Background

- Tropical coastal marine ecosystems (TCMEs) are rich in biodiversity and provide many ecosystem services. Coastal areas are home to increasing numbers of people and population growth is expected to continue, putting TCMEs under pressure from development and broader environmental changes associated with climate change.

- Attention to TCMEs by conservation organizations has increased and although a variety of interventions to promote conservation and sustainable development of TCMEs have been implemented, evidence regarding the outcomes of these - for people or ecosystems - is scattered and unclear.

- This study takes a systematic mapping approach to identify articles that examine the ecological and social outcomes associated with conservation interventions in TCMEs; specifically in coral reef, mangrove, and seagrass habitats.
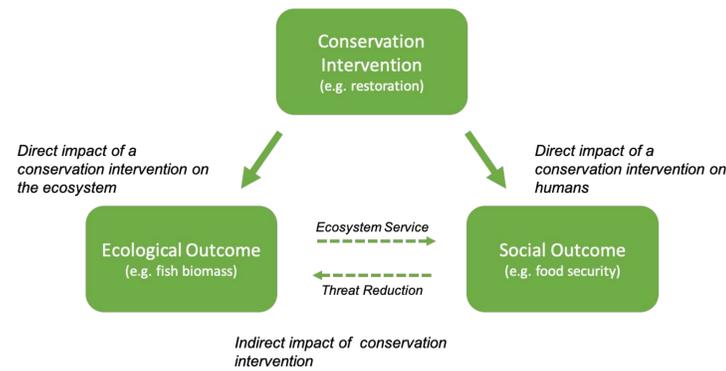
Research Question & PICO

- What are the social and ecological impacts of conservation interventions in tropical coastal marine ecosystems (TCMEs)?
- Our research examines literature that focuses on the following four elements or PICO.
  - **Population**– tropical coastal-marine habitats
  - **Intervention**– conservation interventions
  - **Comparator**– a counterfactual scenario for comparison (required for included studies)
  - **Outcome**-- ecological or social outcomes
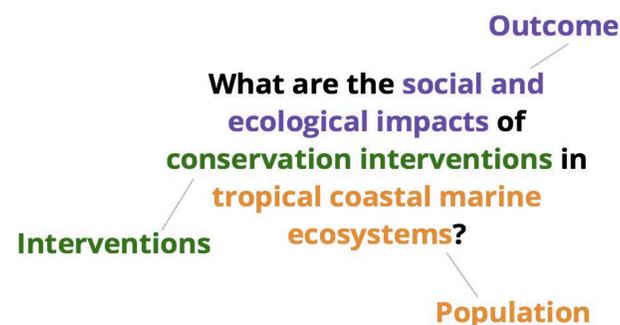
Methods

- Search Strategy: A comprehensive search string was created to search the literature for all potentially relevant studies. We searched four literature databases: Web of Science, Scopus, CAB Abstracts, and Aquatic Sciences and Fisheries Abstracts for articles. All articles identified were compiled.

- Eligibility Criteria: Articles must include all elements of our PICO, must be English-language, must be peer-reviewed, must have appropriate study design.

- Screening: Due to the large volume of articles, a 10% random sample was screened. Articles were first screened at the title and abstract level using Colandr, a machine learning program that aids in evidence syntheses. Articles were then screened at the full text level by two independent screeners. If all eligibility criteria were met, the articles then had data extracted.

- Data Extraction: Data such as bibliographic information, general study information, intervention information (e.g. restoration), and outcome information (e.g. ecological or social outcomes) from all eligible articles were extracted.

Results

All ecosystems

Outcome	1. Land/water management (36)	2. Species management (88)	3. Awareness raising (5)	4. Enforcement & protection (4)	5. Livelihood, economic, and other incentives (9)	6. Conservation designation & planning (109)	7. Legal & policy frameworks (12)	8. Research & monitoring (43)	9. Education & training (8)	10. Institutional/organizational development (12)
1. Population/species (121)	25	64	1	1	2	71	2	22	2	1
2. Ecological community (88)	21	39	0	0	2	49	3	12	1	2
3. Ecosystem function (19)	10	4	0	0	0	5	1	4	0	0
4. Ecosystem services (13)	5	5	0	0	1	5	1	2	0	0
5. Human well-being (53)	4	23	2	0	5	23	5	8	3	8
6. Knowledge and behavior (57)	2	11	4	3	4	26	2	17	6	6
7. Governance (33)	0	9	0	1	1	19	4	2	1	8

Conservation Intervention

Cases
0 20 40 60

Results *cont.*

- Our results highlight the uneven distribution of the literature, both in terms of research focus and location. We also identify areas with potential research gaps, and areas with a substantive body of research that would allow for in-depth reviews and meta-analyses.
- The majority of the literature focuses on species or community level outcomes from conservation designation and planning interventions (namely marine protected areas) and species management interventions (namely fisheries management).
- There was a dearth of research on ecosystem function and service outcomes, as well as outcomes from capacity development interventions (e.g. awareness-raising, education and training, institution/organizational development).
- Geographically, researchers focused on interventions in the U.S., Australia, and Indonesia, with gaps in the North Africa-Middle East regions.

Study countries
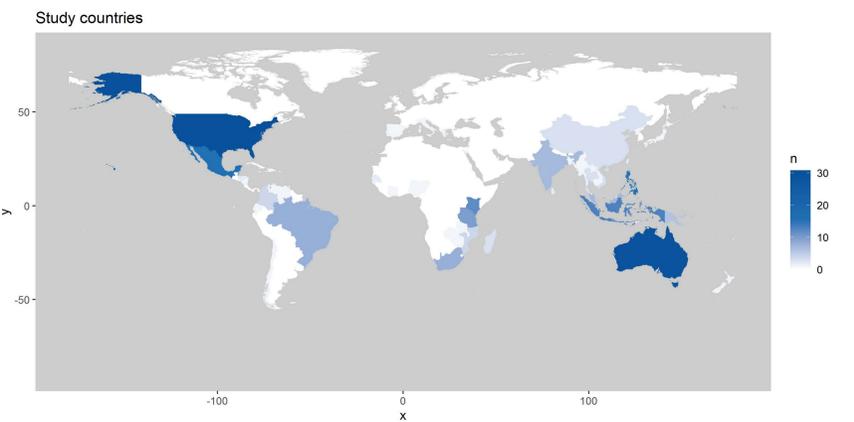
Current Research

- Based on our evidence map, we have developed a new research question: *What are the impacts of restoration in corals, mangroves, and seagrasses on ecosystem services?* Here we focus on ecosystem service outcomes from active restoration projects.

- Following the same methodology, we investigate the geographic distribution of restoration research, the types of services being studied, how these studies vary across habitat type, among other things.

- Thus far, we have conducted the search of the literature, screened at the title and abstract level, and are in the process of full text screening and data extraction.

References & Acknowledgements

- World Wildlife Fund-US
- Duke Bass Connections
- Dr. Sam Cheng (American Museum of Natural History)
- Dr. Gabby Ahmadia (WWF-US)
- Dr. Dominic Andradi-Brown (WWF-US)
- Dr. Louise Glew (WWF-US)
- All current and previous faculty, staff, and students who helped with the project