

## Supplementary Materials

### A. Search String Best Response

You are a researcher about to undertake a scoping review of the existing literature on community-based fisheries management, an approach to fisheries management that gives coastal communities and fishers primary responsibility for managing their coastal resources. In this review, your aim is to explore the perceived (i) benefits of, and (ii) barriers to, the implementation of community-based fisheries management in Pacific Island countries. The first step is to develop a search strategy to locate papers that could be relevant to the topic. You will do this by A) breaking the topic into functional components and then brainstorming a comprehensive list of possible synonyms, related terms, shared embeddings, relevant acronyms, and terms researchers might use for each component, B) Designing an inclusive Boolean search string that incorporates these terms and is able to capture a wide range of relevant literature, and C) creating an exclusive list of inclusion criteria that can be used to screen the titles and abstracts of potential papers. (A) will need to be inclusive enough that no relevant papers are missed. (B) will need to have the correct boolean operators to ensure that the maximum number of relevant articles are returned from the search, and (C) will need to be exclusive enough that only highly relevant papers are able to pass the screening stage.

*A) Brainstorming relevant terms:*

*Community-based fisheries management:*

- *participatory fisheries management*
- *co-management*
- *community-based co-management*
- *collaborative fisheries management*
- *community-based natural resource management*
- *community-based marine resource management*
- *community-based fishery management*
- *community-based management of marine resources*
- *community-led fisheries management*
- *locally-managed marine areas*

*Benefits:*

- *improved livelihoods*
- *increased fish populations*
- *sustainable resource management*
- *increased community empowerment*
- *enhanced food security*
- *reduced poverty*
- *increased social cohesion*
- *improved ecosystem health*
- *increased cultural preservation*
- *increased economic development*

*Barriers:*

- *lack of capacity*
- *weak governance*
- *inadequate funding*
- *conflicting interests*
- *lack of legal frameworks*

- *weak enforcement*
- *lack of participation*
- *limited access to resources*
- *lack of awareness*
- *resistance to change*

*B) Boolean search string:*

*((community-based OR participatory OR co-management OR collaborative OR natural resource management) AND (fisheries OR marine resource OR fishery) AND (management OR conservation OR governance)) AND ((Pacific Island countries) AND (benefits OR advantages OR opportunities OR strengths OR positive OR opportunities OR potential) AND (barriers OR challenges OR obstacles OR limitations OR constraints OR difficulties))*

*C) Inclusion criteria:*

- *Studies published in English*
- *Studies focused on Pacific Island countries*
- *Studies that address the benefits and barriers of community-based fisheries management*
- *Studies that were published between 2000 and 2023*
- *Studies that were peer-reviewed*

*Note: These inclusion criteria can be modified based on the specific needs of the review.*

## B. Search String Comparison

We asked the AI to compare the two search strings generated by each team. Here, string (A) was generated by the human team, and string (B) was generated by the AI. The AI's response demonstrates that, whilst the AI understands that a wide range of keywords is important for being inclusive in the database search, it does not recognise that limiting the number of terms separated by 'AND' operators will result in a more inclusive list of results.

Which of the following search strings would yield the greatest number of relevant documents when performing a systematic review of the perceived (i) benefits of, and (ii) barriers to, the implementation of community-based fisheries management in Pacific Island countries?

A) ("community based coastal resource\* management" OR "community based Marine Resource\* Management" OR "community based fish\* management" OR "community based management" OR "community based fish\* organisation" OR "community based fish\* organization" OR "community based natural resource management" ) AND ( LIMIT-TO ( DOCTYPE , "ar" ) OR LIMIT-TO ( DOCTYPE , "re" ) )

B) ((community-based OR participatory OR co-management OR collaborative OR natural resource management) AND (fisheries OR marine resource OR fishery) AND (management OR conservation OR governance)) AND ((Pacific Island countries) AND (benefits OR advantages OR opportunities OR strengths OR positive OR opportunities OR potential) AND (barriers OR challenges OR obstacles OR limitations OR constraints OR difficulties))

*Option B would likely yield the greatest number of relevant documents when performing a systematic review of the perceived benefits and barriers to the implementation of community-based fisheries management in Pacific Island countries. This is because option B includes a wider range of keywords that are relevant to the topic of interest, such as "participatory", "co-management", "collaborative", "conservation", and "governance". Additionally, option B specifies the region of interest as Pacific Island countries, which may increase the relevance of the search results. Finally, option B includes a comprehensive list of terms related to both the benefits and barriers of community-based fisheries management, which may capture a wider range of relevant documents.*

### C. Non-English Terms for CBFM in the Pacific from ChatGPT

- Ra'ui (or Rahui) - Polynesian term used in countries such as Cook Islands, Samoa, and Tonga.
- Qoliqoli - Fijian term.
- Vanua - Fijian term.
- Kumul - Tok Pisin term used in Papua New Guinea.
- Tapu (or Tabu) - Maori term used in New Zealand, Cook Islands, and other Polynesian cultures.
- Kaitiakitanga - Maori term used in New Zealand, referring to the holistic concept of guardianship and stewardship of natural resources.
- Sasi - Indonesian term used in some parts of eastern Indonesia.
- Tegelese - Chuukese term used in the Federated States of Micronesia.
- Kastom - Bislama term used in Vanuatu, encompassing traditional customs and practices, including fisheries management.
- Mana - Polynesian and Melanesian term used in various Pacific Island cultures, representing spiritual or authoritative power associated with the natural environment.
- Tikina - Fijian term used to describe a traditional administrative unit that may have roles in managing fisheries resources.
- Hiri - Motu term used in Papua New Guinea, describing customary marine resource management systems.
- Toafa - Tuvaluan term used in Tuvalu, referring to traditional marine resource management practices.

Scopus Search:

*(( (ra'ui OR rahui OR qoliqol OR vanua OR kumul OR tapu OR tabu OR kaitiakitanga OR sasi OR tegelese OR kastom OR mana OR tikina OR hiri OR toafa) AND (fisheries OR marine AND resource OR fishery) ))*

Total results: 101

Not present in original search: 82

#### **D. Screening criteria - Human Team**

- Only peer reviewed published literature (no grey literature, conference reports, or book chapters).
- Only studies published in the English language.
- The study must include at least one case study of CBFM in one of the 14 Pacific PICs
  - Cook Islands
  - Federated States of Micronesia
  - Fiji
  - Kiribati
  - Marshall Islands
  - Nauru
  - Niue
  - Palau
  - Papua New Guinea
  - Samoa
  - Solomon Islands
  - Tonga
  - Tuvalu
  - Vanuatu
- Only studies with fisheries related examples of CBM (i.e., no community-based forestry management).
- Only studies related to community-based management (i.e., not government-based management or co-management). The definition of community-based management here is “an approach to fisheries management that gives coastal communities and fishers primary responsibility for managing their coastal resources”.

## **E. Screening Criteria - AI**

- Is it possible that the Title and Abstract summarise a paper with a case study from: Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu?
- Is it likely that the Title and Abstract summarise a paper that will discuss fisheries and/or marine resource management?
- Is it likely that the Title and Abstract summarise a paper that will discuss a community-based approach? Exclude if there is a focus on co-management.
- Is it likely that the Title and Abstract summarise a paper that is part of the peer reviewed published literature? Exclude grey literature, conference reports, and book chapters.

## **F. Random String Injection for Screening Output Diversity**

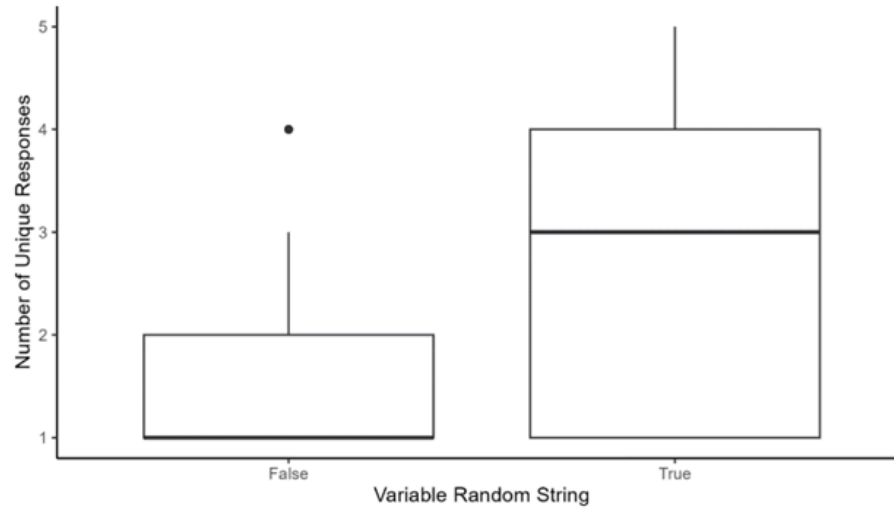
We found that, with the ‘temperature’ parameter set to 0.0, as is recommended by OpenAI for data extraction tasks<sup>1</sup>, there was a high level of determinism. This was problematic when the AI would misinterpret the screening criteria or title/abstract identically over repeated queries - essentially getting ‘stuck in a rut’. Whilst raising the temperature above zero, or decreasing the ‘top-p’ parameter is one way to decrease this determinism (for more detail

see:<https://community.openai.com/t/cheat-sheet-mastering-temperature-and-top-p-in-chatgpt-api-a-few-tips-and-tricks-on-controlling-the-creativity-deterministic-output-of-prompt-responses/172683/10>), it increases the probability of screening errors by allowing less likely tokens in the response. So for example, returning ‘No’ in the response, as opposed to ‘Yes’, which would mis-classify the abstract.

We sought unique responses for every query, even when the query is identical, similar to how multiple human screeners bring rigour to the screen due to their multiple perspectives. We therefore circumvented this limitation of determinism with a temperature setting of 0.0 by prefacing the general prompt with a random string of 10 characters and instructing the AI to ignore it. This string was randomly generated prior to each call to OpenAI so that, even when providing the same Title/Abstract and Screening Criteria, the prompt was unique and was more likely to yield a unique perspective and response..

Whilst the AI with a temperature value set to 0 is not strictly deterministic, it exhibits a high degree of determinism across multiple identical queries. This is problematic when interpreting the screening criteria as it means that the AI may generate identical responses, with identical interpretations, across multiple queries - making redundant the effort of querying it multiple times. To inject a higher level of ‘randomness’ and therefore diversity in interpretation, we added a randomly generated string to the beginning of each prompt, with the instruction that the AI should ignore it. We interpret this technique as essentially setting a different seed for the model. Indeed, the AI effectively ignored this string, however we observed a much greater diversity of responses. We quantified this difference by running the 100 pilot papers twice, once with a prompt the random string was held constant five times, and then once where we varied the random string five times. We then calculated the number of unique output elements for each response element (Final Decision, Reflection, and Initial Thoughts), and calculated a paired t-test to determine if the mean number of unique outputs across all outputs types was different. We found a highly significant difference ( $p\text{-value} = 2.2e-16$ ), with a mean difference of 1.0 responses. The distribution in uniqueness counts are shown in Figure S1, and suggest that varying the random string with each prompt yielded a greater diversity of outputs.

We compared the influence of appending the random string compared to other conventional settings of temperature and top-p by performing a sensitivity analysis where we modified the top-p and temperature parameter using the best performing AI strategy (AnyYes). In summary, for a temperature of 1.0, a default top-p (1.0), and no random string, the kappa-value compared to the ‘Collaborative list’ was 0.41. This increased to 0.60 for a temperature of 0.0, which is better, but not as good as when the random string was used ( $k = 0.69$ ). When we modified top-p to be 0.2, with a default temperature of 1.0 and no random string, we found a kappa-value of 0.40. These results suggest that appending the random string does indeed improve the quality of the screen beyond what can be achieved by modifying OpenAI’s default parameters.



**Figure S1 | Increase in Uniqueness from Random String insertion.** Tally of the increase in unique responses from inserting a random string to otherwise identical prompts. The numbers in each cell represent the difference between (i) the number of unique responses from five AI independent queries to ChatGPT with a unique random string and (ii) the number of unique responses where the random string was not varied across queries. Higher numbers indicate more diversity in responses, whilst lower numbers represent more identical responses. The means between the two treatments are significantly different (paired t-test;  $p\text{-value} = 2.2\text{e-}16$ ), with a mean difference of 1.0 unique responses.



## G. AI choosing the best search string.

<https://chat.openai.com/share/bcf222f4-397c-4f8b-80c8-0c306241170e>

Which of the following search strings would yield the greatest number of relevant documents when performing a systematic review of the perceived (i) benefits of, and (ii) barriers to, the implementation of community-based fisheries management in Pacific Island countries?

A) ((community-based OR participatory OR co-management OR collaborative OR natural resource management) AND (fisheries OR marine resource OR fishery) AND (management OR conservation OR governance)) AND ((Pacific Island countries) AND (benefits OR advantages OR opportunities OR strengths OR positive OR opportunities OR potential) AND (barriers OR challenges OR obstacles OR limitations OR constraints OR difficulties));

B) (("Community-Based Fisheries Management" OR CBM OR "Community-Based Resource Management" OR "Community-based co-management" OR "Community-Based Governance" OR "Co-management") AND ( "Pacific Island Countries" OR "Pacific Islands" OR "Melanesia" OR "Micronesia" OR "Polynesia" OR "Pacific Rim" OR "South Pacific" OR "Oceania")) AND (Benefits OR Advantages OR "Positive outcomes" OR "Social benefits" OR "Economic benefits" OR "Ecological benefits") AND (Barriers OR Challenges OR Constraints OR Obstacles OR Limitations OR Hurdles OR Difficulties) AND (Implementation OR Adoption OR Rollout OR Execution OR "Implementation strategies" OR "Implementation models"));

C) ("community-based fisheries management" OR "community-managed fisheries" OR "community-led fisheries management" OR "participatory fisheries management") AND ("benefits" OR "advantages" OR "pros" OR "positive impacts" OR "success factors" OR "opportunities") AND ("barriers" OR "challenges" OR "limitations" OR "constraints" OR "obstacles" OR "problems" OR "difficulties") AND ("Pacific Island countries" OR "Pacific Island nations" OR "South Pacific countries" OR "Melanesia" OR "Polynesia" OR "Micronesia");

D) ("community-based fisheries management" OR "coastal fisheries management" OR "participatory fisheries management" OR "locally managed fisheries" OR "co-management" OR "collaborative fisheries management" OR "traditional knowledge and fisheries management" OR "customary fisheries management" OR "sustainable fisheries management" OR "small-scale fisheries management" OR "artisanal fisheries management" OR "indigenous fisheries management" OR "Pacific Island fisheries management" OR "fishermen's associations" OR "fishermen's cooperatives" OR "marine protected areas" OR "community-based conservation" OR "community-based resource management") AND ("benefits" OR "advantages" OR "pros" OR "positives" OR "opportunities" OR "challenges" OR "barriers" OR "limitations" OR "constraints" OR "problems" OR "negatives");

E) ("Community-based fisheries management" OR "CBFM") AND ("benefits" OR "advantages" OR "pros" OR "positive impact" OR "positive outcome" OR "beneficial effect" OR "livelihood" OR "productivity" OR "sustainability" OR "social capital" OR "food security" OR "fish catch" OR "local governance" OR "resilience" OR "equity" OR "management" OR "poverty reduction" OR "conflict reduction" OR "overfishing prevention" OR "climate change adaptation" OR "resource scarcity management" OR "participation enhancement" OR "regulatory framework improvement" OR "corruption prevention" OR "barriers" OR "challenges" OR "constraints" OR "limitations" OR "problems" OR "disadvantages" OR "negative impact" OR "negative outcome" OR "harmful effect" OR "political support" OR "capacity building" OR "finance" OR "technical expertise" OR "property rights" OR "governance structures" OR "market access" OR "climate change" OR "scientific

understanding" OR "resource scarcity" OR "participation limitation" OR "regulatory framework weakness" OR "corruption");

*Option A is likely to yield the greatest number of relevant documents when performing a systematic review of the perceived benefits and barriers to the implementation of community-based fisheries management in Pacific Island countries. This is because option A includes a wider range of search terms related to community-based fisheries management, such as "co-management" and "natural resource management," as well as a variety of terms related to benefits and barriers, such as "advantages," "challenges," and "obstacles." Additionally, option A includes a specific reference to Pacific Island countries, which is the geographic region of interest. While some of the other options may yield relevant documents as well, they are more narrow in scope and may not capture all of the relevant literature.*

## **H. Case study: Community-based fisheries management**

Since its inception, the community-based fisheries management has gained increased focus in the literature given the associated benefits it aims to provide with its implementation, and, as such, a burgeoning body of literature has emerged. The team was originally motivated to consider AI as a collaborative tool as the capacity to conduct systematic reviews in this field is significantly hindered by poor access to the mainstream published literature, lack of resources, and the spread of information across grey literature that is less centralised and requires more extensive online searches and information gathering. While we have constrained this initial proof of concept to the published literature (as it was more easily verifiable) the intent is to address all those points of weakness in future work. Here, a scoping review was undertaken instead of a systematic review because the process is faster (involving fewer stages), but retains all the key stages needed to test the method. However, we posit that the systematic process we present here can also be applied in other types of evidence synthesis (e.g., systematic reviews), with the only differences being in the purpose and level of detail of the review.

Specifically within the context of CBFM, we sought to explore the perceived (i) benefits of, and (ii) barriers to, the implementation of community-based fisheries management in Pacific Island Countries (PICs) where the approach is implemented and studied widely (e.g. Steenbergen et al. 2022<sup>2</sup>). While nomenclature and classification for PICs varies depending on the context and organisation, here we use the description provided by the Alliance of Small Island States and the Food and Agricultural Organisation<sup>3-5</sup>. The PICs referred to here include Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

## References

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4. Gillett R, Tauti MI. Fisheries of the Pacific Islands [Internet]. Apia: FAO; 2018 [cited 2023 Jun 6]. (FAO Fisheries and Aquaculture Technical Paper). Report No.: 625. Available from: <https://www.fao.org/3/i9297en/i9297en.pdf>
5. Member States – AOSIS [Internet]. 2021 [cited 2023 Jun 19]. Available from: <https://www.aosis.org/about/member-states/>