APPENDIX 1

Role played by research in fostering societal participation and solving marine social-ecological problems reported in the analyzed scientific documentation.

| Marine transdisciplinary research in Costa Rica | Role played by research in fostering societal participation and solving marine social-ecological problems |
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| N° |  Published articles | Year | Countries of affiliations of first authorship | Who? | Where? | Region | How?  | Level of participation | Communication modes | Stages of transformation of the social-ecological system | Transformational research (phases) |
| 1 | MPAs and aspatial policies in artisanal fisheries (Albers et al., 2021) | 2021 | University of Wyoming, USA | Fisher stakeholders | Costa Rica (Tortuguero)Tanzania | Caribbean (Costa Rica) | Spatial bioeconomic modelInterviewsStakeholder discussions | Collaboration | Bidirectional | Preparation for change | Descriptive researchI. Past-Current State, II. Scenario-Construction |
| 2 | Using dialogue to contextualize culture, ecosystem services, and cultural ecosystem services (Allen et al., 2021) | 2021 | Department of Earth, Environmental, and Sustainability Sciences, Furman University | Rural communities | Costa de Pájaros | Pacific coastGulf of Nicoya | PhotovoiceMapsParticipant observationDialogue workshopsSemi-structured InterviewsPost-workshop surveys  | Coproduction | Bidirectional | Preparation for change | Descriptive research I. Past-Current State, II. Scenario-ConstructionAnticipation research IV. Intervention research |
| 3 | Levels and drivers of fishers’ compliance with marine protected areas.  (Arias et al., 2015) | 2015 | Australian Research Council Centre of Excellence for Coral Reef Studies, James Cook University, | CoastguardIncopescaSINACTour companiesCommunity leadersFisher leaders Researchers | CahuitaSanta RosaManuel AntonioCabo BlancoOstionalGandocaCaletas-ArioCamaronalPalitoIsla Caballo | Caribbean andPacific | Semistructured interviewsKey informantSnowball and convenience sample  | Contribution | Unidirectional | Preparation for change | Descriptive researchI. Past-Current State |
| 4 | Indicator-based management recommendations for an artisanal bottom-longline fishery in Costa Rica, Central America (Bystrom et al., 2017) | 2017 | Sistema Estudios de Posgrado (SEP), Universidad Estatal a Distancia. Centro de Investigación en Ciencias del Mar y Limnología(CIMAR), Universidad de Costa Rica | Artisanal longline fishers | Bejuco (Nicoya Penisula) | North Pacific | Traffic light method PerceptionsFishers’ questionnaires | Contribution | Unidirectional | Preparation for change | Descriptive researchI. Past-Current State |
| 5 | Do responsible fishing areas work? Comparing collective action challenges in three small-scale fisheries in Costa Rica (Carrillo et al., 2019) | 2019 | Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), Costa Rica | ResearchersNGOsGovermental institutionsSSFCoastal comunities | Isla CaballoIsla Chira | PacificGulf of Nicoya | Semistructured interviews | Contribution | Unidirectional | Navigating changeInstitutionalization | Descriptive researchI. Past-Current State |
| 6 | Segmentation by Motivations in Sustainable Coastal and Marine Destinations: A Study in Jacó, Costa Rica (Carvache-Franco et al., 2022). | 2022 | Facultad de Turismo y Hotelería, Universidad Espíritu Santo, Ecuador | Tourist sector | Jacó | Pacific coast | QuestionnairesFactor analysis | Contribution | Unidirectional | Preparation for change | Descriptive researchI. Past-Current State |
| 7 | Pesca artesanal y pobreza en comunidades aledañas al Golfo de Nicoya (Fernández-Carvajal, 2013) | 2013 | Instituto de Estudios de la Mujer de la Universidad Nacional de Costa Rica (UNA) | Fishing communitiesWomen and their families | Punta MoralesCosta de PájarosManzanillo | Gulf of NicoyaPacific coast | Interviews | Contribution | Unidirectional | Preparation for change | Descriptive researchI. Past-Current State |
| 8 | Identifying drivers of collective action for the co-management of coastal marine fisheries in the Gulf of Nicoya, Costa Rica (García Lozano & Heinen, 2016). | 2016 | Department of Earth and Environment, Florida International University, Miami, USA | Fishing communitiesCooperative members | Tárcoles | Gulf of Nicoya Pacific coast | SES framework as a diagnostickey informant interviewsinformal interviews Literature review   | Contribution | Unidirectional | Navigating change | Descriptive researchI. Past-Current State |
| 9 | Property relations and the co-management of small-scale fisheries in Costa Rica: Lessons from Marine Areas for Responsible Fishing in the Gulf of Nicoya (García Lozano & Heinen, 2016) | 2016 | Department of Earth and Environment, Florida International University Miami, USA | FishersNGOsGovermental institutions | TárcolesIsla ChiraCosta de Pájaros | Gulf of Nicoya Pacific coast | Literature review (articles, jurisdiction, gray literature)Semistructured interviewsInformal interviewsEtnographic observation | Collaboration | Bidirectional | Navigating changeInstitutionalization | Descriptive researchI. Past-Current State |
| 10 | Transformative research and capacity building in the education sector to protect livelihoods and biodiversity in Costa Rica (Gorris et al., 2023). | 2023 | University of Osnabrück, Germany | Researchers Costa Rica-GermanyStudentsNon-academic actors |  | Gulf of NicoyaPacific coast | Case studiesParticipatory modellingCausal loop diagramsFuzzy cognitive mappingSemistructured interviews  | Coproduction | Bidirectional | Navigating changeInstitutionalization | Descriptive researchI. Past-Current State |
| 11 | Innovative Recycling Solutions to Waste Management Challenges in Costa Rican Tourism Communities (Little & Little, 2017) | 2017 | Environmental Ethics and DevelopmentSchool for Field Studies, Costa Rica, Center for Sustainable Development Studies | Tourist communitiesNGOs |  | . Nicoya Pensinsula | GIS mapping of litter Surveys on needs and barriers to recycling participation | Collaboration | Bidirectional | Navigating change | Descriptive researchI. Past-Current State |
| 12 | Identifying nearshore nursery habitats for sharks and rays in the Eastern Tropical Pacific from fishers’ knowledge and landings (López-Angarita et al., 2021) | 2021 | Fundación Talking Oceans, Bogotá, Colombia | Coastal community stakeholders  |  | Eastern Tropical PacificCosta RicaPanamáColombia | Interviews Landings data | Coproduction of knowledge | Unidirectional | Preparation for change | Descriptive researchI. Past-Current State |
| 13 | Local community perceptions of sea turtle egg use in Tortuguero, Costa Rica. (Mejías-Balsalobre et al., 2021) | 2021 | Sea Turtle Conservancy FL, USARescue Center for Endangered Marine Species (CREMA), Costa Rica | Community stakeholders  | Tortugero | Caribbean | Perceptions and attitudesSemistructured interviewsQuestionnaires  | Contribution | Unidirectional | Preparation for change | Descriptive researchI. Past-Current State |
| 14 | The link between risk taking, fish catches, and social standing: Untangling a complex cultural landscape (Naranjo-Madrigal & van Putten, 2019) | 2019 | Consultant services department, ALNA S.A, San José, Costa Rica | Artisanal fishers | Playa Lagarto | North Pacific | Ethnographic aspects (ﬁsher´s lifestyle)Fisher´s perceptions (local ecological knowledge)Subsistence catch InterviewsParticipant observations  | Coproduction of knowledge | Bidirectional | Preparation for change | Descriptive researchI. Past-Current State |
| 15 | Understanding socio-ecological drivers of spatial allocation choice in a multi-species artisanal fishery: A Bayesian network modeling approach (Naranjo-Madrigal et al., 2015) | 2015 | Consultant services department, ALNA S.A, San José, Costa Rica | Dive artisanal fishery | Playa Lagarto | North Pacific | Bayesian network modelingGood governance scenarios  | Coproduction | Bidirectional | Preparation for change | Descriptive researchI. Past-Current State, II. Scenario-Construction |
| 16 | Evaluating support for shark conservation among artisanal fishing communities in Costa Rica (O'Bryhim et al., 2016) | 2016 | Department of Environmental Science & Policy, George Mason University, USASavannah River Ecology Laboratory, University of Georgia, USA | Fishing communities | San JuanilloCoyoteBejucoOjochalPuerto Cortés | North PacificSouth Pacific | Structured interviews  | Contribution | Unidirectional | Preparation for change | Descriptive researchI. Past-Current State |
| 17 | Posibilidades de promoción social para los pescadores costeros de Playas del Coco, Guanacaste, Costa Rica, utilizando el Turismo Marino Sostenible (Palacios-Martínez & Núñez-Zamora, 2021) | 2021 | Fundación Promar, OCEANews, CCT, Costa Rica | Coastal fishers | Playas del Coco | North Pacific | Particpatory actionParticipant observationSemistructured interviews | Collaboration | Bidirectional | Preparation for change | Descriptive researchI. Past-Current State |
| 18 | Applying the SES Framework to coral reef restoration projects on the Pacific coast of Costa Rica (Palou-Zúniga et al., 2023) | 2023 | Centro Agronómico de Investigación y Enseñanza (CATIE), Costa Rica; | VolunteersTour operatorsFishersGovernment institutionsCommunity  | Bahía CulebraSámaraGolfo Dulce | North PacificSouth Pacific | SES frameworkSemistructured interviewsPerceptions of projects | Contribution | Unidirectional | Navigating change | Descriptive researchI. Past-Current State |
| 19 | Transforming the social-ecological systems framework into a knowledge exchange and deliberation tool for comanagement (Partelow et al., 2019) | 2019 | Leibniz Centre for Tropical Marine Research (ZMT), Bremen, Germany.Jacobs University, Bremen, Germany | Fishers | Gulf of Nicoya | Pacific Coast | SES framework as knowledge exchangeImagesDeliberationExperimental setting (psychometrics) | Coproduction | Bidirectional | Navigating change | Descriptive research I. Past-Current StateAnticipation research IV. Intervention research  |
| 20 | Linking fisher perceptions to social-ecological context: mixed method application of the SES framework in Costa Rica (Partelow et al., 2021) | 2021 | Leibniz Centre for Tropical Marine Research (ZMT),Bremen, Germany.Jacobs University, Bremen, Germany | Fishers | Isla Venado | Pacific CoastGulf of Nicoya | SES frameworkPerceptionsContent analysisNetwork analysisParticipant observations Semi-structured interviews | Collaboration | Bidirectional | Preparation for change | Descriptive researchI. Past-Current State |
| 21 | Job satisfaction in small-scale fisheries: Comparing differences between Costa Rica, Puerto Rico and the Dominican Republic (Partelow, Pollnac, & Ruiz, 2020) | 2020 | Leibniz Centre for Tropical Marine Research (ZMT),Bremen, Germany | Small-scale fishers | Isla ChiraPaquera-TamborIsla Venado | Pacific CoastGulf of Nicoya | Semistructured interviewsKey informantAttitudes | Contribution | Unidirectional | Preparation for change | Descriptive researchI. Past-Current State |
| 22 | Understanding and valuing human connections to deep-sea methane seeps off Costa Rica (Pereira et al., 2024) | 2024 | Center for Marine Biodiversity and Conservation, Scripps Institution of Oceanography, University of California, USA | Costa Rican taxpayers | Isla del Coco | Eastern Tropical Pacific | Choice modelling (experimental setting)Ecosystem services WTP | Coproduction | Bidirectional | Preparation for change | Descriptive researchI. Past-Current State, II. Scenario-ConstructionAnticipation research IV. Intervention research |
| 23 | Local community characteristics and cooperation for shared green reputation (Rivera et al., 2017) | 2017 | George Washington University, USA | Beach communities |  | North PacificCentral PacificSouth Pacific | Census SIGBased on interviews in previous work 2008 | Contribution | Unidirectional | Navigating change | Descriptive researchI. Past-Current State |
| 24 | Institutions and collective action in a Costa Rican small-scale fisheries cooperative: the case of CoopeTárcoles RL (Rivera et al., 2017) | 2017 | CoopeSoliDar R.L, San Jose, Costa Rica | Small-scale fishing cooperative | Tárcoles | Central Pacific Gulf of Nicoya | Semistructured interviewsSecondary information | Collaboration | Bidirectional | Navigating changeInstitutionalization | Descriptive researchI. Past-Current State |
| 25 | The importance of values in predicting and encouraging environmental behavior: reflections from a Costa Rican small-scale fishery (Sánchez-Jiménez et al., 2021) | 2021 | Leibniz Centre for Tropical Marine Research (ZMT), Bremen, Germany, University of Bremen,Germany, Centro de Investigación en Ciencias del Mar y Limnología (CIMAR). Universidad de Costa Rica | Small-scale fishers | Paquera-TamborCosta de PájarosIsla Chira | Pacific coast Gulf of Nicoya | DeliberationBehavior change interventionsExperimental settingEwE trophic modelScience communication  | Coproduction | Bidirectional | Navigating change | Descriptive researchI. Past-Current State, II. Scenario-ConstructionAnticipation research IV. Intervention research |
| 26 | Connecting a trophic model and local ecological knowledge to improve fisheries management: The case of Gulf of Nicoya, Costa Rica (Sánchez-Jiménez et al., 2019) | 2019 | Leibniz Centre for Tropical Marine Research (ZMT), Bremen, Germany, University of Bremen,Germany, Centro de Investigación en Ciencias del Mar y Limnología (CIMAR), Universidad de Costa Rica | Small-scale fishers | Paquera-TamborCosta de PájarosIsla Chira | Pacific coast Gulf of Nicoya | EwE trophic modelDeliberationSystems of knowledge integration and exchange  | Coproduction of knowledge | Bidirectional | Navigating change | Descriptive researchI. Past-Current State, II. Scenario-Construction |
| 27 | Community Perception and processes of Integrated Coastal Zone Management in the North Pacific of Costa Rica (Sánchez-Jiménez et al., 2015) | 2015 | Programa de Posgrado en Gestión Integrada de Áreas Costeras Tropicales (GIACT), Universidad de Costa Rica.Centro de Investigación en Ciencias del Mar y Limnología (CIMAR), Universidad deCosta Rica | Coastal communities | Cuajiniquil, Villarreal, Montezuma, and surrounding areas | North Pacific | Workshops consultationPerceptionsContent analysis | Collaboration | Bidirectional | Preparation for change | Descriptive researchI. Past-Current State |
| 28 | Sea turtles support sustainable livelihoods at Ostional, Costa Rica (Sardeshpande & MacMillan, 2019) | 2019 | Durrell Institute of Conservation and Ecology, University of Kent, Canterbury,UK | Coastal communities | Ostional | North Pacific | Semistructured interviewsKey informantsQuestionnairesLikert scalePerceptions Hypothetical scenario WTA | Coproduction | Bidirectional | Preparation for change | Descriptive researchI. Past-Current State, II. Scenario-Construction |
| 29 | A beacon of hope: distribution and current status of the largetooth sawfish in Costa Rica (Valerio-Vargas & Espinoza, 2019) | 2019 | Centro de Investigacíon en Ciencias del Mar y Limnología (CIMAR), Universidad de Costa Rica, Sistema de Estudios de Posgrado en Biología, Universidad de Costa Rica | Coastal and riverine communities  |  | CaribbeanPacificNorthen region | Semistructured interviewsAnecdotal records  | Contribution | Unidirectional | Preparation for change | Descriptive researchI. Past-Current State |
| 30 | Percepción comunitaria sobre arrecifes coralinos en Golfo Dulce: bases para integración social en programas de restauración (Villalobos-Cubero, et al., 2023) | 2023 | Raising Coral Costa Rica (RCCR), San José, Costa Rica | Artisanal fishers and tourist sector | Golfo dulce | South Pacific | InterviewsKnowledge perceptions | Contribution | Unidirectional | Preparation for changeNavigating change | Descriptive researchI. Past-Current State |