

Marine offsetting and compensation – review, findings and recommendations

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Development along New Zealand's coastlines often results in poor outcomes for indigenous marine habitats and biodiversity. We need to find a balance between providing for and protecting human interests along the coast, and preserving and giving resilience to the marine environment. History and experience show that with many developments in the marine environment (e.g., reclamations for marinas, ports, transport infrastructure) there is a net loss of biodiversity, and cumulative impacts on coastal habitats and ecosystem function.

This issue is exacerbated by limited guidance and evidence for the efficacy of marine offset and compensation efforts; a consequence of having limited baseline information, the complexity of interactions in the marine environment, and large gaps in our ecological knowledge of marine species, habitats, ecosystems, and related processes.

Stocktake and guidance

Following earlier articles on this topic (Allestro & Bell, *Coastal News* 76; Steer & Oliver, *Coastal News* 77), we commenced work across councils and consultancies to produce a report highlighting current knowledge and tools relating to marine mitigation, offsetting, and compensation, and identifying gaps where they exist. The aim was to drive consistency in our collective approaches to offsetting and compensation, and to ensure that key words and concepts are clearly defined so that they are used and understood with the same intent by consent applicants and decision makers.

The final report provides: (1) an overview of the policy setting for offsetting and compensation, and principles to be applied; (2) discussion on how to determine the ecological value of coastal habitats and species that may be adversely affected by a development and that may be proposed as mitigation, offsetting, and/or compensation;

(3) guidance on how the quantum of offsetting or compensation might be determined in the marine environment, including limitations that may apply; and (4) examples of practical measures and case studies of offsetting and compensating for biodiversity loss in marine ecosystems. We expect this report to be available in late 2023 but want to share some of the key findings with you below.

Offsetting in the marine environment

Offsetting aims to redress the residual adverse effects after applying measures to avoid, minimise, and/or remedy (collectively 'mitigation'). If adverse effects are not able to be sufficiently mitigated, serious consideration should be given to whether it is appropriate for the project to proceed. Offsetting and compensation should be treated as a last resort to manage adverse ecological effects.

For an approach to be considered as offsetting, it must be like-for-like and result in at least no net loss. Some guidance also suggests that like-for-better or 'trading up' is a form of offsetting³. Trading up has the potential to provide better environmental outcomes than like-for-like and may be preferable to environmental compensation. Considering the narrow scope for offsetting in the marine environment, opportunities to improve other impacted habitats should also be explored.

As an example, if a seagrass bed within a construction area is adversely affected, another seagrass bed could be enhanced or restored nearby to an appropriate standard to achieve a no net loss and ideally a net gain in seagrass area or biomass. However, in most cases, restoring or recreating habitats will be severely restricted by our fundamental lack of information on the biophysical requirements of habitat forming species, or even their reproductive ecology. Wellington Harbour, for example, contains high value horse mussel beds, red algae (*Adamsiella*)

meadows, sponge gardens, and polychaete fields, but we lack basic information on how to manage or restore them in the event they are impacted by coastal development.

Proposed offsetting methods should, therefore, have a relatively high level of confidence of success and a low risk of failure or unanticipated adverse effects. Based on our review of offsetting and compensation conducted in New Zealand, this is likely to be difficult to demonstrate as many projects are recent and lack robust monitoring results and evidence of outcomes. It is also important to note that there are limits to offsetting and that biodiversity offsets are not appropriate in situations where biodiversity values cannot be offset to achieve at least a no net loss outcome.

Compensation in the marine environment

In many cases compensation is likely the only viable means of redressing residual adverse effects in the marine environment. We therefore suggest that the standard for compensation in the marine environment should be high. Like offsetting, compensation should be conducted as close to the affected area as possible, but existing guidance suggests it can include approaches that do not meet the requirements for offsetting (e.g., like-for-like or like-for-better). Technically, it includes all other approaches for managing residual adverse effects that are likely to result in overall positive environmental outcomes. Compensation should be designed following best-practice design principles and endeavour to achieve the highest value ecological outcomes possible. Like offsetting, compensation actions should be accompanied by robust monitoring and adaptive management.

Compensation packages could include actions such as restoring shellfish beds, creating artificial reefs, casting textures into seawalls to create habitat, installing rock pools and textured pile sleeves, or catchment-based actions to improve water quality entering the coastal marine

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3 For example, Maseyk et al (2018), section 3.1.2.



Artificial rock pools (left) and textured sea walls (right) recently installed as part of coastal development in Wellington Harbour (Photos: Annie Graham, GWRC, left; Shelley McMurtrie, EOS Ecology, right).



environment, including treating stormwater to a high standard to remove urban contaminants.

Monitoring and adaptive management

All offsetting and compensation approaches should have measurable biodiversity outcomes and/or metrics. These should be clearly identified in a monitoring plan, including the outcomes/metric of success, how these will be measured, and an appropriate timeframe over which the success of the offsetting approach should be realised. Offsetting and compensation approaches may also require ongoing maintenance or management to ensure the estimated ecological value is realised. These should be clearly defined and include appropriate frequencies and timeframes. If an offsetting or compensation approach does not meet the outcomes or metrics of success (i.e., it is unsuccessful within the designated timeframes) it is expected that an alternative or 'back up' form of compensation is applied. These alternatives should be identified at the project outset and form part of a robust adaptive management plan.

The application of adaptive management to offsetting in the marine environment requires a staged approach. It may be appropriate to stage various offsetting and/or compensation components based on the findings from robust monitoring. For example, an offsetting approach may be implemented in a restricted form initially but done so with robust monitoring and clear objectives and timeframes in which the benefits should be realised. If the monitoring demonstrates success of the approach, it could be

expanded. Alternatively, if the monitoring indicates that the approach is unsuccessful, alternative approaches forming part of an offsetting/compensation package could then be enacted.

Valuing marine habitats and quantifying loss

Perhaps the largest, and potentially most controversial, gaps in our knowledge and implementation of offsetting and compensation relate to how we value the marine environment and how we assess the quantum of loss and the quantum of offsetting or compensation required.

Determining the level of effect is dependent on the value of the species, habitats and ecosystems that could be affected by an activity and currently there are no robust tools to determine the ecological value of marine habitats. The current edition of the Ecological Institute of Australia and New Zealand's (EIANZ) *Ecological impact assessment guidelines* (EiA; <https://www.eianz.org/document/item/4447>) does not include an approach for valuing marine habitats. Instead, the approach to evaluate ecological values of terrestrial and freshwater habitats found there has been informally adapted over time for use with marine habitats, but these have not been peer-reviewed and are often not applied consistently for determining the value of the habitat and, in turn, the scale of impact. Having these guidelines reviewed and expanded to include the marine environment would go a long way to ensuring consistent assessment of marine values and improving outcomes for coastal ecosystems.

Calculating the quantum of loss – be that biodiversity loss, ecosystem service loss, or some other measure – and in turn being able to determine the quantity of offsetting or compensation that should be undertaken, is a multi-faceted challenge. This process should be transparent and able to be understood and reviewed by others. In many cases, quantifying residual adverse effects, and the offset or compensation measures to manage them, has relied on 'expert judgement', which can be challenged due to a lack of transparency and a reliance on ad-hoc approaches such as a 'multiplier' (e.g., the loss of 5 m² of seagrass is offset by the creation of 10 m² nearby). Support tools to assist with quantifying offsets and compensation, such as biodiversity compensation models, are not widely used in New Zealand for the marine domain. Where biodiversity compensation models have been used in the marine context, they have typically been based on the ecological values identified using the EIANZ approach.

We desperately need additional or revised tools to quantify what is being lost and the area or habitat needed to offset or compensate for that loss where there are residual adverse effects of development.

Gaps and recommendations

Examples of offsetting or compensation implemented in New Zealand are all relatively recent and there is very little evidence of the success of the approaches used. Accordingly, outcomes for offsetting and compensation approaches must be clearly articulated and robust measures put in place to monitor progress. There should be clear objectives about what a successful outcome will look like and this should also include appropriate timeframes within which these benefits are realised. Adaptive management will be a key tool to manage the complexity and uncertainty of implementing untested methods in the marine environment and ensuring that an acceptable level of offsetting or compensation is achieved.

We need robust, reviewed and agreed upon methods for valuing marine habitats and ecosystems, and, in turn, methods for assessing the quantum of loss and the size of offsetting/compensation packages required to achieve no net loss or net gain. These could, for example, build on the EIANZ guidelines and the biodiversity compensation models variously applied to projects around

the country. To be fit for purpose and more widely used and accepted, however, they will require review and co-development across agencies and sectors to ensure rigour, uptake and consistent application.

Summary

Key points to note from this work are:

- Most efforts to address residual adverse effects in the marine environment will result in compensation rather than offsetting.
- The standard for compensation in the marine environment should consequently be high and focus on high-quality environmental compensation outcomes.
- Offsetting and compensation packages should be designed in consultation with local communities, mana whenua and technical experts, be strategic, and indicate a high likelihood of success.
- Where information is limited, compensation might include funding

relevant marine research, but this should not be more than 20% of the total package.

- Offsetting and compensation efforts must include robust monitoring and clear measures of success.
- An adaptive management approach should be adopted and a 'backup plan' in place if monitoring metrics are not achieved within specified timeframes.
- Monitoring and results of offsetting and compensation efforts should be widely reported to ensure that practitioners can share in and improve outcomes for marine species, habitats, and ecosystems.

Key next steps to advance this work and address gaps include:

- Seek urgent peer review and expansion of the EIANZ guidelines to include valuing marine habitats.
- Consider more targeted methods for calculating the metrics and quantum of loss from coastal development and the

subsequent quantum of offsetting or compensation required to address lost biodiversity, ecosystem services and function.

References

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- Steer, J and Oliver, M (2022). Biodiversity offsetting and compensation in the marine environment: Further reflections from a regional council officer's perspective. *Coastal News* 77, (March 2022). <https://www.coastalsociety.org.nz/assets/Uploads/files/CN-77-2022-3.pdf>