

Climate Change

VULNERABILITY ASSESSMENT FRAMEWORK

WHAT WE LEARNED & WHERE TO GO FROM HERE

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

December 2025
WCPFC22 – 2025-17
WCPFC22-2025-IP14

TODAY'S PRESENTATION - IT'S A BIT DIFFERENT

- Summarise the project outputs
- What does WCPFC need to do if it wants to improve its understanding of climate risk?
 - What we learned through this exploratory process
 - The gap between existing work and a successful framework
 - Getting from here to there - issues to consider
- Video walk through of the CCVA tool for the future

WHAT WE DELIVERED

500+

Sources reviewed
Through the Literature Review

1

IPCC-aligned
definition of vulnerability

5

Pilot Assessments
Cetaceans, Mobulid rays, sharks,
marine pollution, NP Striped Marlin

FRAMEWORK
TOOL

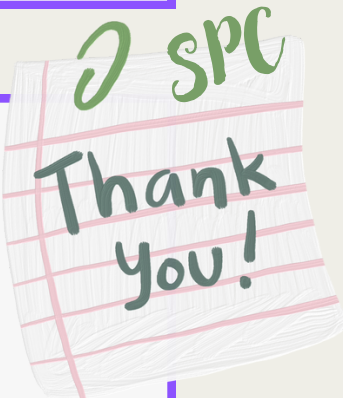
Excel based
Rapid assessment tool

GUIDANCE
DOCUMENTS

Instructional support
to operate and refine the framework

OUTPUT
MAPPING

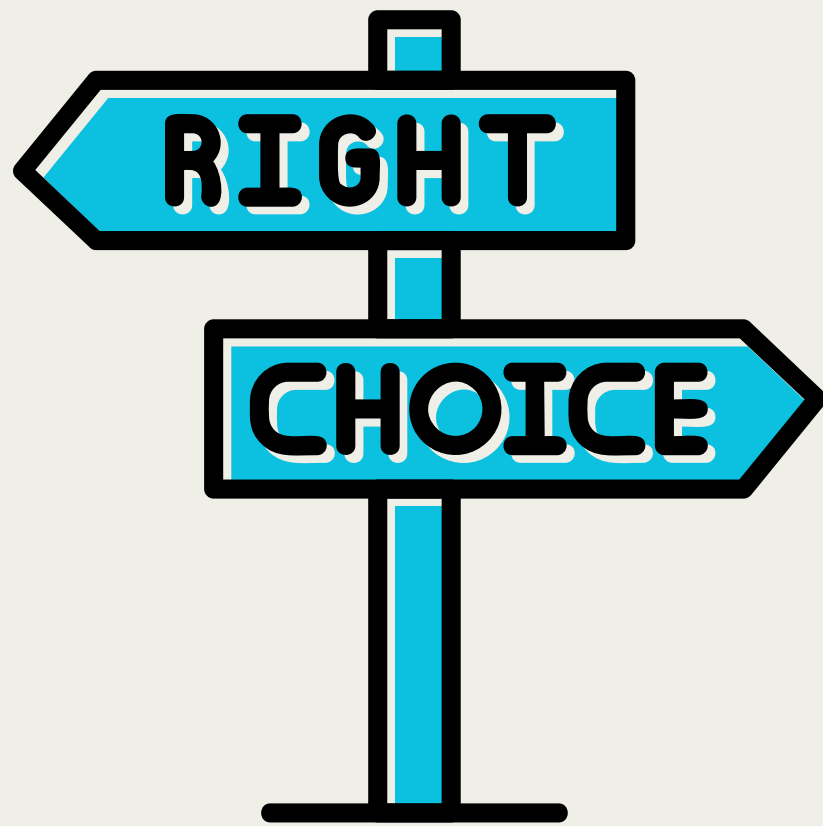
Analysis & data gaps
Mapping SSP outputs to CCVA
Framework & identifying data gaps



Information papers to: NC (NC21-WP05), SC (SC21-EP-WP-01), TCC21 (WCPFC-TCC21-13)
WCPFC22-2025-IP14 For the SSP output mapping analysis prepared with SPC

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:



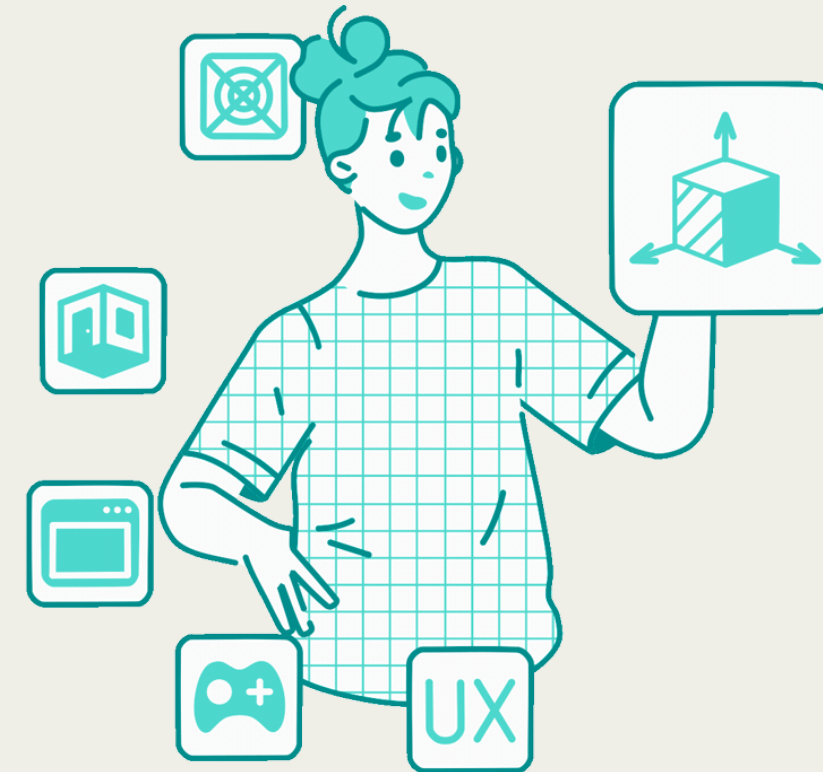
There's more than one way to do it

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.



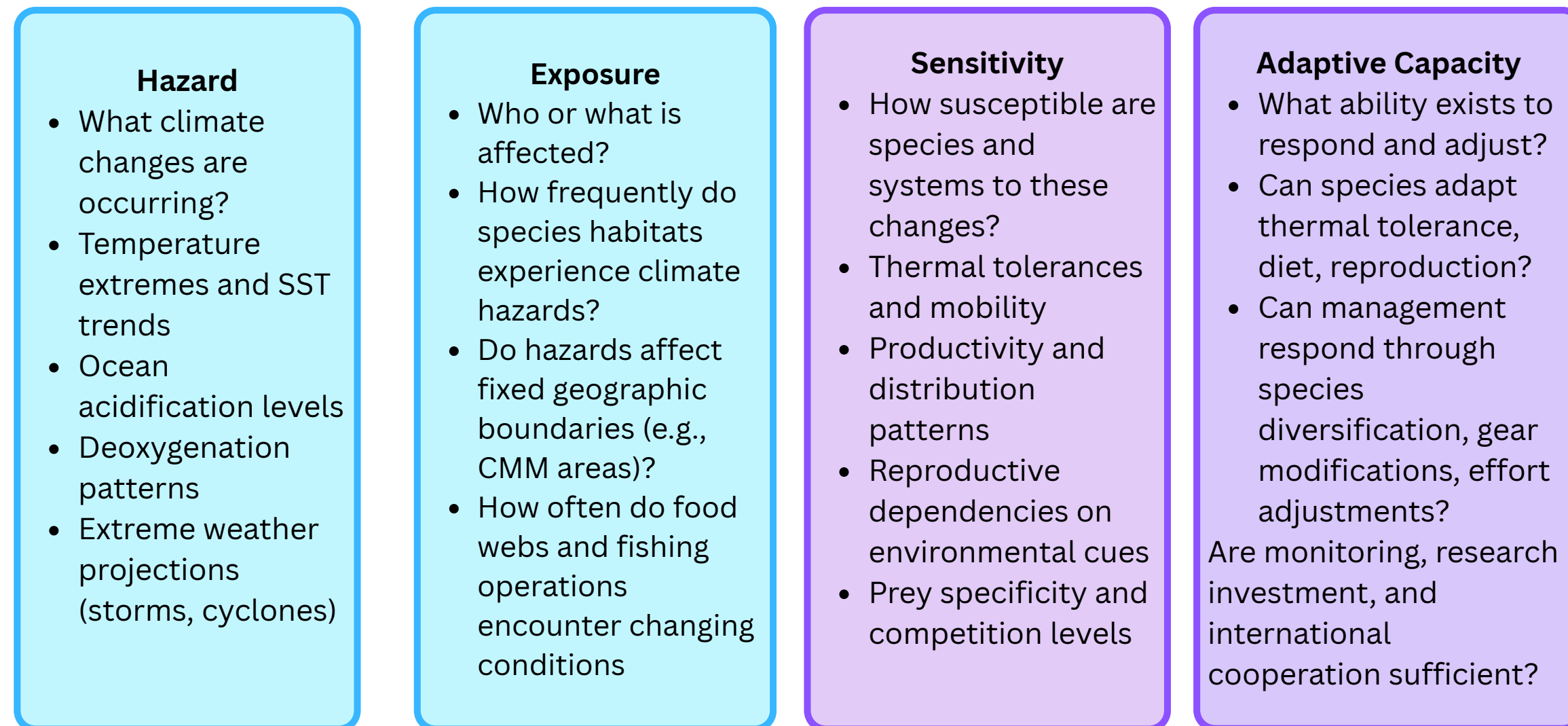
Data gaps are common- work with what you have

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.



Note: As part of addressing the Terms of Reference, the consultants examined how climate change vulnerability and climate risk are defined. That literature review identified these four components as the fundamental questions that must be answered to understand climate risks in fisheries: what climate changes are occurring, who or what is affected, how susceptible they are, and what capacity exists to respond. The CCVA Framework is a tool designed to systematically address these questions when comprehensive data is available. However, in WCPFC's current situation where information is limited, these remain the things you would want to understand to progressively build knowledge of climate risks—what they are, where they originate, and what can be done about them—regardless of whether formal quantitative assessment is immediately feasible.

RELEVANCE TO SC AND TCC

SC would explore biophysical indicators where the results will vary by species - i.e *what happens to fish and ecosystems*

- Evaluating thermal tolerance ranges and physiological limits of target and bycatch species
- Assessing species mobility and capacity to shift distributions in response to climate change
- Understanding productivity changes under altered environmental conditions (temperature, oxygen, pH)
- Mapping current and projected species distributions relative to climate hazards
- Determining reproductive dependencies on environmental cues and seasonal triggers
- Analysing prey-predator relationships and food web vulnerabilities under climate scenarios
- Assessing competition dynamics as species ranges shift

TCC would explore operational and vessel conduct that span CMMs - i.e *what happens to fishing operations and compliance systems*

- Identifying MCS data and information gaps that climate change may exacerbate
- Evaluating operational feasibility of implementing climate-informed management measures
- Assessing technical infrastructure vulnerability to climate-related hazards
- Understanding fleet operational challenges under changing environmental conditions
- Determining compliance monitoring implications when climate risks affect implementation capacity

FEEDBACK - WHAT WE HEARD

Existing Workload

SSP and subsidiary bodies face substantial existing commitments. Adding a comprehensive new assessment process requires realistic consideration of capacity constraints.

Data Availability

A systematic exercise highlight significant data gaps with many framework indicators - information is either not routinely developed or requires substantial work to generate.

Scientific safeguards

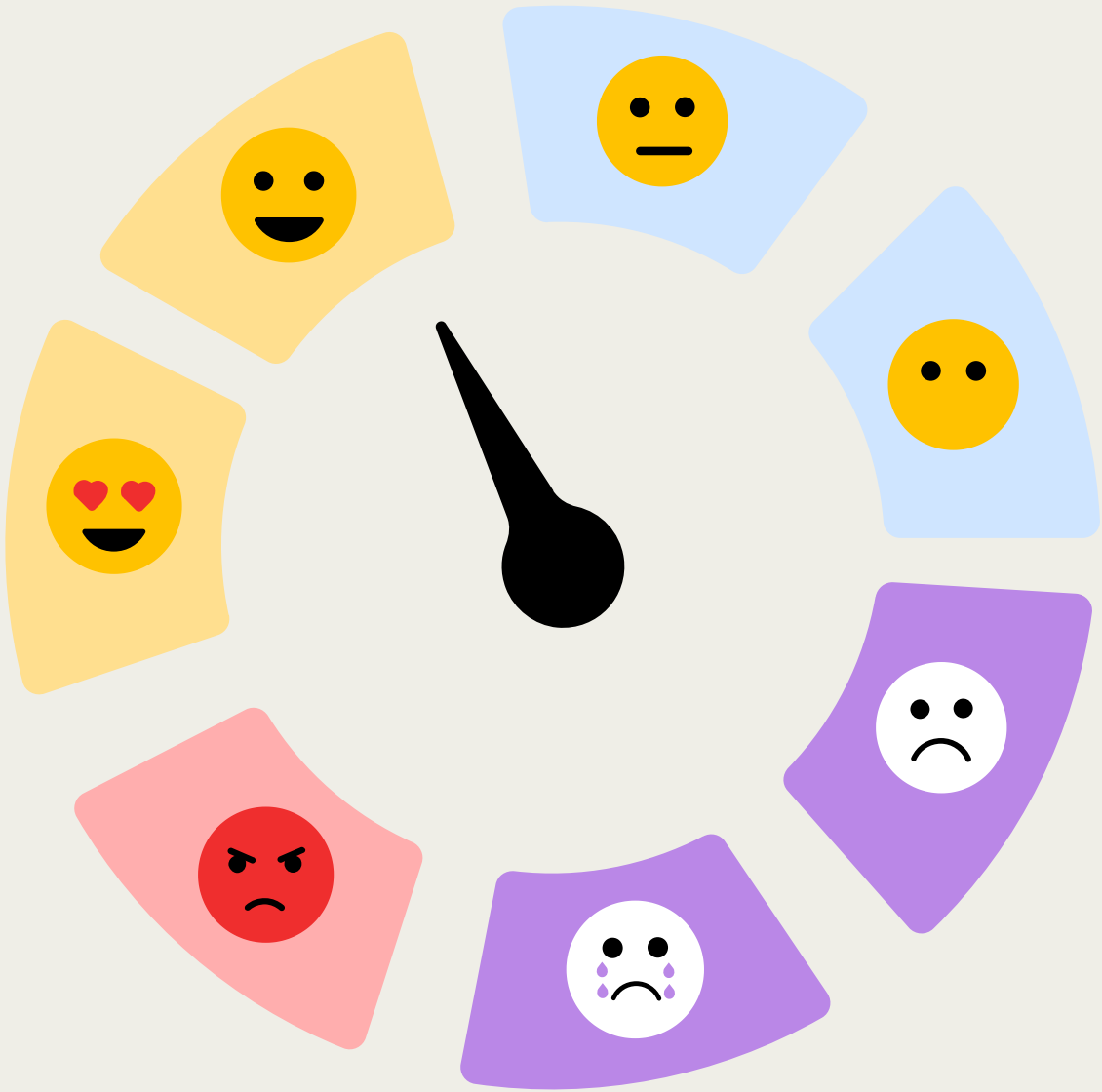
There needs to be process safeguards to ensure that the answers to the CCVA questions are reviewed through SC processes to ensure they are the best available science in the WCPFC context.

Cost Considerations

Ongoing assessment of all CMMs would require sustained resources for data collection, analysis, reporting and maintenance

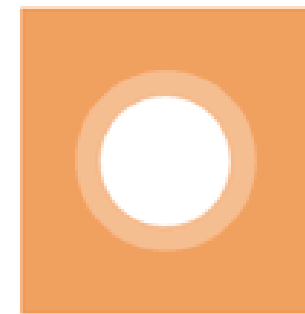
Integration

The framework, as structured, asks fundamentally different questions than existing processes currently answer, potentially creating parallel work streams rather than integrated workflows.



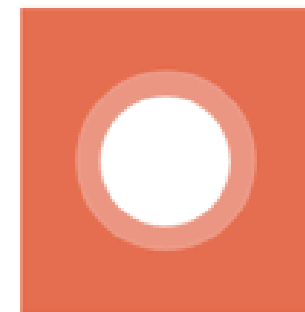
WHERE ARE THE GAPS?

● Available ● Needs work ● Not developed



HAZARD

AMBER – Data exists but needs work to define for WCPFC context



EXPOSURE

RED – Cannot assess without hazard analysis first.



SENSITIVITY

MIXED – Basic data exists, climate-specific impacts need new studies

Green: Life history parameters

Amber: Thermal ranges, mobility, general reproduction

Red: Climate-specific sensitivities, reproduction dependencies



ADAPTIVE CAPACITY

RED – Most data-poor area; many questions outside scope of existing work

- Many scientific questions outside scope of SSP current work
- TCC relevant operational indicators greatest unknowns

WHAT THIS MEANS FOR WCPFC

In order to answer the questions

Framework requires **NEW** work beyond existing outputs

NEW ANALYTICAL APPROACHES Climate hazard metrics, exposure overlays

EXPANDED SCOPE of scientific and technical compliance outputs

ALTERNATE METHODOLOGIES Qualitative approaches for data-poor indicators

SUSTAINED EFFORT Ongoing assessment as conditions evolve

READ MORE



The literature review summarises the range of methodologies used across 130+ CCVAs around the world. These examples may be useful when considering how to address data gaps.

TWO PATHWAYS FORWARD

A. Implementation NOW of the CCVA Framework as envisaged in the TOR

Requirements:

- Substantial expansion of SSP analytical work
- New data collection systems for operational and adaptive capacity indicators
- Sustained additional resources for ongoing CMM-by-CMM assessment
- Development of novel methodologies for data-poor areas
- Capacity building across subsidiary bodies

Timeline: Long-term commitment (5-10 years)

Outcome:

Systematic climate vulnerability assessments for all CMMs, but with varied confidence in the results if data and science review processes are not updated to address identified information gaps and identified issues. High resource intensity to establish required processes and to undertake analysis. Risk of overwhelming existing processes.

B. Pragmatic, incremental steps to improve knowledge of climate risks in the WCPO

Approaches:

- Develop species climate profiles as information assembly mechanism
- Cross-cutting operational risk assessments (rather than CMM-by-CMM)
- Explore new approaches for oceanographic data collection (e.g FVON)
- Leverage partnerships (PACCSAP, PCCC, academic institutions)
- Selective adoption of framework elements where and when feasible

Timeline: Immediate start, progressive build (3-5 years)

Outcome:

Meaningful progress in climate risk understanding without overwhelming existing capacity. Builds institutional capability incrementally. Maintains flexibility to expand as data and resources develop.

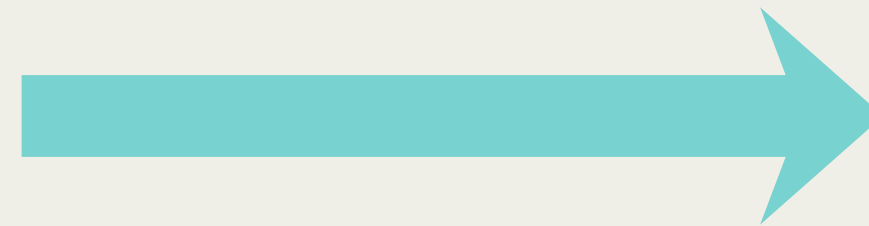
WHAT THIS PROCESS TEACHES US

1

Multiple pathways to understanding climate risk exist

2

Framework is means to an end – real objective is improving understanding



3

Cross-cutting approaches can be more effective than CMM-by-CMM

- *What climate risks exist?*
- *What is the source of that risk?*
- *What can be done to cope with that risk?*

"Multiple pragmatic pathways exist to progressively answer these questions within existing capacity"

To illustrate the point about the cross-cutting nature

Climate Hazards *(What's changing)*

Extreme weather events
(storms, cyclones)

Temperature Extremes

Sea State Changes

Altered ocean conditions

Shared Operational Impacts *(How operations are affected)*

Vessel Operations and Safety

Safety protocols
Emergency Response capacity
SAR

MCS Systems

VMS reliability
communication systems
ER
Observer coverage feasibility

Operational Standards

Waste management procedures
species handling requirement
gear handling protocol
port infrastructure access

Multiple CMMs *(What's impacted)*

Mobulid rays CMM

Sharks CMM

Marine Pollution CMM

Observer CMM

VMS CMM

+ Many more

IMPROVING WCPFC'S UNDERSTANDING OF CLIMATE RISK

GETTING FROM HERE TO THERE

CURRENT STATE

Foundational data exists through current SSP work, but the specific climate-framed questions aren't currently answered by routine processes. Implementing comprehensive CCVA as envisaged in the TOR would require substantial new resources.

SC

- Stock assessments provide key species data
- General understanding of distributions and productivity
- General information on climate variables
- Climate-specific vulnerability data limited
- Adaptive capacity largely undocumented

TCC

- MCS systems in place
- Observer programs operating
- Climate impacts on operations not systematically tracked
- Extreme weather compliance challenges ad hoc
- Infrastructure vulnerability unknown

COMM

- Resolution 2019-01 adopted
- Climate Change Workplan 2024-2027 in place
- CCVA Framework developed
- Implementation challenges identified
- Ready to choose pragmatic pathway

Focus on climate risk understanding - not framework adoption

Consider new initiatives/activities to incorporate oceanographic and meteorological data

Cross-CMM Technical/Operational Risk Review

Create species profiles with climate risks for priority species

Build capacity through partnerships (PACCSAP, PCCC, UNFCCC, WMO, IOC GOOS)

FUTURE STATE: IMPROVED CLIMATE RISK UNDERSTANDING

- Know what climate risks are occurring in WCPO
- Know the source of climate risks
- Understand which species and operations are exposed
- Evidence on system sensitivities and adaptive capacity
- Climate considerations embedded in CMM decisions
- Pragmatic adaptation pathways identified
- Institutional capacity to respond to change

The CCVA Framework is a Tool in the Toolkit

The CCVA Framework is available as a reference tool, diagnostic instrument, or for selective use as capacity allows. It represents one pathway among many for achieving improved climate risk understanding—not the only pathway.

RECOMMENDATIONS AND CONCLUSIONS



Acknowledge deliverables as fulfilling Terms of Reference and note the substantial theoretical and methodological foundation now available to support climate-informed decision-making



Recognise legitimate constraints identified through mapping of framework requirements against existing outputs, confirming that implementation as designed would require substantial new investment in resources and capacity



Reframe from 'framework adoption' to 'progressive improvement of climate risk understanding', recognizing that multiple pathways exist to achieve this objective



Prioritise gap identification over comprehensive assessments, using the framework's indicator structure to systematically identify where additional information would most improve understanding



Explore qualitative approaches for operational and compliance-related climate risks, recognizing that these may be more appropriate than quantitative methods where systematic data is unavailable



Consider cross-cutting assessment of operational challenges under climate change, rather than CMM by CMM analysis, given that many operational risks affect multiple measures

BUT FOR THE FUTURE.....CCVA TOOL

The Framework is valuable even without full implementation:

As a reference tool

- Structured way to think about climate risks
- comprehensive indicator system for guidance

As a diagnostic instrument

- Systematically identify information gaps
- Prioritise research and data collection gaps

For selective use

- Apply specific elements when capacity allows
- Use for periodic strategic assessments (e.g on 3-5 year cycles)
- Employ for priority CMMs or high risk areas

Excel-based rapid assessment tool

User-friendly interface for CMM evaluations

IPCC AR6 risk-based approach

Hazard × Exposure × Vulnerability

Comprehensive indicators

Across all four risk components

Traffic-light scoring system

Visual assessment of data availability

CCVA TOOL

CCVA Guidance Doc

- Overview of the Excel-based Framework
- How it was developed
- How to use it and how to update it
- Basis of the indicator design
- Scoring methodology and calculations
- Data requirements and quality standards
- Assessment process
- Reporting template



AutoSave

39. Annex 1_B_CCVA Framework Master template

Search (Cmd + Ctrl + U)

Comments

2

A11

Identify and prioritize climate change risks to the effectiveness of existing or proposed management measures, and their capacity to ensure the long-term conservation of target stocks, non-target species, associated and dependent species, and the broader marine ecosystem, as well as the human communities reliant

A

B

C

D

E

F

G

H

I

J

K

L

22

Adaptive capacity

The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences. This includes the ability to implement effective *and flexible* management measures, adjust fishing practices, or develop new technologies to respond to climate-driven changes.

23

Vulnerability

The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt. This includes the propensity of management measures or strategies to be adversely affected by climate change impacts.

24

Climate risk

The potential for adverse consequences of climate change, resulting from the interaction of climate-related hazards (including hazardous events and trends) with the vulnerability and exposure of human and natural systems.

25

26

These concepts form the basis of the calculations required to inform the level of climate risk to CMM as a result of climate change. To do this, the following approach has been used:

27

28

Climate risk = Hazard x Exposure x Vulnerability

29

Vulnerability = Sensitivity x Adaptive Capacity

30

31

Design

32

Structure

33

This CCVA is made up of five working tabs and two result tabs:

34

35

Type

Tab

Description

The start tab is the starting point from which the relevant CMM is selected. Once selected, embedded functionality in

Guidance and information

1. Start

2. Hazard

3. Sensitivity

4. Climate risk (Results)

5. Indicator summary

+

Ready

Accessibility: Invest gate

200%

Thank you!
