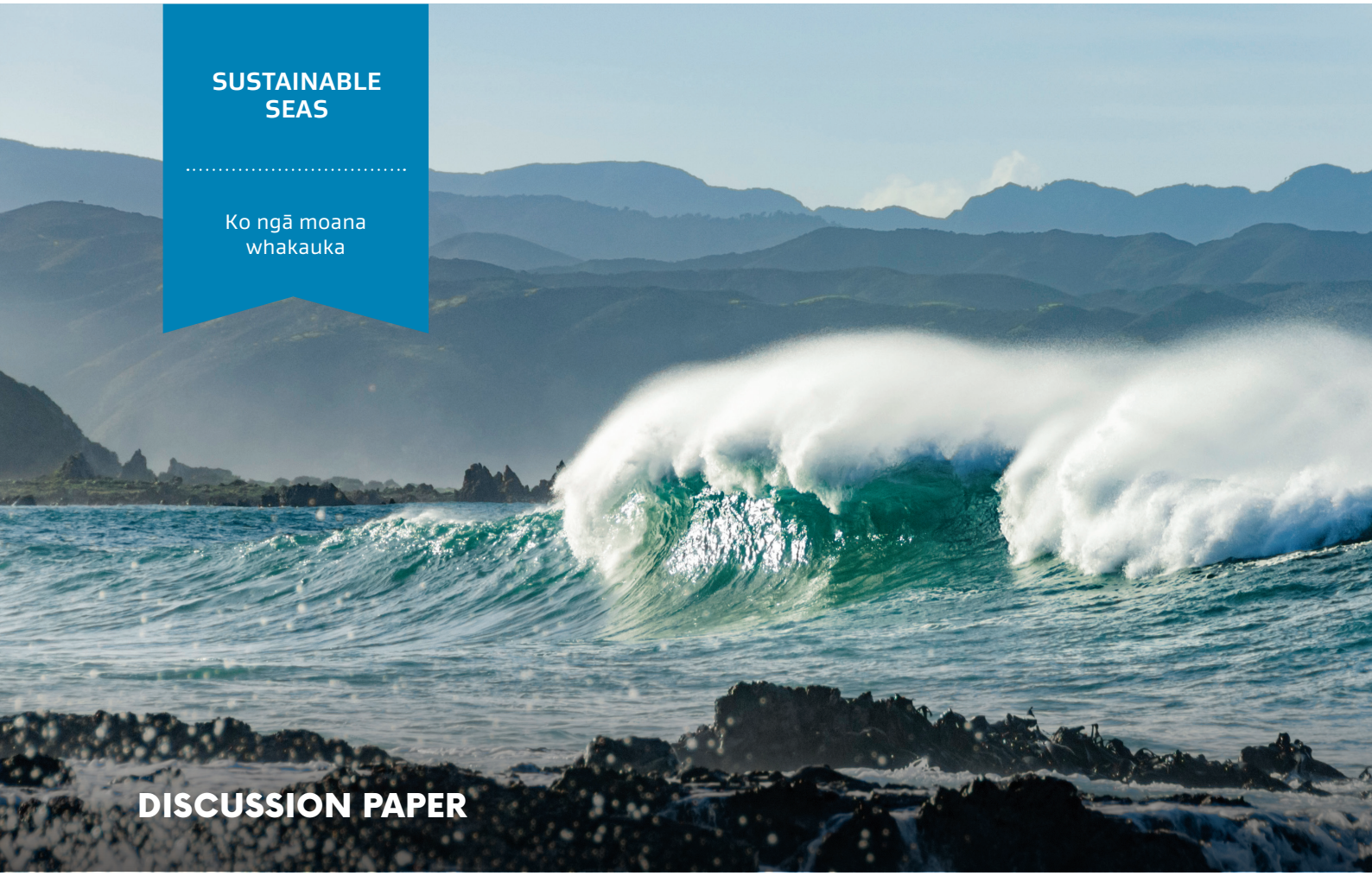
National SCIENCE Challenges

SUSTAINABLE SEAS

Ko ngā moana whakauka



DISCUSSION PAPER

Recommendations for improving regulation of marine management in Aotearoa New Zealand

This discussion paper covers 5 critical issues for marine management under the current regulatory framework.

These are:

- Managing cumulative effects
- Dealing with uncertainty
- Limitations of environmental limits and targets
- Monitoring
- Measuring net gain/net loss of biodiversity

Summary

1. Managing cumulative effects

Understanding and managing cumulative effects in the coastal marine area (CMA), compared to the terrestrial environment is challenging. Not only is it more difficult to observe and establish cause and effect, but the CMA is a multi-use space that experiences stressors both from land- and sea-based activities (in addition to natural stressors such as climate change). And while activities may not overlap spatially, due to connectivity, stressor impacts can occur over multiple spatial and management scales.

This connectivity between land and sea also dictates fluxes of contaminants, the magnitude of which plays a big part in environmental responses to stressors. Lag effects make management in the CMA particularly challenging as it can take years to see the effects of a management action (e.g. removing a stressor). In contrast to the terrestrial environment where most activities are managed under the Resource Management Act 1991 (RMA), there are a number of activities that occur in, or impact on, the CMA that are not managed by the RMA (for example, fisheries). This makes management of cumulative effects of the CMA more difficult as the levers to control activities sit across several different management regimes.

Recommendations

1. Identify, assess and manage cumulative effects at a strategic level

Management fragmentation can lead to unaligned decisions that do not properly account for cumulative effects. Cumulative effects management needs to occur at a strategic level rather than on a consent by consent basis to ensure that current and future activities are considered and that cohesive management responses occur (to the greatest extent possible) where impact footprints cross jurisdictional boundaries. The current system of 'first come, first-served' for resource use doesn't enable decisions to be made at a strategic level about which activities to prioritise (assuming there is an environmental limit that would be breached if all activities were allowed to occur). Rather, it penalises those who are 'last-in' even though they may contribute a relatively small amount to the overall effects in an area.

Some countries have adopted the use of Strategic Environmental Assessments (SEA) – a decision support instrument for predicting and evaluating the likely environmental effects of implementing a policy, plan or programme. SEA can consider the cumulative impacts of more than one project or activity on the same environmental component.

In order to manage cumulative effects a high degree of knowledge is needed about the resources in an area/features within a jurisdiction and how they interact with each other. Assessment and monitoring of cumulative effects should not focus only on interactions between different types of activities (the status quo) but also with natural stressors and variability. This requires taking much more of an integrated management approach to the environment.

2. Provide greater clarity in the legislation

Including clearer direction in marine management legislation about the importance of identifying and managing cumulative effects would be a positive step. For example, in the RMA, the purpose of the Act could be expanded to ensure that "adverse effects, **including cumulative effects**, are avoided, remedied or mitigated." However, guidance in some form will still be needed to help decision-makers understand the different spatial and temporal factors to be considered when assessing and managing cumulative effects.

Creating and embedding a resource consent system that promotes positive effects as well as managing negative effects, may also be useful. For example, by introducing a concept of "positive cumulative effects" as a way of promoting or accelerating progress towards particular targets or outcomes.

2. Dealing with uncertainty

In order to manage cumulative effects in the marine environment, we need to recognise when a limit or threshold is being approached and put in place appropriate management actions to prevent a tipping point being reached. Given the absence of data around this, application of principles such as the precautionary approach, relevant robust information, and adaptive management are crucial. These principles recognise that precise quantitative data may not always be available and provide for a range of approaches including EBM (ecosystem-based management) and Mātauranga Māori to be incorporated into decision-making.

While adaptive management is a useful tool for managing uncertainty, there has been much debate and ambiguity about how to apply it in the marine space where there is a paucity of information.

For example, there have been issues with applying the concept successfully at a consent level under the Exclusive Economic Zone and Continental Shelf Act 2012 (EEZ Act). Without understanding cause and effect, adaptive management of individual activities is challenging and applying any sort of claw-back could lead to unequal treatment of activities. This is particularly pertinent if the most significant adverse effects in an area are from activities managed under a different regime and not subject to claw-back mechanisms.

Recommendations

1. Systems and processes need to allow decisions to be made on expert opinion rather than requiring highly numeric analyses

There is limited information available on biodiversity responses to the multiple interacting activities within the CMA. Obtaining this information to a highly quantitative level (such as is used in fisheries stock assessments) would be prohibitively expensive, time consuming and unlikely to be able to be done at useful organisational, spatial, temporal and environmental scales. However, robust decisions can be based on ecological theory, empirical experimentation, Mātauranga Māori and local experiences.

The stringency of the precautionary approach applied could be dependent on the level of uncertainty around anticipated impacts in the CMA. When there is good, quantifiable data, the band of uncertainty is reduced, and any corresponding buffer can be narrower. When this is not the case and availability of information is limited with greater reliance on qualitative information, a wider buffer may be needed to account for the higher level of uncertainty.

2. Adaptive management should be about adaptively managing to achieve environmental outcomes

Adaptive management is a useful concept for managing uncertainty. However, the purpose of adaptive management should be to achieve outcomes rather than to enable activities to occur. It should therefore occur at a planning level and the importance of the activity should not be a consideration in whether it is appropriate to apply.

The term “adaptive management” is perceived by some as being a way to enable those activities for which there is little information and a risk of significant damage. To avoid confusion with consent level adaptive management which has been applied under the RMA and EEZ Act, a new term could be defined that clarifies the distinction between the current perception of adaptive management and how it should be used to ‘trial approaches in order to work towards/achieve particular targets or outcomes.’

It is unlikely that only incorporating language into legislation around adaptive management will achieve better management outcomes without clear guidance and expectations around how it should be applied.

3. Limitations of environmental limits and targets

The definition of "coastal marine area" under the RMA is probably not adequate for incorporating estuaries (given it extends only 1 km upstream from the river mouth or upstream as far as five times the width of the river mouth). Estuaries, lakes and the coastal marine area are receiving environments – the health of which is heavily influenced by activities occurring upstream (as well as in the ocean). However, these downstream effects are often poorly accounted for in planning or consenting.

We are more likely to breach bottom lines in the CMA and will need bigger buffers due to the inherent level of uncertainty about impacts and response due to the complexity of multiple stressor interactions and the inherent connectivity in marine ecosystems.

Planning and management of the CMA requires a holistic approach that enables consideration of how rules applied in the terrestrial environments will impact on the CMA (for example allowing/managing/stopping activities that could result in contamination via overland flows such as runoff, discharges and leaching).

While the concept of moving towards an outcome (as a desirable, enduring state) rather than focussing on a bottom limit is positive, what is meant by 'limit', and how it is employed and measured are important considerations. Social outcomes or goals may not always align with limits imposed to achieve environmental outcomes, so it is important to understand the purpose of limit setting.

The use of a precautionary "buffer" when setting limits is useful as scientific information/data can often be absent or scarce, incomplete or highly variable in the CMA – particularly when compared with terrestrial areas where there are thousands of data points.

Recommendations

1. Take a 'seas to mountains' approach to limit setting

In terms of planning, it makes sense to think about limits and targets (and outcomes) for estuaries and the marine environment and work backwards i.e. a 'seas to mountains' approach. Being a receiving environment, estuaries are good indicators of the health of upstream catchments but the way in which they respond to stressors is context dependent, so limits and thresholds need to be location specific. Taking a seas and estuaries to mountains approach would enable better management at the source to control inputs from freshwater and terrestrial systems.

2. Put more emphasis on outcomes and targets for the ecosystem rather than limits

Limits are difficult to utilise in an environment with high uncertainty/variability and where non-linear responses to stressors are common. National limits (especially if they were to be based on chemical or physical measures rather than the species/ecological response) may require such a wide buffer that they end up restricting use in many locations that could actually support activities.

Limits in the CMA would need to be ecological/biophysical rather than physico-chemical due to difficulties in robustly measuring physico-chemical drivers and non-linearity in responses to those. Limits will also differ depending on estuary characteristics, resilience and ability to take on extra nutrients or sediment loads. Targets and limits also need to be future proofed against stressors such as climate change.

4. Monitoring

There is frequently inadequate monitoring in coastal areas with a "set, check once, and forget" approach being used, and many councils not having adequate resources allocated to CMA ecological/biophysical monitoring. This does not provide for application of an adaptive management approach which requires ongoing monitoring against desired outcomes and a timely response if certain defined outcomes are not achieved.

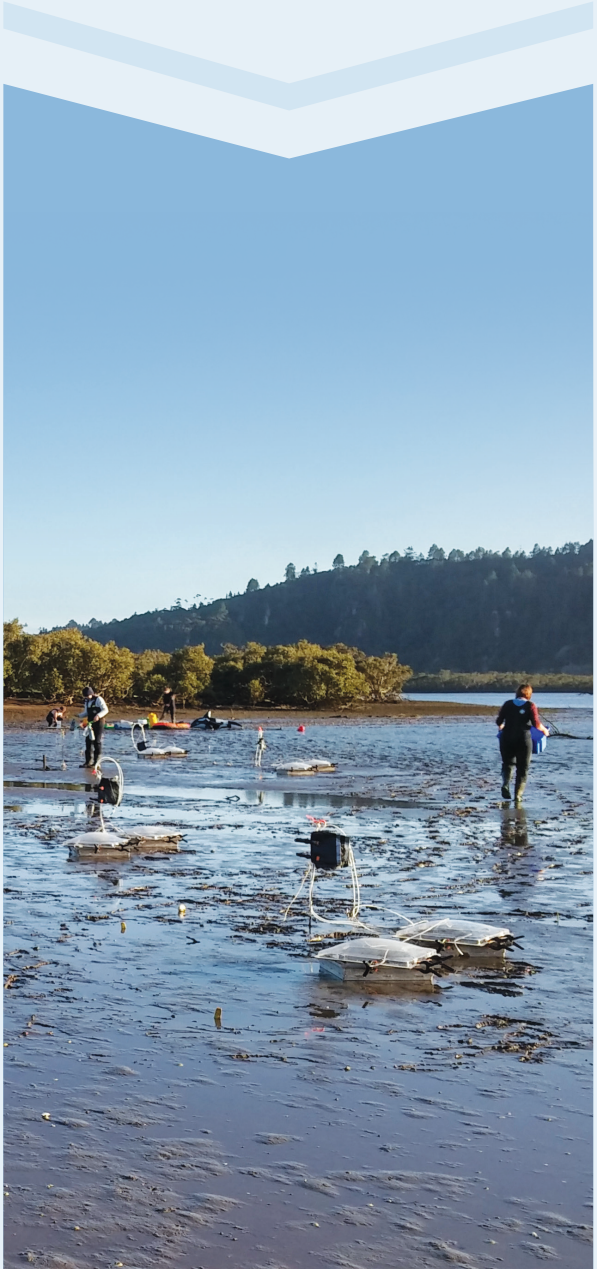
Monitoring (and resourcing) will be vitally important to understand the baseline state of the CMA, its capacity for increased pressures, to set limits and targets, and to understand whether either need to be changed (e.g. as part of an adaptive management approach).

Developments in freshwater management could usefully inform monitoring and management in CMAs. Specifically, Te Mana o te Wai provides a framework to consider and recognise the holistic and integrated well-being of a freshwater body, and to incorporate the values of tangata whenua and the wider community in relation to water bodies. Te Mana o te Wai requires greater consideration of, and integration with CMAs and could be a way to begin to address the significant underinvestment in the marine space.

Recommendation

1. The management system needs to be dynamic and able to adapt and respond quickly

In particular, response systems should be set in place so that "what action" to "what response" is known in advance. These should be set cognisant of expecting sudden, rather than linear, change. Going forward, the marine management system needs to consider the dynamic nature of the environment (including impacts arising out of climate change) meaning what we monitor and how we manage cannot be not static. This might be a consideration when defining and employing a precautionary approach (including deciding the size of the precautionary buffer) around an environmental limit. Planning and management, including the ability to adaptively manage in response to changing environmental states particularly related to cumulative effects, needs to be at a regional level.



5. Measuring net gain/net loss of biodiversity

The definition of "biological diversity" in the RMA, for example, is very wide and may not be appropriate for setting biodiversity goals. The definition includes "ecological complexes" (flows and interactions between species) that may be difficult to recreate through offsetting. Focussing on indigenous biodiversity may be challenging when measuring no-net-loss or biodiversity net gain in the CMA as taxonomically, it is hard to distinguish what is indigenous and what is invasive, and some indigenous species benefit from the presence of non-natives.

Assessments of no net loss/biodiversity net gain must simultaneously consider the biodiversity (i.e. habitats and species richness) and the connectivity between habitats. When a 'small' area of ecologically important habitat is preserved (or enhanced in the instance of offsetting), the connectivity to other habitats must also be preserved for this to be considered no net loss.

Enhancing biodiversity in the CMA is difficult. Any restoration activity has to consider, and work out how to manage, the stressors that caused the damage in the first instance, not just replace what has been damaged. Hysteresis or lag times also mean that it may take much longer to see the effects of an action (positive or negative). Restoration and enhancement in the CMA can be achieved but research has been limited compared with terrestrial and freshwater. Recovery often comes from the ocean itself (e.g. flushing, fish stock replenishment) and is a function of connectivity with similar, healthy habitats.

The ability to manage, monitor and measure no-net-loss or net biodiversity gain depends on the amount of information available. In much of the CMA (especially estuaries), physico-chemical characteristics (such as nutrients and water temperature) exhibit high spatial and temporal variability (driven for example by water movement in multiple directions on a daily basis). Indicators don't always reflect or respond to what we are wanting to measure. Measuring chemical and physical drivers of ecological responses can result in over or underestimating whether targets are met if responses are non-linear (threshold responses and hysteresis).

Recommendations

1. Focus on habitat diversity/resilience/function and ecological integrity rather than marine biodiversity (especially if biodiversity is assessed simply by number of species or number of individuals)

It would be difficult to measure no net loss or net gain in biodiversity, as currently defined under the RMA. There are taxonomic challenges with identifying and robustly sampling indigenous biodiversity, and ecological function and resilience can be lost before the loss of species richness. Given the limited information available, it is probably more useful and realistic to enhance habitats and protect habitat diversity and ecological connectivity which will, in turn, increase the resilience of whole system.

In the CMA, the concept of managing habitats needs to be highly focussed on the seafloor. Measures to assess ecological integrity of the seafloor have been operationalised by the Department of Conservation and in the EU Water Framework Directive. Of particular importance are three-dimensional habitats created by seafloor species, e.g. tubes and burrows, sponge/bryozoan gardens, kelp forests and shellfish beds. When incorporating habitats into biodiversity or conservation it is particularly important to consider both the size of habitat patches and their connectivity, thus incorporating at least one index of fragmentation would be important.

Measurement and monitoring need to look at a broad range of data, including ecosystem function, and monitor consistently. This monitoring needs to have a specific purpose (i.e. monitoring with the idea of looking/scanning for changes, or monitor to test the effectiveness of planning controls or state of the environment reporting) rather than be seen as a compliance exercise to fulfil RMA state of the environment reporting obligations. Monitoring needs to be strategic in its outlook.

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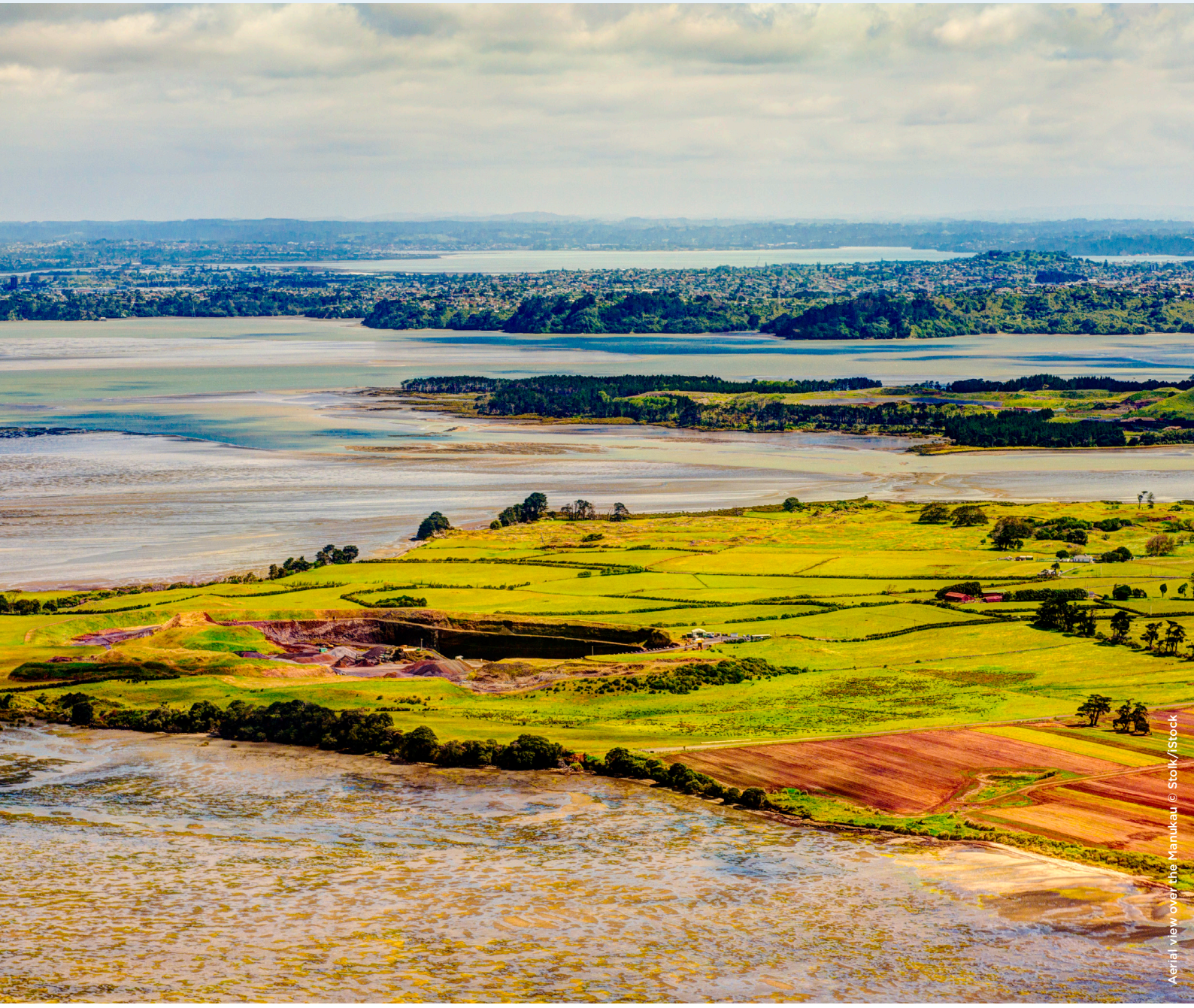
2. Take a nested approach to monitoring and management of habitat resilience

In order to manage for resilience, we need to:

- Manage stressors to protect habitats.
- Focus on multiple stressors and cumulative effects.
- Be prepared for surprises by expecting non-linear responses and tipping points.
- Adapt a scaled monitoring approach and know what response to take, when.

A "nested approach" that incorporates site-specific sentinel monitoring as well as broad scale regional assessments (for example from autonomous platforms and remote sensing) is recommended. The approach depends on what is to be monitored and measured, why and how. In some cases, a sentinel approach may be sufficient, but at other times a larger area may be required. Monitoring needs to be multi-scalar and multi-modal to pick up on different stressors and their effects.



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