



# *Project Brief*

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## **Small Grants Program:**

*The role of ecosystem services  
in adaptation to global  
change for human wellbeing  
(SGP-HW)*

*[SGP-HW 017] Small-scale Fisheries and Marine Ecosystem Services:  
Adaptation and Transformation to Secure Human Wellbeing  
(#SeAdapta)*

*Adapting for Sustainability in Small-Scale Fisheries and Ecosystem in  
Latin America*

SDGs: Goal 13 (Climate action), Goal 14 (Life below water)

Oceans are experiencing drastic change driven by anthropogenic activities. Ramírez et al. (2017) identified six areas of global significance for marine biodiversity, including the Central-Eastern Pacific Ocean and the Southwestern Atlantic, which are hotspots where sea-surface temperature increase rapidly. These bioregions are also under the influence of climate variability, such as El Niño Southern Oscillation (ENSO) or seasonally reversing winds. The changes subsequently also affect the coastal community's wellbeing.

The research project Small-scale Fisheries and Marine Ecosystem Services: Adaptation and Transformation to Secure Human Wellbeing (#SeAdapta) draws attention to the need to augment the adaptive capacities of small-scale fisheries and coastal communities. With support from the Inter-American Institute for Global Change (IAI), scientists have measured the adaptive capacity of three fisheries –Yellow Clam, Spiny Lobster, and Sea Cucumber– across Argentina, Uruguay, Brazil, and Ecuador.

Working together with science experts and staff from the National Directorate for Aquatic Resources (DINARA) and the Food and Agriculture Organization (FAO), the studies in Uruguay have combined long-term oceanographic trends with basic stock assessments, local ecological knowledge, and narrative analysis from small-scale fishers. One of the conclusions is that the management of small-scale fisheries would benefit from a partnership between conventional scientific approaches and local ecological knowledge. With the cooperation of FAO, researchers developed two guidance documents based on their findings. Furthermore, their case study was included in the book *Adaptive Management of Fisheries in Response to Climate Change*, which was edited and published by FAO.

Within Argentina's case study, several scientific advancements have been achieved in relation to the yellow clam (*Mesodesma mactroides*) and wedge clam (*Donax hanleyanus*). Comparison of growth parameters of *M. mactroides* showed a higher growth rate  $k$  and lower maximum age in Mar del Plata site than in Santa Teresita (close to Rio de la Plata estuary). Shell mass condition index and Oceanic Niño Index were negatively correlated, showing the influence of El Niño in shell properties of the species. Considering that events are becoming more intense and frequent, changes in growth rates and shell properties of Santa Teresita's population could be expected to be more vulnerable under climate change. The studies of the *D. hanleyanus* showed that low production and high mortality in Mar del Plata could be caused by a sharp decrease in habitat quality, associated with suboptimal temperatures. Also, the abundance of *D. hanleyanus* was positively correlated with primary production and negatively correlated with maximum salinity

values. These findings strongly suggests the negative impact of low-salinity waters derived from nearby continental discharges, which are strongly modulated by changes of wind patterns combined with hemispheric and global scale coupled atmosphere-ocean climate oscillations. In addition, researchers are currently assessing perceptions of the community and the information it receives regarding stressors related to climate change.

In the specific case of the Galapagos Islands, researchers evaluated the impact of COVID-19 over small-scale fishing sector and seafood consumption patterns. According to this research, the COVID-19 pandemic revealed the strong vulnerability of the Galapagos economy and seafood system to global systemic shocks. However, it also has revealed the key role that the small-scale fishing sector has played to sustain the food security and economy of the Galapagos province in times of need. New opportunities have emerged to promote a systemic transformation of the Galapagos seafood system and the management of small-scale fisheries to increase their resilience to future crises caused by new pandemics, climate change, and other anthropogenic drivers of change. To this end, the authors suggest four adaptation and transformation pathways: (1) promote local pelagic fish consumption; (2) strengthen fishers' entrepreneurial capacity of to improve market access; (3) use technology to reduce illegal, undeclared and unregulated fishing; and (4) promote a circular economy to reduce waste and add value to small-scale fisheries.

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# SMALL SCALE FISHERIES AND MARINE ECOSYSTEM SERVICES

Adaptation and Transformation to Secure Human Wellbeing (#SeAdapt)



**G** Central-Eastern Pacific Ocean and the Southwestern Atlantic are **global marine hot spots**

Oceanic areas where warming is occurring at several times greater than the global average rate (Hobday et al. 2016)



- Yellow Clam
- Spiny Lobster
- Sea Cucumber

**A**

**Adaptive capacity**

of **small-scale fisheries** across Argentina, Uruguay, Brazil and Ecuador

## Case Study Results

### Argentina

" Assessed the current state of yellow clam and wedge clam stocks "

#### Yellow Clam



(*Mesodesma mactroides*)

**Negative correlation** between **Shell mass condition** and **El Niño Index**

#### Wedge Clam



(*Donax hanleyanus*)

The abundance of *D.hanleyanus* has **Positive correlation** with **primary production** and **Negative correlation** with **high salinity**

### Uruguay

" Analyzed long-term social-ecological trends in a small-scale fishery "

The research team (#SeAdapta) worked together with the National Directorate for Aquatic Resources (DINARA) and the Food and Agriculture Organization (FAO). They combined long-term oceanographic trends with basic stock assessments, local ecological knowledge and narrative analysis from various sources.

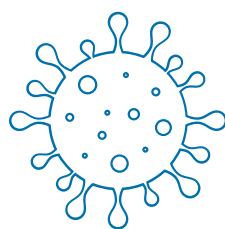
[Click to view their collaborative publications](#)



- [Adaptive Management of Fisheries in Response to Climate Change \(FAO, 2021\)](#)
- [Transición hacia un enfoque ecosistémico de la pesca - Lecciones aprendidas de pesquerías de América del Sur \(FAO, 2020\)](#)
- [Harnessing scientific and local knowledge to face climate change in small-scale fisheries \(Global Environmental Change, 2021\)](#)

### Ecuador

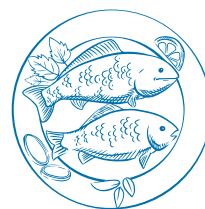
" The impact of COVID-19 on the small-scale fishing sector and seafood consumption patterns in the Galapagos Islands "



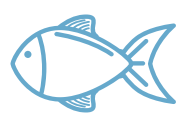
**Strong vulnerability** of the Galapagos economy and seafood system to global systemic shocks

Small-scale fishing sector has played a key role to sustain the food security and economy of the Galapagos province in times of need.

**At the same time,**



**To increase their resilience to future crises,**



**Promote**

local pelagic fish consumption



**Strengthen**

fishers' entrepreneurial capacity to improve market access



**Use**

technology to reduce illegal, undeclared and unregulated fishing



**Promote**

a circular economy to reduce waste and add value to small-scale fisheries.