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## **SUBMISSION INTO CLIMATE CHANGE**

### **IN RESPONSE TO LEGISLATIVE ASSEMBLY STANDING COMMITTEE ON NATURAL RESOURCE MANAGEMENT – CLIMATE CHANGE**

**DECEMBER 2007**

#### **Background to Namoi Regional Organisation of Councils**

The Namoi region is located in north-west NSW, to the west of the Great Dividing Range and north of the Hunter Valley. It is predominantly reliant on agriculture and its service industries for its economic wealth. Major agricultural enterprises include sheep and cattle grazing, dryland cropping (wheat, barley, sorghum), irrigated cotton and intensive animal production. There is some forestry, and an increasing amount of coal mining. The major city is Tamworth, with towns including Quirindi, Gunnedah, Boggabri, Barraba, Narrabri, Wee Waa and Walgett.

Namoi Regional Organisation of Councils (ROC) has the following organisations as members:

- Walcha Shire Council
- Tamworth Regional Council
- Liverpool Plains Shire Council
- Gunnedah Shire Council
- Narrabri Shire Council
- Namoi Catchment Management Authority (CMA)

The Namoi catchment area covered by the Namoi CMA extends beyond the local government boundaries of member councils, with parts of Warrumbungle and Walgett Shires also being part of the Namoi catchment.

## **Introduction to the Submission**

The Terms of Reference for this Submission are extensive. This submission addresses some, but not all of the issues.

Clearly, addressing the impacts of climate change is, and will become increasingly important if we are going to adapt landuse, including agricultural systems, to a changed climate while striving to maintain our natural resource base.

Even more important, however, is addressing the causes of climate change. If the causes are not addressed, through reduction in greenhouse gas emissions, adaptation will be to no avail. The rate at which climate change is occurring makes adaptation virtually impossible if it continues unabated. Industries dependent on natural resources, and particularly agriculture, will feel the effects of climate change to a greater extent than other industries. As a result of this, regions which are dependent on agriculture are likely to suffer more financially, socially and environmentally than other regions. For this reason climate change is of particular importance to the Namoi region, because of its dependence on agriculture and its related industries.

Not only is there a need to reduce greenhouse gas emissions, we also need to act to reverse the "greenhouse legacy" – that is the increased levels of gases in the atmosphere already causing climate change.

While this submission is from NamoiROC, it does not necessarily the views of all individuals in all member organisations.

## **Role of local government**

Some of the NamoiROC councils have projects aimed at addressing climate change. For example, Tamworth Regional Council currently has many projects to mitigate the impact of climate change (particularly projects developed to reduce energy and/or water consumption) but has not, to date, adopted a formal resolution on climate change.

The following general comments can be applied to the role of local government in relation to climate change:

- There is a need for climate change mitigation and adaptation to be comprehensively co-ordinated between federal, state and local government, community, business and industry.
- The financial and staff constraints under which local government is currently operating must be recognised. The costs of climate change mitigation and adaptation must, generally, be carried by the federal government and not become another issue pushed down to local government. While there is currently some funding available from both the federal and state governments for climate change projects, many councils do not have the resources available to develop and implement suitable projects.
- Local government's role in natural resource management and sustainable development must be recognised by the inquiry.
- The Local Government Act 1993, Section 8, lists a Council's Charter, one aspect

of which is:

"To properly manage, develop, protect, restore, enhance and conserve the environment of the area for which it is responsible, in a manner that is consistent with and promotes the principles of ecologically sustainable development."

- The functions of Councils that have an impact on natural resource management include the provision, management and operation of:
  - environmental conservation, protection and improvement services and facilities;
  - waste removal, treatment and disposal services and facilities;
  - energy production, supply and conservation;
  - water, sewerage, drainage works and facilities;
  - stormwater drainage and flood prevention, protection and mitigation services and facilities;
  - fire prevention, protection and mitigation services and facilities;
  - land and property ;
  - provision and development of roads;
  - community education.
- Councils also have an impact on natural resource management through their control over planning and development processes and their involvement in regional programs such as the Northern Inland Regional Waste Group and the Namoi Local Government Group. Thus the involvement of local government is integral to natural resource management and climate change mitigation and adaptation.

### **Role of CMA**

- The Namoi CMA is presently implementing its Catchment Action Plan (CAP) for the Namoi, with priorities dictated by the CAP. The core role of the CMA is in natural resource management, therefore it will only be directly involved in areas such as health, education and infrastructure if there is an effect on the natural resources. It is therefore important that the CMAs work with local and other sectors of government to achieve visionary long-term planning for the catchment.
- Much of Namoi CMAs funding goes towards on-ground works in areas where there is a high value to be obtained through the works.
- The Namoi CMA also sees a significant role in education. A recent survey of Namoi residents (land holders, hobby farmers and town dwellers) supports this direction. The Namoi Catchment Management Authority Stakeholder and Community Benchmarking Study 2007, was conducted by Ipsos- Eureka Social Research Institute. It found that town dwellers in particular, want more information about global warming and its impacts. They are also concerned about water scarcity and the need to be energy efficient. However they are confused as to what they can personally do to help in the area of environmental sustainability and would value more information regarding this.

## **a) The likely consequences of human-induced climate change on land (including salinity), water and other natural resources**

In the Namoi region, the effects of climate change are expected to include the following:

- Higher average temperatures:
  - Higher average maximums
  - Higher average minimums
  - More extremes - heat waves
- Lower rainfall
- More frequent storm events
- More bushfires

### **Land**

- Higher temperatures and resulting higher evaporation, and lower rainfall will lead to lower groundcover.
- Exposed soil will be more prone to erosion.
- Topsoil will be lost at an increasing rate.
- Erosion will be exacerbated by the expected increase in high intensity rainfall and storm events.
- All forms of erosion, including sheet, rill and gully, are likely to become worse.
- With higher temperatures, bushfires are likely to increase with resulting deleterious effects on:
  - biodiversity (flora and fauna);
  - erodibility of soils, due to denuded ground cover;
  - water quality as a result of erosion;
  - air quality as a result of smoke

### **Salinity**

- In the Namoi region dryland (versus) irrigation salinity is a problem in certain areas. Saline scalds occur where ridges connect with plains.
- High intensity rainfall will cause greater erosion of these saline scalds.
- The salinity levels of water are likely to increase due to lower water volumes and greater erosion of saline scalds.

### **Water**

#### **Water Quantity – an increasingly scarce resource:**

- Lower rainfall combined with higher temperatures and higher evaporation will lead to increasing scarcity of what is now an already scarce resource.
- The water market will dictate that water will go to highest value uses, including urban supplies and horticulture.
- Change in agricultural land use to highest value cropping (usually horticulture) will have a secondary effect on natural resources.
- Assuming that environmental flows continue to be viewed as a low value use, river health will continue to decline.
- Dams are likely to be augmented to increase holding capacity for when it does rain. This will have downstream impacts due to reduced river flows.

- Water released from dams is colder than unregulated water. This has impacts on fish health.
- A greater number of high intensity rainfall events will cause more flash flooding with economic, environmental and social implications.

#### **Water Quality**

- Increased erosion due to high intensity rain events will lead to increased sediment load in rivers
- Increased nutrient transfer, attached to soil particles and as fertiliser cause eutrophication (raised nutrient levels) in water.
- Raised nutrient levels, combined with smaller water volumes and higher temperatures will increase number and severity of algal blooms, such as toxic blue green algae.
- Increased high intensity rainfall events will lead to greater chemical pollution of streams, affecting riverine health.

#### **Native, including threatened, species**

Increased temperatures and lower rainfall will affect some species and in some cases whole communities. The effect in this region may not be as great as Australia's alpine regions where snowfall quantities and patterns are likely to change. The effect on individual species will depend on their range of adaptations.

Examples of species which would be at risk in New South Wales are listed in Busby 1988, Hughes & Westoby 1994 cited by Department of Environment and Climate Change, 2005.

#### **Air**

Increased wind combined with reduced ground cover, will lead to more dust storms with a subsequent effect on air quality.

### ***b) Options for ensuring ecologically sustainable natural resource use, taking into particular account the impacts of climate change.***

#### **Ecological Sustainable Natural Resource Use**

The *Environment Protection and Biodiversity Conservation Act 1999* defines ecologically sustainable use of natural resources as:

*use of the natural resources within their capacity to sustain natural processes while maintaining the life-support systems of nature and ensuring that the benefit of the use to the present generation does not diminish the potential to meet the needs and aspirations of future generations*

The Act provides the following principles of ecologically sustainable development :

- (a) decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations;

(b) if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;

(c) the principle of inter-generational equity--that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;

(d) the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making;

(e) improved valuation, pricing and incentive mechanisms should be promoted.

It could be argued that many present day activities do not comply with some or all of the principles of ESD. Further, despite the fact that the Act provides a definition of ecologically sustainable use of natural resources, different people apply their own definitions.

Because we don't have the benefit of hindsight when making decisions and acting, the proposal that we can even have a definition of "sustainable", and its implication of intergenerational equity, may be fundamentally flawed.

Because of this, and the fact that knowledge of climate change has only entered the minds of the general population relatively recently, it is difficult to provide options for ensuring ecologically sustainable land use. This difficulty is exacerbated by the fact that some people do not believe in climate change. Further the rate, and impacts of climate change cannot be guaranteed with absolute certainty.

### **Options for Ecologically Sustainable Natural Resource Use**

Comments regarding this topic rather than options themselves are provided below.

- **Gross Regional Product:** An analysis conducted by Bruce Brown, General Manager of Namoi CMA, into the ABARE CSIRO and QDNRW, Adapting to Climate Change Study, 2007, indicates that there will be significant decline in Gross Regional Product (GRP) as a result of the effects of lower rainfall on agricultural enterprises in the two case study regions by 2030. The decline in GRP is expected despite adaptive response to lower rainfall. Adaptive response is affected by level of education, income levels and diversity of income sources.
- **Government Investment:** Australian Government budget surpluses should be spent effectively targeting areas specifically that facilitate adjustment to climate change impacts, including expenditure on the following priorities:
  - Education;
  - New technology which may lower cost structures, increase outputs and reduce greenhouse emissions;
  - Declining infrastructure

- Effective government expenditure in the above areas, combined with strategic public/private sector partnerships will enable the opportunities presented by climate change to be realised.
- **Soils** – if a carbon market values sequestration of carbon in soils, the effects on NRM will be positive. The rate of sequestration of carbon in soils depends on factors such as soil type, landuse, land management, rainfall and temperature. The planet's soils provide a huge potential carbon sink. It is important that this potential is realised. To achieve this we need an improved understanding of the processes under the given factors. Further we need easy and reliable measuring systems and recognition of soils in international policy. A carbon market which values soil carbon will address triple bottom line objectives, by:
  - increasing landholder wealth,
  - thereby improving social outcomes,
  - provide environmental benefits though increased soil organic matter.

***c) Approaches to land and water use management practices on farms and other natural resource management practices, having regard in particular to the role of such practices in contributing to climate change or as a tool in helping to tackle climate change***

The Namoi CMA, in conjunction with the NSW Department of Primary Industries, held Climate Change forums in Narrabri and Tamworth in March 2007, entitled 'Climate change and agriculture - impacts and adaptation in the Namoi Catchment.' Paul Martin (Australian Centre for Agriculture and Law, University of New England) described a range of instruments which can be used to modify behaviour. Some or all of these may be useful in climate change adaptation. These instruments include markets, private regulation, public regulation, incentives and education.

On a physical level, agricultural practices which contribute to climate change include:

- Decreased capacity for carbon dioxide sequestration - if forests are cleared for agricultural purposes. Because of native vegetation regulations, this should no longer occur in NSW;
- Methane emissions from cattle;
- Nitrous oxide emissions from nitrogenous fertilisers – since fertiliser is an increasingly expensive farm input, there is an incentive to retain the nitrogen within the soil and thereby avoid volatilisation. Practices to assist this include placement of fertiliser below the soil surface and application of fertiliser prior to a rain event.

Tools to help tackle climate change include any practice which stores, or sequesters, carbon. The majority of these practices will have other environmental/economic benefits to the farm business, therefore market theory suggests that these will be favoured by the farm manager. These include:

- Maintenance of ground cover;
- Planting of trees;
- Increased organic content of soils.

***d) The effectiveness of management systems for ensuring that sustainability measures for the management of natural resources in NSW are achieved, having particular regard to climate change***

At the 'Climate change and agriculture - impacts and adaptation in the Namoi Catchment' forum, referred to above, Gary Allan (Climate Change Project Leader, NSW DPI) discussed the need for agriculture to adapt to the effects of climate change, irrespective of whether greenhouse emissions are reduced in the medium to long term. This is because climate change will occur because of the "legacy of history". Effective adaptation will require an understanding of the range of impacts at different scales, from catchment to local levels. The effect of impacts will vary with the industry and its location. The DPI's climatology team is working towards a greater understanding of adaptation required in different industries and in different locations, and extension of these concepts through its networks.

Peter Brown (CSIRO) developed the concepts of adaptation further, explaining that adaptive capacity was important, and this depends on vulnerability which is in turn affected by human, financial, physical, natural and social capital.

Management systems will need to be increasingly responsive and will need to include use of practices such as:

- Zero till, and retention of organic residues;
- Opportunity cropping: planting dates determined by temperatures and soil moisture;
- Varying planting and fertiliser rates to suit the prevailing weather/climate,
- Heat tolerant species, including crops, pastures and livestock;
- An understanding of new pests/weeds which may be favoured by changed weather patterns

***e) The likely consequences of national and international policies on climate change on natural resource management in NSW.***

Given the current national and international awareness of climate change, and with a change of Australian government to Labor, it is likely that national and international policies will reflect an urgent need to reduce green house gas emissions. Reductions are likely to take the form of targets and this will be combined with a carbon market.

Putting a dollar value on carbon, and the implied carbon trading scheme, will immediately create incentives and dis-incentives for certain actions, depending on the particular industry.

- ***Coal mining*** – a carbon market will lead to a higher cost of coal. If this causes the consumer to change to a cheaper source of energy, the demand for coal will be reduced. This will affect the benefit/cost ratio of mining in different areas. For example, areas currently being mined may become uneconomic.

Clean coal technology may enable continued use of coal. However it may prove to be ineffective and/or too costly.



Mining affects natural resource including:

- Underground aquifers - which may be cracked;
- Rivers – beds may be cracked leading to water loss out of the river;
- Riverine environments – as a result of reduced water flow;
- Biodiversity – flora and fauna
- Air quality – dust
- Secondary effects on a range of NRM areas because of the services mining requires eg roads, infrastructure, housing

The effect on NRM of mining will vary with the type of mining (eg open cut, long wall) and the areas involved.

- **Trees** – depending on the cost of carbon, trees may become a more viable form of land use than traditional agricultural enterprises. The effects on natural resources will depend on:
  - species of trees – radiata vs eucalypts
  - whether trees are planted as a monoculture or mixed species
  - location of plantings - both on a broad scale and local level
  - areas involved – for each planting, and total planting.

Effects may include the following:

- Reduction in groundwater and surface water downstream as trees use the water where it falls. Subsequent effects include reduced environmental flows in streams.
  - Change in native fauna species composition, with species that require woodlands being favoured against grassland species.
  - Change in flora composition, with understorey and native grasses possibly declining if trees are grown in a monoculture.
  - Increased erosion due to reduced ground cover as grasses are competed out due to shading and water restrictions.
- **Biofuels** – a carbon market combined with legislation may create a greater market for biofuels. The effect on NRM will depend on the particular production process and inputs used. The expanding biofuel market is leading to higher grain prices which are improving farmer incomes. Providing the process and inputs used are energy efficient, impacts on greenhouse emissions will also be positive

Biofuels using sorghum as the may lead to cropping on marginal land. This land may have previously been used for grazing of introduced and native species. This may lead to:

- land degradation – erosion, loss or topsoil,
- reduced biodiversity,
- increased salinity due to native trees, shrubs and grasses being replaced with annual crop leading to greater recharge and possible point-of-slope salinity.