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NEW RESEARCH TO INFORM MANAGEMENT IN THE GALÁPAGOS MARINE RESERVE

INTRODUCTION

Located approximately 600 miles off the coast of Ecuador, the Galápagos Islands and surrounding Galápagos Marine Reserve (GMR) are one of the most ecologically iconic and diverse areas on the planet. The Galápagos National Park Directorate (GNPD) oversees a spatial zoning scheme to determine where and when different activities are permitted within the GMR. Although some artisanal fishing occurs, most activities in the GMR are related to tourism, which is central to the archipelago's economy and a main cause of environmental change.

The Lenfest Ocean Program is supporting Dr. Leah Gerber, Arizona State University, and a team of researchers to leverage multiple data sources and modeling approaches to improve the scientific basis for management in the GMR. The research team will work with the GNPD to develop a framework for structured decision-making that involves:

- Refining management objectives and modeling ecosystem behavior;
- Monitoring ecosystem change and response to management actions; and
- Evaluating spatial management options.

THE GALÁPAGOS ISLANDS AS A SOCIO-ECOSYSTEM

The GMR covers 133,000 square kilometers, or 51,352 square miles, surrounding the Galápagos Islands in the eastern Pacific Ocean. In 2014, the GNPD introduced the Galápagos Protected Area Marine Plan (GPAMP), which re-envisions the Galápagos as a socio-ecosystem where management recognizes the relations and processes that link human communities to their environment. Thus, the GPAMP prioritizes the recovery and maintenance of ecosystem services in the GMR, such as food, water and energy, coastal protection, and spiritual enjoyment, to support the continued well-being of the local population.

WE WILL WORK
WITH THE
GALÁPAGOS
NATIONAL PARK
DIRECTORATE
TO CO-DEVELOP
A DECISION
FRAMEWORK
TO INFORM
AND EVALUATE
MANAGEMENT
STRATEGIES IN
THE GALÁPAGOS
MARINE RESERVE."

Leah Gerber

The GPAMP calls for an integrated spatial model to enable managers to develop and prioritize zoning strategies, including defining ten coastal (e.g., wetlands, beaches) and marine (e.g., coral reefs, deep sea) habitat types and the associated ecosystem services they provide. In addition, an Adaptive Management Plan was developed that lays out the process for multi-use zoning and communication with the public going forward.







THE NEED FOR A TECHNICAL FRAMEWORK ALIGNED WITH MANAGEMENT

The GNPD recognizes that the current use of ecosystem services is unsustainable, with key impacts stemming from oversaturation of sites from mass tourism. The GPAMP and associated Adaptive Management Plan will help address these challenges. However, to implement these plans effectively requires knowing the ability and limits of ecosystems to provide services to local residents. A monitoring and evaluation program with ecosystem indicators linked to decision thresholds could help managers understand and act before systems become too degraded. Such a program could form the basis for evidence-based decision-making, including modification of zones when needed.

Structured decision-making offers a rigorous framework that would allow managers to assess management zones and actions against specified management objectives. Through this approach, researchers develop a monitoring program based on ecosystem indicators, thresholds and scientific modeling to feed ecological and socioeconomic information into implementation of the GPAMP and the Adaptive Management Plan.

RESEARCH APPROACH

The research team will work with the Galápagos National Park Directorate to develop a framework for structured decision-making.

Refine Management Objectives and Model Ecosystem Behavior

The research team will work with the GPND to develop management objectives that are measurable. The researchers will then evaluate existing ecosystem indicators to establish thresholds for management decisions. To do this, the researchers will integrate multiple existing data sources into metapopulation models to assess ecosystem change against specified management objectives as well as make projections for key species.

The team will employ this approach for three fishery species, three threatened or iconic species, and under three climate scenarios. Species and scenarios will be chosen in conjunction with GNPD technical staff. The research team is considering proposing yellow fin tuna, wahoo, and bacalao as the fished species; and waved albatross, green turtles, and Galápagos sharks as the threatened or iconic species.

Monitor Ecosystem Change and Response to Management Actions

The team will apply the metapopulation models to the revised zoning and implementation of the Adaptive Management Plan in three distinct regions: southeast Isabela; between Santiago and Santa Cruz; and southern San Cristóbal and Española. The aim is to explore the utility of a structured decision-making approach in areas with contrasting zoning rules.

New zoning rules for the GMR considers offshore areas for the first time. Thus, the research team will develop a new monitoring protocol for these areas. To align this protocol with monitoring programs elsewhere in the GMR, the researchers will leverage existing information on abundance, capture and movement of species (e.g., pelagic fishes and seabirds); identify information gaps for all study areas; and integrate existing data streams, as well as the input of local tour operators and other stakeholders.

Evaluate Spatial Management Options

Through the structured decision-making framework, the research team also aims to provide the technical tools to evaluate how likely different spatial configurations of zones in the GMR are to deliver on management objectives. The research team will co-develop all previously described modeling and monitoring efforts with the GNPD to facilitate their application across the GMR. By working directly with technical staff and managers, the research team hopes to ensure their efforts are not only robust but useable in a management context and tangible for stakeholders.

This project started in July 2019 and will run for the next three years.



RESEARCH TEAM

- Leah Gerber, Professor, Arizona State University, Director, Center for Biodiversity Outcomes
- Franzinho Smith, Marine Ecologist, Consultant to Galápagos National Park
- Monica Calvopiña, Conservation Planner, Consultant to Galápagos National Park
- Susana Cárdenas Díaz, Professor and Researcher, Universidad San Francisco Quito
- Paola Sangolquí, Ph.D. student, Arizona State University
- Dany Rueda, Galápagos National Park Directorate



CONTACT

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