

## Marine Resources

# Muddy waters at Te Māhia: cause and effect

*The coastal waters surrounding Te Māhia are subject to smothering plumes of sediment.*

**Sheryl Miller, Murray Hicks, Mark Dickson, and Jarrod Walker** discuss where the plumes come from and how they affect the region's kaimoana.

Tucked under East Cape, between Napier and Gisborne, Te Māhia (Mahia Peninsula) was once separate from New Zealand's North Island, but over the last 10 000 years beach dunes and sand have linked the two. Pasture predominates and the remaining native coastal bush clings to steep, erodible cliffs. Te Māhia is rapidly succumbing to coastal development; subdivisions around the peninsula are potentially increasing the amount of sediment washing into the sea. Plumes of sediment often extend from the mouths of freshwater streams, drains, and eroded cliffs, particularly after heavy rainfall. These sediment plumes occur regularly around the entire peninsula, frequently muddying the water. This 'nuisance' sediment (up to 2 cm thick) sits atop the mudstone reefs much of the time, blanketing the rocky reef habitat, smothering the species living in the intertidal zone and seabed, and preventing the local community from gathering kaimoana – food from the sea.

### Where does the mud come from?

Large volumes of sediment originate from the catchments along the east coast of the North Island and are influenced by geology, tectonics, climate, and deforestation. Mudstone and sandstone are prevalent throughout Te Māhia; both are unstable and highly erodible. The cliffs retreat a quarter metre per year on average. Coastal erosion is so severe that substantial areas of culturally significant land are being lost. For example, the community at Kaiuku marae have had to move the fence marking their seaward boundary four times over the last 10 years, and a statue on the marae grounds has been moved three times in the last 26 years.

Before human settlement, Te Māhia was predominantly



The rapidly eroding cliffs around Te Māhia.

Photo: Sheryl Miller

### Clearing the waters

- Local geology, extreme events, and modern development all contribute to sediment plumes in coastal waters around Te Māhia.
- The clouds of fine sediment around the coast can hinder the customary gathering of kaimoana.
- Research to monitor sediment accumulation and its effect on particular species aims to help preserve kaimoana resources.



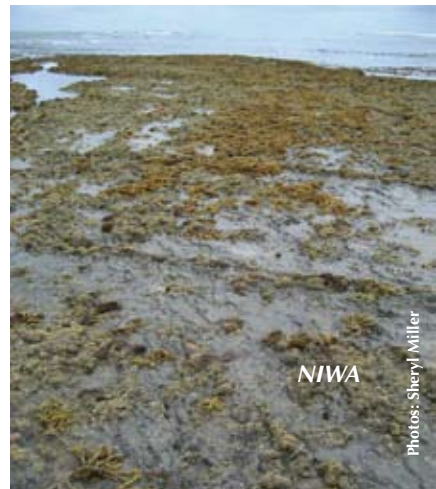
covered by mature indigenous forest, but since the 1880s much of this forest has been cleared for pasture. Consequently, without stabilising vegetation, large areas of these coastal cliffs have suffered severe slips. Development of residential coastal properties, and particularly subdivisions on hilltops, slopes, and ridgelines, has created extra pressure on existing infrastructure, with increased soil runoff often discharging into the surrounding coastal ecosystem.

While sedimentation may occur naturally from erosion or weathering, particularly of the soft mudstone and sandstone at Te Māhia, man-made (or anthropogenic) activities, such as coastal land development, deforestation, and industrial-scale gravel extraction, have resulted in increased sediment accumulation in estuarine and rocky coastal habitats. This is a phenomenon seen worldwide. The effects of increasing sedimentation in the nearshore marine environment are well documented (see article by Airolidi in **Further reading**).

### How does the mud affect kaimoana?

Customary harvest of kaimoana resources occurs regularly at Te Māhia, once synonymous with recreational and commercial harvesting of lobsters, pāua (abalone), and kina (sea urchins). Anecdotal evidence suggests these same kaimoana species have been in decline for a number of years, making it harder for local iwi to exercise cultural harvesting. These observations

Typical views around Te Māhia (left to right): Mudstone reef; muddy water in the nearshore marine environment following heavy rainfall; intertidal rocky platform covered with sediment and seaweeds.



NIWA

Photos: Sheryl Miller



Photos: Sheryl Miller

Residential development and industrial-scale gravel mining contribute to soil runoff into Te Māhia's coastal waters.



have some credence, as the Ministry of Fisheries reduced lobster quota by 30% in 2005–06.

The recovery of a species after intense harvesting is often lengthy, and can take even longer with additional environmental stress, such as sedimentation. The effects of excessive sediment in the nearshore are wide-ranging and complex, including reduced settlement and survival rates of marine larvae, smothering or burial of immobile organisms, and reduced water clarity limiting the light necessary for photosynthesis. These may result in further cascading effects along the food chain, changing what species are found and type of habitat. For example, if kina larvae are reduced by sediment smothering, it affects not only the kina population in the area but also cultural and recreational harvesting. And, as kina are an important component of their diet, lobster may move further offshore to forage.

### What can be done about it?

The Wairoa District Council recognises the need for environmental protection and for mitigating the effects of coastal development, and has adopted a list of actions to be undertaken over the next 20 years. These measures will enhance the landscape through reforestation, restoration, and riparian planting.

An earlier article in *Water & Atmosphere* describes the voluntary rāhui already in place around the peninsula (see 'A gift from the sea' in **Further reading**). These bans on collecting kaimoana provide some protection against over-harvesting by closing the area to commercial fishing (except for lobster).

Members of the Māhia Coastal Marine Strategy (MCMS) monitor three species that live in the rocky reefs surrounding Te Māhia: pāua, kina, and lobster. In order to assess the impact

Te Māhia locals regularly enjoy customary gathering of kaimoana, including karengo seaweed.



the nuisance sediment is having on these kaimoana resources, and additional seaweed species such as karengo, NIWA and the MCMS group will set up permanent monitoring sites inside and outside the rāhui boundary. We will measure sediment cover as well as environmental variables, such as substrate type, water clarity, and depth, on a seasonal or bi-monthly basis to identify patterns in distribution and abundance of selected species. This research will enable robust conclusions regarding the progress and validity of using management techniques such as rāhui.

Ultimately, our research on the effects of sedimentation and the effectiveness of rāhui should complement customary knowledge and practices. Our goal is to determine the best methods of protecting an area while enhancing the ability of local communities to manage their kaimoana resources.

### Further reading and useful link

Airoidi, L. (2003). The effects of sedimentation on rocky coast assemblages. *Oceanography and Marine Biology: an Annual Review* 41: 161–236.

Miller, S.; Ormond, G. (2007). A gift from the sea: managing kaimoana resources. *Water & Atmosphere* 15(2): 14–15.

Wairoa District Council - Māhia Isthmus Communities Structure Plan. <http://www.wairoadc.govt.nz/consultation/Mahiaisthmus/>

**CHECK WITH PETER FREEMAN RE DURABLE LINK**

### Events contributing to the muddy waters around Te Māhia

- The Hawkes Bay earthquake of 1931 (magnitude 7.8) caused numerous landslides, cracks, and fissures.
- An extreme storm in 1938 was the first large rainfall since land was converted to pasture. Aerial survey photos from the 1940s show sediment discharge plumes, indicating muddy waters are a long-term problem.
- Cyclone Bola in 1988 had a devastating impact on the area, with long-lasting consequences. Sediment concentrations in the catchments remained elevated for several years.

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