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Conflicts and solutions related to marine turtle conservation initiatives in the Caribbean basin: Identifying new challenges

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ABSTRACT

Conflicts among and between local, national, regional and international stakeholders involved in marine turtle conservation are increasing. Often, they arise because of different socio-economic backgrounds of the people or groups involved. Here, we identified and assessed the conservation-based conflicts occurring in 24 of the 39 Caribbean countries, including their frequency, level of severity, number of stakeholders' groups involved, the degree to which they hinder conservation goals, and potential solutions. Using a cross-sectional social survey, we evaluated the presence and details of conservation conflicts provided by 72 respondents. The respondents included conservation-based project leaders, researchers, people involved in policy-based decision-making, conservation volunteers (community-based conservation groups), and species experts with experience working on marine turtle conservation programs in the Caribbean. The respondents identified 136 conflicts, and we grouped them into 16 different categories. The most commonly mentioned causes of conflicts were: 1) the 'lack of enforcement by local authorities to support conservation-based legislation or programs' (18%); 2) 'legal consumption of turtles by one sector of community clashing the conservation aspirations of other sectors of community (14%); and 3) 'variable enforcement of legislation to limit/prohibit use across range states of the species (10%). From our data it is also apparent that illicit activities in the region are also likely to impact the future success of conservation or monitoring based projects and programs. Overall, an exhaustive review was carried out, and the potential solutions were gathered. Due to the level of severity (physical violence) that some conflicts have reached, achieving solutions will be challenging without mediation, mutual cooperation around shared values, and adaptive management arrangements. Achieving this will require combinations of bottom up and top down collaborative governance approaches.

1. Introduction

Human-human conservation conflicts are generally associated with differing values or perspectives towards the natural assets and the means or reasons underlying the desire to protect them (Kinan and Dalzell, 2005; Olsen et al., 2018). Some conflicts, such as those linked to the management of illegal or commercial use of wildlife (e.g. ivory, rhino horn, turtle shell, and shark fin) are large, well described, international and somewhat pervasive (Migraine, 2015; Simpfendorfer and Dulvy, 2017; Stahl and De Meulenaer, 2017). While these conservation challenges are well known, information related to the factors that lead to human-human conflicts, and/or how they impact species-based conservation programs are not well understood (such as reasons, solutions, approaches, or outcomes). Indeed, documenting the differences and opportunities to reduce them could help future conservation initiatives.

Different perspectives on pro-environmental topics are part of human relationships and are linked to cultural, social, political norms or economic circumstances (Douglas and Alie, 2014; IOSEA, 2014). While differences can lead to conflict and disengagement from conservation-based initiatives, some authors have claimed that conflicts can have some positive influence, because over-time they can act as a catalyst for sustainable solutions that articulate multiple-perspective approaches (Redpath et al., 2013). Indeed, involving more people with

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various cultural values and socio-economic backgrounds is often recommended because overtime it can improve cross-stakeholder relationships and thus a governments ability to seek and achieve balanced conservation goals (e.g. alternative livelihood programs) (Carter et al., 2017; Kouassi et al., 2017).

For instance, Hamann et al. (2006) highlighted that the success of marine turtle conservation initiatives in Vietnam, such as the prevention of domestic sale of turtle products, is linked to the willingness of all stakeholder groups to cooperate and participate in initiatives to support legislation. Another example occurs in a marine turtle management program in Palau, where research by Risien and Tilt (2008) found that a bottom-up (community-based) conservation structure was successful because well-informed locals increased their participation in pro-environmental activities, and they recommended their program be implemented in other communities. Overall, the authors attribute success to the community-based program harnessing community values and receiving top-level government support. Both of which led to improved decision-making, and the development of integrative policy towards marine turtle conservation initiatives.

Cultural, social and/or economic links between marine turtles and people occur in many countries, and in some there is a strong cultural link between marine turtles and traditional societies, such as traditions, rituals, customs, and uses. The relationships human societies have with marine turtles, and how/why they value turtles, may be influenced by the diverse social or cultural backgrounds and the benefits, perceived or real, that are derived from their use or presence (Campbell, 2003; Casale and Margaritoulis, 2010; Erlandson and Rick, 2010). For instance, economic differences among regions within a country, or between countries, can influence the values of local people and influence the degree to which they support conservation initiatives for marine turtles. Furthermore, in some countries, the use of marine turtles as a food source occurs because there are high levels of poverty (Mancini et al., 2011). In these cases, marine turtle meat is often considered to be an essential and valuable source of protein (Williams et al., 2016; Barrios-Garrido et al., 2017; Williams, 2017). Hence, consumptive use of marine turtles often occurs where there is a strong economic driver, but this type of consumptive use is not generally encouraged under western conservation paradigms (Poonian et al., 2016; Barrios-Garrido, 2018).

Marine turtles are migratory and their extent of occurrence often encompasses multiple national jurisdictions (Hamann et al., 2010). In addition, the socio-economic conditions and values of people vary among the countries, or communities, throughout their range (Frazier, 2005; Horrocks et al., 2011). This variation in the human-dimensions makes initiating national or regional conservation programs a challenging strategy to minimise threats to migratory species (e.g. Miller et al., 2018). This is especially the case in regions where the majority of countries are classed by the United Nations development indices as developing, such as several nations in the Caribbean Basin (Buitrago et al., 2008; Campbell, 2014). In the Caribbean region there are 39 countries, comprising various social, economic, and cultural differences both within and among countries. Hence, designing and implementing conservation initiatives for IUCN listed species with an extent of occurrence covering a large area of the region will be influenced by the values of the people involved.

Although marine turtles are species listed as threatened by the IUCN and thus protected by international treaties and domestic legislation, management of threats to them are challenging because they are long lived, migratory, and occupy large spatial areas. Some researchers affirm that marine turtle conservation initiatives are particularly challenging to initiate in the Caribbean because turtles are shared among countries and there is a large variety of values and beliefs held by the region's residents about the importance of turtles (Eckert, 2002; Horrocks et al., 2016). Hence, the inter-agency and multinational approaches have become important for improving the success of conservation initiatives in the area (IAC, 2013; Campbell, 2014). For this reason, in order to identify, assess, quantify, and evaluate the conservation conflicts regarding marine turtles (in the Caribbean Basin), and how they might influence conservation, we used qualitative and quantitative analysis to examine existing conflicts that could hinder conservation initiatives towards the marine turtles in the Caribbean region.

2. Methods

In order to identify and evaluate the conflicts between people in relation to marine turtle conservation initiatives, a cross-sectional social survey was carried out (Lavrakas, 2008; Alonso et al., 2017). The 66-question survey (Appendix 1) was designed and prepared in English, and then translated and delivered in Spanish and English between September and November 2016. The survey collected data in four sections: (a) general information about each the respondents experience with the topic and their academic background; (b) identification of the potential conservation-based conflicts in the area where the respondent has experience; (c) evaluation of the severity of the conflicts each respondent identifies; (d) description of the potential solutions to minimise or eliminate the identified problems. The survey collected both qualitative and quantitative data.

For section (b) of the survey, we provided a list of fifteen potential conflicts based on conflicts commonly cited in the conservation-based literature. Then to facilitate the analysis, we coded them with a letter.

A. 'Monitoring techniques differ within or across regions';
B. 'National Government initiatives and International Non-Government Organisation initiatives do not align';
C. 'Ecotourism or non-consumptive use of marine turtles and the legal consumptive use of marine turtles';
D. 'Conservation initiatives within a country or region and consumptive use occurs in countries elsewhere in the range of the species',
E. 'Lack of enforcement by local authorities to support conservation based legislation or programs';
F. 'Local community aspirations and National Government Initiatives do not align';
G. 'Legal Indigenous use and Western Conservation ideology';
H. 'Legal consumption of turtles by one sector of community clashing the conservation aspirations of other sectors of community';
I. 'Local community aspirations and International Non-Government Organisation conservation initiatives do not align';
J. 'Variable enforcement of legislation to limit/prohibit use across range states of the species';
K. 'Conflicts among environmental entities due to limited and often competition for funding';
L. 'Animal welfare interests and legal use of marine turtles';
M. 'Illegal use[1] and Western Conservation ideology';
N. 'Stakeholders with different perspective towards non-consumptive use';
O. 'Unclear legal framework';
P. 'Other' (*Other1, Other2, Other3*… up to *Other8*) (*"P1; P2, P3…P8"*).

Marine turtle experts were selected and invited by (1) using the contact lists of the International Union for Conservation of Nature's (IUCN) Marine Turtle Specialist Group (MTSG), the RedTMN (Network of Neotropical Marine Turtles, acronym in Spanish), and the C-Turtle list-server. The contribution of the respondents was voluntary, and their anonymity was ensured. All respondents were involved with marine turtle conservation initiatives, having at least one to five years of direct experience working in the Caribbean basin. Our sample was a convenience sample, which was derived from the pool of people who were willing to engage to our research, and based on their qualities as respondents (knowledge and experience) (Etikan et al., 2016).

Data obtained from the online survey was examined using SPSS

(V.22) (Field, 2013) to examine the relationship between mean values of 'severity' and the degree to which the conflict is believed to hinder the goals of the conservation program (e.g. Rinkus et al., 2017). We used a scale of 1 (very low effect) to 5 (very high effect). For each conflict category we used a Kruskal-Wallis H test to determine if there were differences in: (a) the severity of the conflict and (b) the degree to which the conflict hinders success of the conservation program (1–5, from low to high) (de Carvalho et al., 2016). In addition, we ran a Somers' delta (Somer's d) test to examine whether a relationship exists between the severity of the conflict and the degree to which it is believed to hinder conservation success.

Qualitative analysis (which included deductive, inductive, and content theme) was carried out using NVivo (V.22) (Bazeley and Jackson, 2013) to detect and code trends, and identify substantial differences in qualitative data related to respondents' opinions, perceptions, concerns, values, and attitudes towards conservation conflicts and marine turtle conservation programs in the Caribbean (e.g. Grayson et al., 2010; Bohensky and Maru, 2011).

3. Results

3.1. Participant attributes and trajectory within marine turtle conservation programs

Seventy-two complete responses were obtained. The interviewees (n = 72) represented a range of environmental entities and countries: national and international NGOs (n = 40); universities (n = 15); government agencies (n = 13), and others (n = 4) (Fig. 1). The respondents categorised themselves as being a 'project leader' (n = 34), 'researcher' (n = 20), 'decision-maker' (n = 6), 'volunteer' (n = 7), or 'other' (n = 5). Most participants had 1–5 years (n = 18), 6–10 years (n = 17), then 11 and 15 years (n = 16) of experience in working with marine turtle conservation projects or programs (Fig. 1). The respondents represented 24 (62%) of the 39 countries/territories in the Caribbean Basin; specifically, Anguilla, Antigua and Barbuda, Barbados, Belize, Bonaire, Caiman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Grenada, Guyana, Honduras, Jamaica, México, Nicaragua, Panamá, Puerto Rico, Saint Lucia, Suriname, The Bahamas, Trinidad and Tobago, Turks and Caicos Islands, Venezuela (Fig. 2).

3.2. Conservation conflicts findings

All 72 participants confirmed that there are conflicts occurring within his/her study area, and 52 identified and provided further detailed information for the most important conflict they identified over the past 10 years – such as stakeholders involved, the severity and the degree to which the conflict hinders marine turtle conservation. Some respondents provided details on one conflict, and others provided details on multiple, up to four, conflicts. Finally, the 52 detailed responses provided important perspectives about the causes of the identified conflicts and potential solutions.

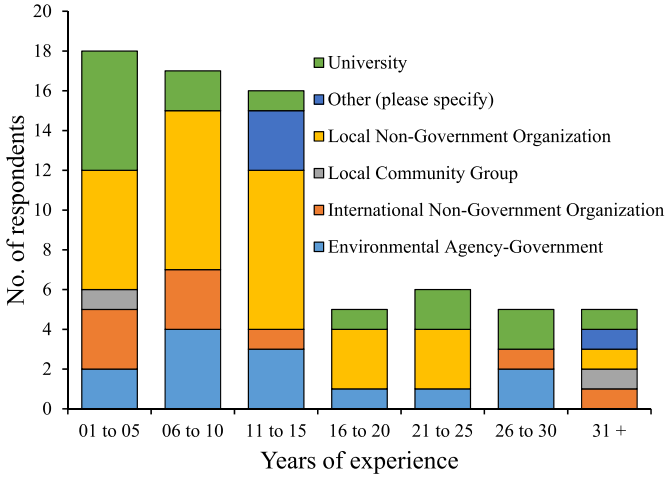

Fig. 1. Respondents' role and their years of experience with marine turtle conservation projects or programs in the Caribbean basin (n = 72).

In total, respondents identified 161 human-derived conflicts and placed them into one of 15 categories, and each category was mentioned at least once by a respondent. In addition to the 15 conflict categories we provided in the survey, respondents identified an additional eight conflicts (Table 1). Each of these eight conflicts were mentioned at least once. Of the 161 conflicts, a total of 136 were provided with additional details. The most frequently mentioned conflicts arise from: 1) 'lack of enforcement by local authorities to support conservation based legislation or programs' (mentioned by 18% of respondents, E in Fig. 3), 2) 'the legal consumption of turtles by one sector of community clashing with the conservation aspirations of other sectors of community' (14%, H in Fig. 3) and 3) 'variable enforcement of legislation to limit/prohibit use across range states of the species' (10%, J in Fig. 3), and 4) 'illegal use occurs, and clashes, with western conservation ideology' (9%, L in Fig. 3). The conflicts, and the participant groups involved, varied among environmental entities, countries, and territories.

3.3. Severity of the conflicts

Distribution of severity scores among the fifteen pre-identified conflict categories (excluding "others" category) were not significantly different ($\chi 2(13) = 13.627$, $p = 0.401$; Kruskal Wallis H test). However, we identified 27 cases among the 136 conflicts for which detailed explanation were provided where the conflict(s) have escalated to a level of physical violence occurring between parties. We regarded these as the 'most severe' conflicts, due to their likely negative influence on marine turtle conservation, the well-being of people involved, and the challenging nature of solving them. Of the 'most severe' conflicts, six instances occurred within a single stakeholder group, seventeen occurred between two stakeholder groups, three were among three stakeholder groups, and three were among five groups of stakeholders (Fig. 4).

3.4. Illegal activities occurrence and the presence of marine turtles

Illegal activities occurring in the region were also mentioned by our respondents, and illegal activities and they were central to some of the most severe conflicts. These illicit activities are especially prevalent in the countries of continental west-southern Caribbean, and were mentioned in relation to smuggling of narcotics, illegal paramilitary presence, and the illegal trafficking of terrestrial and aquatic bushmeat (including marine turtles). Of particular concern, the latter was mentioned by two respondents, who implicated members of environmental-based stakeholders in the illegal use of marine turtle products. No further details were provided by respondents.

3.5. Simple solutions for large problems

We compared the frequency of a conflict occurring (i.e. Fig. 5) with the degree to which it is believed to hinder conservation success (Fig. 5). The scores among the fifteen main conflict categories (excluding "others" category) were significantly different ($\chi 2(14) = 26.569$, $p = 0.022$; Kruskal Wallis H test). Four of the five most commonly cited conflicts are in the top five conflicts believed to have the highest negative influence on conservation. The addition to the top five is the inclusion of (I) conflict generated when local community aspirations and International Non-Government Organisation conservation initiatives do not align. This is believed to have a greater negative effect on conservation success than four of the top five most

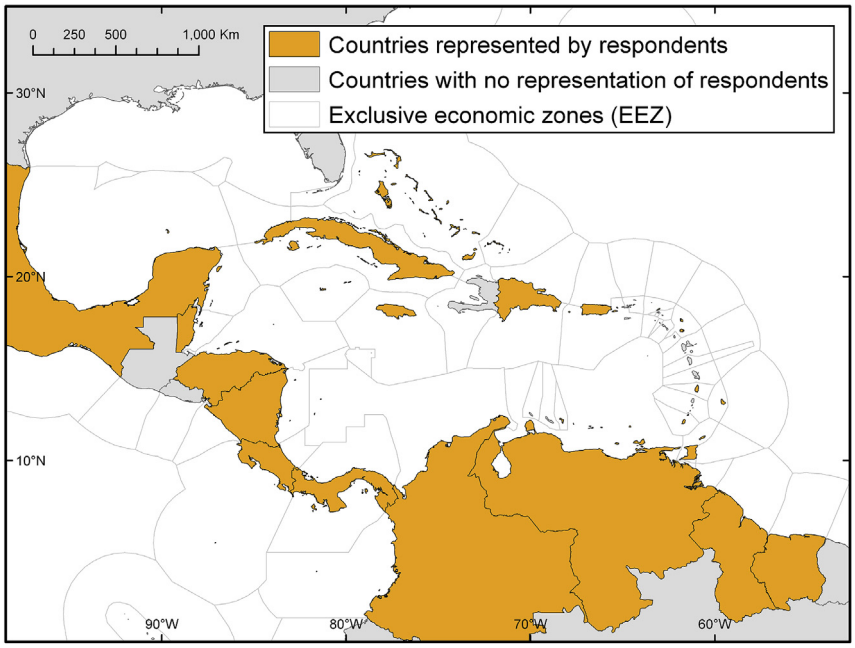

Fig. 2. Countries of the Caribbean basin reported on by survey respondents.

Table 1
List of conflicts categorised as 'others' by our respondents in the survey.

Code	Description of conflicts
P1	A conservation project was stolen, where a local government or conservation authority took over an established conservation program from a local NGO
P2	Conservation capacity becomes limited due to the elimination/reduced capacity of the environment ministry in the country
P3	The change of land tenure leading to the development and use of the coastal areas which are important for nesting turtles, without the alignment of policies among local, state and federal governments
P4	Illegal trafficking/use of marine turtle products by people working in trusted official environmental entities (government officers)
P5	Illegal trafficking/use of marine turtle products by people working in trusted environmental NGO
P6	Lack of long-term evaluation of marine turtle populations to serve as a basis for directing priorities and activities
P7	Illegal inter- and intra- country drug trafficking within the region where marine turtle conservation programs occur
P8	Occasional presence of armed groups (either linked to crime or enforcement) being present along beaches that turtles use as nesting areas

commonly cited conflicts. Although lower in number of respondents (n = 5), conflict arising because the initiatives of national government and international non-government organisations do not align was nearly always scored as having a very high negative effect on conservation.

3.6. Potential impact on conservation

There was a significant positive correlation between the degree to which respondents believed the conflict would affect marine turtle conservation and severity of the conflict (Fig. 6) ($d = 0.424$, $p < 0.0005$; Somers' d). More severe conflicts were believed to have a greater negative effect on conservation.

3.7. Potential solutions to minimise or eliminate the identified conflicts

In total, we were provided 195 solutions, and it was repeatedly recognised that conflicts often require a multiple-solution approach. In addition, six respondents believed there are no short and mid-term solutions because the conflicts are too pervasive. We grouped the suggested solutions into three categories: a) the need for environmental authorities (at local and national level) to become pro-active, leading, actors in conservation or in the direction of conservation initiatives; b) the need to increase the involvement and participation of local community members at all stages and activities, and c) the need for national and regional scale workshops to develop capacity and knowledge for stakeholders (e.g. research centres, universities, national and international NGO, and decision-maker entities).

The majority (n = 84; 43%) of responses about solutions highlighted the need for governments to play a key role, and the need for strong, often Government-led, stakeholder partnerships to achieve effective marine turtle conservation (n = 15; 8%). To accomplish these goals, some participants affirmed that government agencies needed to be more pro-active, supportive and develop trust-worthy attitudes with community people (n = 76; 39%) towards the conservation-based initiatives and non-government and community sectors. The other potential solutions highlighted the increasing recognition that community members, academics, researchers, conservation actors, and volunteers, are all important contributors to conservation and their desire to be active participants in the network of effort required to mitigate pervasive issues to marine turtles (n = 20; 10%).

Indeed, most respondents (n = 77; 39%) identified increased collaboration, and government leadership in collaboration, as key components of managing the regions marine turtles. For example, below are some quotes from multiple respondents:

> "Engagement with government authorities from the highest level down, to make them truly appreciate the value of marine turtles and to encourage active participation in enforcement initiatives, in collaboration with all key stakeholders". R14

> "Create networking among the environmental authorities, fishers' communities, tourism managers, and NGO's personnel, in order to

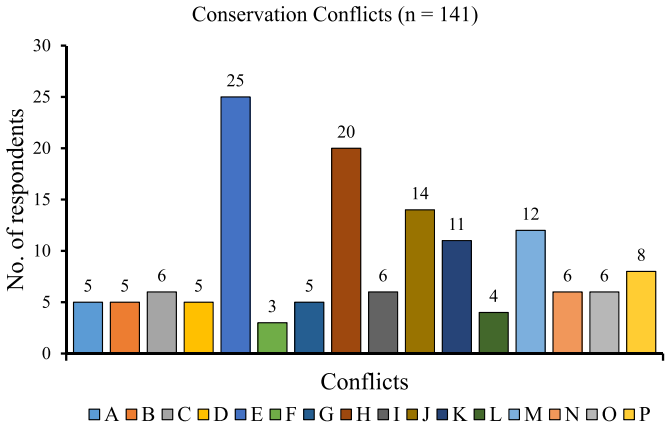

Fig. 3. Frequency of the conflicts identified by respondents. The conflicts were coded as: 'Monitoring techniques differ within or across regions' (A); National government initiatives and international non-government organisation initiatives do not align (B); Ecotourism or non-consumptive use of marine turtles and the legal consumptive use of marine turtles (C); Conservation initiatives within a country or region and consumptive use occurs in countries elsewhere in the range of the species (D), Lack of enforcement by local authorities to support conservation based legislation or programs (E); Local community aspirations and national Government Initiatives do not align (F); Legal indigenous use and western conservation ideology (G); Legal consumption of turtles by one sector of community clashing the conservation aspirations of other sectors of community (H); Local community aspirations and international non-Government organisation conservation initiatives do not align (I); Variable enforcement of legislation to limit/prohibit use across range states of the species (J); Conflicts among environmental entities due to limited and often competition for funding (K); Animal welfare interests and legal use of marine turtles (L); Illegal use and western conservation ideology (M); Stakeholders with different perspective towards non-consumptive use (N); Unclear legal framework (O); 'Other' (P).

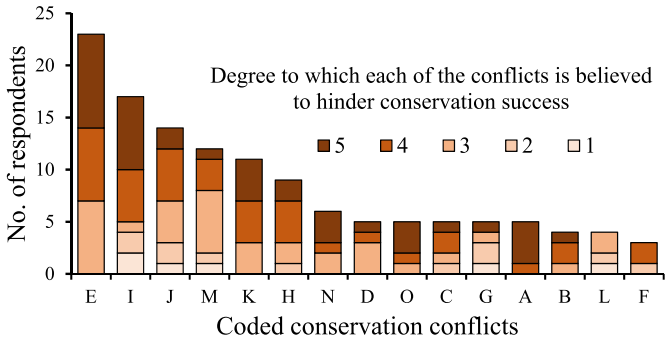

Fig. 5. Frequency of how the conflicts identified are believed to hinder the effectiveness of conservation program. The conflicts were coded as per Fig. 3. Intensity of colours (from light brown, to dark brown) reflect the scale used of 1 for 'very low effect' to 5 for 'very high effect'. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

improve the decision-making process in the national park". R23

"Better education for the communities and better communication between the government and the people of the country". R31

Among the responses it was possible to observe how the people commonly (n = 62; 32%) recommended an increase in the use, and participation, of local community members, and a shift away from projects that are based on foreign environmental agencies, their workers and volunteers, especially if it displaces local participation. This would require a paradigm shift in some programs and considerable investment by Governments of Caribbean nations, especially for programs reliant on foreign donors or grants. Doing this may also aid in the alignment of aspirations of NGOs and local community groups. However, respondents generally believed that creating networking groups of local people would help minimise conflict. Another clear result is that a "top-down" combined with a "bottom-up" approach is required to improve the alignment between the aspirations and objectives of different stakeholders.

There were few solutions offered for mitigating the most severe conflicts (n = 6; 3%). However, for some cases where the conflicts are generated by illegal activities respondents believed:

"Better coordination among different administrations, and local people. Inclusive, increase the number and effectiveness of the checkpoint stations to minimise the smuggling of marine turtle products". R2

"Increase the resources dedicated to law enforcement, particularly in remote areas. Because illegal traffic of turtles is increasing". R8

"Involve local communities in the environmental activities, so encouraging conservation at local level. Then, generate alternative incomes (economic activities) that may supply the resources that nowadays are provided by smuggling marine turtle products". R10

Furthermore, respondents often suggested (n = 57; 29%) the implementation of national and regional conservation workshops, which include representation of all stakeholder groups. These could be used to (1) develop a respectful dialogue and also gain an understanding of shared conservation values, perspective and responsibilities. From

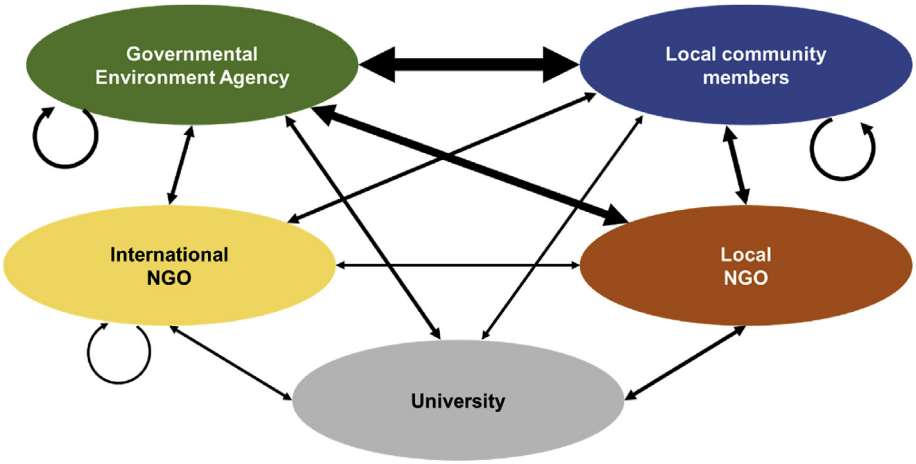

Fig. 4. Diagram to outline the links for the 'most severe' human-derived conservation conflicts described by our respondents in the Caribbean basin (n = 27). Arrow widths are proportional to the number of cases each combination of stakeholder groups were involved in the conflict.

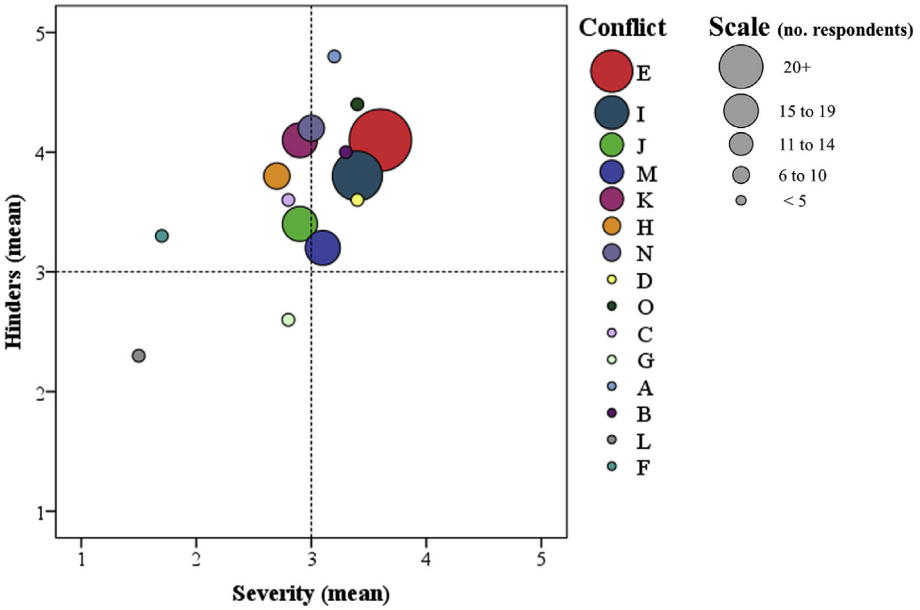

Fig. 6. Scatter plot of the mean values for each conflict. The size of the circle corresponds to the number of respondents citing each conflict. The conflicts were coded as per Fig. 3.

identifying these shared areas, collaborative projects and activities could be developed for marine turtle conservation programs and (2) discuss collaborative relationships to aid with initiating economic and/or social based incentives to aid livelihoods for current groups known to use marine turtles.

A commonly mentioned solution was to increase the level of collaboration between stakeholders (local, national, and regional level). For example, as best stated by one of our respondents "…*this conflict* [illegal use of marine turtle products] *requires strong international collaboration and changes to national legislation in some countries; this would need to be founded on information based on scientific study, to identify the impact of the continued take on the turtle populations in question. There would need to be a lot of effort put into engagement with local communities, and the development of possible strategies to provide economic alternatives to the use of marine turtles".*

4. Discussion

4.1. Types of conservation-conflicts identified

We documented the presence of conservation-conflicts in all of the countries represented by our respondents. All of the fifteen potential conflicts we listed as options in the survey were selected at least three times by our respondents and eight more were provided. Overall, the conflicts believed to have the largest negative influence on conservation were centred around the lack of, or variability in, enforcement to prohibit illegal actions or support conservation, conflicts centred around the consumptive use of turtles (i.e. legal consumption of turtles by one sector of community clashing with the conservation aspirations of other community sector), and conflicts around differing aspirations and objectives for conservation (i.e. when local community aspirations and International Non-Government Organisation conservation initiatives do not align). The conflicts could be categorised into two types: I) practical problems, and II) dissimilar conservation values and attitudes between groups of people (e.g. Table 2). The first type (I) occurred where there was a lack of financial or capacity building resources and/or support by the governments (or collectively) towards the conservation programs. The lack of resources was typically described by the participants as being human-based capacity (i.e. people trained and financially supported in roles related to monitoring and enforcement), as well as financial resources to increase the effort and presence of conservation participation. The second type of conflict (II), largely occurred when people from different groups or communities had differing perspectives or values towards marine turtles, such as their need for conservation (i.e. they do not always agree there is a problem), their various value to people, or their role in nature.

Table 2
Categories to identify the type of conflicts evaluated. Type I = practical problems, and Type II = dissimilar conservation values and attitudes between groups of people. The conflicts were coded as per Fig. 3.

Conflict	Category (Practical – type I; or Values & Attitudes – type II)
A	Practical – type I
B	Values & Attitudes – type II
C	Values & Attitudes – type II
D	Values & Attitudes – type II
E	Practical – type I
F	Values & Attitudes – type II
G	Values & Attitudes – type II
H	Values & Attitudes – type II
I	Values & Attitudes – type II
J	Practical – type I
K	Practical – type I
L	Values & Attitudes – type II
M	Values & Attitudes – type II
N	Values & Attitudes – type II
O	Practical – type I

Our research found that the most common conflicts identified by people working in marine turtle conservation research, monitoring or management projects in Caribbean nations were: 1) the 'lack of enforcement by local authorities to support conservation based legislation or programs'; 2) 'legal consumption of turtles by one sector of community clashing with the conservation aspirations of other community sectors'; and 3) 'variable enforcement of legislation to limit/prohibit use of marine turtles across range states of the species'. This is useful information to know because, although these conflicts may vary in origin, causes and severity, they are overall perceived to impede the success of marine turtle conservation programs in the Caribbean basin.

4.2. Lack of enforcement

The most commonly recorded conflict arose from situations where there was lack of enforcement by local authorities to support conservation based legislation or programs. This conflict was assigned as the conflict most likely to have a negative influence on marine turtle conservation. Low levels of enforcement for pro-environmental legislation was often suggested by our respondents as a conflict-generator. Hence, according to our respondents, improving enforcement of pro-environmental legislation will be necessary for achieving marine turtle conservation goals. One of the issues identified by seven respondents is that enforcement roles are often being undertaken by people with no formal education, training, or experience with environmental laws. Hence, solutions to these types of conflict will require resources to improve knowledge, capacity, and employment of enforcement officers. Plus, it would also be useful to improve the clarity of the roles of various institutional agencies because inter-agency conflict, or at least differences in aspirations, is occurring.

Our result indicating that low levels of enforcement of existing environmental legislation has a negative impact on conservation is not new, nor is it likely to be limited to marine turtle-related projects. Respondents typically believed that responsibility for solutions to environmental issues resides with government environment-agencies and other stakeholders, and one of the key mechanisms to improve enforcement could be through increasing education initiatives, providing incentives and creation of career paths for enforcement personnel to work and improve their awareness of legislation, penalties, and enforcement (Stringell et al., 2015; Watson et al., 2015). Enforcement of pro-environmental legislation has been described by several authors as a key element in the success of conservation-based projects (Keane et al., 2008; Stringell et al., 2015; Carter et al., 2017), and there is evidence of conservation or law-enforcement based problems being solved by increased education and awareness campaigns and leading to conservation success (e.g. reductions in the amount of turtle shell products for sale in Viet Nam (e. g. IOSEA, 2014; Migraine, 2015)). However, while changing patterns of enforcement of developing legislation could be seen as a necessary step, the uptake and acceptance of the legal process by people ultimately depends on values and whether they share the same conservation aspirations as the Government. Hence, changes to enforcement and legislation needs to run concurrent with other “bottom-up” programs and where appropriate allow for variation in human-dimensions.

4.3. Consumptive use of marine turtles in the Caribbean basin

It is likely that marine turtle populations in the Caribbean region are conservation dependent, and conservation status varies across species and spatially (NMFS & USFWS, 2007; Eckert et al., 2012; Campbell, 2014; Seminoff et al., 2015; Chapman and Seminoff, 2016). Another important source of conflict we found occurred in locations where the consumptive use of marine turtle was occurring in the same, or similar, locations as protective-based programs. This clash tended to generate more severe conflicts because both groups of people were placing different, and conflicting values, on the turtles as a resource and deriving the benefits in conflicting ways. In part, these conflicts can occur because communities are often small, and people with different attitudes towards consumptive use can often live and work in close proximity to each other, and have different values or beliefs towards the need conservation (Holmern et al., 2007). In some cases, the differences in opinion and their effect in conservation, were believed by our respondents to be irreconcilable due to the level of animosity and confrontation between community members. However, importantly, some of our respondents reported that in some locations, the groups, despite their different beliefs and values, are also likely to share some values. It is these shared values or beliefs that could be used to facilitate a shared middle ground that could be used as a starting point for cooperative discussions and arrangements. Following this, identification and agreement of local-scale solutions to common problems which would otherwise impact communities' livelihoods may help to bring together social groups or individuals and reconcile issues.

It is clear from our results that dissimilarities in the perspectives of people towards marine turtle conservation occur even at national or sub-national scales. For example, in Colombia and Venezuela perceptions about the need for protection of marine turtles may differ between government conservation groups, NGOs, and Wayuú clan leaders in the Guajira Peninsula. Essentially, the groups all desire to see the survival of the species, but they do so for different reasons and based on different values. The former group's reasons may be linked to the perceived need to prevent use to protect a threatened species; conversely, the Wayuú clan leaders appear to desire the use of marine turtles primarily for culturally significant ancestral rituals (funerals or weddings) to maintain cultural links for his/her community (Barrios-Garrido et al., 2017, 2018). However, both are impacted when turtle numbers decline, and arguably the “user” more so than the “conservationist”. Hence, identifying and understanding conservation conflicts that occur in the Caribbean is vital to minimise pressures on marine turtles and enable people to work collectively towards finding solutions.

4.4. Multi-scale conflicts – bottom-up and top-down solutions

All of the fifteen conflicts we listed as options in the online survey were selected at least three times by our respondents. In addition, eight more were provided. Several cases reflected the need for a multi-scale solution, where bottom-up actions and top-down changes need to co-occur, possibly as co-management, in the region to minimise the impact of take of marine turtles at local level having a negative impact on broader scale conservation. The need for greater levels of intra- or inter-country collaboration on conservation initiatives or legislation are well described, and are not limited to developing countries and nations, e.g. fisheries management and reporting de Carvalho et al. (2016); Karr et al. (2017); Riskas et al. (2018), who emphasised the need for agencies and institutions to collaborate to achieve universal solutions, such as Regional Fisheries Management Organisations (RFMOs).

4.5. Potential solutions, values, and human dimensions in conservation

Of the conflicts between stakeholders, seventeen occurred between governmental environmental agencies and local community members. Previous authors found that when the circumstances of a conflict reach physical violence, resolution is challenging (and sometimes impossible) (Greiner, 2012) – especially when each group's beliefs are founded on values and traditions. Frequently, conservation practitioners make assumptions about the human attitudes and behaviour based on their own experiences, but mediation involving all parties involved in the conflict are needed to rationalise the problem before trying to solve it (Dickman, 2010). Mutual awareness of the problem, or others opinions can improve cooperation and may allow resolutions. One mechanism could be to encourage participation by a broad range of stakeholders (e.g. Sterling et al., 2017) and identify common beliefs, attitudes, goals, and use shared space as a platform from which to build a partnership (Redpath et al., 2015). Indeed, Redpath et al. (2013) affirmed that one possible option to resolve conflicts among stakeholders is to understand and distinguish the fundamental values of both parties, identify any similarities, including those that are not negotiable, and those which may change after an engaged and transparent negotiation. While the mediation may not resolve the problem quickly, it is useful in discovering the shared values and beliefs from which to base the future collaborative arrangement on. Adaptive management is a key component here because, as trust is developed between groups, the conservation actions or activities can broaden in scale, and collaborative frameworks can be strengthened (Redpath et al., 2013).

It is clear from our results and the conservation literature that to

create effective marine turtle (and wildlife in general) conservation programs there is a strong need to understand the human dimensions of the conservation issue. Human values tend to vary across global, regional, and local scales (involving ideas, philosophies, global agreements, narratives, and governances) (Bennett et al., 2017). As such, the applied social sciences required to study and recognise the human perspective of conservation are likely to play a crucial role in marine turtle conservation (Gruby et al., 2015; Pont et al., 2015; Kittinger et al., 2017), especially in culturally diverse regions such as the Caribbean basin.

4.6. Evidences of physical violence across the region

We identified 27 situations where conflicts were severe enough to lead to physical violence among stakeholders. In general, respondents were not optimistic about the likelihood of finding short-term solutions to the severe conflicts. Predominantly because these conflicts occur mainly between members of different stakeholder groups. Some respondents also found it hard to suggest any potential solutions for the most severe conflicts, due to the level of animosity that discussions have reached. However, our findings indicate that these conflicts may benefit from the involvement of a third party to act as a mediator, helping to improve awareness and understanding of complex issues for all involved parties.

Additionally, it is clear that illegal activities are an issue in the Caribbean (National Fish and Wildlife Foundation, 2009; Campbell, 2014). These include claims of drug smuggling, illegal paramilitary presence, and/or the illegal selling of bushmeat. Illegal activities create tensions or anxiety among the conservation practitioners who work on the ground. Of note, the tragic death of young Costa Rican biologist and conservationist Jairo Mora Sandoval in 2013, who was kidnapped during a routine monitoring patrol on a nesting beach on the Caribbean coast of Costa Rica, and found dead the next day (Kopnina, 2016, 2017). Cases such as Jairo Mora Sandoval's are evidence of the risks associated with conducting field-based marine turtle conservation operations in some parts of the Caribbean (Bocarejo and Ojeda, 2016). These risks affect conservation and monitoring activities for marine turtles.

4.7. Final remarks

Other studies have suggested that the degree to which the conservation issue is deemed as a crisis by one or more stakeholder groups can influence the development of co-management initiatives (Grayson et al., 2010). For example, in Baja California-Mexico, a large number of turtles (especially loggerheads) were being either poached or retained after being caught as fisheries bycatch (Koch et al., 2006, 2013). The high level of use, plus the threatened nature of the loggerhead turtle in the Pacific Ocean, led in part to the establishment of a pro-environment organisation called “Grupo Tortuguero”. It is now listed as a non-governmental organisation integrating multiple local, national, and international stakeholders, to develop conservation-based incentive activities (e.g. technical training, funding, and empowerment) at different scales in response to the critical loss of turtles (Senko et al., 2011). Similarly, another important conservation initiative in the Latin American region was created to protect the hawksbill turtle population in the eastern tropical Pacific Ocean, called the “Iniciativa Carey del Pacífico Oriental (ICAPO; Eastern Pacific Hawksbill Initiative in English)” (Gaos et al., 2010). The actions of this group were centred around the scarce records of hawksbill turtles in the eastern Pacific region and the belief that the hawksbill population in the Eastern Pacific Ocean was one of the most threatened marine turtle populations on the planet (Meylan and Donnelly, 1999). Hence, ICAPO was created to promote research and monitoring with local partners, while also developing education and outreach campaigns in the eastern Pacific nations (details in Gaos et al., 2010). These types of groups work at small, local, national and regional scales, they involve multiple stakeholders, and they work where there is existing legislation or policy to frame their objectives. A similar arrangement could be developed for other countries or regions of the Caribbean Basin.

Another issue, and one for which there are scarce data, is the potential impact of Illegal, Unreported, and Unregulated (IUU) fishing. Based on our results we advocate for a more detailed evaluation to assess the presence, impact, and scale of the IUU fishing activities that are likely to be impacting marine turtles in the Caribbean. This evaluation could follow previous and standardised protocols (e.g. Riskas et al., 2018) to measure the impact, as well as understanding the elements of small-scale fisheries that are likely to be affecting marine turtles in the Caribbean, thereby potentially acting to identify hotspots of illegal fisheries that may be adversely impacting threatened regional management units of turtles.

Overall, our results indicated that conflicts occur. They vary in nature and severity, and many of them are perceived to impede the success of marine turtle conservation programs. It is clear that (1) initiatives to improve the enforcement capacity of policy are essential in the Caribbean region, indeed some of the lack of capacity can be linked to limited resources, so there needs to be more than new initiatives being discussed and implemented, and (2) there could be improved integration of the NGOs and government sector to work within communities and community-based initiatives, these would likely build trust and enable more harmonious conservation initiatives.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.ocecoaman.2019.01.003.

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