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MODELING SPATIAL POPULATION DYNAMICS OF GREEN TURTLE (CHELONIA MYDAS) IN THE SOUTHWEST OF INDIAN OCEAN

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References

1/ An integrative approach

“Field data as the basis for parameterization and validation of the model”

Active research programs in the SWIO have generated and are still generating a large number of data focused on green turtle that are integrated into the model:

1) Recent nesting population status and seasonality based on long-term beach tracks monitoring started in 1985
2) Nest parameters and activity based on yearly nest monitoring and incubation temperature since 2006.
3) Regional genetic structure known for the SWIO
4) Physiological studies conducted on captive and free-living individuals since 2007
5) Identified adult migration routes and juveniles open sea behavior, using at least 140 satellite tracks deployed from 2004 to 2011
6) Oceanographic data such as currents or sea surface temperature retrieved from physical models as well as regional fisheries data from RFMOs.

This entire set of collected data acts as the basis for realistic parameterization and validation of the model.

2/ Individual Based Modeling

“A suitable tool to model green turtle population dynamics in the light of individual traits and local interactions”

Individual-based models aim to understand ecological systems from the properties of individuals that constitute that system. They are helpful when global properties emerge from individual singularities and local interactions. Regarding the complex biological cycle of green turtles and the variability in individual traits, individual-based modeling appears to be particularly promising tool. Indeed, sea turtles population dynamics are driven by local interactions in between individuals and between individuals and environment at breeding and foraging grounds as well as during migrations. Moreover individuals breeding at the same rookery sites are likely to feed at distinct foraging area. Similarly, individuals from multiple rookeries may be found in the same foraging area or developmental habitat. We believe that sea turtles population dynamics cannot be understood without considering these local interactions.

3/ Expectations

“Viability of green turtles stock in the South West of Indian Ocean”

Main results of our simulation experiment should lead to a fine evaluation of the viability of green turtle population in the region and also to a complete description of the underlying processes. A clear view of the link between these processes could help conservation managers to identify key levels for conservation priorities: habitats conservation and restoration, fishing by-catch, pollution, poaching and so forth.

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