Climate Change

VULNERABILITY ASSESSMENT

Kerrie Robertson (Adira Consulting)
Matthew Baird (EnviroSea Consulting)

July 2025
NC21-WP-05_
NC21-WP-05_suppl

A G E N D A

- Recap on the TOR
- Literature Review - Overview and highlights
- Definition of vulnerability
- Adapting for WCPFC
- Next steps

A quick recap on the TOR

WCPFC21 adopted a TOR for a CMM Climate Change Vulnerability assessment

WCPFC also agreed to a set of CMMs to be reviewed during the assessment:

2025

CMM 2024-07 (Cetaceans)
CMM 2019-05 (Mobulid rays)
CMM 2024-05 (Sharks)
CMM 2017-04 (Marine pollution)
CMM 2024-06 (NP striped marlin)

2026

CMM 2023-01 (Tropical tunas)
CMM 2018-04 (Sea turtles)
CMM 2018-03 (Seabirds)
CMM 2013-04 (Record of Fishing Vessels)

Literature review + Bibliography

Delivered. See NC21-WP-05_suppl. We have also developed a comprehensive library of literature available

WCPFC Framework with vulnerability definition

This framework is in train. We will test this against the 2025 CMMs.

Assessment Report

This assessment report will outline the assessment method, CMM results, limitations and scientific data and information gaps research needs, potential management challenges and suggested recommendations

Information Papers

information papers to NC21 (NC21-WP-05), SC, TCC21, WCPFC 22

THE LITERATURE REVIEW - IN BRIEF

500+

Documents

Search returned 500+ documents from 2015-2025, in English, that met our search criteria

460

Peer-reviewed

The majority were peer reviewed journal articles from Scopus and Google Scholar. The remainder were eligible grey literature including IPCC reports, World Bank Reports and WCPFC materials

80+

unique definitions of vulnerablity

There was no common definition of climate change vulnerability. Some used IPCC constructions (which also changed) and others used their own, depending on the context of the assessment.

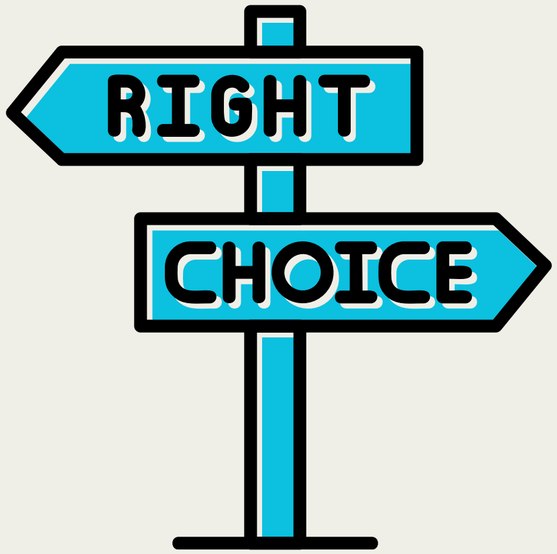
132

operationalised vulnerability assessments

This highlights the huge diversity of approaches used to assess climate change vulnerability, and the wide range of contexts including terrestrial and marine resource management, urban and residential contexts and disaster risk reduction.

LITERATURE REVIEW - WHAT WE TOOK AWAY

The literature review was a helpful exercise because we learned a lot from the examples we read - both what we thought could work for WCPFC, and what would not work for WCPFC. Here's our key learnings:

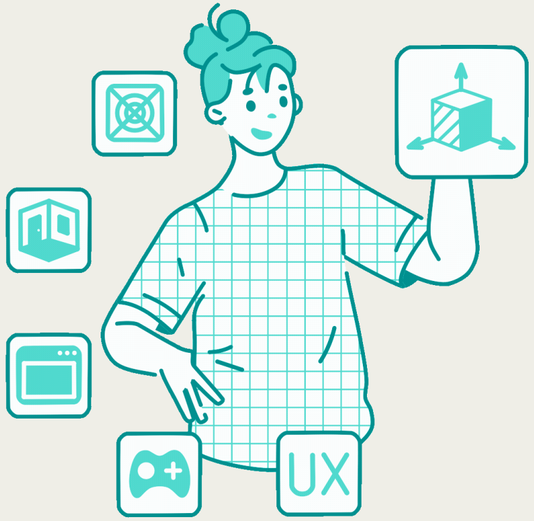


There's more than one way to do it

The diversity in assessment methodologies and operational frameworks shows us that there are multiple, legitimate ways to do an assessment. Scaleability, flexibility and context-specificity are important

Vulnerability assessments should assist with identifying adaptation options and measures.

Assessments are most valuable when used as a planning tool.



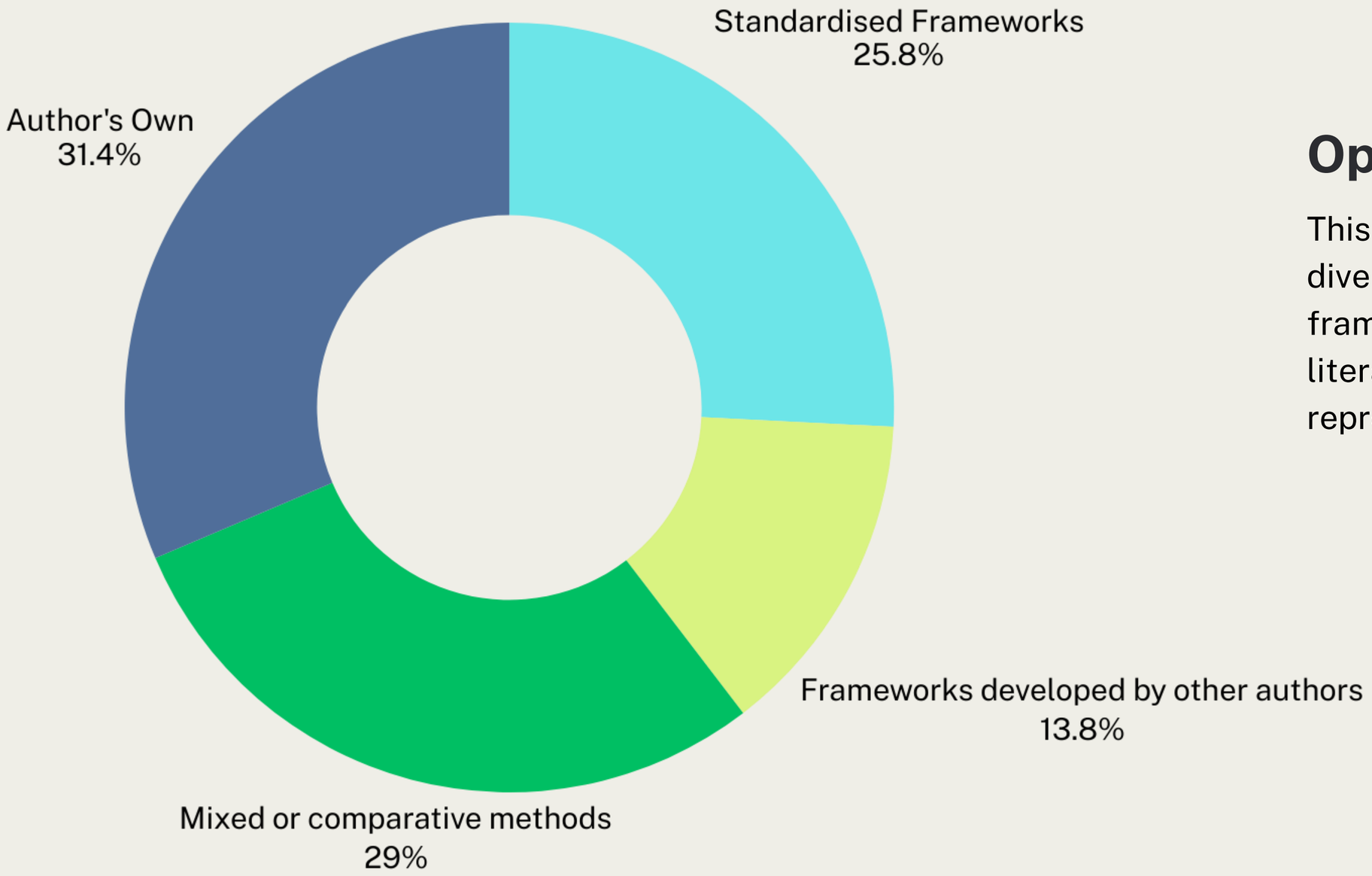
Data gaps are common- work with what you have

No assessment had perfect data. Many assessments use proxies or qualitative data. WCPFC may find it does not YET have the climate data it needs, but it can be updated over time.

This is novel

No one else, anywhere, has conducted a CCVA of a multi-jurisdictional resource
The majority of marine assessments look only at biophysical vulnerability of a specific resource, not the vulnerability of a management framework.

NO ONE, UNIQUE METHOD



Options

This graph demonstrates the diversity of operational frameworks used across the literature reviewed. This represents 132 studies

A DEFINTIION OF 'VULNERABILITY'

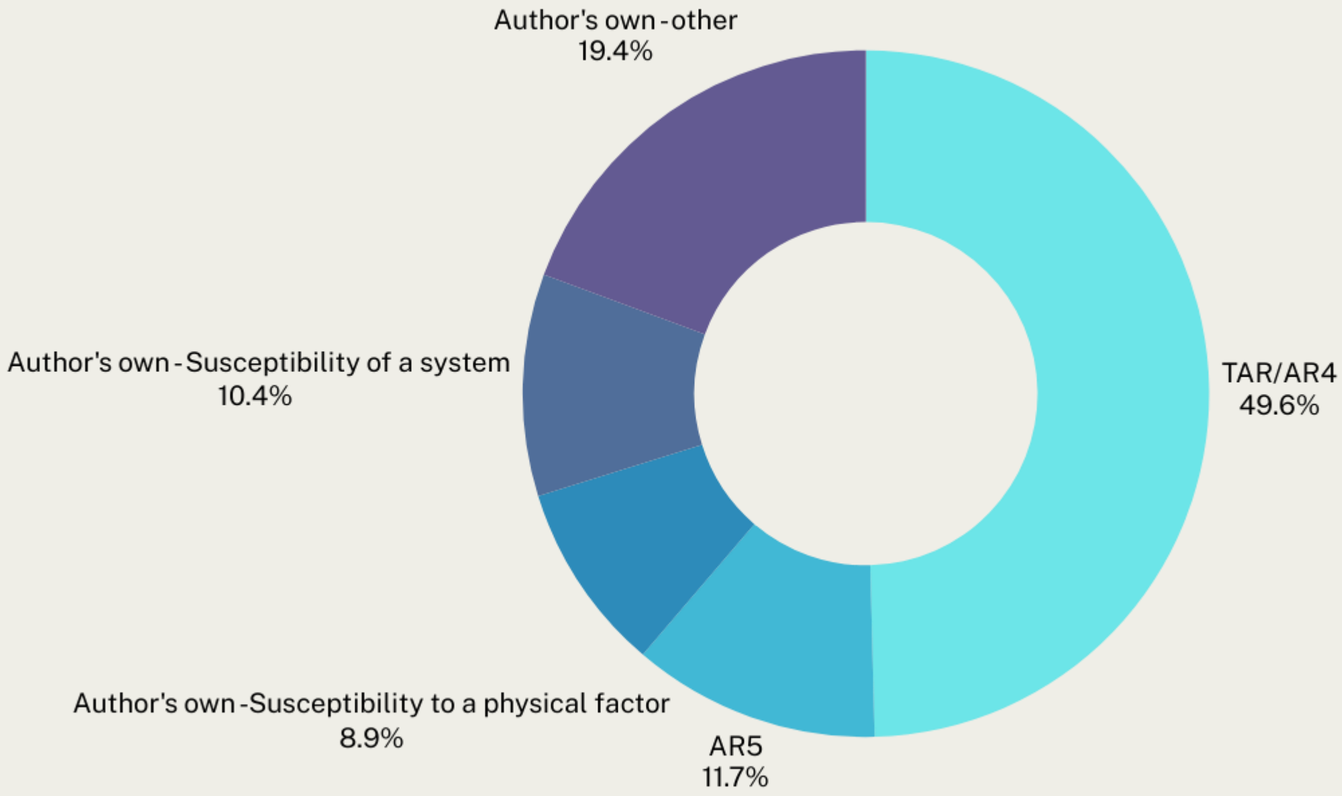
There was no unique definition of climate change vulnerability across the literature.

The IPCC has a definition, which itself has changed over time as its understanding and approach has evolved.

Some studies used IPCC definitions (TAR3/AR4/AR5)

Some used their own

This graph demonstrates the diversity of definitions used across *all* of the literature reviewed, where a definition was provided



SO WHAT SHOULD WCPFC DO?

‘Vulnerability’ is a concept. It is not a term with legal content in the assessments, but a way of conceptualising how to identify impacts attributable to climate change, the extent of it, and what can be done to cope with it.

We propose using the AR6 definition. It is the most contemporary, and most conceptually relevant to assessing the vulnerability of a framework

We understand it like this:

LEARN MORE

To learn more about vulnerability definitions, and particularly how the IPCC definitions have evolved over time, see section 4,2, Figure 3 and Table 2 of the literature review.

LEARN MORE P54

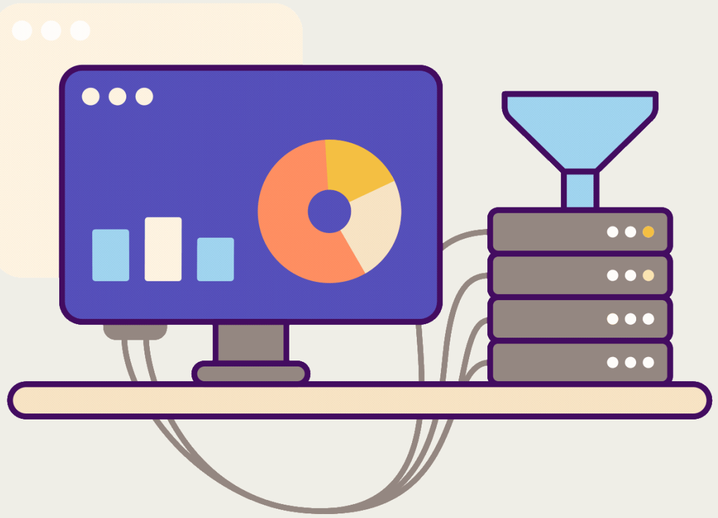
Definition	How we understand it
Climate Risk Hazard × Exposure × Vulnerability	Risk refers to consequences for human or ecological systems Risks can arise from potential impacts of climate change as well as human responses to climate change Adverse consequences can arise from the potential for a response to climate change failing to achieve its intended outcome; or o the intended action creating an adverse outcome elsewhere Example, the term “flood risk” should not be used if it only describes changes in the frequency and intensity of flood events; it would need to be linked explicitly to the consequences of such events for human or ecological systems.
A **hazard** is the potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources	A hazard is a climate driver of risk A hazard is the climate-related physical event or trend that can cause harm It is specifically about the climate-related physical event or phenomena, not the exposure or vulnerability of systems to them It can include acute events (flood, hurricane) or long-term trends (sea level rise, ocean acidification, temperature increase)
Exposure is the presence of people; livelihoods; species or ecosystems; environmental functions, services, and resources; infrastructure; or economic, social, or cultural assets in places and settings that could be adversely affected	Exposure is about what is at risk, not necessarily what will be harmed, but what is located in areas where climate hazards may occur Exposure does not itself equate to harm. Exposure in combination with hazard and vulnerability determines risk
Vulnerability Is a function of sensitivity and adaptive capacity	We understand vulnerability is a function of adaptive capacity and sensitivity
Sensitivity is the degree to which a system is affected, either adversely or beneficially, by climate variability or change	Sensitivity is a subset of vulnerability rather than treated as a separate variable. It is linked to both biophysical and socioeconomic characteristics of systems Whereas Exposure looks at whether something is in harm's way, sensitivity looks at how much harm it suffers when exposed. We consider what the system, species or group is and what makes it sensitive It depends on biological, physical, economic or social characteristics that help us identify which parts of a system, species or group are most at risk
Adaptive capacity Adaptive capacity is the ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences	It is about the potential to adapt, not whether adaptation is currently occurring Adaptive Capacity is dynamic, context specific and inequitably distributed. Higher adaptive capacity results in lower vulnerability; lower adaptive capacity results in greater susceptibility to harm Adaptive capacity is about more than ecological adaptation, but the capacity of ecosystems, people and institutions to adapt It is influenced by resources, resource management, governance and knowledge It can involve: Reducing vulnerability to climate hazards, • Mitigating potential damage, • Taking advantage of beneficial opportunities • Responding

ADAPTING FOR THE WCPFC

A number of the frameworks we saw were:

- Multi year
- Used a team of researchers (likely to be expensive)
- complex data sets with quantitatively weighted indicators
- Rigid

This is very difficult to directly apply to WCPFC.



A bespoke WCPFC Framework should

- Enable iterative and less resource intensive updated as and when new information becomes available
- consolidate existing knowledge against set criteria
- identifies key climate risks and data gaps
- Flags issues relevant to CMM revisions
- able to be undertaken within the normal annual cycle without relying on outside assistance
- that it can generate information that is meaningful to you for management
- Be a useful tool in the WCPFC toolbox

NEXT STEPS

Finalise Draft Framework and apply to assessments

This is in train and we expect to finish before the end of July.

Prepare report

Report will commence following the first assessments

Consult SC

We will prepare a paper to SC (but it will not say much because it is due this week). We will share progress we have and welcome any insights

Consult TCC

TCC will receive a more complete package from us as the work will be quite advanced.

Submit to Commission

Final delivery of TOR outputs

Feedback is welcome!
Please get in touch anytime

MATTHEW.BAIRD@ENVIROSEACONSULTING.COM
KERRIE@ADIRACONSULTING.COM.AU

Thank you!

...AND SEE YOU AT SCIENTIFIC COMMITTEE