

The Secretariat

Tune Review of the National Archives of Australia

Dear Sir

I am employed by the National Archives of Australia (AGS: 855-99445) on a non-ongoing basis in the Property and Security Section. I make this public submission to the Tune Review of the NAA as a Chartered Professional Engineer ('*APEC Certificate*'). I was employed by the Commonwealth from 1980 to 1997 and have an intimate knowledge of the scope of environmental monitoring investigations for two large Commonwealth infrastructure projects in the 1980s. My submission is not related to the work I perform at the NAA.

I wish to draw attention to my concerns on the availability of environmental data collected by or on behalf of Commonwealth agencies and in particular :

- the preservation of Commonwealth environmental data that describes the natural environment;
- the retrieval of Commonwealth environmental data from the NAA records;
- the need for a reference source for Commonwealth environmental data; and
- the need for funding and resourcing to preserve, digitize and promote the availability of Commonwealth environmental data.

For many decades the Commonwealth had an eminent public works authority that investigated, designed and constructed projects, including major infrastructure projects throughout Australia. Sadly in my view, the Commonwealth divested its last engineering entity (Works Australia) around 1997.

Sustainable engineering emerged in the 1970s for infrastructure projects, including comprehensive environmental investigations.

As a specialist engineer engaged by the Commonwealth (Dept of Housing and Construction and then Dept of Administrative Services/Australian Construction Services) I was a contributor and witness to the environmental investigations for two major projects sponsored by the Commonwealth. The projects were the construction of the new Brisbane Airport QLD and the proposed construction of new naval facilities in Jervis Bay NSW.

The extensive environmental monitoring and investigations for each project included :

### Brisbane Airport

- extensive and regular beach profile surveys to monitor the effects of large scale dredging and reclamation works (*'Redevelopment of Brisbane International Airport – Monitoring of the offshore dredging and reclamation works'*);
- extensive water quality monitoring to assess any changes in sedimentation from dredging and reclamation;
- monitoring of wave climate in Moreton Bay over years to assess the effects of dredging; and
- monitoring of river and drainage floodway flows to assess performance against design parameters.

### Jervis Bay

- extensive and regular beach profile surveys around the whole bay to develop a database to later compare to post-construction conditions (did not proceed);
- a detailed seagrass survey of the whole bay by divers (*'Jervis Bay sediment and seagrass survey'*), supplemented by regular aerial photography runs; and
- wave monitoring over a 5 year period of several offshore and in-bay locations to fully understand the wave climate.

A search of NAA records for these projects using key words such as environmental monitoring, beach profile surveys and seagrass survey revealed only a few references to the actual physical data collected through environmental monitoring (*'NAA Records Search – Brisbane Airport environmental monitoring'* and *'NAA Records Search – Jervis Bay seagrass survey'*). Committee reports were easier to find (*'Brisbane Airport development environmental study'* and *'Relocation of naval facilities to Jervis Bay'*) rather than the underlying environmental data .

I think it is very important for Commonwealth environmental data records to be preserved and be readily available for researchers, as the data (such as for the two projects identified) describes the environment in detail not only at these locations, but at a period in time now almost 40 years ago. Having the ability to access high quality environmental data for independent research, such as on climate change, requires quality data be preserved and accessible. I think this is very much in line with the achievement of the UN Sustainable Development Goals to which Australia subscribes (*'World Engineers Convention'*).

For example, historical beach profile surveys are very valuable and when compared to current beach profiles can demonstrate the impact of sea-level rise due to climate change.

The attached article (*'Stronger waves and winds pose rising threat to coastal infrastructure'*) used current and historical wave data collected around the globe. Did Professor Ian Young, former Vice-Chancellor of the ANU, and his collaborator have access to the wave data collected by the Commonwealth in Moreton Bay and Jervis Bay ?

There may be other records that the Commonwealth has collected and may be held by NAA, but appear not to be readily available. For example the large fish kills in the Murray – Darling river system earlier this year had journalists asking where is the data that was used as the basis for the management of the river system (*'Fish deaths in lower Darling exposes huge data gaps in its eco-system'* and *'Dead stinking fish send a message'*).

I would hope that the Archives be tasked by the Commonwealth to take the pre-eminent and lead role in preserving, digitizing and promoting the accessibility of environmental data collected by the Commonwealth, particularly for large infrastructure projects.

I urge that the Tune Review recommend that the Commonwealth provide the necessary funding and resources for the NAA to implement such an environmental data base and strategy.

Yours sincerely

***Doug Crabb***



**Asia-Pacific  
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*Douglas Crockett*

# **FIFTH AUSTRALIAN CONFERENCE ON COASTAL AND OCEAN ENGINEERING 1981**

## **'Offshore Structures'**

**PERTH**

**25-27 NOVEMBER 1981**

The Institution of Engineers, Australia  
National Conference Publication No. 81/16.

# The Redevelopment of Brisbane International Airport — Monitoring of the Offshore Dredging and Reclamation Works

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**SUMMARY** Highlights of the dredging and reclamation techniques for the redevelopment of Brisbane's international airport are given. Comprehensive monitoring of these operations is in progress and is intended to confirm the findings of the environmental effects study, namely that there would be no significant influence on surrounding areas. The scope and findings to date of the monitoring programme are discussed.

## 1. INTRODUCTION

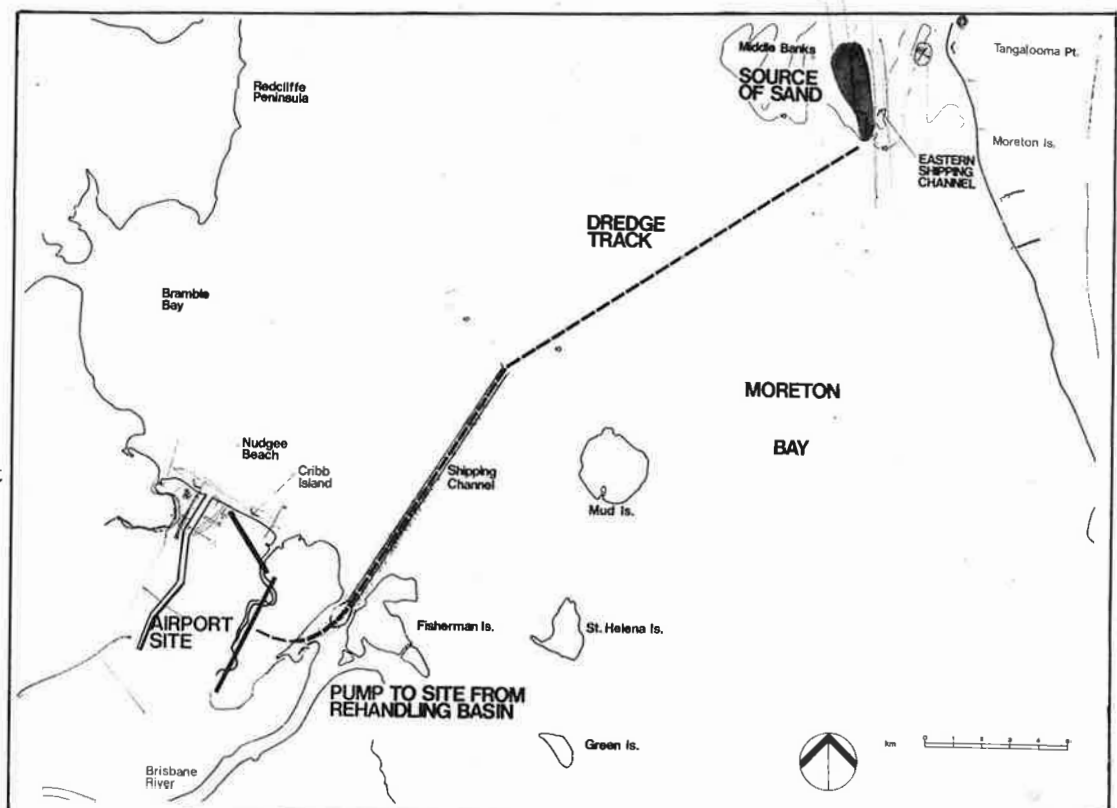
Dredging and reclamation works do not have to adversely effect the environment, as has been reported in many instances. For a good example of what steps can be taken to ensure that risks are kept to a minimum, one should look to the current dredging and reclamation works in Brisbane for the development of the new international airport.

In these works, fourteen million cubic metres of sand are being won 25 kilometres offshore. It is then shipped to the mainland and dumped in a strategic position from where it is pumped ashore to the reclamation, (Fig. 1). Such large scale operations can have many potential problems.

In the early seventies extensive field investigations of the surrounding areas were carried out. These resulted in the publication of a five volume environmental impact statement on all facets of the development as well as the dredging. Risk areas were identified, and boundary conditions were established for potential dredging methods.

Since October 1980, a further intensive programme has been in effect, to monitor the dredging works. It will continue until after the conclusion of the works. The monitoring is being undertaken by a specialist panel chaired by the Department of Housing and Construction's project manager.

Figure 1  
Location of works at  
Brisbane



## 2. OVERVIEW OF WORKS

The new airport is being developed between the existing airport and Moreton Bay on mangrove wetlands and low lying flood plains. The reclamation will raise the levels for the pavements and buildings areas to above potential flood levels. Serpentine Creek, the former main drainage outlet is being progressively filled to 0.5 kilometre from the sea, as part of this reclamation. A new floodway to the west has been excavated to replace the functions of Serpentine Creek, with many rows of mangrove shoots planted along wide benches cut into the banks. Extensive monitoring of the floodway performance is in progress.

In this paper the present monitoring of three specific areas of significant environmental or monetary value will be highlighted, one each for the dredging, rehandling and reclamation operations.

Sand is being won with a large trailing dredge at Middle Banks, 4 km, west of Moreton Island, (Fig. 1) and separated by two extensive near surface sand deposits in Ridge Shoal and Dring Bank. The wave climate in the Bay is not extreme, with a maximum predicted wave height of around 3m in cyclone conditions. The Middle Banks are grass free with uniform clean sand.

The most sensitive region in the case of dredging is the Moreton Island beaches which front the forested sand dunes and are the basis for a tourist industry on the island. The dredging should in no way effect the normal processes already occurring on the island. The present coastline is unstable, generally eroding and highly dynamic particularly at the headlands of Cowan Cowan Point and Tangalooma Point where marked changes have occurred over the past 75 years. Tangalooma Beach at the resort appears to have been relatively stable dynamically over the same period, (Ref. 3).

A basin for the rehandling of dumped Middle Banks sand is located in Boggy Creek at its confluence with Brisbane River, (Fig. 1). This is an advantageous site for rehandling as the

trailing dredge has easy access via the Brisbane River.

With the rehandling operations, the sensitive area is the adjacent swing basin in the river (Fig. 2). The excavation of sand, clay and silt for the rehandling basin with a cutter suction dredge and the dumping and redredging of sand should not aggravate the siltation normally occurring in the swing basin.

The general reclamation technique involves cutting mangroves just above ground level, leaving the root mat intact to minimise disturbance to the soft sub-surface soils during sand build-up. Reclamation areas are bunded with the run-off water escaping through weirs into silt settling basins. Run-off water with a minimum of silt is eventually fed into the lower reaches of the remaining mangrove lined Serpentine Creek.

It is necessary that turbid run-off water does not have the opportunity to effect remaining mangroves or the quality of water in Moreton Bay.

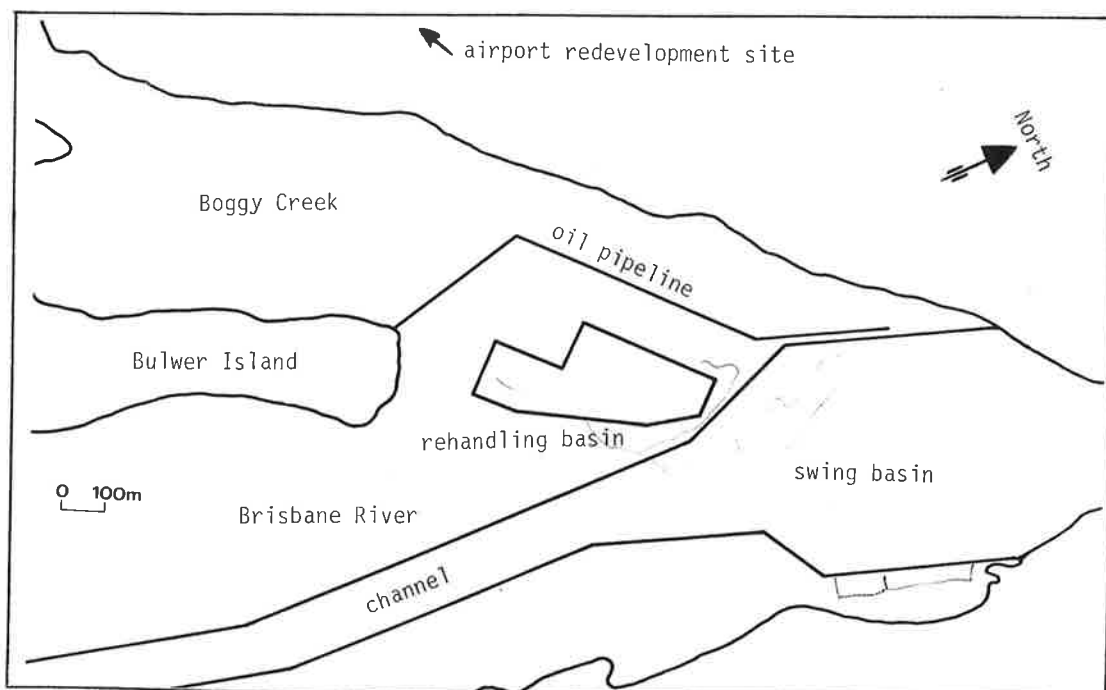
## 3. DREDGING IN MORETON BAY

Two major aspects of the effects of dredging at Middle Banks were examined long before sand removal commenced.

One was the risk to living flora and fauna by a possible decrease in water quality. Investigations using biologists determined that dredging of the Middle Banks would have no deleterious effect on macrophytic vegetation and fish and prawn populations, (Ref. 2). Benthic investigations showed the majority of specimens at the Banks had high rates of natural mortality with the population dependent on recruitment from outside the area, (Ref. 2).

The possibility of extensive plumes resulting from the dredge overflow was also seen as minimal because of the nature of the sand. It has a  $D_{50} = 220$  micron, with a narrow distribution of particle sizes, and with only small percentages less than 100 micron. Sand carried overboard in the overflow was seen as

Figure 2  
Sand rehandling area



quickly settling out. This was subsequently confirmed with the monitoring of a trial dredging operation. Discoloration of the sea extended for about 200 metres astern of the dredge, with no visible discoloration, 30 minutes after the dredging finished. The same characteristics have been observed with the current dredging.

The other aspect of the dredging as mentioned earlier, are the possible effects on Moreton Island beaches. These can be either direct or indirect effects, (Ref. 3). The removal of sand which might otherwise supply the beach or from within the dynamic zone constitute a direct effect. However, because Middle Banks are 4 kilometres offshore, and separated from Moreton Island by channels and banks (Fig. 3) sand from the Banks is considered not at all to supply the beaches. This is substantiated by the different sand gradings at the two locations.

Indirect effects could result because of the changes to the bed configuration, which may alter refraction patterns and hence foreshore wave conditions, or which may alter current patterns which affect the beach sand supply. For the latter case, the increase in cross-section due to dredging (Fig. 3) is small with a resulting very small and localised change in tidal currents, which cannot alter the existing beach sand supply system. Apart from the initial programme to measure currents, no further active current monitoring to date has been done.

For the wave refraction, factors mitigating against significant changes are:-

- the relatively short period of wind waves within Moreton Bay (significant periods of greater than 4 seconds occurring for less than 2% of the time);
- the relatively deep water compared to wave length over Middle Banks
- sand is taken on the eastern flank of Middle Banks with no significant increase in depth to the crest.

Wave refraction analyses using 3.0, 4.5 and 6.0 second waves determined by hindcasting, showed that changes to the mean conditions on the island foreshore for the pre and post dredging conditions were negligible.

Monitoring in the area therefore seeks the confirmation of these earlier conclusions.

Surveys are done regularly of Middle Banks and the island beaches, backed up by aerial photography to monitor changes in the sand. A "Waverider" buoy (Fig. 3) installed before dredging commenced is collecting wave data, which can be used for assessing the accuracy of hindcasted data, and for input into further refraction analyses. The first four months of buoy data were in reasonable agreement with the hindcasted data, (Ref. 4).

As time progresses more of the collected data on the dredging works will be analysed and reported.

#### 4. REHANDLING IN BOGGY CREEK

The position of the rehandling basin in relation to the swing basin of the Port of Brisbane Authority is shown in Fig. 2. Monitoring associated with the dredging operations commenced in October 1980.

##### 4.1 Conditions prior to dredging the basin

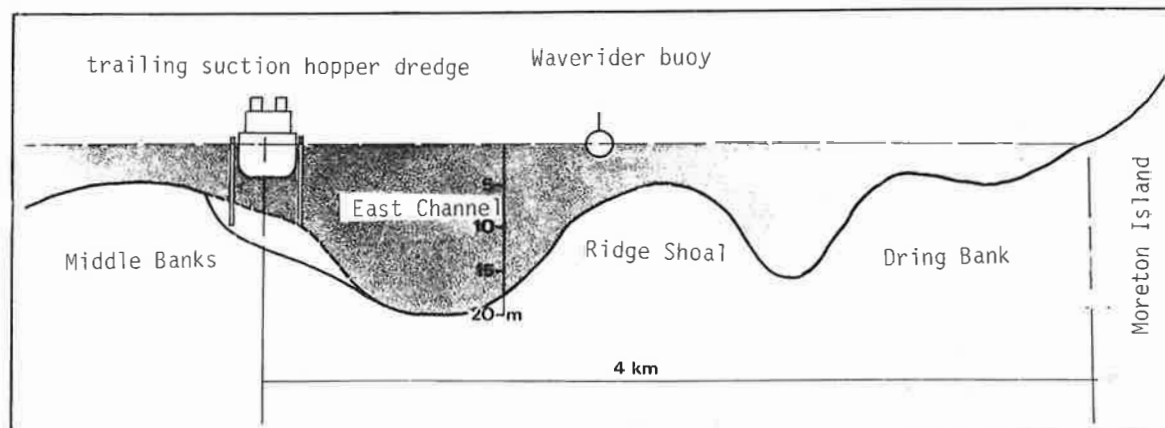
Field data of typical siltation parameters were collected on two days of neap tide and two days of spring tide. In total thirteen stations in Boggy Creek, and ten stations in Brisbane River were established. Eight cross-sections were plotted with a hydrographic survey. Surface currents were plotted with the aid of drogues. A preliminary assessment of the collected data has determined the orders of magnitude of tidal prisms, tidal velocities and suspended sediment transport.

In general, the prism in Brisbane River is twenty times larger than the prism in Boggy Creek and maximum tidal velocities in the river are twice those in the creek. This latter observation suggested that any material capable of being suspended in Boggy Creek would be carried out through the system without settlement under normal conditions. As the velocities in Boggy Creek and the rehandling basin are only of the order 0.2 - 0.3 m/s, analytical methods of estimating rates of sediment transport are unreliable. Currents in the river are generally channelised with evidence of some eddying at the Boggy Creek entrance, (Ref. 5).

Computed peak suspended sediment loads pertaining at the time of data collection, show that the sediment load in the creek was only about 5% of that of the river.

The dominance of the river over the creek was further illustrated by data collected during a

Figure 3  
Dredging sand  
(not to scale)





fresh in the Brisbane River on 11 February 1981. The peak loads in Boggy Creek on flood and ebb were 9% and 3% respectively of the peak loads in Brisbane River.

#### 4.2 Conditions during dredging of basin

During March, June and July 1981 extensive measurements of water quality were collected around the cutter suction dredge excavating the rehandling basin to identify and assess any plumes.

In most cases weak sediment plumes arising from the dredge were evident. Normally they were relatively narrow with the maximum widths determined at about 80m, and with concentrations rarely exceeding 10 to 40 mg/l above background levels which ranged from 10 - 30 mg/l. In some cases weak plumes were detected up to 200m from the dredge, but generally concentrations tended to drop off fairly rapidly with distance, as shown in Fig. 4. The apron area between the rehandling and swing basins nominally always greater than 100m, greatly reduced the risk of plumes extending into the shipping area.

For example on 2 July 1981, at one station downstream the average concentration of suspended sediment above background was 121 mg/l. At other stations on the same section, concentrations above background ranged from 0 - 8 mg/l, indicating a narrow dense plume. A few minutes later, about 100m downstream and on the edge of the swing basin, concentrations across another section were all the same as background. Measurements taken further upstream in Boggy Creek showed that its background levels did not interfere with the plume monitoring.

Discharge pipeline samples were collected concurrently with the plume monitoring. It is interesting to note that even when digging very fine silts the dredge did not cause any plume of major significance.

The general conclusion is that on the occasions when a well defined plume could be distinguished, concentrations tended to drop off fairly rapidly with distance, indicating that the majority of excess sediment settled out fairly rapidly. Also as movement of the plume generally followed the tidal velocity vectors, very little actually reached the swing basin, (Ref. 6).

#### 4.3 Conditions after basin dredged

For the excavation of the rehandling basin approximately 1.8 million cubic metres of material were removed and pumped ashore. Monitoring of siltation parameters in June 1981 was set up to identify any changes from the pre-excavation conditions. A preliminary assessment of the collected data gave indications that there were no significant changes in the suspended sediment transport, and hence to the siltation that would have occurred normally in the swing basin.

#### 4.4 Conditions during sand dumping

Two aspects of the sand dumping are being monitored, the generated turbidity and the spread of dumped sand.

In the very early stages of the sand dumping programme some disturbances of the bottom occurred. This condition soon disappeared as the dumped sand stabilised the bottom and side batters and manoeuvring techniques improved.

Figure 4  
Rehandling basin excavation  
(not to scale)

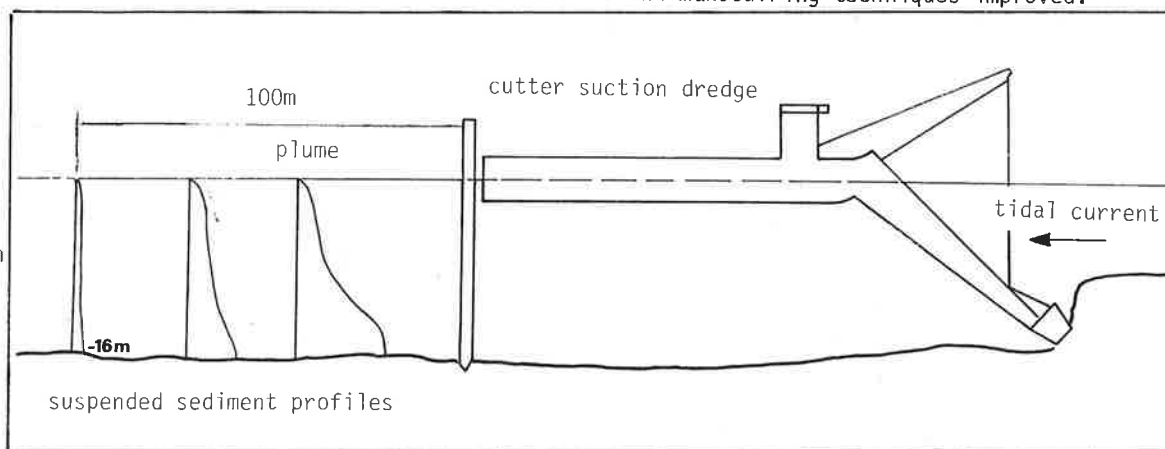
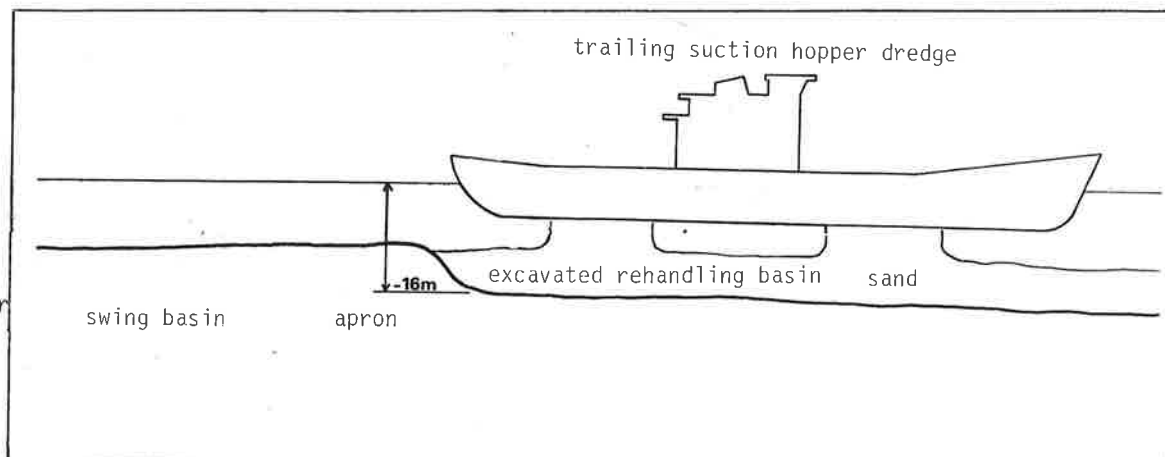


Figure 5  
Dumping sand for rehandling  
(not to scale)



The spread of sand outside the rehandling basin is monitored by collecting bed core samples with a rocket sampler. Samples collected before sand dumping commenced are the reference for the apron and swing basin areas. These samples ranged from clays and silts to sands with distinct colours. Deposits of Moreton Bay sand in the apron area, see Fig. 5, were easily identifiable as they were layered on the firm native material and were a distinct white/grey colour.

At regular intervals the extent of penetration and depth of Moreton Bay sand outside the rehandling basin is assessed. The last exercise, prior to this paper showed that sand amounting to about 300 cubic metres, out of a total of almost 2 million cubic metres of sand dumped, had been dumped or had migrated outside the rehandling basin. As the sand layer was thickest at the rehandling basin end, and quickly petered out towards the swing basin, the average sand layer of about 3 cm was impossible to detect within the normal tolerances of depth sounding.

## 5. RECLAMATION OF MANGROVE WETLANDS

In addition to the clean Moreton Bay sand, all of the sand, clay and silt excavated for the rehandling basin has been pumped into the site's boundaries. Disposal of clay and silt represents the worst possible environmental risks, but it has been achieved by a well planned system of basins. Both reclamation and disposal areas are bunded, with the run-off water monitored by the collection of water samples at weir boxes and in the waterways. Since sand pumping has started, approximately 20 water samples per week have been taken. The particular number of samples depends on the operations in progress at the time and whether or not a problem of exceedance of specified water quality limits appears to exist. The specified water quality parameters are:

- . suspended solids - maximum of 100 parts per million
- . turbidity - maximum of 60 formazin units.

To date turbidity has not been a problem and measurement of suspended solids has been the governing criteria. The testing of water quality provides both policing of the specification requirements and builds up a data bank to indicate the overall quality of discharged water over a long period of time. Quite frequently water qualities of the order 15 - 30 parts per million suspended solids are obtained.

Mangrove communities, especially those to remain, are monitored by ground reconnaissance and by regular colour and infra red aerial photography. The maximum time between

successive photography being 6 months. Specific investigations into the cause of mangrove distress have been carried out as circumstances dictated.

## 6. CONCLUSIONS

The Redevelopment of Brisbane International Airport is a major project which could have adversely effected adjacent environments, had there been ill chosen working techniques. Based on an extensive programme to record existing conditions, and documented in an environmental impact statement, dredging and reclamation methods were chosen to minimise the risks. Now, consistent with a no damage policy that is to be recommended for other such works, an active monitoring programme is in progress to confirm the prudent nature of the selected techniques. To date the results show that the dredging, rehandling and reclamation operations are not affecting the existing conditions. Sand can be won offshore, dumped in an area of narrow confines and placed onshore safely.

## 7. ACKNOWLEDGEMENTS

Appreciation is given to the Secretary of the Department of Housing and Construction for permission to publish this paper. Nevertheless, the opinions expressed herein are those of the authors.

## 8. REFERENCES

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**Brisbane airport development project environmental study / prepared by Brisbane Airport Environmental Study Committee.**

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- v. 6. Environmental study : supplementary report.
- V. 1. Environmental study report, March 1974
- v. 2. Aircraft noise nuisance report, March 1974
- v. 3. Terrestrial study factor reports, March 1974
- v. 4. Marine study factor reports, March 1974
- v. 5. Maps, March 1974.
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THE PARLIAMENT OF THE  
COMMONWEALTH OF AUSTRALIA

RELOCATION OF NAVAL FACILITIES  
TO JERVIS BAY

Report of the House of Representatives  
Standing Committee on Environment and Conservation

September 1986

Australian Government Publishing Service  
Canberra 1986

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## Terms of Reference of the Committee

That a Standing Committee be appointed to inquire into and report on:

- (a) environmental aspects of legislative and administrative measures which ought to be taken in order to ensure the wise and effective management of the Australian environment and of Australia's natural resources; and
- (b) such other matters relating to the environment and conservation and the management of Australia's natural resources as are referred to it by -
  - (i) the Minister responsible for those matters; or
  - (ii) resolution of the House.

## Members of the Committee

Chairman	Mr P. Milton, MP
Deputy Chairman	Mr A.P. Webster, MP
Members	Mr R.L. Chynoweth, MP Mr R.F. Edwards, MP Mr P.S. Fisher, MP Mr G. Gear, MP Ms J. McHugh, MP Mr C.G. Miles, MP
Secretary to the Committee	Mr J.R. Cummins
Research Staff	Mr I.A. Dundas Mr R.I. Kropp



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(Appendix C from Draft EIS on Garden Island Modernisation)
2. Findings and Recommendations from Committee's 1975 Report,  
"Development Pressures on Jervis Bay"
3. Map of Jervis Bay

## RECOMMENDATIONS

The Committee recommends that:

the proposed Environmental Impact Study for naval development at Jervis Bay should be undertaken only when a comprehensive planning study and public review of naval facility requirements and alternative sites demonstrates that relocation to Jervis Bay is necessary; and

the proposed development at Jervis Bay be considered and planned in the context of the overall proposal for Fleet facilities and bases around Australia.

(paragraph 67)

[doug.crabb@outlook.com](mailto:doug.crabb@outlook.com)

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**From:** Engineers Australia <[email@e.engineersaustralia.org.au](mailto:email@e.engineersaustralia.org.au)>  
**Sent:** Wednesday, 21 November 2018 4:05 PM  
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1 6 7 9 12 13 14 15

- Internet of things
- Innovation and disruption
- Data analytics
- Artificial intelligence
- Modelling and simulation
- Telecommunications and cyber security
- Bio-medical engineering and innovations for better health
- Robotics
- Quantum computing

### Theme 4: Preparing the next generation of engineers

4 17

- Education system/framework of tomorrow
- Future workforce
- Borderless qualifications
- Industry-education collaboration
- Blended learning
- Interdisciplinarity

### Theme 5: Engineering leadership, governance and influence

1 4 5 8 12 13 16 17

## Theme 2: Engineering for humanity: responsive design for greater liveability

1 2 3 4 10 11 12

- Sustainable assets and utilities (water, energy, waste)
- Transport systems (road, rail, air)
- Smart cities
- Smart farming
- Engineering a sustainable future (population growth, biodiversity, ecosystems)
- Sustainable water management practices
- Sustainable energy resources
- Green infrastructure
- Environmental sustainability

## Theme 3: Fostering diversity and inclusion

4 5 10 16 17

- Capacity building through diversity and inclusiveness
- Future workforce
- Managing career progression and retention
- Teams of the future (breaking old habits)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

- Governance (market/employer disruption, communication within and outside the profession, mergers)
- Ethical behaviour and obligations
- A changing profession (global environment, lifelong learning, entrepreneurial skills)
- Technical or leadership careers (role models, career pathways)
- Nature of leadership (influence on wider society)
- Transformative models

## Theme 6: Our changing climate: mitigation, resilience and adaptation

3 6 7 10 13 14 15

- Preparedness for major natural and other occurrences (vulnerability assessment)
- Technology for natural disaster monitoring, mitigation and management
- Resilient infrastructure for climate change
- Managing our resources (land, water, mining, energy)
- Protecting our oceans
- Building resilience into our engineered society (mitigation)
- Risk leadership, governance and innovation
- Leadership in response to natural and other major occurrences (adaptation)

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Home > Sustainability > Environment

# Stronger waves and winds pose rising threat to coastal infrastructure



by **Rachael Brown** — May 5, 2019 in **Environment** 2 min read

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Ocean waves and storms have been getting stronger over the past 30 years, which has

# implications for coastal and offshore infrastructure.

Research produced by two engineering professors from the University of Melbourne has found that waves and the winds that generate them have been increasing in magnitude over the past three decades.

During extreme storms, it's not uncommon for waves to reach more than 20 metres high – enough to wash the top floor windows of a five-storey building.

Professor Ian Young and Dr Augustinus Ribal, both from the Melbourne School of Engineering, found this trend is particularly pronounced in the Southern Ocean. Extreme winds have increased 1.5 metres/second, or 8 per cent, over the past 30 years, while extreme waves have increased by 30 cm, or 5 per cent, in the same time frame.

“Although increases of 5 per cent for waves and 8 per cent for winds may not seem like much, if sustained into the future such changes to our climate will have major ramifications,” they wrote in a [piece for Pursuit](#) describing their work.

## Fine detail

Young and Ribal analysed more than 4 billion measurements of wind speeds and wave height collected by 31 satellites between 1985 and 2018. Data was gathered from three different types of satellites to gain a comprehensive view of changing patterns: 13 altimeters, which measured wave height and wind speed; 11 radiometers, which measured wind speed; and seven scatterometers, which measured wind speed and direction.

In their research paper detailing this work, [published in Science](#), Young and Ribal describe how they were able to create a robust data set by comparing these measurements to data gathered by more than 80 ocean buoys from around the world, as well as other satellite datasets assembled over a similar time frame.

According to Young and Ribal, this is the largest and most detailed database of this kind ever compiled.

## Forward looking

Australia is no stranger to floods and cyclones, but higher waves and stronger winds could mean more flooding and erosion, putting [coastal infrastructure at risk](#).

“What most people don’t understand is that the actual flood events are caused by storm surges and breaking waves associated with storms,” Young and Ribal wrote.

“Changes to the Southern Ocean are important, as this is the origin for swell that dominates the wave climate of the South Pacific, South Atlantic and Indian Oceans, and determines the stability of beaches for much of the Southern Hemisphere.”

In order to predict whether these trends will continue, Young and Ribal plan to use this database to create climate models that can project changes in wind strength and wave height over the next 100 years.


According to them, early results show similar patterns to the historical record.

“Changes in the Southern Ocean can have impacts that are felt around the world, with storm waves increasing coastal erosion, and putting coastal settlements and infrastructure at risk,” they wrote.

“We need a better understanding of how much of this change is **due to long-term climate change**, and how much is due to multi-decadal fluctuations, or cycles.”


**Tags:** [DISASTER RESISTANCE](#) [INFRASTRUCTURE](#) [RISK MANAGEMENT](#) [WATER ENGINEERING](#)  
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**Rachael Brown**

Rachael is the digital editor for create. She loves having a job that lets her go down rabbit holes, ask interesting people (hopefully) interesting questions, and indulge her need to know why things are the way they are and how they got that way.

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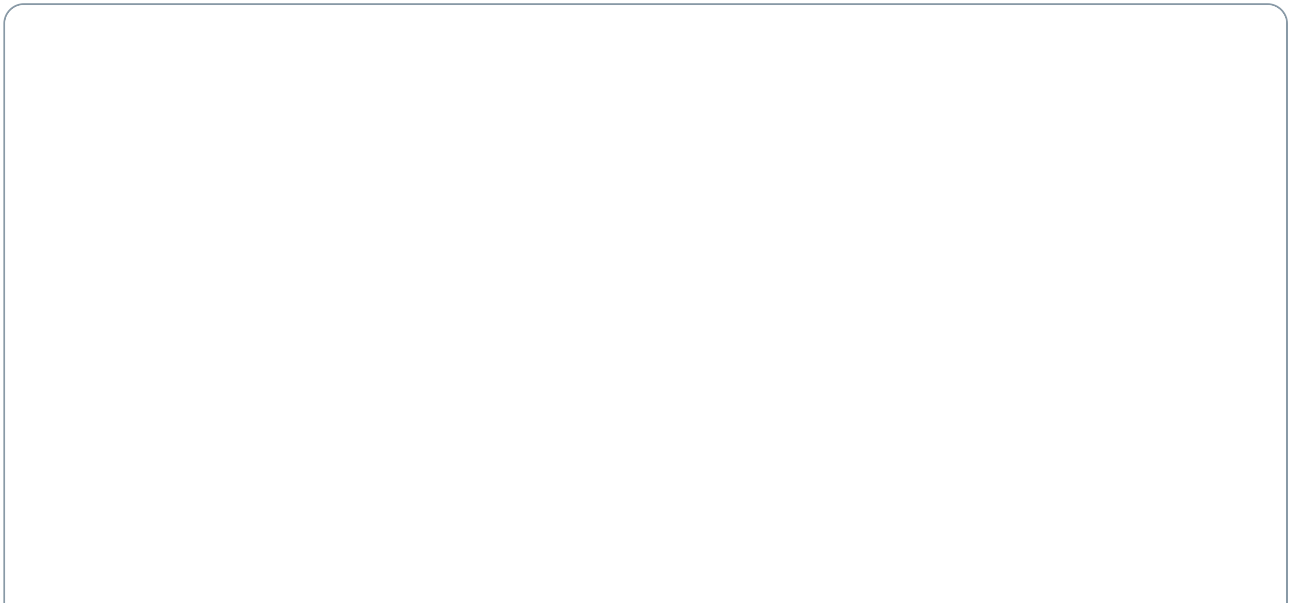
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# Fish deaths in lower Darling 'exposes huge data gaps in its ecosystem'

Hannam, Peter. **The Canberra Times**; Canberra, A.C.T. [Canberra, A.C.T.] 17 Jan 2019: 4.

The massive fish kills at Menindee and other environmental strains have revealed huge gaps in the ecological data collected in the Murray-Darling Basin, according to Tony Burke, federal Labor's water spokesman.

Mr Burke, who earlier this week visited Menindee, said the deaths of up to a million fish in the lower Darling this month had made it "an absolute priority" to get better information about the state of the basin's ecosystems.

"We're dealing with something beyond the problems we've seen before," Mr Burke said.

After speaking with agencies, Mr Burke said it was clear they were good at monitoring water volumes but lacked the funds to track sufficiently the health of the ecology of the basin - including where things were improving.

"It's not a bathtub, where you're only looking at volumes," he said, adding the Murray-Darling Basin Authority "don't have the resources now" to properly monitor environmental outcomes.

Mr Burke's comments come a day after state and commonwealth water agencies, including the basin authority, held a meeting to devise ways to ease the impact of the severe drought and heatwaves on the nation's largest river system. They plan to report to David Littleproud, the water minister, in a week's time.

The NSW government on Wednesday began deploying the first of 16 aerators - six of them to the Darling River - in a bid to keep vital fish stocks alive in waters with low oxygen levels. The machines will increase dissolved oxygen levels in hypoxic waters caused by blue-green algal outbreaks, the low river flows and severe heat.

Parts of far-west NSW hit 48 degrees on Wednesday, while Swan Hill on the Victorian side of the Murray nudged the 46-degree mark. Regions of the Murray and Murrumbidgee have red alerts for algal outbreaks, while fish kills have been reported at Keepit Dam in northern NSW, among other sites.

Comment was also sought from the office of the water minister. Mr Littleproud is currently in Germany at a trade event.

Jamie Pittock, a professor at the Australian National University and a member of the Wentworth Group of Concerned Scientists, said there was a need for a real-time system for auditing the environmental health of the Murray-Darling Basin.

Such a process could also be used to better predict and avoid crises like the Darling River fish kill, he said.

"Tragically, after the Basin Plan was adopted in 2012, governments led by NSW withdrew their funding for the Sustainable River Audit program," Professor Pittock said.

"While the Commonwealth Environmental Water Office monitors the benefits of delivering parcels of its water onto particular wetlands, no one is monitoring the health of the whole 5.7 million hectares of freshwater ecosystems in the basin," he said.

"It is outrageous that \$13 billion in public funds are being spent to restore environmental health without any effective, basin-wide monitoring."

The Greens, meanwhile, plan to introduce legislation when Parliament returns next month to establish a Royal Commission into what the party calls "the mismanagement of the Murray-Darling Basin".

"We have spent \$13 billion on the Murray-Darling Basin Plan yet the river system is in collapse," Sarah Hanson-Young, the Greens environment and water spokeswoman, said.

"This plan was put in place to fix the river, and cotton, corruption and climate change is killing it."

The mass fish kill in the Lower Darling was just the latest "in a long list of problems with the management" of the basin, said Senator Hanson-Young, who also visited Menindee last week.

CREDIT: Peter Hannam

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OPINION POLITICS FEDERAL WATER

# Dead stinking fish send a message

By [Jack Waterford](#)

19 January 2019 – 12:00am



Any halfway decent political opportunist would use this week's images of dead and dying Murray cod and other fish in the Menindee Lakes to put the environment and climate change at the forefront of the election campaign. The fact that the weather has been warmish, even by Goodooga standards, doesn't do any harm either.

The images have an emotive energy often lacking in many of the impassioned debates about places we care about which are fairly far away, and which have become almost abstractions for the feeling that we ought to be doing something – at the very least, something more than we have been doing.

Straight off, the dead and stinking fish could symbolise the mismanagement, maladministration and corruption of water policy in Queensland, NSW and Victoria. It doesn't take a great deal of extension to work it into an argument about the National Party's intellectual and moral bankruptcy, particularly under former leader Barnaby Joyce, and its complete unfitness to govern. Rural folk increasingly feel that way, wondering how a party established to represent rural and regional Australians became instead available for rent to big mining interests, the coal industry, the fracking industry and large-scale agribusiness, particularly when these interests threaten their livelihoods.

But the Nationals are only the obvious culprits. Look, for example, at Malcolm Turnbull, who had a spell as minister in charge of saving the Murray and Darling river systems a bit more than a decade ago, and knew so much about the topic that he and John Howard were able to concoct a river water policy, costing billions of dollars, on the back of an envelope over a couple of afternoons, without even feeling the need to consult the Treasury, which, Turnbull said contemptuously, knew nothing about the subject.

One of the many things that Turnbull learned during his period as water flâneur in chief was the wisdom of successive conservative prime ministers in keeping water policy out of the hands of Nationals ministers. Not even Tony Abbott was tempted to hand it over – probably on the advice of former senator Bill Heffernan, a farmer with some tolerance for human weakness but never for waste or mismanagement of a scarce water supply. After Turnbull knifed Abbott, to general applause, Joyce popped

around to remind him that Coalition agreements were between leaders, not parties, and that continuing the alliance would need to involve some Liberal concessions. When Turnbull announced his ministry, water was with Joyce at agriculture, and that department further refined its habit of looking away and doing nothing when policy became imperial, and when enforcement of the law, or even implementation of it, came to be regarded as a matter of discretion.

But one does not need to dwell long on the dead fish to think also of climate change, and the Morrison government's inertia on the subject, not least because a good proportion of the Coalition doesn't actually believe in it or, at least, in doing anything brave or courageous, or ahead of anybody else, about it. And also of drought, and extreme weather, neither in the least bit unusual in the Australian environment, but both seeming to come more regularly, and with solid evidence of increasing averages. Perhaps the population is not completely certain about what to do to ward off the effects of climate change, and how much of whatever it is is necessary, but opinion polls suggest that most Australians believe we should do a good deal more, and with a more explicit sense of urgency, than the present government.



Some of the thousands of dead fish in the Darling River near Menindee. NICK MOIR

One does not have to segue far off the dead fish, the drought or climate change theme to think of the Great Barrier Reef, and the threat posed to it by rising temperatures, caused not least by coal. The government's response to this crisis appears to involve enabling (if not yet financing, though it may come to that) a large coal-mining project nearby, and giving nearly \$500 million to a club of rich executives, chiefly from the mining industry, who think they can commission work, perhaps with some private sector help, that will tackle some of the evidences of the effects of climate change, if not actually do anything about it.

The power of the images is such that they could be harnessed for messages against the Coalition, or for the Labor Party, which is saying mostly the right things about climate change, if not necessarily about water policy or Adani, or for the Greens or

environmental candidates. The fish don't need a detailed inquest: just by themselves, they show that something has gone very badly wrong.

It says something about the political ineptness of federal and state Nationals ministers, including Deputy Prime Minister Michael McCormack, that he insists that the fish deaths are the effects of drought rather than policy, or of drought accompanied by abrupt changes in temperature. No doubt these have played their part in the catastrophe but, as usual along the Darling system, the problem is much more complicated than that, and owes much to the overallocation of water to irrigation farmers, particularly along the Macquarie and Barwon rivers, to the failures of the Murray-Darling Basin Authority, not least (from the start) in failing to prioritise the environment ahead of agricultural needs, and to rorting of the whole system, with the connivance of public service regulators, particularly in the NSW government. That federal ministers and some public servants in the primary industry department see their function as facilitating agriculture and maximising its export revenue has also led to the corruption of the public stewardship they were supposed to deliver to the whole community.

One reason the symbolism of the fish deaths has the power to sound in votes is that the division of scarce resources inevitably involves rationing, winners and losers, and people who argue about what should be rationed. The *Four Corners* report last year, which showed some big farmers stealing water, acquired some of its moral force from the fact that the rorters were dobbed in by neighbours as well as by folk nearby. They were angry and resentful not only because the rorters were taking water for free while they paid for it, but because the rorting of the supply meant a diminished total supply. That's quite apart from the fact that many farmers are keen fishers, well-versed in their local environments, and want to live sustainably in them, rather than by mining its water supplies and raping the soil.

But that's just in the immediate neighbourhood. In any river system, there are folk upstream and downstream, particularly downstream, who will gripe that their allocations have been reduced because too much water has been taken upstream. They are often right, even within a state. But there has been a long pattern of farmers within an upstream state taking more than they should, to the ultimate disadvantage of downstream states, particularly South Australia. That's a problem aggravated by physical constraints, including weirs that often prevent water flowing downstream, by very poor Commonwealth policy and management of efficiencies to save water, and by evaporation.

Given the original overallocations of water licences to irrigators, the Commonwealth began buying allocations (from "willing sellers" on the water market). But this was unpopular in some areas, with claims (by no means substantiated) that the sale of irrigation licences was depopulating communities and reducing their resources. The present government prefers to spend public money subsidising farmers to increase the efficiency of their water use, thus liberating some water for the environment. There are problems with this approach. First, the cost of the water "liberated" for the environment by such measures is nearly three times that of water liberated through buying allocations on the open market, the supposed ideal distributing mechanism. Second, the economic benefit from the subsidised infrastructure and efficiency

mechanisms goes to the individual farmer, rather than to a district or the public at large. In a real sense, neighbours can be economically disadvantaged because they are unable to grow food or cotton at the cost of the neighbours whose "investment" in better methods was heavily subsidised.

That has also brought to light other inequities. Last year in NSW, the government announced measures to "borrow" water from the environmental reservation because of the drought's severity. Listening to the blather coming from the Nationals, one would have understood the announcement as suggesting that some water was being liberated so farmers and graziers could get minimal supplies for thirsty sheep, or to round off a crop almost ready for harvest.

But the extra water, better characterised as water stolen rather than borrowed, was not rationed out to the needy. It was auctioned out to the highest bidder – usually to better-off farmers not suffering as greatly from the drought and thus in a better position to bid high. Some water, indeed, went upstream to farmers not actually in drought at all. And some of the crops "topped off" were not crops planned and planted as possible from diminishing allocations as drought took hold, but extra speculative planting, just in case there was late rain.

The South Australian royal commission into the management of the Murray-Darling system, being conducted by Bret Walker, SC, should soon report. Set up in response to anger about its very junior status at the table, it has had minimal cooperation from the Commonwealth (which ordered that the basin authority, and its staff and board members, not give evidence). The commission has had only token cooperation from the states.

But that has not meant that it has been purely parochial, or that the evidence before it has been skewed to South Australian matters or interests. For starters, there are many players, including irrigators and farming interests from other states, who were keen to give evidence and to describe their problems. There have been retired basin workers and regulators, and former CSIRO staff still angry about how managers caved in to politicians and changed scientific calculations of water needs to suit political agendas. There has been abundant evidence showing the authority's setting and subsequent reduction of sustainable environmental allocations not in response to any scientific analysis but to calculations of what interest groups might accept. After the interests complained about the initial determination that a minimum 3000 gegalitres of water a year was needed to meet environmental water requirements, the authority was told to "pick a number with a '2' in front of it". It settled for 2750 gegalitres, but despite all of the fad words about science, accountability and transparency, has been unable, since its establishment, to show how it arrived at either figure. Expert advice from scientists is that the minimum environmental allocation should have been 6900 gegalitres in an average year, that there was Buckley's of satisfying the environmental needs with an allocation of 3000, let alone 2750.

It is typical of the mendacity of NSW's participation in the scheme that it came up with a rort to meet demands for a higher environmental flow. It wants to close up the Menindee Lakes, leaving only a narrow channel by which the water can go



downstream. After all, it argues, the water in the lakes (when it is there) only evaporates. Would it be better if, instead, it was sent to those whingeing crow-eaters, without actually disturbing the standard of living of NSW agribusiness upstream. Local farmers, as well as the city of Broken Hill, which draws its water from the lakes, are furious, some insisting that the evaporation causes local weather in any event, but also speaking of the lakes' importance as a wetlands site, a sanctuary for birds, a breeding place for fish (if there are any left) and as a sieve settling some of the dirty water. The basin does not appear to be much of a player in the argument involved, even from its duty as the ultimate protector of the riverine environment.

But it seems certain that Bret Walker will hold that the then Commonwealth solicitor-general was wrong when he advised Tony Burke, when the authority was set up, that protecting the environment was only one aim in basin management. Equally important were social and economic considerations.

Walker, and the counsel assisting the royal commission, are certain that this interpretation is wrong. Indeed, they say that every senior constitutional lawyer consulted shares this view. The authority is first required to establish the basin's minimum environmental needs. Only after that can it set allocations for irrigation, or for domestic use in towns and elsewhere.

Walker plainly thinks the misinterpretation of the Water Act's clear instructions has led the authority to think it must perform some political juggling act, by which it ends up with some solution that causes all of the vested interests least trouble. As such, the authority has failed miserably, and compounded rather than alleviated the rivers' problems.

The counsel assisting, Richard Beasley, SC, has not been kind to the authority or its board. He quoted senior international scientists who said it was a fundamental tenet of good governance that scientists produced facts and that government decided on values and made choices. They were concerned that scientists in the authority felt pressured "to trim [the facts] so that the sustainable diversion limit will be one that is politically acceptable".

Beasley said that if all the Murray-Darling Basin Authority had done over the past eight years was to "trim the facts", it would be bad enough.

"But it's worse than that. The implementation of the basin plan has been marred by maladministration. By that I mean mismanagement by those in charge of the task at the basin authority, its executives and its board, and the consequent mismanagement of huge amounts of public funds. The responsibility for that ... falls on both past and present executives of the MDBA and its board."

There are many guilty parties, and few deserve to be spared. Fish rot from the top, it is said.

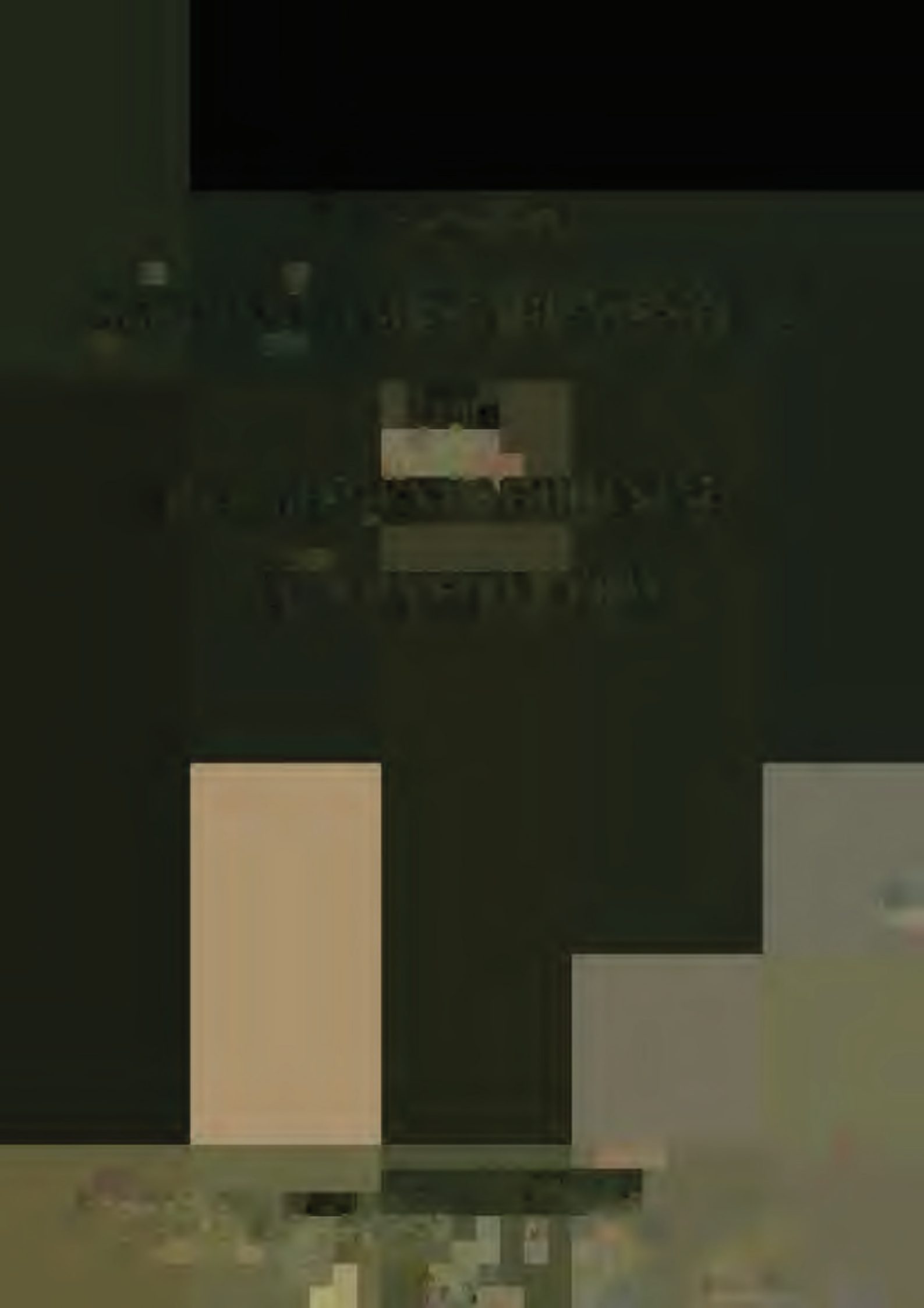
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### **Jack Waterford**

Jack Waterford is the former Editor-at-large at The Canberra Times and writes a regular column





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