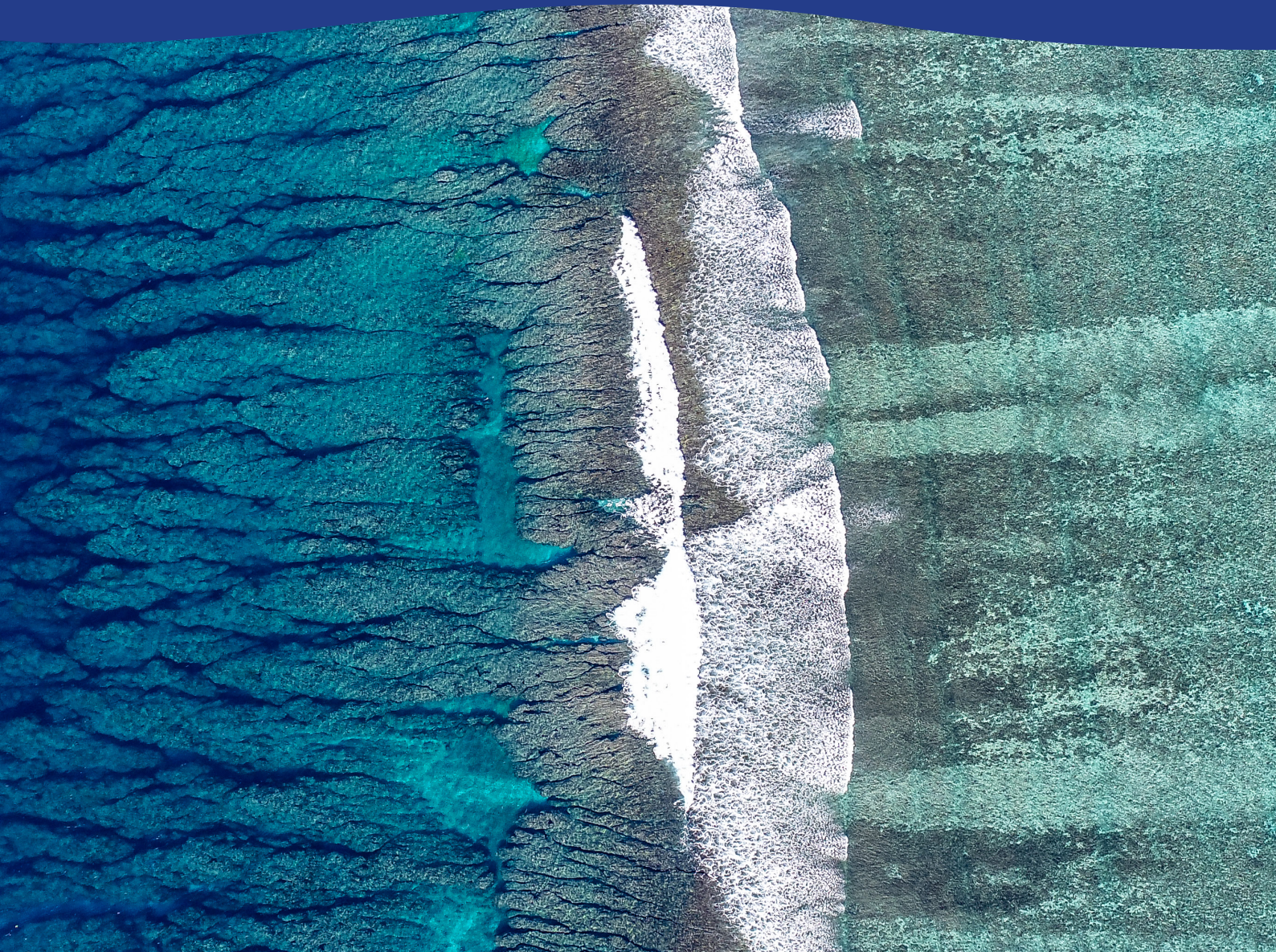


# What coastal environment for our children ?

The first New Caledonia socio-environmental Report Card



**PACPATH**  
PACific ocean PATHways





## With climate change, coastal communities in New Caledonia are or will be faced with displacement and degradation of their environment and quality of life, generating uncertainties

This qualitative assessment, drawn up during an expert workshop convened by the PACPATH project, aims to highlight the impacts of climate change on the coastal communities of New Caledonia. The participants laid the foundations for research and adaptation solutions. This map shows the priorities identified and the corresponding indicators.

Coastal erosion is a problem that has a lasting impact on the environment and society. Predictable population and infrastructure displacements will force a rethinking - anticipating and prioritizing - of coastal development policies and their evolution. The loss of customary lands and sacred sites is even more impactful in a culturally organized society with clans of the sea and clans of the land. The degradation predicted by the IPCC of coral reefs and associated ecosystems (seagrass beds, mangroves) leads to uncertainty about the future of food sources for many communities, further aggravated by the different pollutions.



## The PACPATH project seeks to identify sustainability\* pathways towards resilient coastlines

The process of developing this socio-environmental map is collaborative and includes a diverse group of stakeholders

Addressing the pressing issues that affect coastal populations requires a process that includes members of all components of society: research institutes, government departments, policy makers, customary authorities, civil society organizations, NGOs, indigenous associations, etc. In a collaborative context, we can understand how the effects of sea level rise, ocean warming, ocean acidification and deoxygenation are perceived. The PACPATH project, for "Sustainability Trajectories for the Pacific Ocean" involves active collaboration at all stages to assess vulnerabilities, identify priorities, propose co-constructed research to consolidate tools and means for adaptation and mitigation, and accompany public policies.

\*The United Nations defines sustainability, or sustainable development, as "meeting the needs of the present without compromising the ability of future generations to meet their own needs."



## Climate change accelerates problems in coastal communities

Important environmental changes are already underway

The IPCC 2022 reports produce unequivocal scientific conclusions: ocean temperatures will increase with exacerbation of marine heat waves well beyond the tolerance thresholds of tropical marine organisms; sea level will continue to rise and the ocean will continue to acidify and deoxygenate. These phenomena weaken seagrass beds, mangroves and corals as well as the shoreline protection and fish habitat they provide. The vulnerability of populations is increased: erosion, risk of flooding and fishing stocks.

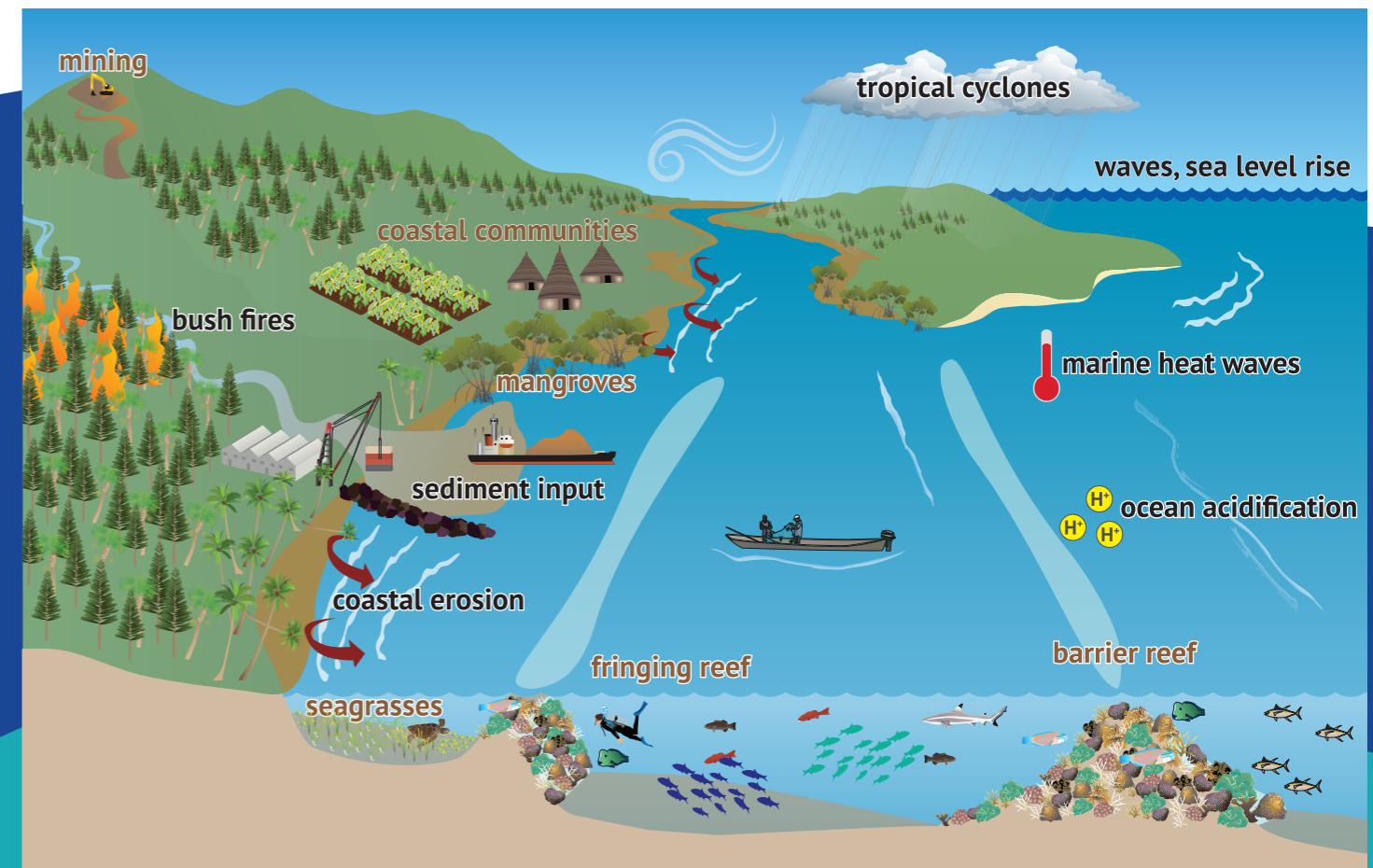


In Touho, some inhabitants have already been relocated due to coastal erosion. ©IRD

## The land, the sea and the people are connected

The characteristics of the land, the sea and the people are inseparable

What happens upstream of the coastline affects coastal communities and resources. Water pollution due to human activities, including that induced by bushfires, development, mining activities and pollutant discharges, affects the health of ecosystems and their vulnerability to climatic factors. In addition, the installation of infrastructure along the coast can increase the vulnerability of the communities that depend on it (roads, buildings, etc.). The figure below illustrates how the effects of these processes are linked.





# Examples of sites illustrate how coastal communities are affected by climate change in New Caledonia

These processes are representative of what happens in coastal areas

Coastal habitability, water quality, and marine ecosystem health are identified as critical and vulnerable values along the entire coastline to varying degrees. This map identifies areas that illustrate these issues and the impacts they have on coastal communities. Examples of sites illustrate how coastal communities are affected by climate change in New Caledonia.



The Eastern New Caledonia has areas of poor water circulation in partially enclosed bays, resulting in poor water quality and high temperatures, as well as massive fish kills. Others, particularly those affected by mining waste, experience flooding, river bed erosion and poor soil health, leading to population displacement to areas where there is less risk of flooding, but where soil conditions are poor and cultivation is more difficult.

Photo\*1: Poro mine, Monéo bay, Houaïlou ©Thierry Malé



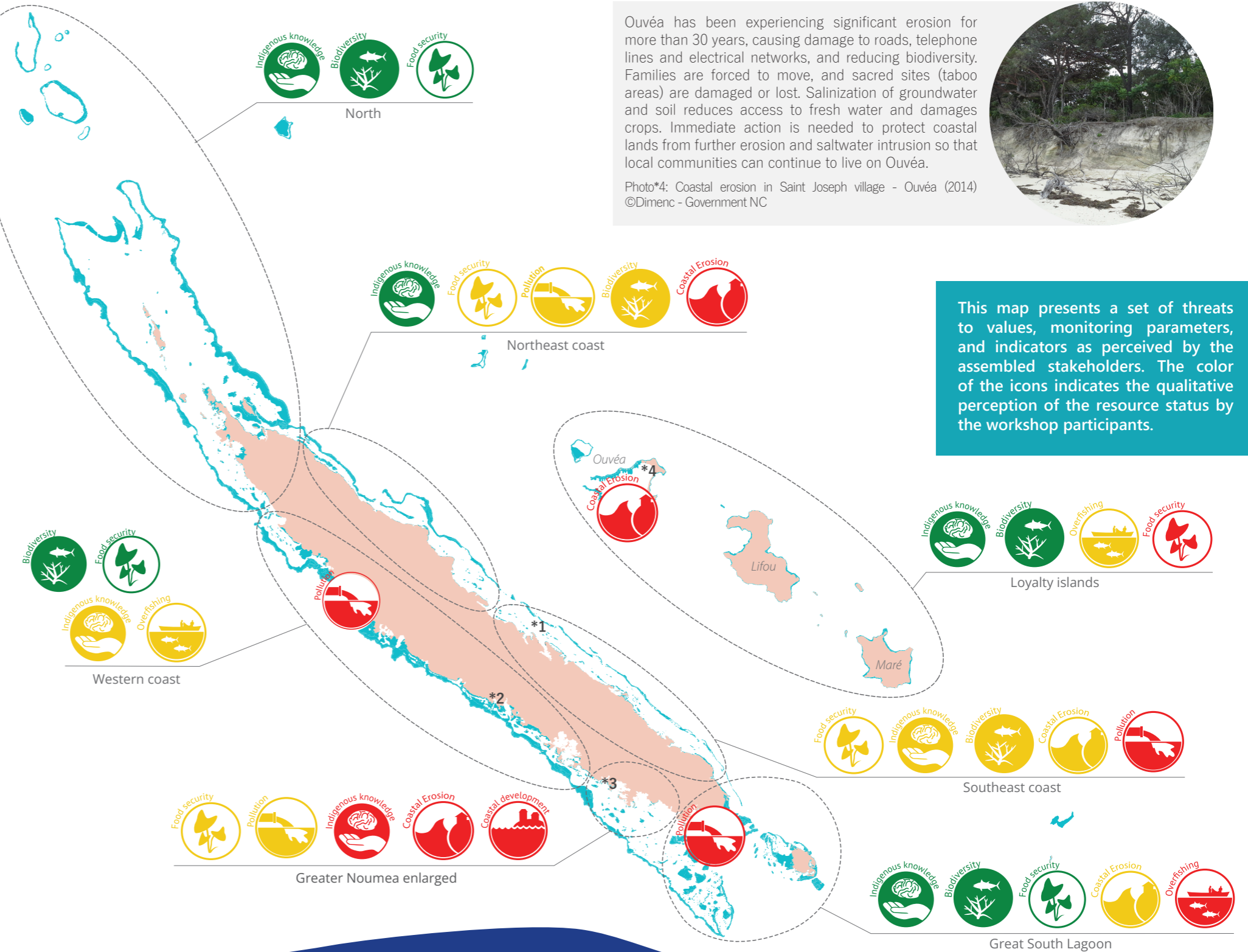
The Western coast of New Caledonia illustrates how communities are affected by agricultural and pastoral management. Heavy rains during cyclones and storms cause significant water flows from the watersheds to the lagoon and the use of fertilizers on agricultural lands causes (or can cause) a strong degradation of the water quality of the rivers and the lagoon. Coral reefs here, as throughout New Caledonia, are damaged by high water temperatures. This reduces the availability of fish for coastal communities.

Photo\*2: Nera bay after Ruby depression (2022) ©FranceTV Info



In coastal areas near Noumea, coastal erosion has recently caused severe damage in the densely populated and economically important area of Anse Vata. Extensive and costly repairs and erosion prevention infrastructure are being constructed to reduce future erosion of beaches and nearby hotels and restaurants. In this area of the coast, more land should be set aside for mangrove expansion, which is needed to support natural flood control and erosion reduction.

Photo\*3: Anse Vata beach in Noumea ©LNC



Ouvéa has been experiencing significant erosion for more than 30 years, causing damage to roads, telephone lines and electrical networks, and reducing biodiversity. Families are forced to move, and sacred sites (taboo areas) are damaged or lost. Salinization of groundwater and soil reduces access to fresh water and damages crops. Immediate action is needed to protect coastal lands from further erosion and saltwater intrusion so that local communities can continue to live on Ouvéa.

Photo\*4: Coastal erosion in Saint Joseph village - Ouvéa (2014) ©Dimenc - Government NC



This map presents a set of threats to values, monitoring parameters, and indicators as perceived by the assembled stakeholders. The color of the icons indicates the qualitative perception of the resource status by the workshop participants.

## Resources condition

- Good (Green)
- Moderate (Yellow)
- Degraded (Red)

## Landscapes

- Land (Light Brown)
- Coral reefs (Light Blue)



# Values and threats of coastal sustainability in New Caledonia

The proposed indicators aim to measure the status of coastal environmental values and monitor threats to these values.

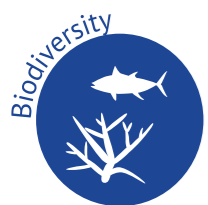
At Noumea workshop in October 2022, participants from local, regional, and national organizations in Fiji and New Caledonia identified potential indicators for assessing coastal sustainability. The color of the indicators reflects the perception of the workshop participants; the description of the indicators and corresponding measures will help track progress toward the goals of protecting the coastal environment and reducing threats to coastal ecosystems and communities from climate change and local human activities. These indicators are not a substitute for existing observatories on reef conditions, water quality, and water temperature.



**Coastal Erosion**  
Coastal erosion is already affecting many of New Caledonia's coasts. People living in coastal areas are being forced to move to higher ground while losing their cultural resources. Suggested indicators for coastal erosion are the monitoring of the evolution of the coastline, the extent of land vulnerable to extreme events, the number of people relocated and the areas revegetated for coastal protection, the well-being and local knowledge, especially with regard to the associated land issue, as well as the awareness of customary authorities.



**Pollution**  
Nutrients, terrigenous particles, wastes, and chemical contaminants in watersheds contribute to the loss of marine biodiversity, which makes marine ecosystems more vulnerable to climate pressures and ultimately threatens food security. Suggested indicators include measures of the quantity of pollutants related to land degradation from all human activities.



**Biodiversity**  
Rich biodiversity provides a variety of food options for local communities, supports economic opportunities related to tourism, and is a sign of a healthy and resilient ecosystem. Reefs, seagrass beds, and mangroves provide critical habitat for marine life that supports coastal fisheries and offers protection from waves, erosion, and flooding. Proposed indicators include the vitality of these habitats, the presence of key fish and coral species, and tourism-related jobs and economic opportunities. Indirect measures of biodiversity could include community well-being and local and traditional knowledge of resources.



**Food security**  
Sense of confidence in the future availability of food is an important measure of community well-being. For Greater Noumea, it represents the difficulty of access to marine and terrestrial food resources for low-income residents. Indicators to be developed include changes in fish catches, the health of fish stocks, and the displacement of fish breeding and nursery areas. Other indicators could include the extent of salinization of soils and croplands and the ratio of fish for market to fish for subsistence.



**Indigenous knowledge**  
Consideration of local knowledge, uses, and traditions can be an important indicator for the management and governance of coastal lands and resources. Suggested indicators include the degree of integration of cultural issues in population displacement, local knowledge of traditional seasonal weather indicators, and the intergenerational transmission of this knowledge. They may also represent the erosion of cultural heritage related to the sea due to lifestyle changes, particularly in Noumea.



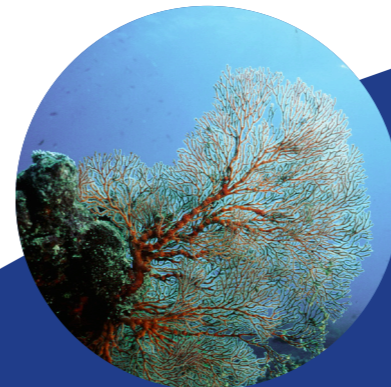
**Overfishing**  
Harvesting more fish than is sustainable results in fewer fish available for market and subsistence. This means that effort is required to catch the same amount of fish and the availability of fish in the future may be uncertain. Potential indicators of overfishing include fish size, stocks, species diversity, market prices, and catch per unit effort (the amount of fish caught for the same amount of fishing time and effort). Two areas are shown in orange for specific species.



**Coastal development**  
Infrastructure and activities related to economic development have a direct effect on coastal erosion and water pollution (housing, agriculture, etc.) Understanding these threats allows for management and planning to address them. The proposed indicators are related to the assessment and monitoring of development and planning activities.

## And the temperature?

Ocean temperature and its warming during marine heat waves is an essential variable that can cause coral bleaching or even death, algal blooms that disrupt the natural cycle of marine ecosystems by affecting water quality and substrates. Toxic algae, in particular, threaten food security, for example during ciguatera episodes. Ocean temperature is not displayed as a felt variable but is measured elsewhere, notably with the Reeftemps observatory. Temperature indicators include changes in seasonal mean, seasonal maximum, number and duration of warm events, and bleaching events.





# The socio-environmental map presents a framework for monitoring coastal sustainability in New Caledonia

Sea level rise, coastal erosion, marine heat waves, ocean acidification and deoxygenation combined with coastal development and polluting human activities represent a threat of existential crisis for New Caledonian communities, leading to forced displacement, degradation of food security and loss of natural and cultural heritage.

The PACPATH project aims to bring this information to light in order to identify the means by which communities can continue to live sustainably on the coast. This first socio-environmental map presents a qualitative assessment of the sustainability of coastal environments based on a series of indicators. It reflects the multiple perspectives and perceptions of actors from the customary world, government, provinces, city councils, universities, research organizations, observatories, non-governmental organizations, associations and consultancies.



Kanak fisheries  
©IRD

## Actions for sustainability

Participants in the Noumea workshops emphasized the need to identify actions that would support local communities. Several potential actions were mentioned, including:

- Measure the status of the situation using the proposed indicators
- Co-construct research programs that meet the needs of stakeholders in their public policies, approaches and decisions.
- Raise awareness and engage stakeholders, including legal and customary authorities
- Stopping or limiting impacting pressures, improving hydrology, decreasing effluent concentration, sediment, nutrient and heavy metal inputs from watersheds
- Implement coastal restoration and protection strategies that include nature-based solutions and a short, medium and long-term vision
- Support local preservation and restoration efforts; co-construct implementation of solutions
- Include local and traditional knowledge in decision-making and provide a forum for communities to share their knowledge of coastal protection techniques
- Create coastal land reserves, understand and adapt land tenure regimes, and closely regulate coastal development

