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TITLE: Media framing of the Cayman Turtle Farm: implications for conservation conflicts

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ABSTRACT

Conflicts over natural resource use and management often arise where groups have different goals or priorities. The media can play an important dual role in these conflicts; article content might offer insights about public opinion, whilst media may shape debates and how issues are perceived by the public and decision-makers. Wildlife farming is a contentious conservation tool attracting the attention of worldwide media, and associated conflicts among different interest groups may undermine its applicability. We investigated the media's portrayal of the Cayman Turtle Farm (CTF), a facility in the Cayman Islands which breeds green sea turtles (*Chelonia mydas*) for human consumption, to investigate how the media presents information about wildlife farming (i.e. framing), consider its potential roles influencing conflicts and explore how it can be used for conservation conflict management. Content analysis was used to compare framing, article valence, and stakeholder representation in 634 newspaper articles from the international and local media. These media stories were framed in terms of: tourism, conflict, conservation, culture/community, management, and utilisation. International articles most often described CTF as a tourism facility. However, during a media campaign by an international animal welfare group, CTF was also often depicted as a source of controversy. Trade in turtle products was mostly debated in older articles. Local media mainly had a financial focus. Conflict framing was associated with a negative article valence, and conflict framed articles were significantly more likely to contain no conservation information. Mentions of environmental interest groups were significantly associated with negative articles, whereas academics were significantly more likely to be mentioned in positive articles. Conservationists must consider stakeholder objectives from the outset of interventions and be aware of the multiple roles the media might play. Media analysis and effectively harnessing the potential of media outlets should be considered as tools for managing conservation conflicts.

KEYWORDS: agenda-setting; captive breeding; conservation conflicts; framing; marine turtles; wildlife trade

INTRODUCTION

Conservation stakeholders rarely all share similar goals (Marshall *et al*., 2007) and conflicts occur as a result of clashes between parties with differing objectives (Redpath *et al.*, 2013). If not managed properly, conflicts can threaten conservation interventions; issues of mistrust may undermine existing plans or prevent the implementation of new ones (Young *et al.*, 2010). A systematic and more predictive approach to conflict management, transitioning from reactive to proactive measures, may lead to enhanced cost-effectiveness, improved governance and more sustainable conservation outcomes (Young *et al.,* 2016). This requires an understanding of how to better navigate among multiple actors and objectives (Kansky, Kidd, & Knight, 2016).

The media collects, frames, and distributes information and can be a significant player in portraying and shaping conservation conflicts (Gore *et al.,* 2005; Rust, 2015). A key mechanism for media influence is by setting the 'agenda' for what the public consider topical issues (McCombs & Shaw 1972; McCombs, 2005; Weaver, 2007). According to agenda setting theory, the media may influence its audience not by telling them what to think, but by telling them what to think about (McCombs, 2005); the public learn how much importance to attach to a topic according to the emphasis and amount of coverage in the news (McCombs, 2005). For example, greater amount of international press coverage of climate change than biodiversity loss suggests that climate change has become more of a mainstream issue (Veríssimo *et al.,* 2014).

Media coverage can inform debate by promoting public engagement and providing a forum for discussion (Abroms & Maibach 2008). However, it may also present a challenge to conflict resolution by sensationalizing aspects of debate (Gore & Knuth 2009; Barua, 2010), as journalists can use framing (e.g. metaphors, spins, stories) to highlight or downplay certain aspects of an issue, impacting how audiences interpret the media stories (Entman,

1993). Frames can thus have important implications for how people perceive and act towards interventions. For example, militaristic metaphors are often used within invasion biology (Larson, 2005) and conservation (Campbell & Veríssimo, 2015) but can be problematic because they cast opposing stakeholders as enemies and contribute to social misunderstanding. Framing an issue in dramatic terms may also exacerbate simplification and neglect important contextual information (Siemer, Decker, & Shanahan, 2007).

Additionally, frame valence, i.e. if a media report is positively or negatively expressed, has been suggested to influence public support for specific policies (Vreese & Boomgaarden, 2003). For example, media coverage of negative events, such as attacks by animals, can amplify perceived risk and reduce support for conservation interventions (Jacobson *et al.*, 2012). The media is also able to define important "messengers" in a debate (e.g. scientists, politicians, celebrities) to deliver different perspectives (Muter *et al.*, 2013); this choice of messenger can also influence how the readers perceive the issue (Jacobson *et al.,* 2012). By translating powerful voices into messages that carry across wide audiences, the media represents perspectives of primary definers (i.e. individuals or groups, often with privileged access to the media, who may shape the debate; Hall *et al.,* 1978). The role of media is thus not straightforward as it can both reflect measures of public opinion (e.g. media outlets might only publish something that they believe is of interest to their target readership) as well as influence public perceptions, ultimately acting as an additional sector in the conservation process with its own goals (e.g. financial/readership; Papworth *et al.*, 2015).

Wildlife farming, representing the domestication, cultivation, propagation or breeding of plant or animal species (Phelps *et al.*, 2014), is a particularly contentious conservation tool (Nogueira & Nogueira-Filho, 2011; Moyle, 2013). One aim of wildlife farming is to promote sustainable trade by providing legally sourced non-wild products, decreasing harvest from the wild and driving down prices (Damania & Bulte, 2007; Abbott & van Kooten, 2011). For example, farmed crocodile products have replaced wild crocodile harvest in key supplier

countries, with positive impacts on the recovery of wild populations of some crocodilians (Moyle, 2013). If specific criteria regarding demand, enforcement, costs and source are met (Tensen, 2016), wildlife farming can be a useful conservation tool. However, it remains a widely discussed and often emotive topic. For example, concerns that continued wildlife supply may increase demand, stimulate illegal take and allow laundering of illegal products (Damania & Bulte, 2007) have been raised for turtles, rhinos, and tigers (Campbell, 2002; Abbott & van Kooten, 2011; Biggs *et al.*, 2013). Economic, animal welfare and ethical concerns are also often raised (e.g. Gratwicke *et al.*, 2008; Kirkpatrick & Emerton, 2010; Lyons & Natusch, 2011; Sheng *et al.*, 2012). A comprehensive discussion of arguments for and against wildlife farming, including sea turtles, is provided in Campbell (2002) and Tensen (2016).

Analysis of media coverage can thus be used to obtain insights into public opinion, multiple stakeholder perspectives over wildlife farming, as well as better understanding the role of media as a conservation actor (i.e. being able to influence conservation values and actions; Papworth *et al.*, 2015; Jepson, Barua & Buckingham, 2011), contributing to more effective conflict management. Media content analysis (Macnamara, 2005) has previously been used to understand the discourse surrounding environmental issues such as climate change (e.g. Dotson *et al.*, 2012) and human-wildlife interactions (Dayer *et al*., 2017) but it has never been applied to wildlife farming.

Aiming to understand how the media frames wildlife farming and consider its potential multiple roles as actor in conflicts, we used the Cayman Turtle Farm (CTF) as a case study - where turtle meat for consumption has been produced for 50 years. We examined media reporting over time, including a period surrounding a media campaign launched by an international animal welfare group (see case study description for details), comparing national and international coverage to explore potential cultural differences towards sea

turtle farming, and focused on article content in terms of article framing, valence, and stakeholder representation. Information on how the media frames wildlife farming will, ultimately, assist decision-making for more effective management of conflicts over natural resources (e.g. by assisting in characterizing multiple stakeholder perspectives or acting as forum for discussions).

METHODS

Case study

The Cayman Islands are a UK Overseas Territory in the Caribbean. Now a tourism hotspot, turtle fishing once formed the basis of Cayman's economy (Wood & Wood, 1994). The islands hosted abundant nesting by green (*Chelonia mydas),* loggerhead (*Caretta caretta*), leatherback (*Dermochelys coriacea*), and hawksbill (*Eretmochelys imbricata*) turtles but the turtle fishing industry, supplying both local consumption and international markets, exhausted local turtle populations by the early 1800s (Aiken *et al.*, 2001). Turtles remain integral to the Islands' cultural identity, as is visible on the flag and currency (Wood & Wood, 1994) and turtle meat is often considered the "national dish". In 1968, a commercial green turtle breeding operation was established to provide turtle meat for consumption, reduce demand on wild stocks, and replenish the wild population through turtle releases (Fosdick & Fosdick, 1994; Rieser, 2012). In 1978, legal protection for the remnant wild nesting population was introduced through prohibiting possession of turtle eggs and take of female turtles during a closed season (Government of the Cayman Islands, 1978), with further protections added in 1985 and 2008 (Echternacht *et al.*, 2011). Small wild populations of green turtles have been monitored in nesting beaches since 1998, with more than 200 nests recorded in 2015 (Cayman Islands' Department of Environment unpublished data). Currently, turtle meat consumption is mostly an occasional event of traditional nature by residents with strong linkages to Caymanian culture (Nuno *et al.*, 2017).

CTF's operations have been subject to long-standing controversy regarding its conservation

role, animal welfare and economic sustainability (Ehrenfeld, 1974; Fosdick & Fosdick, 1994; D'Cruze, Alcock & Donnelly, 2015). International trade of most turtle products ceased in 1978 as a result of Convention on International Trade of Endangered Species (CITES) regulations (Fosdick & Fosdick, 1994). In addition, the USA listed green turtles as endangered under the Endangered Species Act in 1978, barring shipment of turtle products through Miami and resulting in CTF operating only domestically since that time. Closure of the international market created financial difficulties for CTF, with management changing hands frequently, eventually to come under the control of Cayman Islands Government since 1983 (Rieser, 2012). In 2002, the UK attempted to gain CITES permission to reopen trade in farmed turtle shell to allow CTF to sell by-product turtle carapaces to tourists, but concerns that this could cover a trade in illegally hunted turtles and insufficient evidence that the founding stock from the 1960s had been sourced legally clouded the debate (Donnelly, 2011): when presented to CITES, 38 votes in favour, 24 objections and 48 abstentions failed to obtain the required two thirds majority. Besides turtle meat production for domestic trade, nowadays CTF focuses also on education, culture and entertainment; it is currently a tourism facility, with turtle viewing pools, nature trails, an aviary and water park.

In 2012, an international animal welfare group called World Animal Protection (WAP; previously WSPA) launched a media campaign to end sea turtle farming in Cayman, the only place where the practice remains. This involved press statements with accompanying photographs of the turtle tanks, as well as issuing investigative reports and using influential personalities such as Sir Paul McCartney to back the campaign. Concerns raised included: animal welfare conditions (Arena *et al.*, 2014), creation of "artificial" (i.e. in addition to traditional consumption) demand by providing meat to tourists (WSPA, 2013), inbreeding and mixed genetic ancestry (WSPA, 2012) and high operating costs (D'Cruze, Alcock & Donnelly, 2015). The WAP campaign generated discussions in the public and political arenas about several potential farm management strategies, including closure or transition into a rehabilitation and release facility for injured sea turtles; this resulted in some

operational changes (e.g. full-time veterinarian hired) and research about potential social and ecological contributions of CTF (Nuno *et al.*, 2017).

Media sample selection

Our international sample was mainly sourced from the LexisNexis newspaper database; coverage varies by news source but some go back several decades (LexisNexis, 2016); our study thus does not cover all media published throughout time but simply those articles that were available using major databases. The terms 'Cayman' and 'turtle' were searched for simultaneously for all available dates (returned results dated from 1973, with the last search completed on the 26th May 2015). An article was considered relevant if it provided contextual information about CTF, rather than simply a geographical location (e.g. we excluded: '*The incident occurred....behind the Cracked Conch Restaurant on Turtle Farm Road*.'). Repeated stories were included if they were in a different newspaper. Similarly to other studies (e.g., Siemer *et al.,* 2007; Rust, 2015), newswires and letters to the Editor were also included as the editor judged them topical enough to publish and also contribute to the media framing of CTF; from now on, these are all included under "articles". Photographs without associated news pieces were not included.

The only local news source covered in the LexisNexis search, Cayman Net News (CNN), is no longer live. Therefore, in addition to this source, local news providers (Cayman News Service (CNS); Cayman Compass; Cayman Reporter; ieyenews.com) were identified (Blumenthal, J, pers. comm., 15 May 2015), and their online archives were searched for the term 'turtle farm'; the term "Cayman" was not included as it would not narrow down searches in local media. In addition, Google News, an aggregator with worldwide coverage, was cross-checked for 'Cayman turtle'. Any relevant international or local articles not in the original searches were included in the final database.

Overall, this resulted in 317 international articles and 707 local articles ("complete sample"). All international articles and, due to project time constraints, a randomly selected sub-sample of 45% of the local articles were considered for detailed media content analysis (see Table B.1 for comparison between complete and sub-sample). This resulted in a total of 634 articles passing to the coding stage, including two sub-samples: international (n=317) and local (n=317, among which, eight were letters to the editor).

Coding protocol

Content analysis was used to examine the articles. A hybrid approach of inductive and deductive coding was used (Hsieh & Shannon, 2005). Deductive coding was used first to derive categories from the literature, prior to involvement with the data (Cavanagh, 1997). Framing analyses from political science (Semetko & Valkenburg, 2000), climate change (Boykoff, 2008; Nisbet, 2009) and environmental management literatures were consulted (Kellert, 1985; Boissonneault *et al.*, 2005), resulting in the following initial codes of themes expected in the media stories: conflict, ecological, economic, ethical, human interest (culture and utilitarian), political, and solutions.

To ensure that the codebook was comprehensive, an inductive approach was then used to develop codes (Elo & Kyngäs, 2008) through pretesting the codebook on 30 randomly selected international articles with 'Cayman Turtle Farm' in their headline, as headlines have been shown to optimise relevance for the reader (Dor, 2003). More specific frames such as tourism were added, and sub-frames were grouped under broader categories: conflict, conservation, culture/community, management, tourism. Conflict also included aspects of disagreement and uncertainty, but these are referred to together as 'conflict' for brevity. The final codebook is described in Table 1.

Following Nisbet, Brossard and Kroepsch (2003), each article was coded for each frame as

absent = 0, present = 1, or the main focus/lead frame = 2; each article was assigned one 'lead'/ primary frame, but could also express several other 'secondary' frames. The lead frame was determined based on the central theme of the article, whereas secondary frames might be better understood as general attributes (Table 1) (McCombs, 2005). Articles were also coded for valence as positive, negative, or ambiguous. Articles focusing on benefits of CTF (e.g. for tourism, gastronomy, conservation, culture), including neutral articles that did not mention any negative aspect and thus did not present CTF as a problem, were recorded as positive unless they contained negative language, or elements of uncertainty (Burke *et al.*, 2015). Articles that outlined various viewpoints were deemed ambiguous whereas controversy portrayed in a one-sided way was deemed negative. Publication year and country of origin were also recorded. "Messengers" were identified where an organization was positioned as a key player or having a 'voice' on turtle management issues (such as trade in turtle products or turtle farming) or a representative was quoted as an information source (Muter *et al.*, 2013); each article could thus have multiple messengers.

All coding was done by researcher J.M.M.W.; 10% (n=64) of international and local articles were randomly selected for double blind coding by researcher A.N. to assess reliability. Final inter-coder reliability for all variables was measured using percent agreement (93.8 to 100% agreement per variable; mean agreement=97.3%) and Scott's pi (*pi* = 0.85 to *pi* = 1.0 with an average reliability of 0.94 across variables), thus achieving acceptable reliability scores (Macnamara, 2005).

Data analysis

In order to test potential relationships in categorical variables, differences in frequencies of articles for each specific lead frame between the local and international samples were investigated using Chi-square tests for 2 x 6 contingency tables (i.e. 6 frames and 2 sample categories: local and international); differences in proportions between particular frame

counts assessed using z-tests. Given the binary nature of variables (presence/absence), logistic regression was used to test for association between lead frames and secondary frames, between frame and valence, and between messengers and valence. Statistical analysis was carried out in SPSS 12 and Microsoft Office Excel 2007.

RESULTS

Sample coverage

Our complete sample included 1024 articles published from 1973 to May 2015 (last search date: 26th May 2015) and found in major online databases; frequency of articles obtained per year is in Fig. A.1, Fig. A.2. However, given the explosion in Internet use since the late 1990s, and the greater digitalisation of newspapers, it is likely older newspapers are underrepresented in our sample; our findings are thus indicative and relate to available material covered in this study. In addition, our sampling methods only returned local media articles from 2004 onwards thus, when comparing local and international media, we indicate specific time periods being analyzed. The majority of sources in the international sample were from three nations (USA: 37%; UK: 31%; and Canada: 25%). Names and source locations of international and local articles are available in Table A.1 and Table B.1 respectively.

Framing

Media stories covered a range of topics, which were categorised under six broad frames (Table 1).

Lead and secondary frames in local and international media

For the period 2004-2015 (when both local and international media stories were available from major online databases; 162 international articles and 317 local articles) the frequency of lead frames varied significantly between the local and international media ($X^2(5) = 87.9$, p

< 0.001) (Fig. 1). The most common lead frame internationally was tourism (67%), whereas locally it was conflict (38%). There was no significant difference between the samples for the proportion of articles with conservation as a lead frame (z = -0.47, $p > 0.05$).

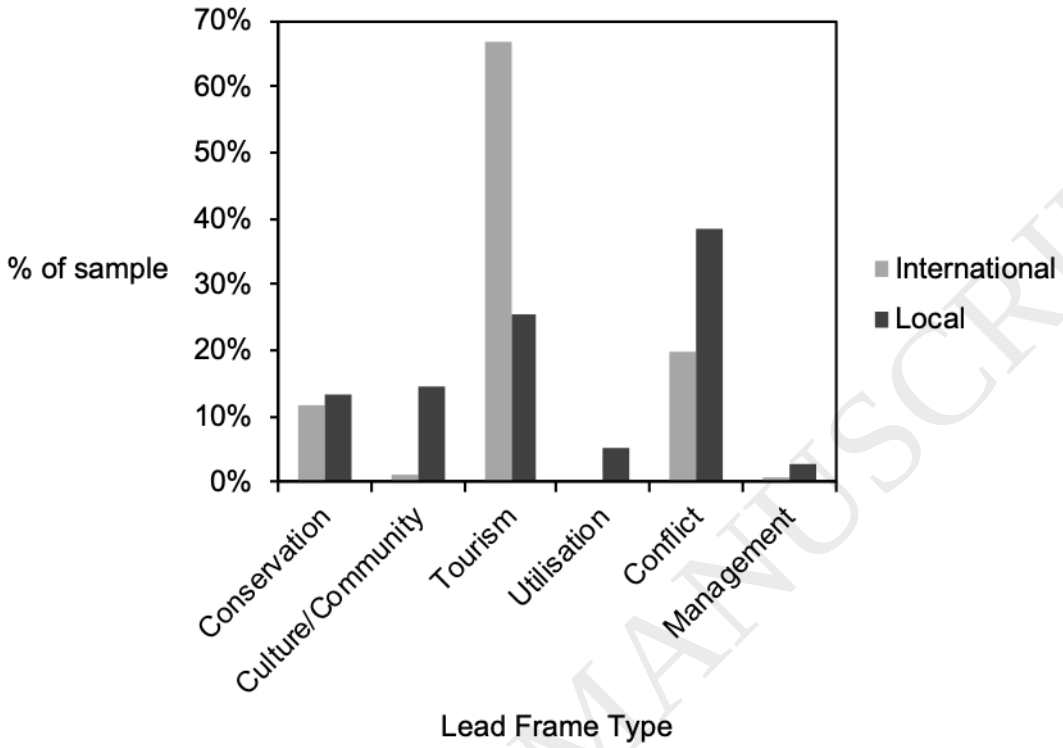

Figure 1. Lead frame prevalence in international and local media for 2004-2015 (when both local and international media stories were available from major online databases). This is calculated as a percentage of the international article sample (n=162) and local article sample (n=317) for each lead frame type (the main article focus).

For the same period (2004 onward), the most common secondary frame internationally was conservation (34% of international articles), closely followed by conflict (31%). Locally it was conflict (55%), closely followed by management (54%). 74% of the local articles with management as a secondary frame were a result of the sub-frame 'governance', where the Cayman government was identified as being responsible for CTF. Articles with conservation as the lead frame were significantly associated with having conservation also as a secondary frame (t=5.04, $p < 0.001$). However, where conflict was the lead frame, articles were significantly likely to not have secondary conservation (t= -1.96, $p < 0.05$) nor cultural

framing (t=-5.68, p < 0.001) but were significantly associated with management as a secondary frame (t=8.97, p < 0.001).

Frame trends over time

Among the articles obtained in this study, management was more common as a lead frame in older international articles (Table 2), mainly as a result of articles with a policy focus; policy was mentioned in more recent articles (after 2004) but this was only as a secondary framing. Tourism remained the most strongly occurring lead frame throughout the course of the international media. However, conflict became almost equally common for the period 2010-2015, where over a third of the international stories had conflict as the lead. In the local media, conflict increased significantly for the period 2010-2015 ($z = 2.42$, $p = 0.02$), to become the most prevalent lead frame. Conservation framing was stable across time and media sub-samples (international and local), except for the period 1980-1989 internationally where it was absent.

2010-2015

In 2012, WAP launched the campaign to end sea turtle farming in Cayman; the increase in conflict framing in both the international and local media during 2010-2015 (Table 2) is suggestive of potential campaign impacts. Although conflict was present in both the international and local samples during this period, it was expressed differently between the two samples in terms of sub-frames ($X^2(8) = 79.6$, p < 0.001). The overwhelming source of conflict in the local sample was financial (65%), although this notably decreased during 2012 and was counterbalanced by sub-frames such as interpersonal conflict, which had not been present before 2012. Internationally, the most prevalent conflict sub-frame for the years 2013-2014 was animal welfare. A significantly greater proportion of the international sample had welfare as the leading form of conflict than the local sample ($z = 6.00$, $p < 0.001$).

Valence trends over time

Among the articles obtained in this study, the majority of articles over time had a positive valence, possibly because all frames, apart from conflict, were significantly associated with positive valence (Wald's $X^2(5) = 218$, $p < 0.001$). Articles with conflict as the lead were 1.5 times significantly more likely to be negative stories (Wald's $X^2(1) = 6.59$, $p = 0.01$). When considering the period surrounding media campaign launched by WAP, the proportion of negative articles increased in 2012 (Fig. 2), and peaked during 2013.

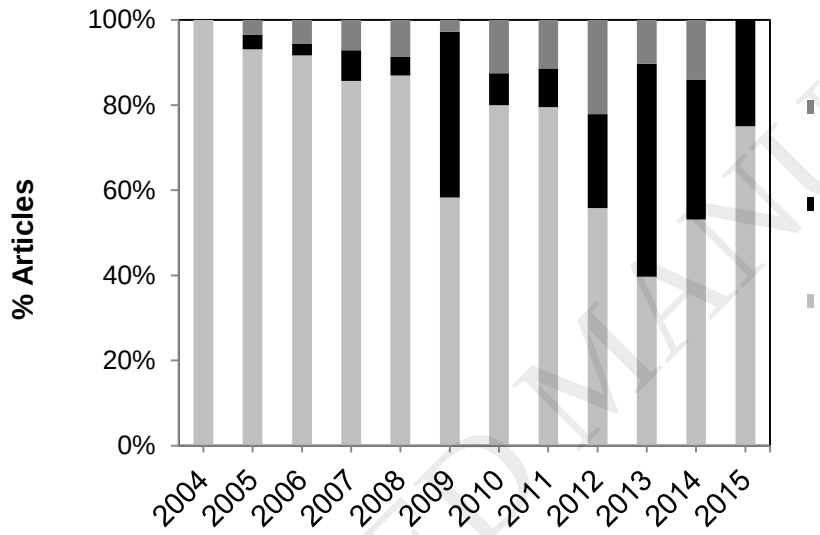

Figure 2. Change in the valence (positive, negative, ambiguous) of media articles obtained in this study for the time period 2004-2015 (when both local and international media stories were available from major online databases). Note: data for 2015 were on a partial year's coverage (last search date was 26th May).

Messenger groups

Ten types of "messengers" were identified across the media stories (Table 3), among which environmental/animal welfare groups and the Cayman Islands government were the most common in international and local media, respectively. For example, the government of the USA was often quoted in connection with CITES and controversy over trade in turtle

products. Environmental interest groups, such as Greenpeace, were 11 times more likely to be associated if the article had a negative valence (Wald's $X^2(1) = 21.5$, $p < 0.001$). Conversely, academics were significantly associated with positive articles (Wald's $X^2(1) = 6.59$, $p = 0.01$). Valence was not a significant predictor of celebrity presence (Wald's $X^2(2) = 0.584$, $p > 0.05$).

DISCUSSION

We used media content analysis to explore framing of a sea turtle farming facility over four decades (1973-2015). Understanding conservation conflicts and assessing perspectives and roles of different actors is essential for designing and implementing effective interventions (Redpath *et al*., 2013). By focusing on framing, valence and stakeholder representation in newspaper articles, we obtained insights that are useful for analysing conflict dynamics and considering how the media might play a role in conservation debates; a key issue surrounding conflict management (Young *et al*., 2016).

The roles of media

We found different frame prevalence in local and international media, demonstrating the varying temporal and spatial scale of discussions. Overall, the international media most commonly portrayed CTF as a popular tourist facility. Aside from tourism, conflict was a common framing, particularly during WAP's campaign; this suggests that international media might have played a role in conflict dynamics. For example, whilst conflict stories in the international media often focused on animal welfare, the local media largely reported CTF's financial problems, illustrating different concerns as potential drivers of conflict. Given the local tradition of utilizing turtles (Nuno *et al.*, 2017), the ethical and welfare framings found in the international sample might not have great local resonance:

'we take umbrage with people who know nothing of Cayman's heritage and culture telling us we should quit our tradition of eating turtle meat' (Cayman Compass, 2012).

Examples of local media stories trying to capture both the public and governments' attention also suggest that the media might be a contributor to the political process in the country:

'Make no mistake: Each dollar squandered on entrepreneurial fictions such as the Cayman Turtle Farm...is one less dollar that the government could have devoted to education, infrastructure or indigent care.' (Cayman Compass, 2014).

'The Turtle Farm is still losing money and the people...have a right to ask whether that should be allowed to go on. They deserve honest answers from those who are running for office...' (Cayman Compass, 2013).

Information on how the media frames conservation issues can also assist communication and outreach efforts by providing insights about social dimensions of conservation and messages being delivered (Gore *et al*., 2011; Muter *et al*., 2013). We found that articles where conflict was the lead frame of the story generally did not include conservation as a secondary attribute. This echoes wider concerns about how news articles can simplify complex issues, potentially to the detriment of conservation outcomes (Siemer *et al*., 2007, Bhatia *et al.*, 2013). However, articles with conservation as the lead were rich in conservation information, which could be promising in terms of driving concern for environmental matters (Soroka, 2002). Together with information on how people seek and process information, considering factors such as judgements of quality and perceived control over issue (Clarke, 2009), media content analyses can be useful to improve communication.

By including different stakeholders as messengers, the media selects and represents specific perspectives (Hall *et al*., 1978). For example, environmental and animal welfare groups, the most commonly mentioned messengers in international media, were associated with negative articles due to their involvement, and sometimes instigation of debate. Frames can also have greater public resonance through the use of influential personalities (Gamson & Modigliani, 1989), such as use of celebrities by WAP (e.g. Paul McCartney) to attract attention, but the efficacy of such tactics to sustain continued attention is questionable

(Thrall *et al*., 2008). Studies about media sources and messengers can be particularly informative to better understand issues of power and access; for example, Takahashi (2011) found that environmentalists were generally missing from media coverage of climate change in Peru, with consequences for media framing and content.

Implications for wildlife farming

CTF is represented in a number of ways in the local and international media, with frames illustrating potential trade-offs between multiple objectives. For example, the local sample in particular reflected the socioeconomic importance of the facility: CTF engages with the community and is embedded in local culture:

'the Cayman Turtle Farm, has just announced the launch of the much anticipated kids club – 'Bosun's' Adventure Club (….) the park offered free admission all day to the public' (Cayman Compass, 2006).

Meanwhile, although waning slightly in our sample, debate over trade in sea turtles sustained the attention of the international media.

'Why do they want to open up the trade in selling turtle trinkets? They are pushing us back to the bad old days of people putting turtle shells on walls.' (The Times (2002) quoting an animal welfare campaigner).

Older conflict-framed articles often focused on the debate in trade over turtle products, and welfare was not present as a lead frame prior to the WAP campaign. This provides useful insights into how different concerns matter (or are evoked) at different scales.

It has been argued that CITES trade ban restrictions are insufficient for preventing wildlife poaching, and wildlife farming should not be forgotten as at least a short-term alternative (Challender & MacMillan, 2014). Nevertheless, debates surrounding trade in products from endangered species are common; for instance, Biggs *et al*. (2013) sparked intense discussion when they described crocodilian farming as applicable to rhino conservation (e.g.

Collins, Fraser & Snowball, 2013; Litchfield, 2013; Prins & Okita-Ouma, 2013). A focus on differences over normative perceptions ("conflict of beliefs"; Young, 2010), which can be particularly difficult to resolve (Redpath *et al.* 2015), can be jeopardizing for pragmatic conservation efforts. For example, the absence of welfare as a lead frame prior to the WAP campaign might reflect international pressure over a practice that is more widely accepted locally, given the traditional use of turtle meat (Nuno *et al*. 2017).

While acknowledging the importance of the human dimensions of conservation, in particular those pertaining to ethics and psychology (Nelson *et al.* 2016), warnings about transforming conservation conflicts into a purely ethical debate have been raised (Macdonald *et al.*, 2016). For example, the widespread appeal of sea turtles has curtailed turtle farming in comparison to the less charismatic crocodilians (Dickson & Hutton, 2000). Ethical framing is likely applicable to other species of conservation concern, and Challender and MacMillan (2014) note that ethical opposition should not necessarily prevent the development of wildlife farming.

A robust and comprehensive evaluation of wildlife farming as conservation tool must consider a wide range of social and ecological impacts; in our study, we focus on the potential role of the media in debates about sea turtle farming by CTF. Other studies specifically about CTF included analyses of: consumer behaviour and implications for its efficacy (Nuno *et al*. 2017), impacts of headstarting with released turtles contributing to the local breeding population (Bell *et al.* 2005), and husbandry issues and animal welfare (D'Cruze, Alcock & Donnelly, 2015). By bringing these different considerations together, as well as analyzing potential trade-offs and synergies with other conservation tools (e.g. environmental education, social marketing and bycatch reduction), we will be able to better understand their relative contribution to the conservation of sea turtles and implications for other taxa.

Enhancing conflict management

Conservation conflicts are likely to become an increasing problem (Redpath *et al*., 2015) and the media is an important consideration for conflict management both due to its potential as actor and facilitator of debate. CTF was often depicted as a source of controversy, and conflict was associated with a negative article valence. The increase in negative articles during WAP's campaign may reflect dramatization, which can prevent the development of a constructive dialogue and result in conflicts becoming increasingly intractable (Shmueli, Elliott & Kaufman, 2006). Media analysis can thus be a useful tool for pro-actively managing conflicts, as it can assist in characterizing multiple actors' standpoints, as well as understanding how to use the media as forum for discussions.

Conflicts can be seen as an indicator of democratic processes (Young *et al*., 2016) and may even play a key role at drawing attention to ineffective policies (Triezenberg, Knuth, & Yuan, 2011) but failing to manage them adequately might have important implications. A systematic and more predictive approach to conflict management should then consider the multiple objectives of conservation interventions (e.g. wildlife farming can have multiple roles, including social, economic, touristic and ecological) and consider them throughout planning, implementation and evaluation stages. In order to enhance conflict management, conservationists must be aware of the multiple roles the media might play from the outset of interventions, work with media outlets to harness its potential, and mitigate any potential negative consequences.

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Table 1. Descriptions of each main frame type found in articles about the Cayman Turtle Farm (CTF). The rationale provides details of how each frame is made up of smaller sub-frames, and contains quotes taken from the media stories to illustrate examples.

Frame name	Rationale and examples
Conservation	Portrays CTF as having a potential role in conservation. For example, reducing the number of turtles poached from the wild, releasing farmed turtles, and scientific research. This frame was also assigned if CTF was mentioned as a conservation centre; providing education, practical terrestrial conservation or beach cleans, providing veterinary care for both turtles and other animals, and relocating turtles to other establishments for the purposes of conservation.
Culture/ Community	Depicts CTF as part of Cayman's cultural identity, including both historic and symbolic importance (e.g. *'take turtle out of the Cayman way of life would be similar to taking the whale away from the Eskimos.').* CTF's role in community engagement and creating local jobs also applies here (e.g. *'sponsored a local volleyball club team'*).
Tourism	Describes CTF as a visitor attraction (e.g. *'Baby green turtles are handed out to the crowds'*).
Utilisation	Encompasses CTF's commercial aspects, and was assigned where turtle meat consumption or price was mentioned. This also includes other potential or historically produced commodities, even if CTF does not currently retail them (e.g. *'leather, tortoise shell and cosmetics'*). A turtle poaching episode, or stealing from CTF, was also assigned to this category under the assumption that it was motivated by financial gain, or the desire to consume turtle (e.g. *'making a quick dollar by stealing the turtles, butchering and selling the meat'*).
Conflict/ Disagreement/ Uncertainty	Presents CTF as a source of controversy, including uncertainty that results in debate and potential disagreement. This includes conflicts over beliefs or fundamental values i.e. Ethics: Opposing views on whether sea turtle farming, and consumption, is inherently wrong. (e.g. *'scandal of breeding sea turtles for food', 'no humane way', 'differentiate between farming of fish and turtles? Neither is domesticated'*). Welfare: Opposing views on whether CTF's turtles are adequately cared for (e.g. *'foul conditions', 'horrific sight', 'cannibalism', 'overcrowding'*) Trade: Conflict over trade in farmed turtle products (e.g. *'to permit*

	imports of farmed products might open the door for unscrupulous sellers to supplement their wares with creatures taken from the wild'). Personal disagreement also applies here i.e. Interpersonal Conflict: Conflict between main actors, in terms of personal disagreement and issues of trust (e.g. *'sensational allegations', 'ignoring our concerns', 'unwillingness to meet us halfway is posing a great challenge'*). Financial: Disagreement over how to manage CTF considering its financial difficulties. May be portrayed as a burden on Cayman's economy (e.g. *'$2 million of that is going into the financially failing Turtle Farm; more than is going to our national carrier Cayman Airways'*). This category also includes debate which is largely the result of uncertainty. This may not necessarily be negative, but it does frame CTF as an issue that needs to be discussed i.e. Demand: where the demand for turtle meat is presented as uncertain this may question necessity for turtle farming (e.g. *'Caymanian Department of Environment has committed to a three-year study to ascertain the true demand', 'Who the heck eats turtles anyway?'*). Releases: Controversy concerning the impact of releasing farmed turtles into the wild (e.g. *'lack of evidence', 'endangers wild populations'*). Health (human): Debate concerning if CTF presents a risk to human health (e.g. *'at risk of contracting E. coli and salmonella', 'can be fatal'*). Environmental impact: Concern about CTF's uncertain impact on Cayman's natural environment (e.g. *'discharging unregulated amounts of waste into the ocean', 'anecdotal evidence that coral reefs...have been damaged'*).
Management	Presents turtle farming as a management option for conservation, which may be subject to alternative options (e.g. WAP approached CTF about changing some of its operations to come more in line with a sea turtle research facility). This frame also includes the various factors affecting management decisions such as: Policy: Both local and international laws affecting trade in turtle products (e.g. *'U.S. decision to ban the import of farmed turtle products - which considerably affected the farms productivity'*). Governance: Local governance where CTF is considered the

	responsibility of the Cayman Islands government (e.g. *'state-run', 'government-funded', 'subsidy'*).
	Cooperation: Where the respective stakeholders are demonstrating efforts to be productive/work together (e.g. *'agreed to be independently evaluated', 'positive talks'*).

Table 2. Frequency and percentage of lead frames for each sample (Int. represents international, Lo. represents local) and date bracket. No local articles where available prior 2004[1].

Lead Frame	**1973-1979**		**1980-1989**		**1990-1999**		**2000-2009**		**2010-2015**	
	Int. n=2 (%)	Lo. n=0	Int. n=39 (%)	Lo. n=0	Int. n=61 (%)	Lo. n=0	Int. n=125 (%)	Lo. n=98 (%)	Int. n=90 (%)	Lo. n=219 (%)
Conservation	1 (50)	N/A	0	N/A	11 (18)	N/A	11 (8.8)	14 (14.3)	11 (12.2)	28 (12.8)
Culture/ Community	0	N/A	0	N/A	1 (1.6)	N/A	1 (0.8)	18 (18.4)	1 (1.1)	28 (12.8)
Tourism	0	N/A	22 (56.4)	N/A	42 (68.9)	N/A	103 (82.4)	34 (34.7)	46 (51.1)	47 (21.5)
Utilisation	0	N/A	2 (5.1)	N/A	2 (3.3)	N/A	1 (0.8)	4 (4.1)	0	13 (5.9)
Management	1 (50)	N/A	12 (30.8)	N/A	3 (4.9)	N/A	4 (3.2)	0	1 (1.1)	9 (4.1)
Conflict	0	N/A	3 (7.7)	N/A	2 (3.3)	N/A	5 (4)	28 (28.6)	31 (34.4)	94 (42.9)

[1.] The number of articles found per year increased in both samples. Therefore, to assess if the main article focus has altered over time, lead frames were calculated as a proportion of a specified date bracket (Table 2). As the international sample started in 1973, decadal date-brackets were chosen

Table 3. Magnitude of stakeholder mentions in the international and local media. For each one of the 317 international and 317 local stories, each of the 10 stakeholder groups was recorded as being mentioned or not. Number of mentions (n) represents the sum of all mentions actually found in each sample.

Stakeholder group	**Mentions in international media** n=166 (%)	**Mentions in local media** n=330 (%)
Farm staff/management	20 (12.1)	82 (24.9)
Cayman Islands government	24 (14.5)	125 (37.9)
UK government	20 (12.1)	14 (4.2)
USA government	15 (9.0)	0
Environmental/ animal welfare group	40 (24.1)	56 (17.0)
Academics	14 (8.4)	15 (4.6)
Celebrities	6 (3.6)	10 (3.0)
Corporate companies	10 (6.0)	12 (3.6)
Cayman locals	2 (1.2)	13 (3.9)
British Royal family	15 (9.0)	3 (0.9)

FIGURE LEGENDS

Figure 1. Lead frame prevalence in international and local media for 2004-2015 (when both local and international media stories were available from major online databases). This is calculated as a percentage of the international article sample (n=162) and local article sample (n=317) for each lead frame type (the main article focus).

Figure 2. Change in the valence (positive, negative, ambiguous) of media articles obtained in this study for the time period 2010-2015 (period surrounding media campaign launched by WAP). Note: data for 2015 were on a partial year's coverage (last search date was 26th May).

APPENDICES

Table A.1. Table of geographical sources and names of newspapers, newswires and magazines found in the international sample.

Location n=317 (%)	**Newspaper/newswire/magazine name**	
United States 116 (36.6)	Associated Press International	Newswire US
	Bloomberg Business	Patriot Ledger
	BPI Entertainment News Wire	PR Newswire
	Buffalo News Cape Code	San Diego Reader
	Times Chicago Daily	San Jose Mercury News
	Herald Chico Enterprise-	SF Gate
	Record Contra Costa	St. Louis Post-Dispatch
	Times	St. Paul Pioneer Press St.
	Daily News (New York)	Petersburg Times (Florida)
	Dallas Morning News	Stillwater Gazette
	Denver Post	Targeted News Service
	Eturbo News	The Atlanta Journal and Constitution
	Federal News Service	The Oklahoman
	Houston Chronicle	The Philadelphia Inquirer The
	Idaho Falls Post Register	State Journal-Register
	Investor's Business Daily	Toronto Star
	Journal of Commerce	Travel & Leisure Close-Up
	Miami Herald	United Press International US
	New Jersey Newsroom	Federal News
	New York Post	US Newswire

Table B.1. Number of articles and their proportions per news source found in the local press in total and randomly selected sub-sample. All proportions in sub-sample are non-significantly different from those in total sample (for all comparisons: $p>0.1$, test for one proportion using z-test).

News source	**Total sample** (n=707)	**Sub-sample** (n=317)
Cayman Compass	530 (75.0%)	235 (74.1%)
Cayman Reporter	14 (2.0%)	8 (2.5%)
CNN	33 (4.7%)	16 (5.0%)
CNS	10 (1.4%)	3 (0.9%)
iEyeNews	118 (16.7%)	54 (17.0%)
Other (*Mondaq business briefing*)	2 (0.3%)	1 (0.3%)

Figure A.1, A.2. Number of newspaper articles per year (1973-2014) covering the Cayman Turtle Farm in (A.1) the international sample (n=317) and (A.2) local sample (n=707). Papers from 2015 are not included in this visual as the last search was completed on the 26th May 2015) and therefore it was not a complete year. Because we do not report proportion of CTF media articles over total number of articles published for the sources of interest per year, this figure does not represent variation in media attention over time.