Addressing risk and uncertainty in decision-making

In Aotearoa New Zealand, we do not have recommended best practices for marine risk assessments. Most processes do not support cumulative effects assessments, the needs and aspirations of Māori, or ecosystem-based management.

Uncertainty and lack of data are often viewed as obstacles to addressing cumulative effects – compounding and overlapping stressors that degrade the marine ecosystem. Cumulative effects need to be addressed to meet the requirements of marine legislation and policy.

Decision-making tools that can communicate risk (including indirect effects) and the degree of uncertainty associated with a particular decision are urgently needed. We've developed a new method of addressing risk and uncertainty to help better manage our marine ecosystem.

About this document

This summary recommends a new process for addressing risk and uncertainty in decision-making and is supported by research from the Sustainable Seas National Science Challenge.

For more information, please see our full guidance document and the references and resources listed at the end of this summary.

Recommendations – follow a process that supports fit-for-purpose decision-making

We recommend a more standardised best practice risk assessment process to account for broader values, multiple activities and stressors, and cumulative effects. Specifically, we recommend the following three important steps.

- Follow a reflective and participatory process to build a shared understanding of differences in people's desired outcomes and how they perceive risk – include 'risk to what' and 'why'.
- Carefully consider the right risk assessment method to support decision-making – many risk assessment methods constrain assessments and outcomes.
- Consider uncertainty explicitly in risk assessments. The greater the level of uncertainty, the more important it is for iwi and stakeholders to participate in analysing risk. Uncertainty should not just be presented for the most likely outcome but for its opposite outcome as well.

Follow a reflective, participatory process

Our recommended process for setting up risk assessments, is a reflective, participatory process where decision-makers can fully understand and record what constraints are being applied to an assessment.

This process includes understanding your own and the worldviews of others and reflecting on 'who is at the table' and 'what do they bring with them' (Figure 1).

A participatory approach is better placed to support cumulative effects assessment, te ao Māori aspirations, blue economy activities, and ecosystem-based management.

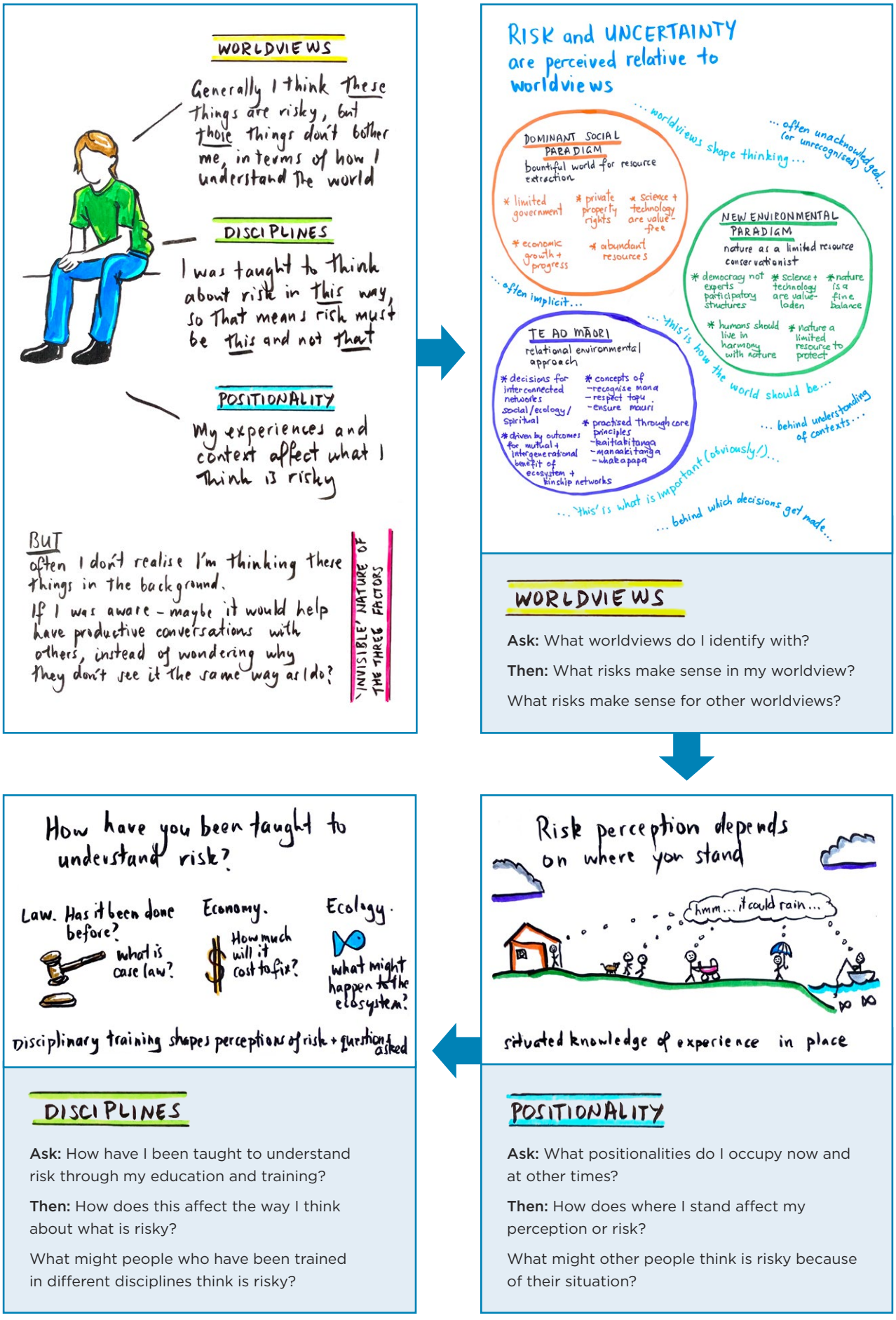

Figure 1 Worldviews, disciplines, and positionality influence perceptions of risk and uncertainty

Carefully consider the right risk assessment method for your decision-making

Risk generally refers to the likelihood that some event with undesirable consequences will occur. Assessment of how likely the event occurring is, and the severity of the consequences, are usually accompanied by some uncertainty.

Risk assessments are a practical method for marine law and policy decision-makers to better consider the cumulative impacts of their management decisions across time and space.

We provide guidance on choosing fit-for-purpose risk assessments from existing methods in our full guidance document. We've also developed a new tool based on ecological principles. These processes focus on assessing the risks of management actions when data is limited and is particularly useful for considering cumulative effects and actions to help with recovery. This process can also be used as a scoping or screening tool for more detailed risk assessments.

We've also created a decision tree to select an appropriate risk assessment method or tool (Guide 5, Sustainable Seas 2023). The risk assessment methods we recommend can be used at local to national scales and allow transparency about the uncertainties attached to the level of risk and whether the actions assessed will successfully support desired outcomes.

Adopt a hierarchical framework for choosing a risk assessment method based on the complexity of the risk assessment needed. Methods should support iwi and stakeholder participation in the building of risk assessment models and consider a range of ecological, cultural, social and economic outcomes and drivers. The methods we recommend use many different knowledge types.

The methods we recommend can be used:

- within statutory and non-statutory marine decision-making processes to ensure that decisions are based on all relevant information
- to formalise presently informal advice on risks given by government agencies
- by consultants and businesses generating social and environmental risk assessments.


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Consider uncertainty explicitly

While uncertainty is considered extensively across a range of literatures and conceptualised separately to risk in western disciplines, whakaaro Māori does not separate uncertainty from risk.

How people respond to uncertainty depends on how uncertainty is presented. For example, medicine often presents '1 in 4 New Zealanders will have cancer' rather than 3 out of 4 people won't. To avoid bias, it's important to present both sides: 'there is an 80% chance that this action will prevent any further degradation' should be balanced with 'there is a 20% chance that this action will result in further degradation'.

Avoid holding up risk assessments and management decisions because of a lack of 'perfect' data. The risk assessment methods and tools we recommend allow you to be transparent about uncertainty.

Why a new risk assessment process was needed

Guidance was urgently needed on risk assessment methods that could communicate the risk of multiple activities and cumulative effects, as well as the degree of uncertainty associated with different management actions – whether that be inaction, allowing new activities, or reducing stressors.

Most risk assessment methods and processes currently in use in Aotearoa New Zealand do not consider differing worldviews and desired outcomes, nor do most operate well in a world of cumulative impacts from multiple activities and sparse numeric data.

What did we do?

We reviewed analytical tools and processes currently used in Aotearoa New Zealand to support risk assessments and decision making.

We created a 'how to guide' to bring people together to discuss risks and decision-making. The guide included a questionnaire to help people identify worldviews associated with risk.

We matched tools to requirements and developed a decision tree to select fit-for-purpose tools. The best tools were tested in different scenarios, including:

- conservation spatial planning in the EEZ
- iwi restoration efforts in Ōhiwa Harbour
- blue economy principles fisheries risk.

Definitions

Risk can be defined in numerous ways but generally refers to the likelihood that some event with undesirable consequences will occur. Assessment of both how likely the event occurring is, and the severity of the consequences, are usually accompanied by some uncertainty. Generally, the risk of an ecological shift increases under cumulative pressures, and this should be coupled with management interventions (**Gladstone-Gallagher et al 2024**).

A social definition of perceptions of risk is; '*the way that individuals (institutions, communities, groups, iwi and hapū) understand and expect to experience the impact/ implications of an event or change or action to/on something they value (eg a place or activity, or relationship) or a desired future outcome*' (Le Heron et al, 2024).

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For more information and support with marine management decisions, please see our other synthesis project summaries and guidance documents in this series.