Case Study: 3. Waste Management in the Lower Clarence River Catchment

What are the Waste Management Issues of the Clarence River Catchment?

With increasing population, increasing living standards and a growing tourism industry, waste creation in the Clarence River Catchment is likely to increase. All types of waste have a potential to impact negatively on the environment and in particular water quality. Water quality is critical to the survival of estuarine and marine ecosystems on which many Clarence River Valley industries depend. The fishing industry, in the Clarence River coastal zone (estuary and ocean), is particularly vulnerable to declining water quality which in turn affects fish habitats and fisheries productivity.

Waste Streams or Sources of Waste in the Clarence River Catchment

Household or Domestic Waste

The population of the Clarence Valley in 2006 was 50,102 and is increasing at an average annual rate of 0.6%. Grafton, Yamba, Maclean and Iluka are the main urban centres. A total domestic waste stream of 19,444 tonnes of domestic waste was produced in 2005/2006 with most of this waste coming from packaging. See Clarence Valley Waste Stream data at http://www.clarence.nsw.gov.au/

Household waste with lots of packaging, source: OceanWatch Australia

What are the possible impacts of increasing amounts of domestic solid wastes?

Some of the impacts include:

- loss of natural resources used to create the packaging and products;
- an increasing demand for land fill sites;
- impacts on water quality - chemicals and other pollutants from landfill sites can escape into groundwater and enter nearby streams and rivers:
  - Leachate develops when waste is buried and decomposes. This can also seep into waterways and cause serious pollution and result in eutrophication (increasing nutrient levels), algal blooms, the loss of aquatic habitats and fish kills; and
- impacts on air quality from landfill sites and burning solid waste:
  - Methane, a greenhouse gas can escape into the atmosphere.
  - Dumps act like large compost heaps and can heat up and catch alight.
  - Dumps are smelly and unattractive and can contribute to air pollution on windy days.

Industrial and Commercial Waste

In 2007 there were 10,500 registered businesses in the Clarence Valley, an increase of 9% from the previous year.

In 2005/2006, industrial and commercial waste made up 36% of the total waste stream for the area. Most of this waste was generated in urban centres such as Grafton, Maclean and Yamba. Not all of this commercial and industrial waste ends up in landfill, with about 38% was diverted for recycling or other uses.

New Grafton landfill during construction, source: Clarence Valley Council

Many businesses also produce what is known as "liquid trade waste". This is usually discharged into the sewerage system and is additional to the liquid wastes from showers, toilets, and baths. The types of businesses producing liquid trade waste include restaurants, coffee shops, supermarkets, hairdressers, funeral parlours, dry cleaners, clubs, laundromats, abattoirs, service stations, car wash facilities and sewage treatment plants (STPs) at marinas.

Some of the identified high risk or high volume of waste producing activities require a special licence from the Department of Environment and Climate Change (DECC). These activities or businesses are said to be 'scheduled' e.g. concrete batching plants, STPs and intensive agriculture - such as piggeries and feedlots above a certain size.

Sewage treatment plant at Yamba, source: Clarence Valley Council

http://www.environment.nsw.gov.au/licensing/. These licences are inspected and strictly regulated by DECC. Other activities and premises that are not 'scheduled' are regulated by the Clarence Valley Council.

What are the consequences of poor liquid trade waste management?

- Grease, oil, solid material, if not removed on-site may cause blockages in the sewerage system and result in overflows of untreated sewage into the environment.
- Strong waste may cause odour problems and corrosion of the sewerage system infrastructure with potential environmental impacts such as leaks or seepage of sewage into waterways.
- Illegal practices may lead to serious pollution of the waterway including fish kills, mangrove die-off and other long term harm to the waterway and estuary. Such events are investigated by the DECC with heavy fines and cleanup notices imposed.

Those Clarence River industries that are licensed to dispose of their liquid wastes directly into the Clarence River include aquaculture (prawn farms), sewage treatment works and timber mills. The Harwood Sugar Mill has the largest water discharge rate to the Clarence River, however this is primarily river water used for cooling and the nutrient input from this source is relatively small. The DECC licensing schemes usually contain incentives to reduce the level of contaminants entering the waterway including hefty licensing fees. These fees collected by DECC are directed back into improving the environment through the Environmental Trusts.

http://www.environment.nsw.gov.au/prpoeo/licences/L171.PDF

http://www.environment.nsw.gov.au/grants/envtrust.htm

Harwood Sugar Mill located next to the river, source: NSW Sugar

Construction waste

Soil that is exposed at construction site can be washed from the sites into stormwater drains if measures to keep this soil at the site in place (sediment controls) are poor. This sediment is eventually deposited into the Clarence River or its tributaries and can even make its way into the ocean through the river mouth at Yamba.

Although a single block of land may seem a small part of the river catchment, the cumulative (additive) effect of polluted sediment-rich runoff from a number of building sites can have a dramatic impact on water quality.

Thus, there are a number of environmental impacts directly associated with pollution from building sites.

Soil erosion on building and infrastructure sites can be a major source of sediment pollution in waterways. A single building block can lose four truckloads of soil in one storm event, source: OceanWatch Australia

For example, water which runs off building sites, carries pollutants like soil and soil nutrients, as well as building materials such as concrete residues, and enters stormwater drains with subsequent pollution of natural waterways. Furthermore, changes that are made to natural land surfaces and drainage patterns during construction and urban development can result in natural watercourses becoming turbid, silted, littered and undesirably enriched with nutrients (eutrophication). This nutrient-rich water often develops algal blooms. When turbid water restricts sunlight filtration, photosynthesis is reduced and productivity of the aquatic ecosystem suffers. This affects habitats (particularly seagrass), marine life and has negative consequences for the fishing industry.

Sediment curtain in place to help stop soil from washing into nearby creeks source: OceanWatch Australia

Most councils have sediment and erosion guidelines for building and construction works and approvals for these types of development generally require inclusion of the sediment and erosion control procedures to be employed or are required as a condition of consent by Council.

http://www.healthywaterways.org/PAGE270506PML45HL8.html

http://www.infolink.com.au/dir/Erosion-And-Sediment-Control

http://www.byron.nsw.gov.au/pdfs/stormwater/sediment_erosion.pdf

Agricultural Waste

Sugar Cane Growing

Sugar cane production is an important industry in the Clarence River Catchment; however it does pose a number of identified environmental risks to the River. For example, sugar cane production typically requires application of lots of fertiliser, pesticides and herbicides and is usually grown immediately next to the river/ estuary, meaning that there is a high potential for large amounts of nutrients and toxic materials to run off this land and enter the estuary. Scientists believe the high nutrient loads in the Clarence may be causing ulceration of mullet in the Clarence River Estuary with other negative impacts for the aquatic ecosystem.

Agricultural activities such as surface ploughing and tilling generate additional sediment loads which may also contain high levels of nutrients and pesticides (insecticides and herbicides) that can runoff the land and degrade natural river and estuarine systems.

Furthermore, many areas on the Clarence Floodplain have been drained to create land that is suitable for sugar cane and other agricultural (and urban) activities. Unfortunately, this exposes acid sulfate soils to the air. These soils react with oxygen so that when it rains, toxic acidic runoff and associated toxic metals contaminate estuarine waterways with serious environmental consequences. (See Case study fact sheet 2. Land and Water Management Issues in the Lower Clarence River Catchment).

Beef and Dairy Cattle Farming

Grazing cattle requires extensive areas of grassland for pasture. This not only requires an initial clearing of land but also results in progressive loss of tree cover of adjoining areas because seedlings are eaten by stock.

Drained backswamp for agricultural use, source: Clarence Valley Council

Other detrimental effects include trampling of flora, the compaction of soils, increased nutrient levels in runoff (from faecal matter) and the destabilisation of river banks (unless these areas are fenced off or the accessible area restricted).

Dairying requires the regular congregation of large numbers of cattle to a small area for milking. This can lead to high levels of nutrient runoff from accumulated faecal matter unless these milking areas are well positioned and designed. The consequences for water quality can therefore be similar to that from cane farming.

Prawn Farming

Several aquaculture facilities are located on the land adjacent to the Clarence River estuary near Yamba. These premises are licensed to discharge waste water into the estuary. Return flows to the estuary can have very high concentrations of organic matter and other pollutants (prawns are fed with food pellets). This can impact on water quality in the estuary if not carefully monitored. These premises are also at risk from flood events that could defeat pollution control measures (see DECC scheduled premises licensing above).

Other Clarence River catchment agricultural activities that occur include, on a smaller scale, potato growing, tea tree production and oyster farming.

Abandoned prawn farm, Lower Clarence River, source: Nigel Blake, Northern Rivers Catchment Management Authority

Fishing Industry Waste

As outlined in fact sheet 4. Waste Management, waste generated by the fishing industry can include:

- plastics
- fishing line and nets,
- offal (left over fish carcass from filleting/processing); and
- fuel emissions.

One of the main issues for this industry is the impact of discarded fishing equipment such as tangled fishing line, torn nets, hooks and ropes etc which pose a threat to aquatic life. It should be noted, however, that the fishing industry is only ONE of the sources of marine debris and other waste impacting on our estuaries and marine ecosystems.

Investigate regulation of waste from boats, antifouling paints, tributyl tin, oil spills, pump-out facilities in the Clarence estuary, exotic plants and animals from untreated ballast waters, Caulerpa.

Fishing waste, source: OceanWatch Australia

Stormwater Runoff

The creation of 'hard stand' surfaces such as roofs, driveways, footpaths and impermeable pavers, creates a significant increase in stormwater runoff volume and duration. These increased flows carry sediment and other organic waste from households and councils into water bodies through the kerb and gutter system. This stormwater carries nutrients and other wastes into the Clarence River and eventually the ocean resulting in increased siltation and nutrient pollution.

Hard stand surfaces in Grafton town centre, source: Clarence Valley Council

Sewage

The Clarence River Valley has 11 centralised Sewerage Treatment Plants (STPs) to service an estimated population of 30,000 with a peak of 39,000 persons in summer. The remaining population is serviced by on-site sewerage systems (septic). Leaks occur when pipes break and septic systems overflow in flood times resulting in untreated sewage entering the Clarence River. Untreated sewage contains harmful bacteria and nutrients. Many coastal urban areas such as Iluka, Minnie Waters and Brooms Head remain unsewered and these are also close to sensitive waterways and wetlands as well as oyster growing activities. Contamination of oyster leases can have serious human health consequences.

Investigate Vibrio and oyster depuration, STPs operated by Clarence Valley Council their location and processes how do the non sewered areas of Clarence Valley treat their effluent.

Air pollution from waste

Air quality in the Clarence Valley is influenced by pollution from bush fires, controlled burning for hazard reduction, burning for agriculture (including burning of cane for harvesting), industrial discharges both licensed and unlicensed, solid fuel heaters, backyard burning of green waste, transport pollution including private vehicle use, commercial cooking activities, sewerage treatment plants, landfills, dust from agriculture and building activities and indoor air pollution such as smoking and heating.

Fire was used as a tool in the past to address pests on sugar cane fields, however it is not such a common practice now, source: OceanWatch Australia

The impacts of air pollution in the Clarence River Valley include:

- contributing to global warming;
- contributing to Ozone depletion;
- declining water quality when the air borne wastes settle onto and/or wash into waterways; and
- human health issues from air borne particles.

Water pollution from waste

The Healthy Rivers Commission's *Independent Inquiry into the Clarence River System* (1999) summarises the major water quality issues of concern throughout the Clarence Catchment. They include:

- suspended solids (during high flows), in both freshwater and estuarine locations;
- nutrients in small estuarine tributaries, and high nitrogen levels in the estuary;
- pathogenic organisms around Grafton;
- pH – acid levels measured in the estuary; and
- drains coming from cane farms and urban areas.

Runoff from agriculture can be a major source of nutrients, source: NSW DPI

Nutrients, in small amounts, are required for plant growth but in large amounts they can cause excessive algal growth in waterways (including blue green algae) which can put natural ecosystems out of balance, harming water-life and animals. Blue-green algal growth can also seriously affect human uses of water for purposes such as drinking, recreation, stock water and irrigation.

Sediment smothers aquatic habitats such as seagrasses and high turbidity interrupts photosynthesis. Both of these events reduce plant production and interrupt food chains. These habitats are important breeding grounds and nurseries for many aquatic species such as prawns and fish. If breeding is interrupted and nurseries destroyed, fishery productivity is reduced and therefore the fishing industry (recreational and commercial) suffers.

Major sources of nutrients in the lower Clarence River Catchment are:

- run-off from urban and rural residential areas;
- erosion and run-off from grazing and cultivated land;
- discharges from sewage treatment plants and septic systems; and
- runoff water from irrigation areas.

What are Some of the Ways These Waste Management Issues are Dealt With in the Clarence River Catchment?

Waste management is an issue that we can all influence. Some of the ways we can all reduce the impact of wastes in the environment are:

- reduce the production of waste and therefore the demand for natural resources;
- dispose of all types of waste in a way that minimises environmental and human impacts;
- recycle or reuse waste products where possible to reduce the demand on natural resources and the need to dispose of the waste into the environment; and
- educate groups and individuals on the role they can play in waste minimisation and responsible disposal of waste to minimise environmental impacts.

Councils, schools, State and Commonwealth Governments along with individuals have a responsibility to improve waste impact on the environment through educating themselves and others. The Clarence River Catchment has implemented many strategies to achieve effective waste mitigation and promote improved sustainability (as illustrated in the diagram).

Source: Clarence Valley Council

While a lot has been achieved there is still progress to be made to reduce the environmental impacts from waste and in particular the impacts on water quality caused by waste disposal.

What are the Types of Strategies for Improving Waste Management? What Can Governments Do?

In NSW the DECC is the lead government agency responsible for state-wide regulation of waste management. Local Government is vested with the regulatory responsibility at the local level of carrying out waste management services within this state-wide framework. The Commonwealth Government is also involved through incentives and partnerships with Local and State Governments as well as with industry. Councils develop policy and operating plans to ensure that they meet their obligations under legislation. See fact sheet 4. Waste Management Issues.

http://www.environment.nsw.gov.au/waste/waste_regulation.htm

http://www.environment.gov.au/settlements/waste/index.html

http://www.environment.nsw.gov.au/waste/

http://www.environment.nsw.gov.au/households/recwaste.htm

http://www.environment.nsw.gov.au/waste/consult.htm

How Does Clarence Valley Council Carry Out Its Waste Management Functions?

Disposal of solid waste

A business unit of Clarence Valley Council, Clarence Waste Solutions, has been established to administer domestic and commercial/industrial waste collection services.

A regional landfill site is located at Grafton with smaller sites located at Copmanhurst and Glenreagh. There are also commercial and domestic waste collection services based around the provision of coloured bins for different types of materials, including recyclables. The details of these schemes can be found on the Clarence Valley Council website at http://www.clarence.nsw.gov.au

Source: Clarence Valley Council

Commercial waste collection is a user pays system for shops, offices and industrial premises. General rubbish collection is twice per week in the urban areas of Grafton, Maclean, Yamba and Iluka. Recycling waste is collected weekly. Services to other centres are weekly. Each bin is micro chipped as well as colour coded. The microchip enables the correct business to be billed.

Currently 41% of domestic waste and 28% of commercial waste in the Clarence Valley goes to landfill sites.

To reduce the environmental impacts of landfill sites the council has implemented many strategies to make these sites ecologically sustainable including:

- a hazardous waste store at the Regional landfill Grafton;
- using contour drains and flood detention dams to prevent runoff water from mixing with waste water and leachate;
- a leachate collection and treatment system to prevent water pollution including clay soil liners to reduce infiltration into the groundwater; and
- waste screening to ensure prohibited wastes are not dumped in landfill sites.

Source: Clarence Valley Council

The Clarence Valley Council has implemented strategies to mitigate specific types of waste in order to reduce environmental and health impacts. Some of these wastes include: concrete, soil, cooking oils, mobile phones, asbestos, pesticides, bulk motor oil, sediment runoff from building and construction sites and the disposal of "sharps" used for medical purposes such as the treatment of diabetes, cancer or multiple sclerosis.

Disposal of liquid waste

Sewage, liquid trade waste and stormwater waste disposal systems are found throughout the Clarence River Valley. Sewerage treatment plants are monitored under licence to DECC and, where necessary, upgraded to reduce leaks and breakdowns. In many new urban developments, lakes and wetlands are being constructed to filter stormwater waste and protect downstream water quality. Water Sensitive Urban Design (WSUD) is now an important part of planning processes for all new developments.


Leachate and sedimentation dams at Grafton landfill, source: Clarence Valley Council

Unsewered towns and rural properties with on-site sewage systems or septics are managed under Council's *On-Site Waste Water Management Plan 2005* which requires inspections, minimum treatment standards, and upgrading of treatment systems to reduce environmental threats.

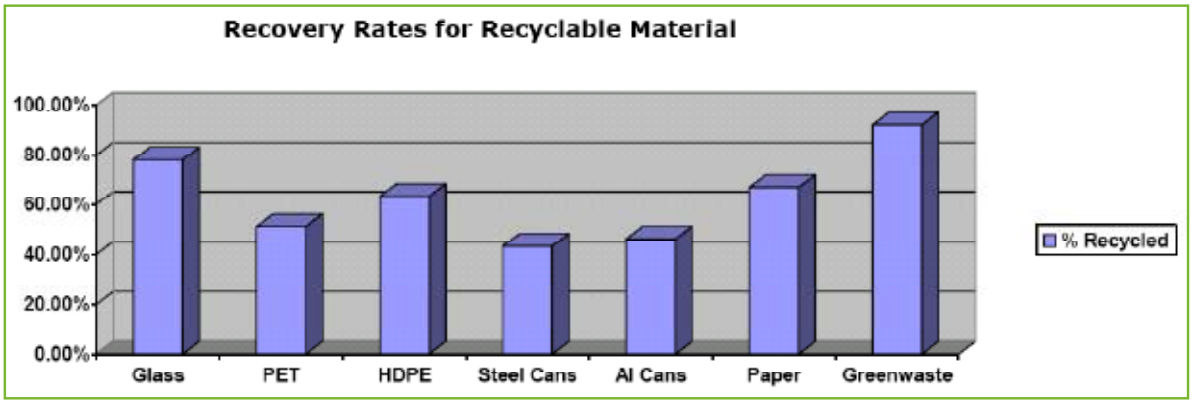
Recycling and waste minimisation

Solid Waste

There are recycling centres for solid wastes at Grafton and MacLean. The Clarence Valley Council and its residents have a good record of waste minimisation and recycling of domestic waste.

Reducing the contamination of recycled materials caused by people putting the wrong materials into recycling bins is now a challenge.

The graph below illustrates the high percentage of waste recovered for some selected recyclable items generated in the Shire.



Source: Clarence Valley Council

Urban residents are supporting recycling initiatives and the focus of recycling is now turning to business, commercial and industrial sectors that produce 37% of the waste collected by Council. Clarence Valley Council provides a specialised recycling service to commercial and industrial premises and about 800 premises make use of this facility but more education and awareness is needed to increase the level of usage.

Mulched green waste, source: Clarence Valley Council

The Business Waste Reduction strategy identifies the producers that create the most waste and then assists them in reducing waste generation and waste disposal to landfill. Grafton gaol and Acmena Juvenile Justice Centre have carried out waste audits and developed management to reduce waste levels. The project has been successful in achieving waste reduction and financial savings for the participating businesses and at the same time reducing environmental impacts.

There are also facilities for green waste recycling. Green waste is regularly mulched and is now marketed by MI Organics a local business in the area. http://www.miorganics.com.au/

The materials recycled in the Clarence Valley have resulted in significant reductions in Greenhouse gas emissions and created energy and water savings.

The table below summarises the benefits achieved in recycling by Clarence Valley residents.

Environmental Benefits of Recycling	
Greenhouse Benefit	
Net Savings in CO2 from recycled materials	Equivalent cars Permanently Removed From The Road
3,094 tonnes	743
Energy Benefit	
Net Energy Savings from recycled materials	Annual Electricity Usage Saving, Equivalent Households
102,859 gigajoules	4760
Water Benefit	
Total Water Savings from recycled materials	Annual Water Usage Savings (equivalent persons)
87,822 tonnes	939

Source: Clarence Valley Council

Gaseous Waste

Council regulates backyard burning and non scheduled industrial emissions into the atmosphere. These regulations reduce waste that impacts on air quality in urban areas. Council is also able to regulate open burning-off under the Protection of the Environment Operations (Control of Burning) Regulation 2000.

Council has participated in the Sustainable Energy Development Authority Energy Smart Homes program that requires new homes meet minimum energy efficiency requirements to reduce greenhouse emissions. New homes must comply with the requirements of BASIX (Building Sustainability Index).

Liquid Waste

Around 12% of treated effluent from STPs is recycled and diverted to off stream uses.

For example: an Australian Government Community Water Grant of over $45,000 was used to undertake an initiative the Yamba Golf Course Recycled Water Irrigation Expansion project. This scheme will increase the reuse of treated effluent from the Yamba Sewage Treatment Plant to irrigate sections of the Yamba Golf Course. This project will save 53,000,000 litres of water a year and reduce the amount of treated effluent entering the Clarence River directly.

The main urban areas of Clarence Valley Shire now have stormwater management plans developed. Strategies for Water Sensitive Urban Design in new release areas include constructed wetlands, retention basins and in existing areas offering rebates for rainwater tank installation.

Education

Education for sustainability is a State wide initiative that recognises the vital role education has across all sectors of the community. Clarence Valley Council (CVC) in recognition of its important local role in educating its community has employed a waste education officer who responsible for developing education strategies for the community on waste matters with the aim of reducing the amount of waste both generated and ultimately disposal to landfill.

http://www.environment.nsw.gov.au/cee/lfs.htm

http://www.environment.nsw.gov.au/cee/lfsPlan0710.htm

http://www.environment.gov.au/education/

http://www.environment.gov.au/education/publications/index.html

CVC has also developed and provided resources to deliver waste education programs in partnership with the North East Waste Forum.

These programs include:

- promotional campaigns e.g. composting, worm farms, reuse directory;
- second hand Saturday events to promote reuse of household items;
- “Greenhouse” mobile waste education trailer;
- landfill/recycling tours;
- waste reduction projects;
- waste wise events targeting local event organisers; and
- regular community newsletters

Community involvement in National initiatives such as “Clean up Australia” and the former EPAs “Litter” campaign helps to promote waste minimisation and appropriate disposal messages in the Clarence Valley catchment.

Source: North East Waste Forum

How is the Fishing Industry in the Clarence addressing Waste Issues?

The commercial fishers in the Clarence are addressing waste issues through various means (see General Waste Fact Sheet) such as through OceanWatch Australia’s “Fishing for Waste Program”.

Clarence River Council has partnered with OceanWatch Australia to help reduce the impacts of recreational

Fishers in the Clarence collecting nets for recycling as part of OceanWatch Australia’s “Fishing for Waste” Program, source: OceanWatch Australia

fishing waste through OceanWatch Australia's ***TAngler Bin*** project. This project aims to reduce discarded fishing line and the issues associated with it (see fact sheet 4. on Waste Management).

How Can Locals Respond to the Local Clarence Valley Waste Issues?

Businesses, environmental groups, government bodies and individuals can all get involved in waste minimisation and awareness projects such as those outlined.

Often when community members, groups and businesses all get together to work on special projects it benefits the whole community in ways beyond just that project.

For example, in 2005 and 2006, NSW Department of Environment and Conservation (now DECC), Clarence Landcare groups and Yamba Yacht Club worked together with other individual volunteers, and businesses to clean up the Clarence Estuary.

http://www.envite.org.au/index.html

Further actions individuals can take to minimise waste

Ultimately it is the at home, at play or at work practices of individuals that make a difference.

At home ask the question Do I –

- recycle all the recyclable containers and packaging?
- make sure I don't contaminate waste by putting the wrong things in the wrong bin?
- compost all the organic and green waste that I can?
- ensure that I don't litter?

Taking your own re-usable bag shopping, source: OceanWatch Australia

Reduce waste when shopping by:

- avoiding excessive packaging on items you purchase;
- taking your own bags or shopping basket to reduce the use of plastic bags;
- buying your fresh food and vegetables loose;
- avoiding the use of freezer bags in your supermarket;
- avoiding pre-packaged fresh foods;
- cutting packaging - buy in bulk;
- buying concentrated products; and
- not buying things that you don't need.

Buying fruit and vegetables loose, source: OceanWatch Australia

Contribute to cleaner waterways by:

- preventing pollutants including soil, leaves, detergents, litter and animal faeces from washing into stormwater drains;
- protecting trees and other vegetation along local waterways (and planting more);
- encouraging the protection of local wetlands as these act as natural filters for pollutants, as well as providing habitat for birds and aquatic life; and
- recycling products and their packaging.

Volunteers planting trees next to waterways, source: LandCare Australia