Knowledge and positive perception about crocodiles by the inhabitants of two communities of the Sian Ka'an Biosphere Reserve

Primary Researcher:
MSc. Javier Arturo Benítez-Moreno
Departamento Sistemática y Ecología Acuática, El Colegio de la Frontera Sur
Chetumal, México, 77014

Project Advisor:
Dr. José Rogelio Cedeño-Vázquez
Departamento Sistemática y Ecología Acuática, El Colegio de la Frontera Sur
Chetumal, México, 77014

Introduction

Local knowledge is a set of beliefs, traditions, observations, and experiences with the environment, consistent with each other for those who share it (Farrington & Martin, 1998; Dixon et al., 2001). The perception of the environment has been described as the result of the continuous interaction between the natural and social environments, building part of what is known as culture (Verde et al., 2009).

Crocodiles are among the animal species in need of attention regarding their conservation status and their relationship with humans, sometimes the negative attitude from people to humans, based on bad experiences or media influene and a gap of knowledge about a positive coexistence promote the hunting and rejection to crocodiles (García-Grajales & Buenrostro-Silva, 2019). The American crocodile (*Crocodylus acutus*) is the most widely distributed in America and is found in 18 countries (Thorbjarnarson et al., 2006); its range extends from the southern tip of Florida, along both the Atlantic and Pacific coasts of Mexico, Central America, and northern South America, as well as the Caribbean islands of Cuba, Jamaica, and Dominican Republic (Groombridge, 1987; Kushlan, 1988; Thorbjarnarson et al., 2006).

The other crocodile species in Mexico is the Morelet´s crocodile (*C. moreletii*), which range includes the Petén in Guatemala, Belize, and south-eastern Mexico. The species inhabits freshwater ecosystems such as lakes, swamps, streams, lagoons within forests, temporary lagoons ("aguadas") associated with jungles, and is frequently found in slow-flowing rivers, although occasionally also rushing rivers.

In Mexico, both species occupy areas of frequent contact with humans, *C. acutus* in the Pacific coast, *C. moreletii* in the Gulf of Mexico, and both species in the Yucatán Peninsula. In Quintana Roo, both species coexist along the coastal zone, where human settlements of different sizes in extension and population are located; some of these locations receive dozens of tourists per year (Lozano, 2016; Damián, 2020), increasing the number of people visiting the areas with presence of crocodiles. With this background, the main objective of this research was to document and evaluate the knowledge and perception of the Sian Ka'an locals, a first step in the way to enhance and promote a positive coexistence between humans and crocodiles.

Methods

Study area

The Sian Ka'an Biosphere Reserve (SKBR) is located on the Mexican Caribbean coast (Mazzotti et al. 2005). The vegetation in SKBR includes patches of jungle, flooded grassland, and savanna, dominated by grassland (*Cladium jamaicense*) and extensions of white (*Laguncularia racemosa),* black (*Avicennia germinans*), and red (*Rhizophora mangle*) mangroves (Centro de Investigaciones de Quintana Roo [CIQRO], 1983; Durán & Olmsted, 1990; Secretaría del Medio Ambiente y Recursos Naturales [SEMARNAT], 1996; Mazzotti et al., 2005). There are two major villages in the SKBR, Punta Allen and Punta Herrero, the main economic activities developed in the community are sport fishing, the sustainable use of spiny lobster (*Panulirus argus*) and tourism focused on wildlife watching (INEGI, 2010a; Ley-Cooper et al., 2013; Gómez-Dzib, 2016; Cabrera-Borraz et al., 2018).

Surveys

We applied individually questionnaires to the resident inhabitants of Punta Allen and Punta Herrero over 18 years of age, without distinction of sex, occupation, or educational level. The questionnaires were carried out while the respondents were in their homes or their workplaces. The sample size was calculated considering the total size of the population in each community, with an error of 0.10% and 0.90% confidence and securing at least the 10% of the total population.

The surveys were conducted from August to October 2019 and from November 2020 to January of 2021. The instrument consisted in a semi-open model; we considered extra data from the respondents that could provide an idea to understand better the community context (Vela, 2001; Tarrés, 2004).

Results

Surveys

The inhabitants of both villages have a medium level of knowledge about basic aspects of crocodile biology, however, their attitude towards the danger and proximity to crocodiles is positive. The sightings have reinforced their knowledge empirically; although crocs are not important in their economic activity, they showed a positive attitude to keep them in the SKBR and to learn more about them. It is necessary to develop a communication program that fills the gap in the local's knowledge, to promote conservation and positive coexistence between crocodiles and humans.

Additionally, a statistical analysis was applied to the socioeconomic variables included in the surveys comparing the information obtained in the questions on the importance, dangerousness and liking of crocodiles. None of the tests applied to socioeconomic variables in relation to importance, dangerousness and liking of crocodiles, showed significant differences in the variables evaluated.

Workshops and community engagement

A total of 50 people assist to a different activities during the workshops, including some kids; also was handed a set of infographic material to touristic cooperatives and some leaflets to have a greater scope with tourists and locals about crocodiles importance and conservation.

Discussion-Conclusion

Regarding the communities and their level of knowledge in general (three levels), there is a tendency of better information management in Punta Herrero than in Punta Allen, but it seems that this it depends on local and characteristics of the towns and their population.

Also, sometimes the people are self-selective in this kind of activities, and that those not interested in the topics on environmental education around crocodiles, do not participate of the activities (Skupien et al., 2016), in addition, they could not prove in the long term the effects of their educational program, which reinforces that this type of programs should be constant and planned with future actions. In Tabasco were applied educational programs to children, to determine the perception that infants have towards crocodiles, it seems that the knowledge if locals is obtained apparently by the proximity to the reptiles and the frequency of sightings (Ocampo-González et al., 2021), as also has been reported in Campeche, Mexico (Padilla & Perera-Trejo, 2010; Rodas-Trejo et al., 2018).

It can be concluded that the part of the population surveyed in Punta Allen and Punta Herrero has a low to medium level of knowledge about basic aspects of the biology of crocodiles in the SKBR, as well as aspects of importance and forms of exploitation, therefore it is necessary to implement better and constant communication strategies and dissemination of information that seeks the appropriation of knowledge and awareness on the part of the population towards crocodiles.

It is necessary to assess the level of knowledge and perception also of minors, trying to reach as many students as possible in the communities, to identify the gaps in their knowledge of the species and to start forming a baseline of educational products that promote peaceful coexistence and crocodile conservation, if possible, by including them in the formal activities of the school curriculum.

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