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A Gama tool to study the Senegalese artisanal fisheries dynamics

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Keywords

Senegalese artisanal fishery, Migrations, Climate change, Fishery collapse, Agent Based Modeling, Deep Learning, Sustainable Development

Abstract

The "Lolly Simulator", implemented in Gama, is a tool for artisanal fishery management decision support including the climate and socio-economic parameters that may impact the fishery. The impact of climate change on fisheries is not straightforward, thus the purpose here was to make it emerge from the impact of spatially explicit climate change scenarios on the distribution of fish habitat. In turn, the distribution of fish habitat impacted artisanal fishing trips distance and duration. Artisanal fisheries in low governance areas, such as developing countries, are weakly impacted by regulation, thus the purpose was to relate the fishing effort to market demand, itself controlled by processing capacities infrastructures. Social behaviors and financial mechanism constrained the onset of fishing operations and migrations, the purpose of the model was to assess the impact of these processes through migrations probability and duration parameters.

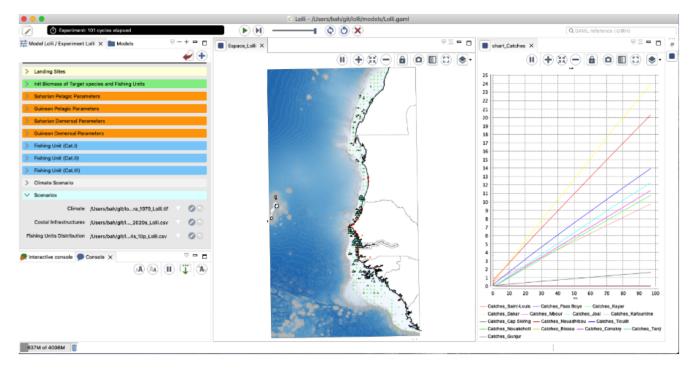


Figure 1: "lolly" simulator graphical interface

Sensors , MELAX buoy, Satellites Images, Radar, Oceanic simulations, Deep Learning

(Data/Observations) Physic/Ecology/ Economy

Oceanography (Sea surface temperature, Salinity, Currents, Swell...) Atmosphere (Wind, temperature, rain) Biomasses (Landings, fish populations) Market (Price, Demand,...)

Interviews, Focus Groups, Social Surveys, Literature study

(Data) Society/Politic

Actors' logics / Actors' network /

Politics/Diplomatie (Fishing Agreements, Management,..)

Fishers' community historic/ New communities appearance

Fisher's Migrations?

Interactions

Migrations scenarii Future fisher's community dynamics Futures tipping points / Resilience

Modelisation

Mathematic Informatic Agent Based Model or Equation based model Gama Platform

Figure 2: Schematic view of the interdisciplinary research strategy. Processes and parameter to be identified are in the circles, while methods to approach them are in the squares.