

# Case Study: 2. Land and Water Management Issues in the Lower Shoalhaven River Catchment

## What are Some of the Land and Water Management Issues in the Shoalhaven River Catchment?

Land and water within a catchment is often managed for multiple benefits that might include such things as agricultural production, biodiversity conservation, good water quality, soil health, flood mitigation and for supporting human lifestyles and living places.

Quite often there are competing interests in land use and water management outcomes. For example, an irrigator may wish to extract more water from the river in times of drought, whereas a fisher would want this water to remain in the river for wetland health and fish survival. Thus there needs to be cooperation between individuals, groups and governments to balance often opposing social, economic and environmental needs.

Sometimes people get things wrong and past practices and approaches need to be stopped, refined or modified.

The Shoalhaven River Catchment has many land and water management issues that are typical of other catchments and estuaries along the NSW coast.

However, these issues have specific details and management options that are unique to the Shoalhaven River. According to plans such as the Shoalhaven River Estuary Management Plan, the main land and water management issues in the Lower Shoalhaven Catchment are:

- increased urban and industrial development;
- flood mitigation works;
- acid sulfate soils;
- streambank erosion;
- specific pollution sources;
- catchment flows;
- barriers to fish passage; and
- the possible impacts of climate change.



Industry alongside the Shoalhaven River (starch plant), source: OceanWatch Australia

## How are the Land and Water Issues in the Catchment Managed?

### 1. Increased urban and industrial development

Considerable urban growth is planned for the Lower Shoalhaven River Catchment area, particularly in the Nowra and Bomaderry area. Within the next 30 years, it is estimated that the population in this area will rise from 43,000 to 65,000. Expansion in industry is planned and encouraged by Shoalhaven City Council.

Increased urban and industrial development can have major impacts on land and water if not managed properly. For instance, clearing for development can destroy sensitive environments. New urban areas and industrial development can increase pollution flowing to local waterways and estuaries.

The potential impacts of new development on land and water are mainly managed through Commonwealth, State and local council regulations and plans. What development is allowable is generally prescribed under the Shoalhaven Local Environment Plan 1985, State Environmental Planning Policies (SEPPs), Development Control Plans (DCPs) and other policy at the local government level. Development applications are then reviewed by Shoalhaven City Council in relation to a broad suite of laws, plans and policies to minimise

the impacts on the environment. When an industry operates it comes under further scrutiny especially in relation to air and water pollution.

Although planning and regulations are the main ways to manage the environmental impacts of urban and industrial development, there are several other local initiatives including:

- a large water recycling scheme developed by Shoalhaven City Council that will utilise up to 80% of reclaimed water from six Shoalhaven wastewater treatment plants to irrigate local dairy farms, golf courses and sports fields;
- stormwater education programs run by Council that aim to encourage urban dwellers to carry out practices to minimise stormwater pollution run off; and
- water quality monitoring program run by Council that can isolate pollution sources.

## 2. Flood mitigation works

Flood mitigation works such as floodgates have been installed in several NSW estuaries including the Shoalhaven River estuary. They are designed to prevent inundation of low-lying land by high tides or flood events.

Flood mitigation works can have some negative impacts on aquatic life if managed poorly. The NSW Department of Primary Industries (DPI) has identified 12 potential negative impacts of flood gates including them acting as barriers to the migration of juvenile fish and prawns and fragmenting habitat.

Southern Rivers Catchment Management Authority (SRCMA) and the NSW Department of Primary Industries (DPI) are working with local councils and landholders to manage flood mitigation works in ways that are more sensitive to aquatic life as part of the Bring Back the Fish Program. This primarily involves removing and/or modifying several floodgates on the Shoalhaven estuary. More details can be found at:

<http://www.dpi.nsw.gov.au/fisheries/habitat/rehabilitating/floodgate#The-steps-to-managing-a-floodgate>

## 3. Acid Sulfate Soils

Acid sulfate soils (ASS) is the common name given to soils and sediments containing iron sulfides. These soils are found throughout the floodplains of NSW coastal rivers, including the Shoalhaven River.

ASS were formed over millions of years in marine sedimentary rocks but it is those formed since the last major sea level rise that are of most concern. These more recent sediments are usually found in low lying areas such as around coastal wetlands.

As they were originally laid down in anaerobic (oxygen-depleted) conditions, once the soils are disturbed they react with oxygen and water to form sulfuric acid. This acid can then flow into local drains, creeks, rivers and estuaries causing major impacts on aquatic life, including fish kills.

ASS can be managed by preventing any disturbance to them. To do this it is critical to know their location and prevent any works that may in some way expose them to oxygen. One of biggest threats to ASS are floodplain drainage works that although aim to better drain water in the floodplain, can disturb ASS.

ASS have been exposed in the Lower Shoalhaven River Catchment, particularly around Broughton Creek. This has mainly been caused by the draining of low lying land for dairy farming and cattle grazing. The exposure of the soils has led



Expanding residential areas in Nowra, source: OceanWatch Australia



Floodgates on the Crookhaven River, source: NSW DPI (Scott Nicols)



Acid sulfate soils, Greenwell Point, source: NSW DPI (Allan Lugg)

to water quality problems causing fish kills often during rain events that follow a low rainfall period such as a drought.

Apart from trying to avoid future disturbance of the ASS, management options include the use of floodgates to control drainage and allow tidal water to neutralise acidity.

#### 4. Streambank erosion

Bank erosion is part of natural stream processes; however, the activities of people can greatly exacerbate it. If left unchecked, bank erosion can devour valuable farming land and even endanger homes. The sediment eroded from the banks can wash downstream compromising the quality of water for rivers life, farming purposes and recreation. It can greatly impact on estuarine habitats by smothering seagrass and blocking channel flow.

Bank erosion is a considerable problem along the Lower Shoalhaven River and its tributaries. There are numerous places where banks are unstable and deeply gouged. Studies show that the causes of the erosion are complex and include:

- scouring by floods;
- scouring by tidal currents;
- wind waves;
- waves causes by boating;
- removal of riverbank vegetation e.g. causes by stock trampling, clearing; and
- natural meandering of the stream.

The impact of bank erosion on local wetlands is of particular concern. Sedimentation originating from the erosion can smother the wetlands causing further decline of these critical estuarine habitats for bird and aquatic life.

Options to manage streambank erosion in the Lower Shoalhaven River Catchment are listed in the Shoalhaven River Estuary Management Plan and include:

- zone all riverbank to ensure there is no development that may cause excessive erosion;
- replant reed beds and mangroves to help protect banks from wind waves;
- construct rock walls or groynes to protect severely eroding banks where it threatens recreation reserves and major infrastructure;
- manage speed boat behaviour close to where boat waves contribute to erosion;
- monitor bank erosion along the River; and
- fence riverbanks to exclude cattle access/trampling and the destruction of riverbank vegetation.

The Shoalhaven River and Estuary Five Year Investment Strategy is funding two actions that will help reduce future streambank erosion. These actions are:

1. Installing fencing and off-stream watering points to exclude stock from riverbanks at priority points
2. Broadscale planting of mangroves and reeds in vulnerable parts of the River.

Several projects have already been carried out to address bank erosion that involve government (Southern Rivers Catchment Management Authority, other state government agencies, Shoalhaven City Council) and local landholders working together.



*Riverbank erosion Broughton Creek, source: NSW DPI (Allan Lugg)*



*Greencorps team helping landowners fence cattle out of the Shoalhaven River, source: SRCMA*

For example, some of the eroded banks close to the mouth of the Shoalhaven River have been rehabilitated through a four step process:

Step 1. Develop agreements to carry out the works with local landholders.

Step 2. Reshape the eroded banks and construct a rock wall

Step 3. Planting vegetation to further stabilise the bank and fence off areas to prevent trampling by stock

Step 4. Maintain vegetation until it has become established

More details about this project can be found at:

<http://www.southern.cma.nsw.gov.au/pdf/ShoalhavenRiverCaseStudy3.pdf>

In another project involving the Southern Rivers Catchment Management Authority and local partners including Landcare and Riverwatch groups, mangrove and other plant species are being planted to stabilise banks below the Nowra Bridge. This project has resulted in the restoration of over four kilometers of riverbank. More details about the project can be found at:

<http://www.southern.cma.nsw.gov.au/pdf/ShoalhavenRiverCaseStudy2.pdf>

## 5. Specific pollution sources

There are several specific sites in the Lower Shoalhaven River Catchment that are potential sources of pollution. These local 'point source pollution sources' include:

- Sewage Treatment Plants (STPs);
- industries; and
- agricultural enterprises e.g. dairy farms



*Dairy farm in the Shoalhaven, source: OceanWatch Australia*



*Nowra Wastewater Treatment Plant, source: OceanWatch Australia*

There are three STPs – located at Berry, Bomaderry, Nowra – that can have a major impact on the water quality of the Lower Shoalhaven River and estuary. All STPs are licenced polluters and regulated by the NSW Government. Each of these STPs run by Shoalhaven Water, has the highest level (tertiary) treatment. All of the biosolids from the STPs are re-used and 30% of the water from them is re-used.

There are a further 40 industrial premises in the area that are also licenced polluters and regulated by the NSW Government. These premises include:

- concrete works;
- extractive industries;
- paper production;
- waste facilities; and
- animal slaughtering.

Some local industries are also taking their own measures to minimise water pollutants emanating from their sites. For example, Manildra's Nowra starch and ethanol plants generate a water based waste stream containing soluble organic nutrients. An environmental



*Manildra's Nowra starch and ethanol plant, source: OceanWatch Australia*

farm adjacent to the Nowra site, on the banks of the Shoalhaven River, has been established to manage the large volumes of liquid effluent generated by its industrial operations. The waste water is applied using very large centre pivot regulators, which maximise the hydraulic capacity of the soils and optimises pasture growth.

Agricultural enterprises can also be sources of water pollution. Of particular concern in the Lower Shoalhaven Catchment is the effluent originating from dairy farms. There are some local projects that aim to help dairy farmers minimise effluent flows off their property. One of these projects is the SRCMA's Shoalhaven Illawarra Dairy Industry Partnership Project which aims to provide support dairy farmers in the Shoalhaven and Illawarra to implement sustainable resource management projects and improve effluent management systems.

In another project, the SRCMA is partnering with local dairy farmers and oyster growers to reduce cattle wastes (in the form of faecal coliforms) that can foul water around oyster leases. According to the CMA, the project has:

- constructed 20 kilometres of fencing to exclude stock from approximately 75 hectares of river bank close to the oyster leases;
- excluded 500 head of cattle from the estuary, potentially preventing 5.5 million kilograms of direct faecal and nutrient pollution per year;
- assisted dairy farmers and oyster growers to meet best practices in managing natural resources within their operations; and
- developed long term management agreements with landholders to ensure sound management of project sites.

Further information about this project can be found at:

<http://www.southern.cma.nsw.gov.au/pdf/ShoalhavenRiverCaseStudy1.pdf>

More details about water quality issues can be found in the fact sheets on Waste Management in the Lower Shoalhaven River Catchment and The Lower Shoalhaven River Catchment Fishing Industry.



*Dairy cattle fenced out from riverbanks near oyster leases, source: OceanWatch Australia*

## 6. Catchment flows

To maintain a healthy estuary, it is important to have flows to it from the upper catchment that are as natural as possible. These 'natural flows' are highly variable (i.e. range from very low flows to floods) and critical in maintaining estuarine habitats.

There are upstream water extractions that can influence water flow into the Lower Shoalhaven River Catchment and estuary. These include extractions by the Sydney Catchment Authority, Shoalhaven Water (for town water supplies) and farmers along the River.

The Sydney Catchment Authority (SCA) operates three main storages – Tallowa Dam, and Fitzroy Falls and Wingecarribee reservoirs – located in the upper catchment of Shoalhaven River. Water from these storages is used to supply local communities and supplement other SCA storages during drought. Power is also generated through the regular exchange of stored waters between Lake Yarrunga, Bendeela Pondage and Fitzroy Falls Reservoir.

Studies are being carried out to investigate the impacts of the water extractions on the habitats of the Shoalhaven estuary. Of particular concern is the impact of the Sydney Catchment Authority's drought extractions during low flow periods in the River.



*Tallowa Dam, source: Sydney Catchment Management Authority*

There has been considerable controversy (see newspaper article) over a NSW Government plan to pump water from the Shoalhaven River on a more regular basis in an effort to secure Sydney's water supply.

## NEWSPAPER ARTICLE

<http://www.smh.com.au/news/national/sydneys-great-river-robbery/2006/08/25/1156012745627.html>

SYDNEY will take billions of extra litres of water a year from the Shoalhaven River, possibly via a tunnel costing several hundred million dollars.

The decision is part of the State Government's effort to secure Sydney's water supply in the face of the pressures of over-consumption and climate change.

On Monday the State Government will publish a discussion paper detailing its plan to pump as much as 105 billion litres a year from the river, scrapping the system of only using Shoalhaven water in drought. This is 10 per cent of the Shoalhaven's flows, although in most years only half this would be used.

The move has dismayed some South Coast residents and green groups, who fear that further exploitation of the Shoalhaven will hurt fishermen, farmers, oyster leaseholders and tourism.

Every million litres pumped from the Shoalhaven costs \$57 and produces two tonnes of greenhouse gases. The threat of carbon dioxide emissions worsening climate change was one of the main reasons the Government abandoned the desalination plant.

Sydney has resorted to taking the Shoalhaven's water three times in the past quarter of a century, but now it will be on tap. The new trigger for taking the river water, under the Government's plan, is likely to be when the city's dam levels fall below 85 per cent capacity.

On Thursday the dam levels were still falling, down to 41.2 per cent capacity, and they have been below 45 per cent for the past two years. During this drought Sydney has been permitted to take a long-term annual average of 75 billion litres from the Shoalhaven. The water is delivered to the Nepean, Avon and Warragamba dams via the Wingecarribee River and Doudles Folly Creek, causing significant ecological damage to these waterways and localised flooding.

The Sydney Catchment Authority is keen to see this degradation ended. There is consensus that it would devastate the ecology of these waterways to increase their use as drains. The preference of experts and environmentalists is likely to be a pipeline three metres in diameter and 20 kilometres long, through the Southern Highlands to Avon Dam. From Avon the water can be sent to Prospect Reservoir in Sydney.

Such a tunnel could move 1500 million litres a day and generate hydro-electricity to offset up to 60 per cent of pumping costs and greenhouse emissions. But the chairman of the Shoalhaven River Alliance, Terry Barratt, of Bomaderry, fears the pipeline would make it difficult to limit how much water Sydney takes.

More information about the progress of this plan can be found at:

<http://www.waterforlife.nsw.gov.au/about/plan>

## NEWSPAPER ARTICLE

South Coast Register, 21/7/08, by Adam Wright

### Low flows are killing our oysters

SHOALHAVEN'S \$1 million oyster industry is starving to death.

The lack of fresh water being let out of the Sydney Catchment Authority-controlled Tallowa Dam is hurting oysters in the lower Shoalhaven River and the river itself according to Shoalhaven River Oysters Inc co-ordinator Lyn Desoto.

"The current environmental flow is 90 megalitres per day. It should be 270 megalitres per day but the Sydney Catchment Authority (SCA) won't change it until Warragamba Dam is over 70 per cent full.

"But they've taken the water restrictions off Sydney when it reached 68 per cent, so figure that out," she said.

Ms Desoto said the SCA was pumping water to add to flows down the Hawkesbury River.

"So Shoalhaven River water is being used to help with the Hawkesbury River environmental flow when our river needs it."

She said the impact on the oyster industry was that salinity was too high, the water temperature has dropped dramatically and there isn't as much 'food' in the water.

"The water they're releasing from the dam is dead. It's from the bottom of the dam and it's too cold, isn't oxygenated and has little nutrient in it.

"Sydney Catchment Authority swear to us that it's oxygenated and warmed by the time it gets to us. Yes it's oxygenated but that's it.

"Our water temperatures are down by four degrees on what they should be and it was a pretty rapid drop.

"That's not normal for this time of year, it goes down slowly and regularly. To drop like this is pretty strange.

"The river is saltier too. In drought the river is saltier than the ocean but our river is still saltier now, because we're not getting enough flow."

Ms Desoto said the SCA has plans to cut a gate into the top of the wall to help, but she said the big question is when that will happen.

"It's not just hurting oysters, it's everything else that has to do with the health of the river too," she said.

<http://nowra.yourguide.com.au/news/local/news/general/low-flows-are-killing-our-oysters/1060996.aspx>

## 7. Barriers to fish passage

All Australian fish need to move along the streams they inhabit. They need to migrate to find food, shelter, avoid predators and breed. Structures in streams act as barriers to restrict this movement and can greatly impact on fish populations.

A study in the Shoalhaven River Catchment found 90 barriers to fish passage, the most in any NSW south coast catchment. The barriers consisted of:

- 30 culverts;
- 24 causeways;
- 24 floodgates;
- 5 weirs;
- 5 high dams; and
- 2 stream gauging weirs.



*Floodgates on the Crookhaven River, source: NSW DPI (Scott Nichols)*

There has been considerable activity throughout the Shoalhaven River catchment to reduce the impacts of fish barriers. For example, the NSW Department of Primary Industries (DPI) and the Department of Water and Energy are conducting research into native fish population movements and changes in the Shoalhaven using electronic tracking devices to determine the status of native fish populations and ways to minimise the impacts of barriers in the River. Also part of the Shoalhaven River Estuary and Rehabilitation Program is to remediate and/or remove identified barriers to fish passage.

DPI and the SRCMA are also addressing barriers to fish passage through the Bringing Back the Fish Program by removing or modifying some of these structures.

A 'fish lift' is being installed as part of the upgrade of Tallowa Dam. The fish lift will allow for the upstream migration of native fish. A new gated slot through the dam spillway will allow fish to move downstream. More details about this project can be found at:

<http://www.dpi.nsw.gov.au/research/updates/issues/july-2008/fish-lift>

## 8. Climate Change

The Garnaut Report and other studies predict considerable environmental, economic and social impacts as a result of 'accelerated' climate change across Australia in the next 50 years.

A study of the possible impacts of climate change in the Shoalhaven and other NSW south coast catchments identified issues that will affect future land and water management in the area.

The study predicted that the future climate of the area would be warmer and drier (causing more drought, higher evaporation). The study highlighted the fact that ' a warming of 1 degree Celsius and a 5 percent decrease in rainfall (a moderate scenario for 2030) would make the climate of Nowra similar to the climate of Parramatta in Western Sydney'. Although this would be the general trend, the report believed there was also the 'potential for increases in extreme rainfall events'.

Impacts on land and water management identified in the study include:

- sea level rise coupled with intense storms causing more inundation of properties in the estuary and coast;
- further bank erosion from increase in flood events;
- general reduction of flows into the Shoalhaven estuary;



Shoreline erosion, Numbaa Island, source: NSW DPI (Allan Lugg)



Shoreline erosion: source UMWELT

- decreases in fresh water runoff and increases in sea water input that may reduce the functioning of estuarine wetlands, the habitats of many bird and aquatic species;
- poorer water quality (e.g. increase in salinity in upper estuary) caused by lower flows and higher temperatures; and
- changes in the distribution of some plant and animal species e.g. landward migration of mangrove and saltmarsh communities; and
- increased risk of bushfires that may damage fire-sensitive communities e.g. swamp forests.

More details can be found from the report at:

[http://www.greenhouse.nsw.gov.au/\\_data/assets/pdf\\_file/0009/7785/SouthernRiversDetailedFinal.pdf](http://www.greenhouse.nsw.gov.au/_data/assets/pdf_file/0009/7785/SouthernRiversDetailedFinal.pdf)

Further studies are being carried out in the Shoalhaven River Catchment to understand and plan for the impacts of climate change. For instance, there are several strategies in the Shoalhaven River Estuary Management Plan to adapt to sea level rise and other impacts of climate change including:

- protect wetland areas that could be changed by sea level rise;
- communicate information about sea level rise implications, especially to primary producers and those that live near the River or on the coast;
- remove barriers to fish passage to allow fish to adapt to changes in sea level;
- review the zoning of land in relation to sea level rise and the increased risk of flooding;
- prepare guidelines about climate change risks for the oyster industry; and
- monitor the estuary for indicators of climate change.

Although climate change is a global issue, there are numerous actions that people and organisations can generally take to minimise its impacts. Details of these actions can be found at:

[http://www.greenhouse.nsw.gov.au/home\\_page](http://www.greenhouse.nsw.gov.au/home_page)

<http://www.greenhouse.gov.au/>