

The influence of development on the adaptation response to climate change in small coastal cities

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Small coastal cities

- Small coastal cities (50,000 to 100,000 population) exhibit comparable knowledge and planning infrastructure.
- At a global scale,
 - there is little data about small cities, and
 - their adaptation response to climate change thus so far unknown.

Study settlements

Settlements	Population	Location	Type of ecosystem
Burigoalini, Gabura, and Munshigan	88,000	Bangladesh	Mangrove Forest
Knysna Municipality	75,000	South Africa	Estuary
Mandurah	81,000	Australia	Estuary
Miami Beach	92,000	USA	Largely transformed into manmade island
Milford	55,000	USA	Estuary

Climate change effects

EFFECTS	MIAMI BEACH	KNYSNA	SUNDARBANS	MANDURAH	MILFORD
Sea Level Rise	Y	Y	Y	Y	Y
Increasing storm intensity	Y	Y	Y	Y	Y
Coastal erosion	Y	Y	Y	Y	Not sig.
Decreasing river flow	Not sig.	Y	-	Y	Not sig.
Increasing river flow	Not sig.	Y	Y	-	-
Increasing air temperature	-	-	-	-	Y
Fire	-	Y	-	-	-

Miami (adaptation)

- In Miami Beach,
 - little ecological infrastructure and
 - wealthy residents
- Adaptation response is based on:
 - using highly technological solutions, like pumping stations and raising road heights.
- In the State of Florida, in which Miami Beach is located, climate change denial has resulted in
 - limited state support for adaptation,
 - but this has been countered by in-situ wealth and a willingness by local government to act.
- The scope for long-term adaptation to sea level rise is constrained by the porous nature of the limestone bedrock.
- Flood walls have a role in adaptation, as for example the sea wall along Indian Creek Drive.



Milford (adaptation)

- In Milford, there is **no comprehensive climate change adaptation plan**;
- However, the city's Hazard Mitigation Plan identifies flooding as the primary natural hazard.
- The local government thereby
 - **proposes** flood safety, hazard mitigation, and coastal resilience measures, and
 - additionally encourages (and sometimes requires) property owners to **purchase** flood insurance protection.
- Some **homeowners have even invested** in raising structures to avoid flood damages to coastal real estate.



Sundarbans (adaptation)

- In the Sundarbans, **raising plantations** on islands and **embankments** helps reduce
 - river bank erosion,
 - protects from storm and cyclones,
 - reduces saline intrusion and
 - functions as a transport route.
- A potential **maladaptation exists** when the ability to withstand flood waters associated with cyclones is exceeded.
- **Access to ecosystem services**
 - significantly increases availability to cleaner water for household use in the Sundarbans, and
 - facilitates greater social freedom, encourages better collaboration and cooperation.



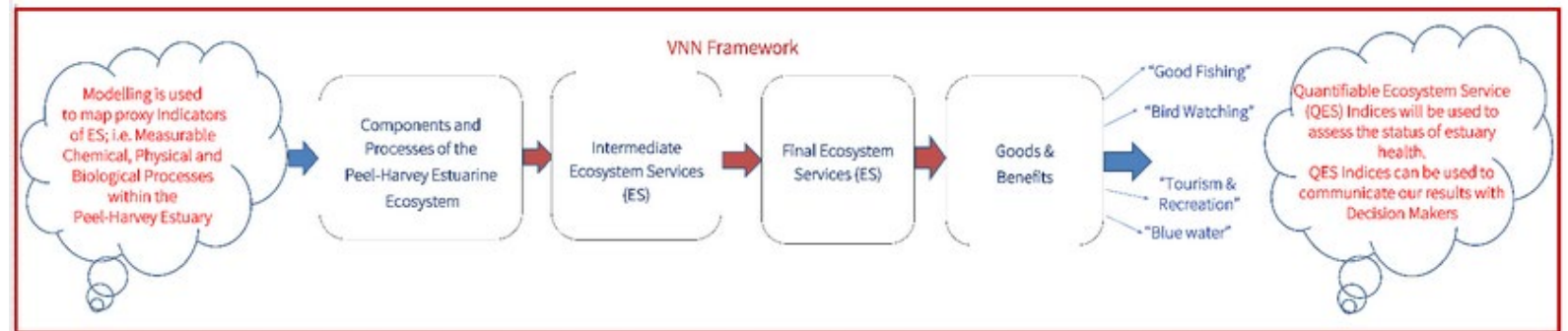
Knysna (adaptation)

- High income development has focused on the **valuable coastal zone**.
- **Coastal erosion** of beaches reveal the impacts of storm surges on the coastline.
- In many instances, **private property owners**, who have invested in high income properties,
 - **use their own resources** and exercise power beyond the state, in an attempt to manage the risk to their properties.
 - they often **act outside of the legislation**, policy and practices of the state, reducing risk on their properties, but transferring it elsewhere, through their use of rock walls, sand bags and other infrastructure.



Mandurah (adaptation)

- The estuary is impacted by hyper-eutrophic conditions resulting in **algal blooms and fish kills**.
- A major **rehabilitation intervention**, the Dawesville Cut entrance channel, **has not alleviated these impacts**.
- The estuary is also **subject to further development** pressures.
- **Understanding the interactions** between anthropogenic impacts, estuarine systems and society is important for managing ecosystem services within the Peel Harvey Estuary.



Conclusion

- Small coastal cities from **developing countries**,
 - with **limited budgets** and conflicting priorities,
 - forced to prioritize immediate needs.
- Developed cities are more reliant on **technologies instead** of robust and inclusive adaptation strategies.
- Initiatives for climate adaptation being wrested by the private sector,
 - which will not meet development requirements in equal and inclusionary ways.
- There is a need to improve on how the **municipality interacts with its residents**.
- Whilst this status quo remains, there is an urgent need to **include the value of ecosystem services** into development framework and climate change adaptation plans.

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More details?

- In this paper, five cases of small coastal cities,
 - two of which are located in the USA - Miami Beach and Milford
 - three, in Australia (Mandurah), Bangladesh (Sundarbans), and South Africa (Knysna)



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Adaptation to climate change in small coastal cities: The influence of development status on adaptation response

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Kibria, A.S.M.G., Soto, J. et al.

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