

Cuban research on sea turtles (1994-2021): Authorship, subject, and collaboration analysis

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ABSTRACT

This article analyzed Cuban research on sea turtles from a thematic and bibliometric perspective. This has been a mixed investigation in which bibliometric and content analysis techniques were applied. The Google Scholar database was used to retrieve documents. The authors with the highest productivity were those from the Fisheries Research Center (Cuba). The thematic areas most studied were: Studies in nesting areas (41%) and Conservation and management (25.6%). The south of the Guanahacabibes peninsula and the south of the Isla de la Juventud were the most examined geographical areas. The most studied species were: *Chelonia mydas*, *Eretmochelys imbricata*, and *Caretta caretta*. According to the centrality degree, the most important institutions were Cuban, standing out the Center for Fisheries Research, the Center for Marine Research, and the University of Havana. The most significant collaboration links were between the University of Havana-Marine Research Center, the National Company for the Protection of Flora and Fauna-Marine Research Center, the Marine Research Center-Fisheries Research Center, and the University of Havana-INSTEC. Through the thematic analysis, it was evidenced that there are geographical areas that sea turtles also inhabit. However, there are not many studies in this regard. Future research is recommended in order to deepen these issues for the best management of sea turtles in Cuba.

Keywords: marine species; conservation; biodiversity; bibliometrics, research trends.

INTRODUCTION

Despite their important ecological role, sea turtles are among the world's most endangered vertebrates. They are considered important species for conservation due to the innumerable threats they face. Its survival has awakened interest in research worldwide and, in the case of Cuba, has led to the development of different

conservation programs and the application of various regulatory measures. These turtles are part of complex marine and coastal ecosystems, to which they contribute with their health and maintenance. They play multiple roles, so the scientific community contributes significant efforts to their conservation (Arizaga, 2020).

Due to their wide geographical distribution, migratory habits, slow growth and late sexual

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maturation, they are highly vulnerable in all phases of their development (Azanza *et al.*, 2006). The management and conservation of sea turtles is a recurring theme for the scientific community in Cuba. This is somehow linked to the study of the environment since the five species that inhabit on the island (Carrillo & Moncada, 1998; Moncada *et al.*, 2000) are classified on the Red List of Threatened Species of the Union International for Conservation of Nature (IUCN), and in the Appendices of the International Convention for Trade in Endangered Species of Wild Fauna and Flora (CITES). The investigations developed on this subject have increased the knowledge about the populations of these species in Cuba. This places the country prominent in research within the Caribbean region (Moncada *et al.*, 2013). However, the patterns of Cuban scientific production around these issues are unknown. The study of scientific literature, applying bibliometric techniques, offers a clear view of publication trends. For this reason, the objective of this study is to analyze, from a thematic and bibliometric perspective, Cuban research on sea turtles. Throughout the study, the following research questions (PI) will be answered:

- PI 1: Who are the most productive Cuban authors on sea turtles?
- PI 2: What are the most studied thematic lines, geographical areas and species?
- PI 3: What are the patterns of scientific collaboration at the institutional and country level?

MATERIALS AND METHODS

This is a mixed investigation in which bibliometric and content analysis techniques were applied. To retrieve the literature on sea turtles, the Google Scholar database was used since it is beneficial for consulting publications that are not part of the so-called “mainstream” (González-Valiente *et al.*, 2016). For the search strategy, the terms ‘sea turtles’ and ‘Cuba’ were used throughout the document, using the Spanish and English variants. The defined temporal coverage was 1994–2021 since it is from 1994 that, based on the preservation of these species, the fishery in Cuba is reduced to only two traditional capture sites: Nuevitas and Cocodrilo

(Carrillo *et al.*, 1999), being established in 2008 a total ban for these species for an indefinite period (Caderno & Moncada, 2019). The sample was limited to the documentary typology: original articles, review articles, book chapters, and master’s and doctoral theses. ‘Cuban research’ was considered to be those studies in which, regardless of the author’s origin, the issue of sea turtles in Cuba was addressed.

Using the terms in Spanish, 1,940 documents were retrieved, and 3,980 used English variants. The content of each document was analyzed to confirm the focus of the topic. After a disambiguation and normalization process, we worked with a sample of 78 papers. The variables were also normalized: author, keywords, country, affiliation, themes, geographical areas and species. From this, productivity indicators were calculated through statistical counting. Lotka’s Law (1926) was used to determine the most productive authors. Collaborative bibliometric networks were also generated, from which centrality measures were calculated (Freeman, 1977).

Scientific articles represented the highest percentage of the papers reviewed (90%), which confirms that this documentary typology is the most rigorous, dynamic and visible form of communication in current science (Thomas-Sánchez *et al.*, 2017), and the most used for the socialization of research results (Paz, 2018). It is worth mentioning that we did not recover any book typology in the studied period.

The thematic areas were defined in correspondence with the study object in the investigations. When the same publication addressed more than one theme, both were taken into consideration:

- Human-sea turtle interactions: fisheries, by-catch, poaching
- Studies in nesting areas: nesting areas and beaches, quantification of nests, reproductive behavior
- Studies of development and water habitats: juveniles, breeding and development areas, growth, feeding stomach content
- Migration and connectivity: metallic dialing, satellite dialing
- Conservation and management: protection and conservation measures, state of the populations.

- Genetics: DNA studies
- Diseases

RESULTS AND DISCUSSION

Productivity analysis and themes

Table 1 shows the large producers. 22 and 59 authors also identify as medium and small producers. It is significant to recognize that of the 5 large producers, 4 of them worked at the Fisheries Research Center at the time of the publication of the research results.

Authors	Number of documents	%*
Félix Moncada Gavilán	40	51,2
Julia Azanza Ricardo	30	38,4
Gonzalo Nodarse Andreu	26	33,3
Yosvani Medina Cruz	17	21,7
Alexis Meneses	10	12,8

Tabla 1. Most productive authors.

The most recurring themes were identified: Studies in nesting areas, addressed in 32 publications (41%), and conservation and management, present in 20 documents (25.6%). The cause of the first result could be related to the fact that studies in nesting areas are more accessible. The second result might be oriented towards their proper management and conservation.

When analyzing the geographical locations in the investigations, the south of the Guanahacabibes peninsula was considered the one with the highest number of documentary contributions (33.3% of the total), followed by the south of the Isla de la Juventud (19.2%). This could be because the southern coast of the Cuban archipelago, in a general sense, concentrates most of the nesting of sea turtles (Cardona & de la Rúa, 1972; Moncada *et al.*, 2011). In 30.8% of the documents, the geographical area was not identified.

Regarding the Guanahacabibes peninsula, the program development for studying and conserving Marine Research Centre sea turtles could also have had an influence. This program is the only one in the country that involves voluntary collaborators, allowing the

multiplication of efforts in conserving these species and positively impacting the formation of values aimed at protecting the environment (Azanza *et al.*, 2014). In addition, the peninsula was recently identified at the national level as one of the critical areas for monitoring the possible impacts of Climate Change on biodiversity (Azanza *et al.*, 2019).

Regarding the language of publications, 61.5% (48 papers) were in Spanish, and 26.9% (21 papers) were in English. The rest of the publications (9; 11.5%) were in both languages. Although the use of English is not a quality indicator (Buena-Casal, 2001), its acceptance as a universal language for scientific communication is genuine and proven (Foratini, 1997; Hamel, 2007; Child, 2013; Mendoza-Parra & Paravic, 2018).

Of the total publications examined, 64.1% (50 papers) contained information on the species *Chelonia mydas*, 48.7% (38 papers) on the species *Eretmochelys imbricata*, and 50% (39 documents) on *Caretta caretta*. The species *Dermochelys coriácea* and *Lepidochelys olivácea* were only addressed in 12.8% (10 papers) and 6.4% (5 papers), respectively. The fact that this work showed that the green turtle has been the most studied could be related to the fact that, according to Nodarse *et al.*, (1998), this is the main nesting species in the Cuban archipelago and the main nesting species in the Cuban archipelago.

Collaboration analysis

The institutional collaboration network is made up of 48 nodes and 182 links. According to the degree of centrality, the most important institutions are precisely Cuban, standing out the Center for Fisheries Research, the Center for Marine Research, and the University of Havana (see table 2). The Fisheries Research Center, from the late 1960s of the 20th century, initiated the first actions for protecting and conserving sea turtles, which consisted of collecting and planting eggs and releasing hatchlings in the main nesting areas of the southern archipelagos (Moncada *et al.*, 2013). Starting in the 1990s, the Center for Marine Research and the Faculty of Biology, belonging to the University of Havana, also became involved in conservation and research activities on these species (Moncada *et al.*, 2013).

Institution	Country	Betweenness centrality	Institution	Country	Degree
Centro de Investigaciones Pesqueras	Cuba	154.5	Centro de Investigaciones Pesqueras	Cuba	33
Centro de Investigaciones Marinas	Cuba	115.233333	Centro de Investigaciones Marinas	Cuba	26
Universidad de La Habana	Cuba	92.433333	Universidad de La Habana	Cuba	21
Universidad Nacional Autónoma de México	Mexico	57.4	Universidad Nacional Autónoma de México	Cuba	20
Instituto Superior de Tecnologías y Ciencias Aplicadas	Cuba	23.766667	Instituto Superior de Tecnologías y Ciencias Aplicadas	Cuba	15
Empresa Nacional para la Protección de la Flora y la Fauna	Cuba	16.683333	Centro de Investigaciones Biológicas del Noroeste	Mexico	14
Patricia and Phillip Frost Museum of Science	United States	12.583333	Universidad de la Florida	United States	14
The Ocean Foundation	United States	8.416667	Universidad Central de la Florida	United States	14
Centro de Investigaciones Biológicas del Noroeste	Mexico	5.333333	Empresa Nacional para la Protección de la Flora y la Fauna	Cuba	12
Universidad de la Florida	United States	4.35	Caribbean Conservation Corporation	Costa Rica	10

Tabla 2. Institutions with a higher degree and structured centrality in the institutional collaboration network.

Similarly, these institutions have the most significant mediating role within the map (see figure 1). Although in this case, the National Autonomous University of Mexico and other North American institutions are also represented due to the collaboration they have maintained systematically with Cuban researchers. The most significant collaboration links are between the University of Havana-Marine Research Center, the National Company for the Protection of Flora and Fauna-Marine Research Center, the Marine Research Center-Fisheries Research Center, and the University of Havana-INSTEC.

Through this study, it was possible to characterize the behavior of the research activity around sea turtles in Cuba. Through the thematic analysis, it was evidenced that there are geographical areas where sea turtles also nest. However, there are not many studies in this regard. Future research is recommended in order to deepen these issues for the best management of sea turtles in Cuba.

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REFERENCES

ARIZAGA, M., R. E. & CÁRDENAS P., L. E. (2020). Efecto de la luz artificial en la anidación de tortugas marinas en playas del Cantón Puerto López, Manabí, Ecuador. *INNOVA Research Journal*, 5(3.1), 300-314.

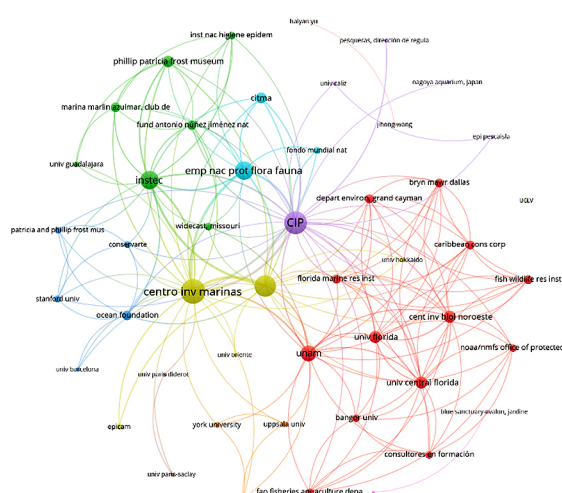


Figure 1. Institutional collaboration network.

- AZANZA R. J., FORNEIRO M. Y., MARTÍNEZ, G. Y., MÁRQUEZ, L., PÉREZ A. A., CALDERÓN P. R. ... & FERNÁNDEZ, J. (2019). Avances del proyecto universitario "Prevención de los efectos del cambio climático en especies amenazadas". *Monteverdía*, 12(2), e3273. Recuperado de: <https://revistas.reduc.edu.cu/index.php/monteverdia/3273>.
- AZANZA, R. J., IBARRA, M. M. E., & COBIÁN R.D. (2014). El papel del voluntariado en la conservación de tortugas marinas en la península de Guanahacabibes, Cuba. *Revista de Investigaciones Marinas*, 34(1), 24-35.
- AZANZA, R. J., RUISANCHEZ C.Y., IBARRA, M. E., RUIZ, U. A., LUIS, C. C. Y., & RÍOS, T. D. (2006). Indicadores del éxito reproductivo de la tortuga verde (*Chelonia mydas*) en tres playas de la Península de Guanahacabibes, Pinar del Río, Cuba. *Revista de Investigaciones Marinas*, 27(1), 69-78.
- BUELA-CASAL, G. (2001). La psicología española y su proyección internacional. El problema del criterio: internacional, calidad y castellano y/o inglés. *Papeles del psicólogo*, (79), 53-57.
- CADERNO, P.A. & MONCADA G. F. (2019). Análisis de la pesquería furtiva de tortugas marinas en aguas de la plataforma cubana. *Revista Cubana de Investigaciones Pesqueras*, 36(1), 1-8.
- CARDONA, R. & RÚA, R. DE LA (1972). Protejamos nuestras tortugas. *Boletín de Divulgación Técnica, CIP*, 5, 5-35.
- CARRILLO, E., WEBB, G. J. W. & MANOLIS, S. C. (1999). Hawksbill turtles (*Eretmochelys imbricata*) in Cuba: An assessment of the historical harvest and its impacts. *Chelonian Conservation Biology*, 3(2), 264-280.
- CARRILLO, E. C. & MONCADA G., F. (1998). Anexo 1. Tortugas marinas de Cuba. *Revista Cubana de Investigaciones Pesqueras*, 22(1), 59-60.
- FORATINI, O. P. (1997). A lingua francada ciencia. *Rev. Saude Publica*, 31, 3-8.
- FREEMAN, L. (1979). Centrality in Social Networks Conceptual Clarification in Hawaii Nets Conferences. *Social Networks. An International Journal of Structural Analysis Lausanne*, 1(3), 215-239. [https://doi.org/10.1016/0378-8733\(78\)90021-7](https://doi.org/10.1016/0378-8733(78)90021-7)
- GONZÁLEZ-VALIENTE, C. L., NÚÑEZ A., S., SANTOVENIA D., J. R. & LINARES H., M. P. (2016). Análisis de la revista *Bibliotecas. Anales de Investigación. Biblios*, 62, 1-16. <https://doi.org/10.5195/biblios.2016.259>
- HAMEL, R. E. (2007). The dominance of English in the international scientific periodical literature and the future of language use in science. *AILA Review*, 20(1), 53-71. <https://doi.org/10.1075/aila.20.06ham>
- LOTKA, A. J. (1926). The frequency distribution of scientific productivity. *Journal of the Washington Academy of Sciences*, 16(12), 317-323.
- MENDOZA-PARRA, S., & PARAVIC, T. (2018). Origen, clasificación y desafíos de las revistas científicas. *Investigación y postgrado*, 21(1), 49-75.
- MONCADA G., F., NODARSE A., G., G., AZANZA R., J., MEDINA C., Y., & FORNEIRO M., Y. (2011). Principales áreas de anidación de las tortugas marinas en el archipiélago cubano. *Cub@: Medio Ambiente y Desarrollo*, 11(20).
- MONCADA, F., NODARSE, G. & MEDINA, Y. (2013). Investigación y conservación de las tortugas marinas en Cuba. *Revista Cubana de Investigaciones Pesqueras*, 30(1), 75-77.
- MONCADA, F., RODRÍGUEZ, A., MÁRQUEZ, R. & CARRILLO, E. (2000). New report of the olive ridley turtle (*Lepidochelys olivacea*) in Cuban waters. *Marine Turtle Newsletter*, (90), 13-15.
- NIÑO, P. M. (2013). El inglés y su importancia en la investigación científica: algunas reflexiones. *Revista Colombiana de Ciencia Animal*, 5(1), 243-254. <https://doi.org/10.24188/recia.v5.n1.2013.487>
- NODARSE, G., MONCADA, F., MENESES, A. & RODRÍGUEZ, C. (1998). Long term monitoring of the green sea turtle (*Chelonia mydas*) in the Southern Platform of Cuba. *Proceeding of the 18th International Symposium on Sea Turtles Biology and Conservation*, pp. 67-68.
- PAZ E., L. E. (2018). *Actividad editorial y socialización de la ciencia*. Editorial Feijóo.
- THOMAS, S., R., PIS R., M. A. & ARENCIBIA C., G. (2017). Análisis de la producción investigativa, redes de colaboración e impacto científico del Centro de Investigaciones Pesqueras, Cuba (2000-2015). *Bibliotecas. Anales de Investigación*, 13(2), 185-201.

