

## RESEARCH BRIEF

# Livelihoods & incentives towards regulations for protecting turtles: Empirical evidence from Nicaragua

BY RÓGER MADRIGAL & DIANA JURADO – JULY 10<sup>TH</sup>, 2014

Marine turtles are a flagship species for conservation because of their ecological role in marine ecosystems as well as the existence value that humans attach to them. Despite the legal ban on turtle egg harvesting, poaching and consumption are very common in Nicaragua.

In one of the major nesting beaches for olive Ridley (*Lepidochelys olivacea*) within La Flor Wildlife Refuge, the Nicaraguan government has made an effort to enforce the prohibition to harvest by defining a protected area patrolled by governmental and army officers. However the effectiveness of this policy is questioned, particularly because of the difficulties to exclude people from turtle's habitat, and the scarce governmental budgets dedicated to the enforcement of these regulations.

From the academic perspective, this problem is intrinsically related to the study of the conditions that affect the individual compliance with rules for the use of common pool resources. Even that sanctioning mechanisms are key determinant of successful management of these resources (Coleman & Steed, 2009; Ostrom, 2007), little empirical evidence exists at the individual level to explain why some local harvesters are more prone than others to break, or to follow the existing rules to manage this type of resources.

This project aims to improve understanding of different motivations (monetary and non-monetary) of local villagers to protect turtle marine nests in a context where poverty and limited



Massive arrival of olive Ridley turtles

natural resources tend to push them to overharvesting, but also where local authorities do not have the means to fully enforce the existing regulations. In particular, we seek to explore the role of procedural justice (perception of fairness in rule making process); existence of environmental values (intrinsic values on turtle protection); and socioeconomic attributes (e.g. age, income diversification) in explaining the decision of villagers to dedicate time and resources to harvest and sell turtle eggs.

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We collected primary data from villagers from Ostional, a settlement of the San Juan del Sur Municipality in the Rivas Province of Nicaragua. This community is located 4 km south from La Flor Wildlife Refuge. In addition, previous focus groups and in depth interviews with local leaders during August 2011 revealed that a large proportion of male villagers from this community have been engaged in turtle egg harvesting activities in La Flor and nearby beaches over the last years.

We designed a survey based on field observations and in depth interviews to key informants during August 2011. The survey was designed to satisfy different research objectives simultaneously: study motivations to harvest eggs and ultimately, to the non-compliance with existing regulations. The survey instrument included questions regarding normative and economic motivations to comply or not with the existing ban on harvesting; general characteristics of local livelihoods and demographics, among others. The information collected using the survey helped to inform Probit models (Wooldridge, 2002) that predict the likelihood that different socioeconomic attributes and perception on regulations are associated to egg poachers. We interviewed the head of households from each of the houses of the Ostional community. In addition, other male adult members of the household were interviewed separately if they were present at the moment of the visit. Two trained enumerators collected 180 surveys over two weeks of field work during October 2012.

It is worth to mention that when rule breaking behavior is investigated ex-post with the help of surveys people could have incentives to lie or simply have poor memory recall (Agarwal, 2010; Eggert & Lokina, 2009). This could be a potential threat to identify egg poaching behavior in La Flor region. However, we do believe that this is not a serious threat to our research. Most local fishermen interviewed admitted openly that they have harvested eggs as part of their daily livelihoods since many years. They also clearly identified other fishermen in the community that have similar behaviors (there is no strong negative stigmatization about this activity). This openness allowed for cross checks to determine the reliability of the survey responses. In fact, we detected 5 persons that were providing untruthful responses regarding their participation in poaching activities. These persons are excluded from the dataset and hence, from the analysis of the results.

#### Key Points

- Lack of livelihoods diversification negatively affect conservation of nesting sites
- The design and implementation of harvesting bans should take into account incentives faced by locals

Our results indicate that the perception towards regulations differs between egg harvesters and non-egg harvesters in Ostional. Interesting discrepancies and similarities can be observed based on aggregated descriptive statistics. For instance, while both groups tend to coincide on different perception on necessity to protect turtles and the responsible for such protection, there is tendency that harvesters perceive that the monitoring effectiveness of governmental guards is relatively low, compared to that of non-harvesters.

The results of the Probit model indicate that some socioeconomic attributes and perceptions on regulations are associated with being an actual turtle egg harvester. Age, education, the number of sources of income besides selling eggs and the ownership of land for cattle and/or agriculture

negatively affect the probability of being an egg harvester. The last two variables suggest that the lack of outside opportunities and diverse livelihoods makes local villagers more dependent on harvesting and selling eggs. Thus, this economic driver tends to generate strong incentives to break the existing ban on harvesting defined by the government.

It seems that perception drivers for compliance with the existing ban on harvesting are less relevant to those discussed above. The lack of relevance of normative factors such as procedural justice (community participation in definition of harvesting ban), the perception of justice and environmental values towards the protection of turtles to explain compliance with regulations deserves further analysis.

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## Conclusions

The literature highlights the relevance of economic and normative factors as main predictors on individual rule compliance. This study found empirical support for economic drivers as the most important driving forces to comply with existing governmental regulations that prohibit the harvesting and selling of marine turtle eggs. The lack of diversify livelihoods tend to push people to depend on harvesting eggs. From a policy perspective, both interested in increasing the protection of marine biodiversity and to reduce poverty of local villagers, the promotion of alternative income generating activities seems as the most promising alternative to reduce the pressure on turtle nests from local villagers. Nevertheless some other factors might continue generating incentives to harvest eggs. For instance, if consumers from large cities in Nicaragua continue to demand eggs, the incentives to harvest would push people from other villagers to access and harvest eggs. Even that these external threats were not directly addressed in this paper it is clear that an integral strategy to protect turtle nests needs to take into account such factors. Our results are similar to those of other scholars in fisheries (Ahmed, Troell, Allison, & Muir, 2010). They have analyzed the enforcement of harvesting bans i.e. rule compliance, for particular marine species using the livelihoods approach (Carney 2002). This approach embraces a wider perspective to understand assets beyond financial resources. Ahmed et al. (2010) have found that the lack of compliance of a governmental ban on harvesting a particular marine species of high importance for the livelihoods of coastal fishers in Bangladesh was mainly because of the lack of alternative livelihoods (fishers were vulnerable due their dependence on this particular species).

## ABOUT THIS BRIEF

This brief is based on Madrigal, R; Jurado, D. 2013. Livelihoods, attitudes towards regulation and the participation in performance based payments for protecting turtles: Empirical evidence from Nicaragua. EFD Working paper.

## FURTHER READING

Madrigal, R; Schlüter, A; López, M. 2013. What makes them follow the rules? Empirical evidence from turtle egg harvesters in Costa Rica. *Marine Policy*, 37, 270–277. doi:10.1016/j.marpol.2012.05.009

Smith, R., & Otterstrom, S. 2009. Engaging local communities in sea turtle conservation: strategies from Nicaragua. *The George Wright Forum*, 26(2), 39–50.

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