Tropical Water Quality Hub

National Environmental Science Programme

Assessing the influence of Fly River discharge on the Torres Strait: Final report

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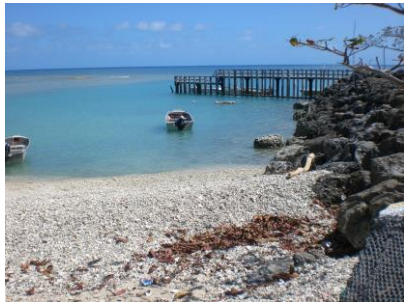
Acknowledgement of country

I would like to begin by acknowledging the Traditional Custodians of the country where we present today, as well as the **many Traditional Owner groups across the Great Barrier Reef, Torres Strait and PNG** region, and pay my respects to Elders, past, present and emerging

Torres Strait and water quality

Torres Strait Islanders depend on their marine resources for food, livelihoods & cultural activities











Potential threats

- Under certain flow conditions, water from Fly River estuary can enter some parts of the Torres Strait, carrying mine-derived sediments and trace metals
- Ok Tedi copper mine (1984), Porgera gold mine (1991)
- Sediment load increased – 40 million t/y
- Increases in copper concentrations in Fly River (~x2)

➢ **Local concerns raised over the last 30 years of potential impacts on the ecology and public health status of seafood in the Torres Strait**



Incursion of Fly River discharge plumes into the northern Torres Strait and coastal waters

Spanning 30 years of research

1980's

Copper mining begins along Ok Tedi/Fly River, PNG

Mine releases sediments & contaminated waste into Fly River

High levels of copper are harmful to marine & freshwater plants & animals

1990

Porgera gold mine opens on Ok Tedi/Fly River, PNG

Sediment & waste increased Fly River runoff from 100 to almost 150 million tonnes each year

1991-1993

Torres Strait Baseline Study

2015 - 2018

Two NESP projects expanded on baseline study to look at when & where Fly River runoff goes in Torres Strait

2019 - 2020

Closer look at concentrations of trace metals in water and sediments

2025 / 2030

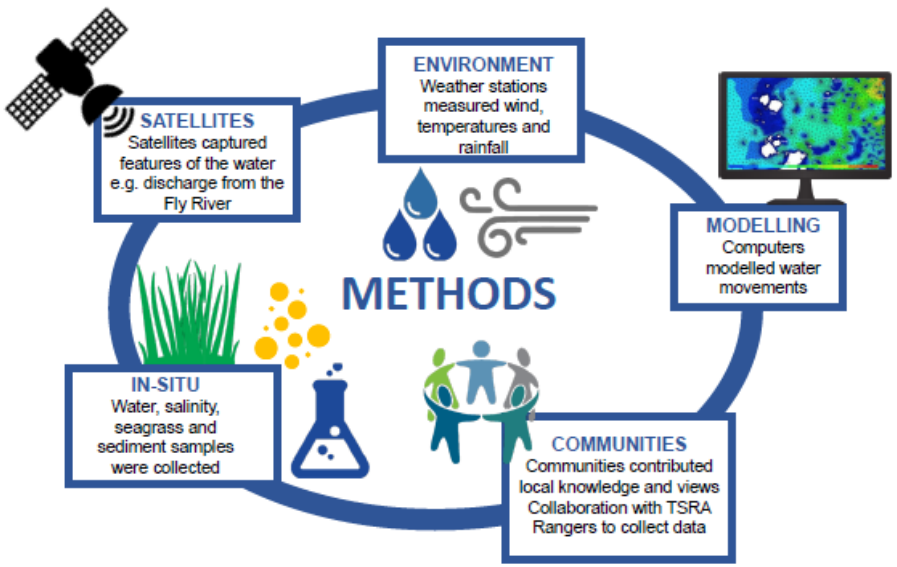
Monitoring activity recommended to be repeated every 5-10 years

Most recent work

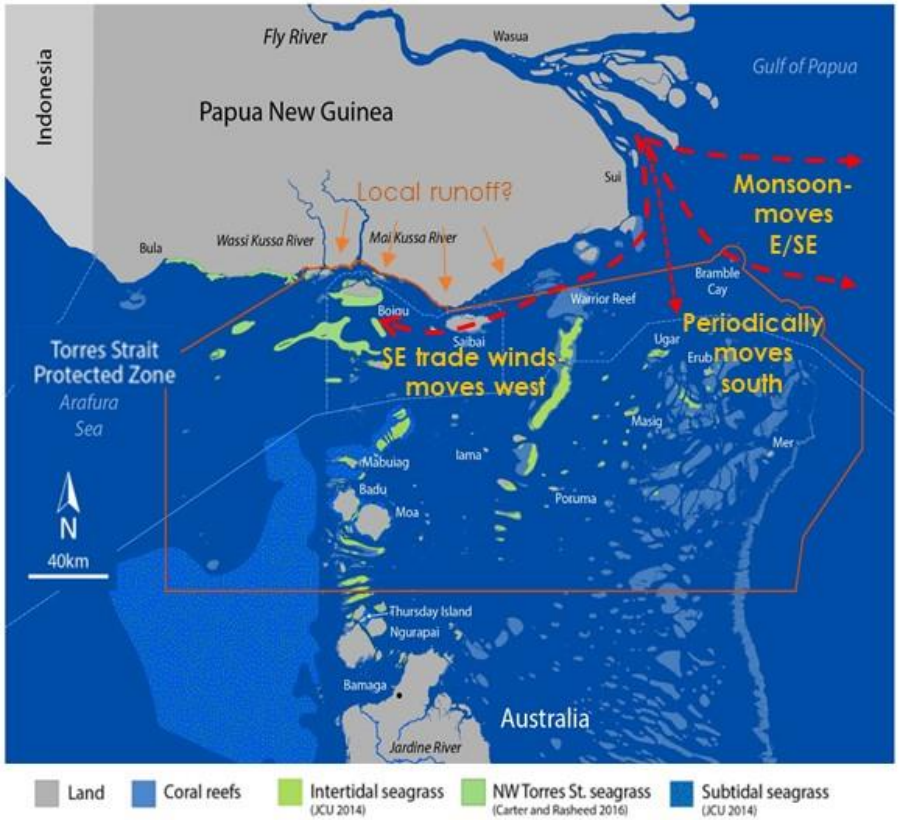
WHAT

1. **WHERE** does the Fly River runoff go in the Torres Strait?
2. **WHEN** does the Fly River runoff go into the Torres Strait?
3. **WHAT** is in the runoff that reaches the Torres Strait?

HOW



Extent of influence



- Strong seasonal differences.
- Turbid coastal boundary layer along the PNG coast with highest turbidity found inshore and decreasing seaward.
- Source – Fly + smaller streams from PNG mainland (Wassi Kussa and Mai Kussa Rivers around Boigu Island).
- The time scales for the pollution spread in Torres Strait are probably of the order of 100 years.

Assessment of mine-derived contaminants

- Collected water, sediment and seagrass for metals analysis.
- **Water and sediment quality generally very good.**
- Elevated concentrations of some trace metals in waters, sediments and seagrasses in the northeast including Bramble Cay, the northern Warrior Reefs, Boigu and Saibai Islands.
- Dissolved trace metal concentrations were all below the ANZ marine water quality guideline values for 95% species protection – the main guideline values applied in Australia for coastal management.
- Concentrations of dissolved copper detected in the Boigu and Saibai regions consistently exceeded the ANZ Guideline Value of 99% that is applicable to pristine, uncontaminated waters.

Comparison with the Torres Strait Baseline Study **did not suggest any marked increase in metals concentrations in sediments that could be associated with mine-derived sediment inputs**.

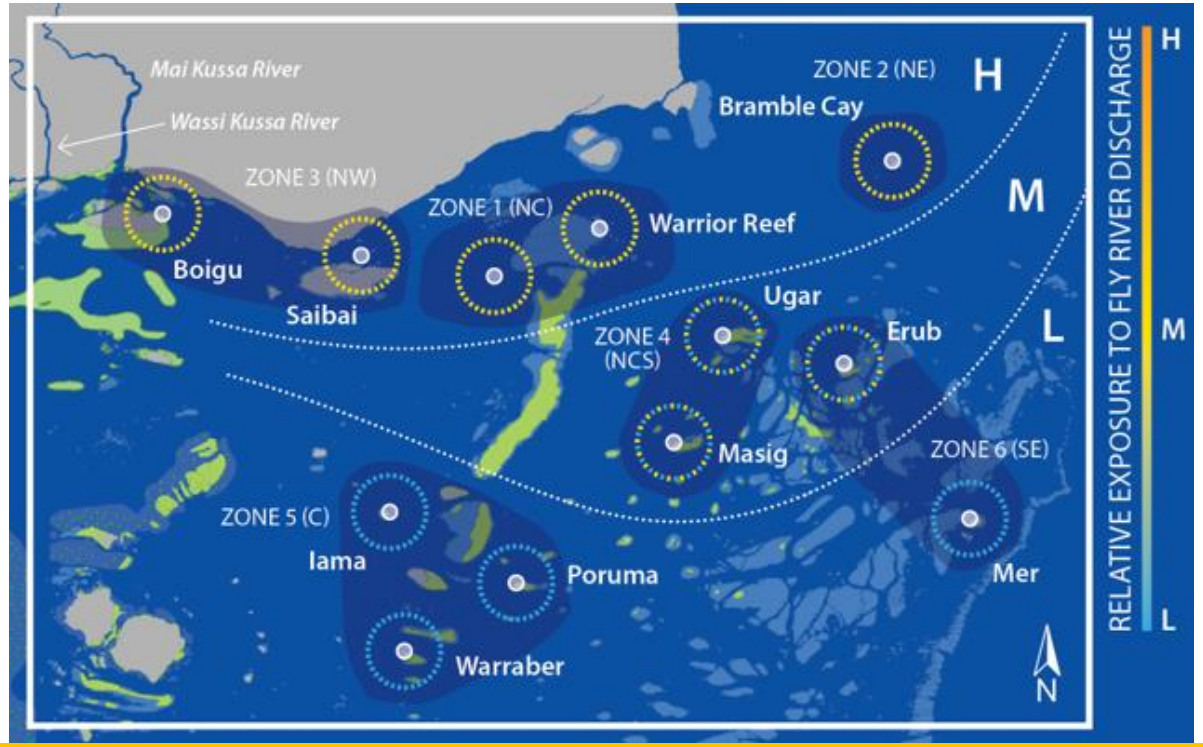






Exposure assessment

The findings from the investigations were combined to make an overall assessment for locations in the Torres Strait: ***3 categories (H,M,L) assigned.***



H: Exposure to Fly River discharge (waters & sediments), elevated trace metals, ecological risk possible

M: Exposure to diluted Fly River discharge (waters & sediments), slightly elevated trace metals, low ecological risk

L: Low exposure, low trace metals, low ecological risk

Identifying the influence of the Fly River discharge on the Torres Strait

Questions

1. **WHERE** does the Fly River runoff go in the Torres Strait?
2. **WHEN** does the Fly River runoff go into the Torres Strait?
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Methods

Satellite images

Modelling

Community surveys

Salinity

Sediments

Trace metals

Mining for copper and gold began in the 1980s on tributaries of the Fly River, Papua New Guinea

Fly River

Mining waste enters the Fly River containing sediment and some trace metals including copper

Some of this waste is harmful to plants and animals in the Fly River which can impact local communities

PAPUA NEW GUINEA

Wassi Kussa River

Mai Kussa River

Boigu

Kuki (monsoon winds)

The plume travels more into the Torres Strait during the Sager (dry season) than the Kuki (wet season)

Sager (southeast trade winds)

Maizab Kaur (Bramble Cay)

The plume carries sediments which can reduce light for seagrass and corals, as well as trace metals

Saibai

Warrior Reef

Intertidal seagrass

TORRES STRAIT

Erub

Masig

Habitats in the northern Torres Strait are more exposed to the Fly River discharge than central and southern regions

Some areas in the northern Torres Strait have higher but safe levels of trace metals

Iama

Poruma

Warraber

Generally, seawater quality is good across the Torres Strait.

The results of the most recent surveys were similar to the 1993 Torres Strait Baseline Study and show that runoff from the Fly River is not having a big impact on the Torres Strait.

Subtidal seagrass

QUEENSLAND

N

study sites



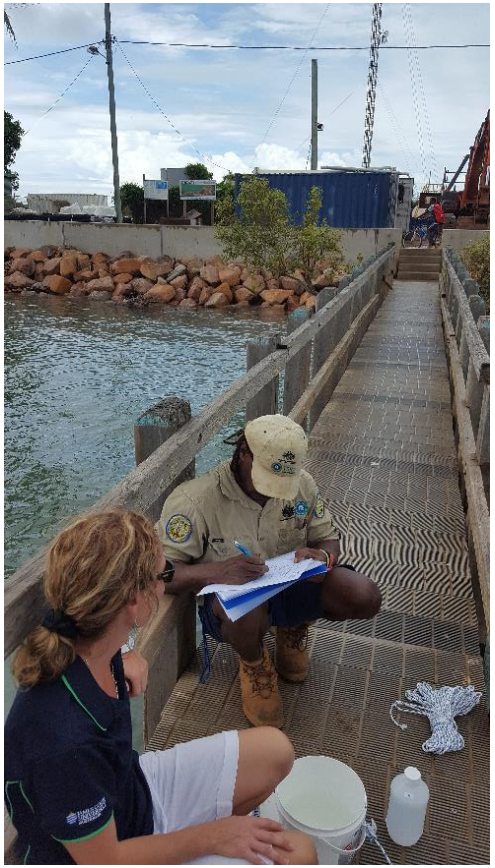
Satellite images show freshwater outflow from the Fly River entering parts of the Torres Strait

More information
www.synthesis.nesptropical.edu.au

Australian Government | TSRA www.tsra.gov.au | Reef & Rainforest Research Centre | James Cook University Australia | CSIRO | Australian Institute of Marine Science | Australian Government | National Environmental Science Programme

Recommendations

- Joint monitoring of the Torres Strait between Australia and PNG – to allow access areas of PNG mainland rivers and the sources of mine-derived contamination.
- Given the slow rates of sediment accumulation, monitoring every 5 to 10 years would be sufficient to track environmental change.
- Focus on Bramble Cay, the Warrior Reef complex and the PNG coastline (Daru to Boigu).
- Local Rangers to be involved in any future monitoring: provides significant benefits in terms of access to local support, and engagement and upskilling of the Ranger teams.



Acknowledgements

Australian Government's National Environmental Science Program (NESP) Tropical Water Quality (TWQ) Hub for funding Project 2.2.1, 2.2.3 and 5.14

Torres Strait Regional Authority (TSRA) for their engagement in project activities and, in particular, the local Rangers for providing field support and undertaking local salinity monitoring

The work of scientists involved in previous research programs (Torres Strait Baseline Study, NERP)

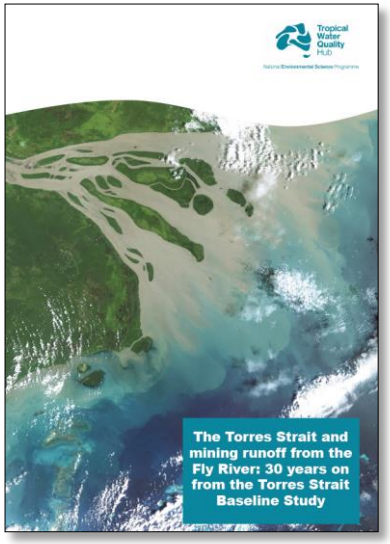
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- Joel Davis (ANSTO) for electron microscopy
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The final report can be downloaded from:

https://nesptropical.edu.au/wp-content/uploads/2021/06/NESP-TWQ-Project-5.14-Final-Report_COMPLETE.pdf

Other final products are available through the NESP TWQ Hub website and the NESP Synthesis website

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