist centres. This plan states that all burn plans must include measures to reduce the impact of smoke as far as practicable.

While a number of prescribed burns were conducted within the City during the reporting period, given the lack of scientific data it is impossible to quantify the contribution prescribed burning has on reduced local and regional air quality. As the conditions that allow safe prescribed burning to be carried out also tend to inhibit smoke dispersal, it is reasonable to assume that prescribed fires do have a short term effect on local air quality. To a certain extent the impacts of smoke from prescribed fires can be managed, however, as with all fire the generation of smoke is an unavoidable product of such activities.

Prescribed burn, Linden

Wildfire

The impact of smoke resulting from wildfire is impossible to manage and may have significant implications for local and regional air quality.

Given the weather conditions that are conducive to very high and extreme fire danger in the Blue Mountains, the occurrence of wildfire under these conditions will typically result in large quantities of smoke being blown for long distances downwind of the fire. This has the potential to severely impact on air quality within the city, affecting residents, tourists and businesses alike. The composition of smoke from an intense wildfire may be substantially different from that of a low intensity prescribed burn, and exposure may have implications for the health of persons with respiratory illness.

Although numerous fires were attended and extinguished by both the NSW Fire Brigades and the NSW Rural Fire Service during the reporting period, the reported incidents were minor in significance and are unlikely to have contributed significantly to reduced local or regional air quality.

Motor vehicles

Greenhouse gas emissions from road transport in NSW have increased steadily over the last 10 years because both vehicle numbers and their use are growing. As a result, overall vehicle emissions in 2000 showed a 20.3% increase on 1990 levels (NSW SoE 2003). Vehicle emissions also contribute to reduced local

air quality due to particulate pollutants. The number of Blue Mountains residents who journey to work by car increased by 24 per cent between 1991 and 2001.

Commercial and industrial sources

Under the Protection of the Environment Operations Act 1997, industries over a certain threshold must be licensed to pollute air or water. There are approximately 14 active Environment Protection Licences in the Blue Mountains Local Government area, as issued by the NSW Environment Protection Authority under the *Protection of the Environment Operations Act 1997* (PoEO Act). Many of these activities are licensed for emissions other than air. During the reporting period, the public made 3 complaints to the EPA Pollution Line regarding air pollution incidents in the Blue Mountains Local Government Area.

Greenhouse gas emissions

The increase in population in the Blue Mountains and general trends in increasing consumption per capita throughout NSW is likely to have increased the greenhouse gas emissions attributable to our community. Net emissions are likely to be increasing and the rate of increase may also be on the rise. Most of the increases in Australia's greenhouse gas emissions over the past decade have come from the generation and use of energy, agriculture, land-use changes and motor vehicles. Energy production and energy conversion (mainly coal-fired) is the main source of greenhouse gas emissions in NSW (AGO 2002 cited in EPA 2003).

What is the current state of the atmosphere in our region?

Globally, the current main issues with our atmosphere are depletion of the ozone layer, rapid enhancement of the greenhouse effect resulting in climate change, and air quality – both ambient and indoor. These have impacts on plant growth and function, climate, agriculture, human and animal health and ecosystem function.

The ozone layer

Stratospheric ozone concentrations have generally stabilised since catastrophic falls in the 1990's, due to the effectiveness of the Montreal Convention and associated efforts to eliminate production and use of CFC's and halocarbons.

Enhancement of the Greenhouse effect / Climate change

The combustion of fossil fuels and clearing of forests are increasing levels of greenhouse gases in the atmosphere. This has the effect of altering the overall heat balance and leading to changes in global climate and weather patterns. A continuing rise in greenhouse gas emissions is predicted to bring about global warming and an increase in extreme weather events, varying from region to region (IPCC, 2001). A recent modelling study undertaken by CSIRO, suggest that the climatic impacts predominant in eastern NSW, will be: extreme temperature and rainfall events resulting in droughts and bushfires, in addition to lack of water supplies for cities and the natural ecosystem(CSRIO, 2002).

Climate change is discussed further in Section 4.

Australia's total net greenhouse gas emissions increased by 2.3% over the period 1990 to 2004 which is an additional 12.8 million tonnes of carbon dioxide equivalent (ABS, 2006). Although Australia has not ratified the Kyoto Protocol, this increase in CO_2 (eq) emissions is just off Australia's target of a 2 % increase in emissions. The 2 % net increase not only reflects the efforts to minimise emissions but is largely due to the halt to land clearing practises that occurred during this reporting period.

Air quality

There is no reliable data about air quality in the City of Blue Mountains, as the City falls outside the Metropolitan Air Quality Study carried out by the Department of Environment and Conservation.

We can infer, however, that air quality in the Blue Mountains is likely to be better than in many areas of metropolitan Sydney. This is because the area is elevated and lies beyond the Sydney airshed, has relatively low levels of industry, has large natural areas which provide a buffer between the Sydney Basin and the Local Government Area and as a result of frequent 'flushing' of air due to topographic-induced winds and breezes. Air pollutants and photochemical smog (seen as a brown haze) from the Sydney region are not thought to significantly affect air quality in the Blue Mountains.

Indoor air quality can be poor even when outside air quality is very good, as it is determined primarily by indoor sources of pollution in combination with poor building ventilation. Many people's main exposure to air pollutants occurs when they are indoors, such as at home, in the workplace or in entertainment venues (CSIRO 2003). Main sources are indoor fires (heating, gas cooking, smoking) and the emissions from new products such as furniture made with glue, paints, plastics. Given the presence of unflued gas heaters / cookers and solid fuel heaters (such as fires or combustion heaters) in the mountains, and the cold weather which may encourage residents to reduce ventilation in the home, indoor air quality may be an issue. Smoking indoors is also a pressure on indoor air quality. Given the high incidence of childhood asthma in some areas of the mountains (a condition which can be exacerbated by poor indoor air quality), this issue probably warrants further investigation.

Making a Difference

Response from general community

Citizens Climate Campaign is group of concerned citizens who are helping to create a groundswell to force climate change onto the political agenda. The group started in the Blue Mountains, but hopes to spread much further.

Citizens Climate Campaign believes that decision makers can be influenced by regularly writing short letters of concern. Their policy is "if enough people do this, policies can change."

Members of the campaign receive a monthly email with:

- Information about a particular climate change issue;
- Correspondence details of the relevant decision maker.

You can join the campaign by sending an email to climatez@bigpond.net.au

Response through partnerships

Passenger Choice Project

The Passenger Choice Project was developed to improve the coordination of transport options. In particular the project aims to address those with a transport disadvantage such as people with disabilities and frail older people. It is the first of its type in NSW.

The leadership and pivotal role of Helen Walker at Great Community Transport is acknowledged.

The Passenger Choice Project plans to develop a web-site called Smart City Transport. This website will be an interactive tool allowing those in need of transport to register their transport requirements, and where appropriate to place a booking if there is capacity, on one of the vehicles in the system. Information and links to mainstream services will also be provided on the website to provide an opportunity for a person's transport needs to be met by mainstream transport options.

This model also has the potential to address a number of other needs and issues faced by the local residents of the Blue Mountains.

These include:

- Meeting the growing demand for accessible transport services of our ageing population;
- Attracting more people onto public transport services;
- Reducing the social, environmental and economic costs associated with high car usage and
- Making better use of existing transport capacity in terms of service provision and infrastructure.

The key transport providers involved in this project include:

- Westbus
- Blue Mountains Bus Company
- Hawkesbury Valley Buses
- Specialised Transport Services e.g. Great Community Transport, Hawkesbury Community Transport, Taxis services, vehicles provided by community organisations and Government agencies such as the Area Health Service, Councils, Schools, and Clubs

A consortium has been established to oversee the project. Its membership includes representation from the following organisations:

- Great Community Transport Inc
- Blue Mountains City Council
- Penrith City Council
- Hawkesbury City Council

- Tri- Community Exchange
- Blue Mountains Bus Company
- Westbus
- Western Sydney Community Forum
- eVolition
- NSW Department of Commerce

The Passenger Choice Project is not in competition with mainstream transport providers, rather its market is targeting those who for a variety of reasons can not access mainstream transport.

The Passenger Choice Project has received funding from the Commonwealth Department of Transport and Regional Services through the Regional Partnerships Program and from the State Government through the Western Sydney Area Assistance Scheme.

Response from Blue Mountains City Council

Bike Plan

During 2005-2006 a draft Blue Mountains Bike Plan 2010 was prepared. The Plan prioritises the development of the proposed network of bike routes and pathways that are desired throughout the City for regional needs, local needs and recreational needs. The vision is "to create safe and accessible pathways of travel that improves our connections with our destinations and each other and encourages people of all ages to use their bicycles for everyday transportation and enjoyment". In 2005-2006, footpath widening to accommodate cyclists was undertaken at Macquarie Road Springwood as part of Council's Cycleways Program in the Capital Works Program.

Council Joins Cities for Climate Protection Program

In May 2005 Blue Mountains City Council joined the International Council for Local Environmental Initiatives' (ICLEI) and their Cities for Climate Protection (CCP) Program. This program is a global initiative designed to assist local governments to reduce greenhouse gas emissions (GGE) from their own operations and their community. The program is administered in Australia by the International Council for Local Environmental Initiatives (ICLEI) – Local Governments for Sustainability Australia and New Zealand, in collaboration with the Australian Greenhouse Office (AGO). The CCP program is based on an innovative performance framework structured around five milestones that local governments commit to undertake. The milestones allow local governments to better understand how the Council decisions affect energy use and how these decisions can be used to mitigate global climate change while improving community well being. The CCP methodology provides a simple, standardised way of acting to reduce greenhouse gas emissions and of monitoring, measuring and reporting performance.

The five Cities for Climate Protection milestones that the BMCC has adopted include:

Milestone	Comment
Milestone 1: Conduct an inventory and forecast of GGE for community and for the Council.	This includes an audit of estimated greenhouse gas emissions from both the Council operations and from the activities of the local community. It provides a powerful picture of the sources and scale of emissions. The audit acts as a yardstick of greenhouse gas emissions for a specified baseline year (2004), and also includes estimates of emissions growth into the future assuming a 'business as usual' scenario.
Milestone 2: Establish an emissions reduction goal	This is the amount of greenhouse gases the Council aims to reduce from the baseline year. Reduction goals generally vary between Councils depending on such issues as population characteristics, geographic location and resources.
Milestone 3: Develop and adopt a Local Action Plan to reduce GGEs.	The Local Action Plan sets out the actions the Council will be taking to reduce the Council and community's GGEs. It also sets strategic directions, reporting frameworks and timelines for implementation. The plan informs and educates the community and the Council staff on why certain areas have been prioritised.
Milestone 4: Implement the Local Action Plan.	The Australian Greenhouse Office currently provides grants to the Councils implementing CCP and has funded work to date on Milestones 1 and 2 in the Blue Mountains. DEUS is also offering substantial grants for energy/ water efficiency projects. The Councils that forge relationships and partnerships with other stakeholders (community groups/ other agencies) can increase and attract additional resources to implement the action plan. Local communities can also actively participate in reducing GGEs.
Milestone 5: Monitor and report on achievements.	Reporting on the progress of the CCP program over time provides useful feedback and direction for Council, the community and other relevant agencies participating in the Australian and global CCP program. Continual reporting keeps everyone informed and active in working together to reduce GGEs. The Council and the community can also learn from the initiatives implemented by other organisations.

Council achieved CCP Milestone 1 in April 2006 with the development of a greenhouse gas emissions inventory for the Council operations and the community. The inventory was completed for the chosen base years of 2004 (using 2004-2005 data) for the Council sector (i.e. emissions generated from Council operations) and 2001 for the community sector (i.e. emissions generated from the wider local government area). A forecast of emissions growth to 2012 for the Council emissions and 2010 for community emissions was also completed, based on a 'business as usual' scenario.

During the period September 2005 and April 2006 Omega Environmental Pty Ltd were engaged to conduct the emissions audit and forecast. The process involved collecting and interpreting data relating to consumption and cost of energy for the Council and the community, consistent with requirements of Milestone 1 of the CCP program. The results of this process, including detailed graphs, tables and recommendations to assist the Council in integrating energy management issues into the operation of the organisation, are outlined in the report: *Blue Mountains City Council - Cities for Climate Protection Program - Milestone 1 Summary Report* (May 2006) available on Council's website (www.bmcc.nsw.gov.au). This report provides essential information and recommendations that will inform and guide work on Milestone 3 in 2006-2007 – the development of a local action plan to reduce greenhouse gas emissions.

In June 2006, Council also achieved CCP Milestone 2 with the formal adoption of a 10% greenhouse gas emissions reduction goal to be achieved by 2012. Having a greenhouse gas reduction goal provides a clear target for the City to work towards. It also helps drive decision making and action to reduce emissions.

Current Actions to Reduce Greenhouse Gas Emissions

The Council is already implementing a number of actions that will count towards achievement of the reduction goal of 10%.

Energy Performance Contract

Following on from Council's foray in energy conservation with the successful implementation of light-save systems throughout its Katoomba Headquarters building in 2003, Council engaged Energy Conservation Systems to conduct a detailed energy saving study in the early stage of the 2005-2006 financial year. This study led to the signing of an Energy Performance Contract (EPC) that not only incorporated light savings, but heating, air conditioning and ventilation savings as well as water savings at nine Council-owned building assets.

The above study focused on Katoomba Sports and Aquatic Centre, Glenbrook Pool, Lawson Pool, Katoomba Council Depot, Springwood Council Depot, Blaxland Community Centre/Library, Katoomba Civic Centre/Library, Katoomba Headquarters and Springwood Council Office/Library. The EPC commenced in February 2006 and was successfully implemented by the end of June 2006.

Contract installations are estimated to result in a reduction of 617 tonnes of CO_2 equivalent emissions and a reduction in energy consumption by 7.4 million megajoules per annum. Further reductions are expected from non-programmed completed works, including upgrading the heat exchange hot water units at Lawson Pool. Final calculations are yet to be determined, however, it is expected that the 700 tonnes per annum target will be achieved.

Council Fleet Review

In response to escalating global oil prices and in keeping with the Council commitment to sustainability, a review of the Council vehicle fleet, heavy vehicles, plant and the light fleet has been completed. In addition, an overall review of the fleet composition was undertaken, resulting in a net reduction to the overall fleet numbers and a shift in composition of the fleet from from 6 cylinders to 4 cylinder vehicles. Already approximately 76% of the cars in the fleet have been changed over to smaller vehicles. The balance of the vehicles will change to 4 cylinder models at the next scheduled changeover for the individual vehicles. Some vehicles will, by operational necessity, have to be retained as 6 cylinders eg. Toyota Hilux 4WD - however these will be by far in the minority. The Council will also be trialling a more energy efficient Toyota Prius vehicle within its fleet in 2006/2007.

Implementation of the Building Sustainability Index

The Council is also committed to implementing BASIX (the Building Sustainability Index). BASIX ensures each dwelling design meets the NSW Government's targets of:

- 40% reduction in water consumption; and
- 25% reduction in greenhouse gas emissions, compared with the average home.
- The greenhouse target will increase to 40% from July 2006.

Increasing our understanding

Selected time series data (trends) for our atmosphere resources

Pressures on our atmosphere resources

What are we monitoring	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Number of applications for backyard burning		1,155	1,663	868	707	408	564
Permits issued for backyard burning		122	68	47	28	24	39
Greenhouse emissions – Council (tonnes CO_2 equivalent).						18,367	
Greenhouse emissions – Blue Mountains community (tonnes CO_2 equivalent)			800,374				

What are we monitoring	1991	1996	2001
Number of Blue Mountains households with 0 vehicles	3,103	3,131	2,820
Number of Blue Mountains households with 1 vehicle	11,262	11,646	11,544
Number of Blue Mountains households with 2 vehicles	7,113	7,925	8,932
Number of Blue Mountains households with 3 vehicles or more	1,886	2,154	2,961

**Note, 2006 Census data not available*

What are we monitoring	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Total number of registered vehicles by fuel type						
Unleaded	33,502	35,767	37,863	40,100	41,419	42,595
Leaded	8,039	6,732	5,762	4,911	4,133	3,396
Other / Unknown	12,669	12,781	12,820	13,137	13,190	13,507
TOTAL	54,210	55,280	56,445	58,148	58,742	59,498

What are we monitoring	1991	1996	2001
Number of persons (>15 years) who journeyed to work by...			
Car - as driver	14,829	16,585	18,460
Car - as passenger	2,485	1,926	1,831
Motorbike	199	167	172
Truck			560
Taxi	201	113	96
Train	4,429	4,235	3,839
Bus	898	151	153
Tram or Ferry	6	5	10
Bicycle	171	107	137
Walked only	1,022	965	1,078
Other	332	533	408
Worked at home	1,308	1,667	1,889
Did not go to work	3,335	4,517	4,870
Not stated	966	415	467
Total	**30,181**	**31,386**	**33,970**

**Respondents were able to select one or more modes of travel to work.*
**Note, 2006 Census data not available*

The State of our atmosphere resources

What are we monitoring	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Number of complaints to the EPA pollution line about air in the Blue Mountains (where EPA is appropriate regulatory authority)	5				12	8	3

Responses in looking after our atmosphere resources

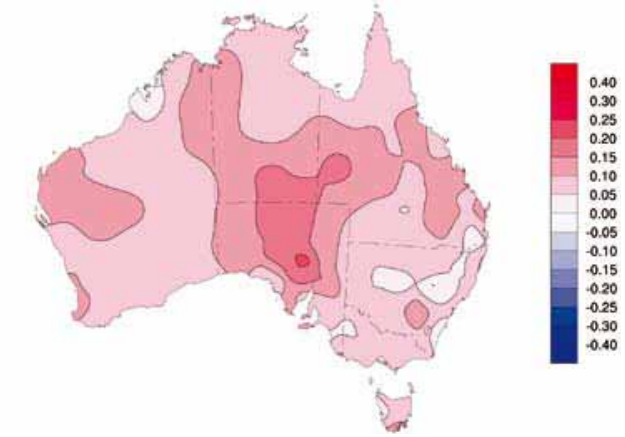
What are we monitoring	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Greenhouse savings from Council building energy retrofits (tonnes CO2 equivalent)							132

SECTION 4 ALERT

This section highlights and discusses emerging issues with the potential to have a significant impact on the condition of our natural assets.

Climate change

Global warming, the phenomenon caused by an increase in atmospheric greenhouse gases will be the most significant issue facing humankind this century. Global warming has given rise to climate change which has a pronounced affect on natural ecosystems, agriculture/forestry, ocean productivity, the built environment, and human health. The impact of climate change, whilst variable, will almost certainly be felt everywhere on the planet by the middle of this century. Indications of global warming and other changes in climatic conditions have already begun to appear with the 1990s being the warmest decade since records were kept in 1861. The following figure indicates the trends in mean temperature increase or decrease (^{0}C/10 years) for 1910-2005 (Australia State of Environment Report 2006 At a Glance).



Our Earth, the Greenhouse Planet

The atmosphere is the most critical of environments as it regulates the very conditions that give life to our planet. Our atmosphere regulates the amount of radiation that reaches the earth's surface, regulates temperature (through the greenhouse effect) and provides the specific gases that plants need to grow and animals need to breathe.

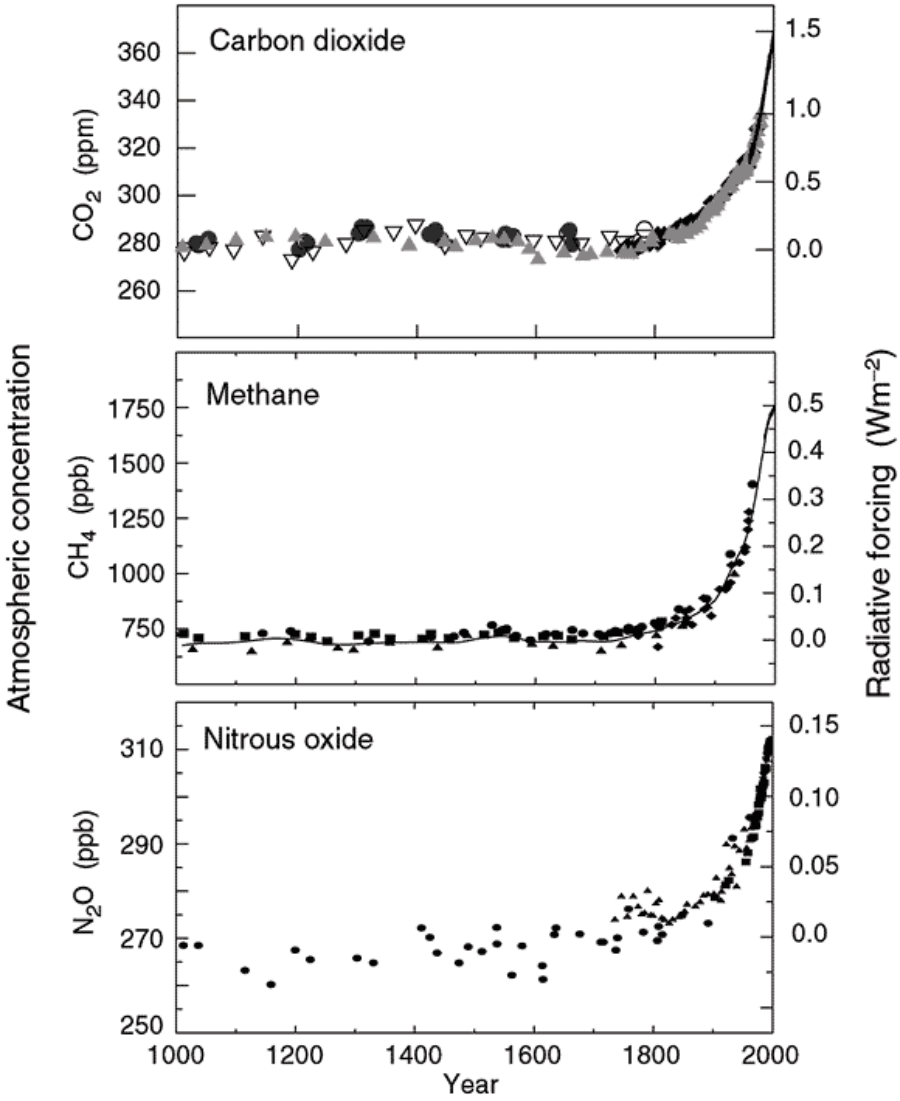
The greenhouse effect occurs when gases in the upper atmosphere trap heat making the earth's surface warmer. Some gases are far more effective at trapping heat than others and are commonly referred to as greenhouse gases, the most significant being water vapor, carbon dioxide, methane, and nitrous oxide. If there were no greenhouse gases, then the earth's surface would be some 30^{0}C cooler than at present. Atmospheric greenhouse gas concentrations fluctuate naturally, in cycles that last many hundreds of thousands of years. Depressions in these cycles are marked by ice ages interspersed with periods of high temperatures. Industrialisation marked the beginning of a rapid increase in human activities, such as burning of fossil fuels, deforestation, and intensive

Climate change and energy issues have grown significantly in importance
"People nominating climate change as one of the two most important environmental issues increased to 13% in 2006 from 6% in 2003 and 2000, and those nominating energy conservation management increased to 7% in 2006 from 2% in 2003. The number of people who say they often make an effort to reduce their fuel consumption and air pollution has increased by 10% since 2003 from 38% to 48%"
From Who Cares about the Environment in 2006? A survey of NSW people's environmental knowledge, attitudes and behaviours

livestock farming, and an equally rapid increase in greenhouse gas emissions. In fact, the atmospheric carbon dioxide concentration is now at its highest level in 10,000 years. The figure below highlights the recent increases in global concentrations of three greenhouse gases (IPCC, 2001).

Indicators of the human influence on the atmosphere during the Industrial Era

(a) Global atmospheric concentrations of three well mixed greenhouse gases



Rising greenhouse gas levels will enhance the greenhouse effect resulting in a long-term increase in the average surface temperature of the earth, or global warming. The Intergovernmental Panel on Climate Change (IPCC) estimates that by the year 2100, global surface temperature will have increased by 1.4 to 5.8 ^{0}C. Global warming is only one part of climate change, as other variables that are driven or influenced by surface temperature are also likely to change. These include rainfall and wind patterns, sea levels, and the operation of oceanic currents. The frequency and intensity of natural disasters such as floods, storms, cyclones, drought and wildfire are expected to increase.

Our Land and Water

Climate change will affect both the land and the water in a variety of ways that will create significant challenges for land managers.

As surface temperatures rise, rainfall will increase at higher latitudes and decrease at lower latitudes. Rainfall in the Sydney Region including the Blue Mountains may fall by 20-30% by 2030 placing pressure on domestic water supplies (CSIRO, 2001). Shortfalls in supply will have to be made up through reuse of grey water, recycling of treated sewerage and increased residential rain water capture and storage. Declining rainfall will reduce groundwater recharge and stream flow affecting natural ecosystems. Storms will increase in frequency and intensity which will place further pressure on soil and streams, accelerating the process of erosion. Improvements to stormwater management will be essential in order to limit the impacts of these changes.

In the soil, a warmer environment favours the growth of bacteria, which accelerates the decomposition process, hence, altering the nutrient cycle. Cycling of the nutrient, nitrogen, produces higher concentrations of nitrous oxide, which is a greenhouse gas with a warming potential that is 200-300 times more effective at trapping heat than carbon dioxide. An increase in atmospheric carbon dioxide concentration (necessary for photosynthesis) will allow more rapid plant growth. However, as temperature rises plant growth is likely to decline in response to reduced soil moisture and heat stress. Plant reproduction is typically dependant upon climatic variables. For example, apple and stone fruit bud burst is reliant upon chilling and some fruit growing areas may no longer be productive in the face of climate change. Development of new crop varieties with characteristics that will maintain productivity will be required to limit agricultural losses.

The infrastructure that our society has grown reliant upon will be placed under considerable pressure as a result of climate change. Civil infrastructure built to withstand certain climatic variables will face higher and lower temperatures and more intense natural disasters, that may ultimately result in infrastructure failure or a reduced operational lifespan. Queensland investigated the impact of climate change on the states' transport infrastructure and determined that impacts will be noticeable by 2030, and without significant adaptation of the transport infrastructure there is a real risk of severe failure by 2070. Council, as with other regulatory authorities and infrastructure managers, will need to adopt improved construction practices taking into account the potential for climate change and will need to address issues in the existing infrastructure.

Our Natural Environment

Many of Australia's natural systems will be vulnerable to the effects of climate change due to the limited adaptive capability. Those ecosystems or species with specialised ecological requirements, limited distribution or mobility, will be most at risk. Climate induced changes affecting biota include: a change in rainfall distribution, intensity and seasonality, altered growth patterns associated with increased carbon dioxide, increased temperature affecting growth and heat stress and change in sea level affecting marine, aquatic and riparian ecosystems. Extreme events such as drought, flood, cyclones, and wildfire will

increase causing further impacts. Already there has been observed changes in Australian biota as a result of global warming. These include early breeding in birds and reptiles, earlier flowering of eucalypts and early arrival of migratory birds.

The Greater Blue Mountains has the highest biodiversity in temperate forest environments in Australia, and globally. The World Heritage Area contains over 400 animals and 10% of Australia's or 1% of the worlds vascular plants. It is considered an evolutionary cradle that has given rise to significant speciation and a high proportion of endemic species (species confined to a particular locality). The Area contains over 90 species of Eucalypt, seven endemic plant genus, and numerous endemic species including the well known Blue Mountains Water Skink, and Wollemi and Dwarf Mountain Pines, all of which are nationally threatened. The region is typified by its variable climate, elevation (100 to 1300 m) and diversity of landscapes ranging from dry ridgetops to secluded valley gorges. Its ecosystems and species have adapted to fill the many ecological niches that the environment provides.

Dwarf Mountain Pine
The Dwarf Mountain Pine, like its more famous relative the Wollemi Pine, is millions of years old having been around since the dinosaurs. It is a highly specialised species endemic to the Blue Mountains, occurring on just 13 waterfalls between Wentworth Falls and Katoomba. It grows in the claystone bands that are wet by spray from the falls. Climate change is expected to significantly modify the environment which this plant has adapted to over hundreds of thousands of years. Average rainfall is expected to decline, with increased periods between rain events reducing the spray zone, hence the area of suitable habitat for the Dwarf Mountain Pine will decline. Storms events that are expected to increase in frequency and intensity could damage the plants directly or erode the claystone bands in which they grow. Having survived for millions of years the Dwarf Mountain Pine may now be under serious threat as a result of climate change.

Global warming is expected to have a significant impact upon the natural heritage values of the Blue Mountains. A temperature rise will change metabolism and may stress both plants and animals. Increased carbon dioxide will promote plant growth placing pressure on the low nutrient sandstone soils, rainfall will change in intensity, frequency and seasonality affecting biota with a preferred hydrological regime, storms will increase in frequency and intensity increasing soil erosion, and bushfires will increase in frequency and intensity affected the reproductive cycle of fire adapted species. There will be some biota advantaged by climate change as it creates conditions that are more favourable. Ecosystems or species adapted to a specific ecological environment, of which there are many in the Blue Mountains, may not be so fortunate and will be placed at risk. Eucalypts, which are a well known feature of the Blue Mountains can be used to illustrate the potential affect of climate change on biota. Predictive modelling to assess the impact of global warming on Eucalypts suggest that up to 50% of species will be adversely affected by climate change, and 25% may be at significant risk. Scientific consensus is that a 2^0C rise in temperature will result in the widespread loss of both fauna and flora and there conservation will pose new challenges to those charged with the conservation of biodiversity.

Adaptation is crucial to survival
"… the primary concern is that Australia should build its capability to live with its environment and respond appropriately to changes in that environment. An adaptive approach to environmental issues where we learn by doing, and modifying approaches as needed, should be the underlying basis of actions and policies. Cooperation across all levels of governance is critical for this to be effective."
From Australia State of Environment Report 2006 At a Glance

Our Future

The cost of intervention to maintain the natural, economic and social environments as they respond to the climate change, will be prohibitive. Reducing atmospheric greenhouse gas levels will be only effective solution and will require affirmative action at all levels of society from the

individual through to government. Council provides a number of education programs that assist individuals to reduce their contribution to greenhouse gas emissions. Council is also progressively introducing new programs to reduce emissions by the organisation. Examples include energy efficient lighting in buildings and an increase in more energy efficient vehicles. Through continue vigilance, positive action and ongoing support for reducing greenhouse gas emissions, we can limit the impact of global warming ensuring a healthier planet for future generations.

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