

Sustainability of community-based conservation: sea turtle egg harvesting in Ostional (Costa Rica) ten years later

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SUMMARY

In 1995, a study found that the socioeconomic benefits from a legalized commercial harvest of sea turtle eggs in Ostional (Costa Rica) were substantial and widely recognized by Ostional residents. Legal and administrative structures ensured community participation in and control of resource use, and evidence indicated support for community-based conservation (CBC) was high. In 2004, the study was repeated to assess how perceptions of the egg harvest might have changed over time. There were continued high levels of support for conservation and positive perceptions of the project's impacts on the economy, environment and community. Some explanations for impact rankings have changed, with greater emphasis on the importance of conservation and awareness of how this is achieved, greater animosity towards one government agency and greater concern about the impacts of tourism on the egg harvesting project. Between surveys, a variety of social, political and economic changes have occurred. The CBC concept has been further refined and critiqued; by examining a CBC project over time, this paper considers the durability and flexibility of the incentive, legal and administrative structures associated with a successful example of CBC.

Keywords: community-based conservation, Costa Rica, economic incentives, participation, sea turtles, sustainable use

INTRODUCTION

It has become difficult to imagine the word 'conservation' without 'community' sitting alongside it, as their combination is part of the international conservation and development lexicon. Community-based conservation (CBC) encompasses several core principles, including: involving communities in decision-making; devolving control over resource management; developing community institutions for management; incorporating traditional or local knowledge; legitimizing community property rights; linking environment and development objectives; and providing incentives for

conservation (Western & Wright 1994; Songorwa 1999; Kellert *et al.* 2000; Barrow & Murphree 2001). All of these are employed with the aims of overcoming the limitations associated with traditional 'top-down' approaches to conservation (Adams & Hulme 2001; Campbell 2002), and CBC should benefit both people and environments, contributing to both development and conservation.

While CBC has been widely promoted, several common problems have emerged in practice. First, CBC projects have often been undertaken without an adequate understanding of both local socioeconomic context and wider socio-political systems that mediate community interactions with the environment (Agrawal & Gibson 2001; Barrett *et al.* 2001; Berkes 2004). Second, CBC implementers have failed to realize community participation in project identification, design and management, and have particularly struggled with devolving authority and responsibility (Songorwa 1999; Campbell 2000; Murphree 2002). Third, the notion of community as socially homogenous and cohesive, sharing norms and values and tied to place, has been oversimplified. In reality, communities are more complex, varying along class, ethnic, caste and cultural lines, representing diverse interests in conservation and with changing membership (Songorwa 1999; Agrawal & Gibson 2001; Barrow & Murphree 2001). Finally, incentives have often failed to be translated into increased support for conservation, with development gains disconnected from conservation or even negatively impacting on it (Adams & Thomas 1996; Noss 1997; Infield & Namara 2001).

These challenges have been widely recognized and evoke two distinct responses. The first is to present CBC as a good concept that has suffered in implementation (see Brechin *et al.* 2002; Brosius & Russell 2003). In this response, challenges to CBC are surmountable, and Brechin *et al.* (2002) list six recommendations for re-envisioning CBC. A second response is to reject CBC altogether (see Oates 1999; Terborgh 1999). Proponents of this view advocate a return to exclusionary conservation, and base their arguments on a number of factors, including the lack of evidence showing improvements in conservation through CBC (Wilshusen *et al.* 2002; Brosius & Russell 2003). Brockington *et al.* (2006) describe an unproductive discomfort between the two responses, and Redford *et al.* (2006, p. 1) lament an ongoing 'dialog of the deaf', with little willingness on either side to engage constructively with the other.

To contribute to the debate about the overall utility of CBC, this paper focuses on incentives for conservation, the way in

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which these work in a particular case study, and how they have changed over time. Incentives are important in and of themselves, but they are also linked to other issues (for example failure to engage communities in designing CBC may lead to the design of inappropriate or unappreciated incentives). Communities' attitudes towards conservation are thought to be influenced strongly by economic incentives (Freese 1997), but predicting the impact of economic incentives for conservation has proven challenging for several reasons. First, economic incentives for CBC may exist, but will only have positive conservation impacts when they result in changed decision-making about labour and land allocations (Wunder 2000). These decisions are influenced by other economic issues (for example the substitution versus complementarity of productive activities) and by non-economic issues, including 'the incentive structure inherent in the mode of participation' (Wunder 2000, p. 465). Second, distribution of economic benefits can influence attitudes towards conservation, but not always in a predictable manner. In some cases, individuals may view conservation positively even when they do not benefit individually if there are economic benefits for some members of the community (see Alexander 2000). In others, support for conservation may wane when individuals realize that only certain households benefit (for example Belsky 1999). Although Stem *et al.* (2003) argue that more equitable distribution of economic benefits can be expected to result in more favourable attitudes towards CBC, this will be influenced by the nature of the community. Third, the nature of economic benefits can vary and some communities may prioritize investments in infrastructure (such as improvements to clinics and schools) over access to resources or individuals' employment (Infield & Namara 2001). Fourth, economic incentives may not stand the test of time; positive attitudes that arise with initial benefits may, in the long term, prove unable to outweigh problems associated with conservation (Infield & Namara 2001). Overall, it is too simplistic to conceive benefits from CBC purely in economic terms. Equity, empowerment and fairness in the CBC process (Berkes 2004), as well as legitimacy, governance structures and accountability (Brechin *et al.* 2002) are other features that communities value. Community participation in and control over decision-making can be just as important in securing support for conservation (Parry & Campbell 1992; Western & Wright 1994; Campbell 1998).

Our case study is the legal, commercial harvest of olive ridley sea turtle eggs, run by a community cooperative in Ostional (Costa Rica). The Ostional egg harvesting project (EHP) makes an interesting case study of incentives for CBC for two reasons. First, the EHP is considered to be a successful from both conservation and development perspectives. While there is much to be learned from CBC failures, successes are also necessary for understanding the potential for CBC. Second, the EHP has been operating for over 20 years in much the same form, administratively, legally and operationally, and this allows for examination of how incentives evolve. Many CBC case studies are temporally bounded, with determinations of success or failure based on a one-time

view and potentially influenced by specific volatile events or sudden windfalls (Infield & Namara 2001). Furthermore, 'arrangements for decision making or power sharing are constantly being crafted and renegotiated' (Brechin *et al.* 2002, p. 47), and such activities can turn a one-time failure into a success (or vice versa). Long-term studies of particular projects are required to capture such dynamics.

In terms of conservation success, the Ostional EHP capitalizes on a phenomenon known as *arribada* nesting, where hundreds of thousands of olive ridley sea turtles nest simultaneously over several days. Nesting numbers are sufficiently high at Ostional that turtles soon run out of unused space to nest, and eggs already laid are destroyed by subsequent waves of nesting turtles. The egg loss during *arribadas* is a key argument in favour of the EHP, but Cornelius *et al.* (1991) also speculated that removing a portion of eggs from the beach could actually increase overall hatchling productivity (then estimated at 8%), by reducing the number of eggs decomposing on the beach. This may have occurred, with Ostional hatchling success as high as 20% at certain times of the year (Gerardo Chaves, personal communication June 2006), and at a second *arribada* beach in Costa Rica hatchling success is lowest where nesting density (and destruction of eggs) is highest (Honarvar *et al.* 2006). Eleven years of nesting data suggest a stable and possibly increasing population at Ostional (Ballesterio *et al.* 2000); in 2001, nesting estimates ranged as high as 130 000 turtles per *arribada* (Chaves 2002) and the frequency of *arribadas* was higher than historically reported (see Richard & Hughes 1972; Ballesterio 1994). While the ability to assess the impact of egg harvesting on sea turtle populations is compromised by their delayed sexual maturity (Mortimer 1995), the legal egg harvest has been operating for 20 years. Estimates of ridley turtle maturation time range from 11–19 years (Chaloupka & Zug 1997; Zug *et al.* 1997), and that there are no indications of decreased nesting at Ostional (Ballesterio *et al.* 2000) is the most convincing argument regarding the biological sustainability of the harvest.

In terms of socioeconomic success, Campbell's (1997, 1998) 1994–1995 study concluded that the EHP faced challenges, but met the goals of CBC. She found that the benefits from the EHP were substantial and widely recognized by Ostional residents, and that its legal and administrative structures ensured community participation in, and control of, resource use. These features combined to encourage local awareness of, support for, and investment of EHP profits in conservation of nesting sea turtles and their eggs and in community development (Campbell 1998). While data on socioeconomic aspects of the EHP do not exist for the 20-year span of the project, Campbell's (1998) study can be used as a baseline for a 10-year assessment. In this paper, the results of a household survey administered by Campbell in 1995 are compared with the results of the identical survey re-administered by Trow in 2004, in order to assess whether and if so, how attitudes toward and incentives for conservation have changed. The paper also revisits the factors Campbell (1998) identified as contributing to success in 1995, and the challenges the EHP

Table 1 Characteristics of survey respondents and their households.

<i>Characteristics</i>	<i>1995 survey (n = 76)</i>	<i>2004 survey (n = 60)</i>	χ^2	<i>p</i>
% Male (<i>n</i>)	34 (26)	47 (28)	2.173	0.1405
% Female (<i>n</i>)	66 (50)	53 (32)		
Average age (years)	38	40		
Average education (years)	5 primary	7 primary		
Average residency in Ostional (years)	24	27		
% Association member respondents (<i>n</i>)	89 (68)	80 (48)	2.399	0.1214
% Non-member respondents (<i>n</i>)	11 (8)	20 (12)		
% Association member households (<i>n</i>)	92 (70)	90 (54)	0.1847	0.6673
% Non-member households (<i>n</i>)	8 (6)	10 (6)		

faced at that time. Lessons learned from Ostional may inform other attempts to implement CBC, particularly in terms of overcoming the common problems associated with CBC in practice.

THE OSTIONAL EGG HARVESTING PROJECT

The history of Ostional, the Wildlife Refuge, and the EHP are described in detail in Campbell (1998). Only brief descriptions are provided here, emphasizing things that have changed over the past 10 years. These changes, though sometimes minor, provide a context for considering if, how and why incentives for conservation and attitudes toward the EHP have shifted.

Wildlife Conservation Law 6919 remains the principal law guiding egg harvesting (see Campbell 1998, table 1, p. 310), and a year 2000 law (Law 8325) devoted to sea turtle conservation retains provisions allowing for the EHP. Campbell (1998) concluded that the legal framework was one of the most important features of the EHP and, although there was some concern in 1995 about internal problems with EHP administration, most people were confident of the project's legal status (Campbell 1998). The importance of legal security has been tested since 1995, a year that marked the beginning of several years of conflict between biologists interested in the EHP. Multiple legal challenges to the EHP were launched by one biologist, and the many *recursos de amparo* (petitions) registered with Constitutional Court are described in Monge Artavia and Jiménez Gómez (2001). While none of the challenges was successful, the sense of security Campbell (1998) deemed crucial to the project may have been threatened.

Three national institutions, namely the Ministry of Environment and Energy (MINAE), the Institute of Marine Fisheries and the Association for Rural Economic Development, retain responsibilities for various aspects of the project (see Campbell 1998). In 1995, none of these agencies maintained a permanent presence in Ostional, although MINAE assigned a refuge administrator/ranger to Ostional late in that year to visit during arribadas (Campbell 1998). In 2005, MINAE built an office in Ostional, but whether or not MINAE will eventually have permanent staff there remains to be seen.

The Integrated Development Association of Ostional (hereafter the Association), managed by an elected *Junta Directiva* (Board of Directors, hereafter the Junta), is

responsible for the day-to-day running of the EHP (Campbell 1998). In 1995, the Junta was plagued with turmoil and faced accusations of embezzlement, incompetence and favouritism. Over the course of Campbell's field work, Junta elections were held three times and community anxiety about the Junta was high (Campbell 1998). During Trow's 15 months in Ostional in 2003 and 2004, the Junta continued to experience problems, but only one Junta was in power throughout Trow's stay.

The mechanics of the egg harvest are described in detail in Campbell (1998) and have changed little since 1995. The price for eggs has also remained stable; in 2006, a bag of 200 eggs sold for 5500 colones (approximately US\$ 11 at 2006 exchange rates), an increase of only US\$ 2 over the 1995 price. This reflects government policy that ties the price of turtle eggs to chicken eggs. While this policy is designed to discourage illegal egg harvesting from other Costa Rican beaches, Hope (2002) has argued that, provided the Association captures the benefits, higher prices for turtle eggs would provide additional incentives for conservation. However, Hope's (2002) argument rests on demand for eggs exceeding supply, a situation that did not occur throughout Trow's residency; on the contrary, the Junta was concerned with expanding the market for eggs.

Associates undertake turtle protection activities, such as collecting garbage from the beach, 'liberating' hatchlings and guarding the beach (see Campbell 1998). Some activities have changed since 1995. For example, more guards are on duty generally and for 24 hours a day during arribadas. Guards are equipped with special clothing, walkie-talkies, night-and-day vision binoculars and video cameras. In January 2005, the Association built a guard tower at one end of the beach, and a second is planned. In 2001, a tourism guiding cooperative was established by the Association, designed to control tourist access to the beach (guiding was mostly non-existent in 1995; see Campbell 1999). With the introduction of a MINAE by-law in 2005, tourists are now required to use a guide when viewing turtles in the Refuge.

In 1995, approximately 90% of Ostional households participated in the EHP and new membership was restricted to children of existing associates when they turned 15 (Campbell 1998). The percentage of households participating in the EHP has decreased as the number of households in Ostional has grown and membership rules have been further tightened; in

2004 children of associates could join only if they were born in Ostional, or if they were born elsewhere but had lived in Ostional for five years. Membership levels remained fairly constant over the ten years; in both survey periods, there were approximately 220 associates.

Profits from the EHP are distributed between salaries paid to associates (70%) and the community (30%). Following government appropriation of 40% of community profits, the remainder is used to pay for development projects, expenses of the Association (including the biologist's salary; Campbell 1998) and hardship grants (Hope 2002). Community projects financed at the time of the 1995 research are described in Campbell (1998). Since 1995, two footbridges have been built across rivers that often flood during the rainy season (Hope 2002), in addition to the guard tower mentioned above. Additional funds are spent on maintaining roads, the school, the soccer field and community buildings.

METHODS

In 1995 and 2004, a survey of all Ostional households was attempted, with 91% ($n=76$) of all households ($n=84$) surveyed in 1995, and 51% ($n=60$) of households ($n=119$) surveyed in 2004. Households were defined by physical dwelling and surveys were directed at either the male or female household head. While a smaller percentage of households was surveyed in 2004, the similarity of respondent characteristics (Table 1) increases confidence that any differences in responses between years is not due to sampling.

Household surveys recorded: (1) general socioeconomic data; (2) Likert-like ranked opinions on the EHP's impacts on the economy, community and turtles, and explanations of rankings; (3) perceived 'best' and 'worst' things about the EHP; (4) awareness and perceptions of sea turtle protection activities; and (5) perceptions of threats to the EHP, and specifically of existing and potential conflicts between the EHP and tourism, the two activities that rely on continued sea turtle nesting. With the exception of the Likert-like rankings, questions were open-ended and responses were coded and categorized based on themes present in the data. For example, respondents were not asked to choose from a list of 'best things' about the project. Rather they identified 'best things' independently, and rankings were assigned according to the 'best thing' cited most frequently. Codes developed in 1995 were applied to 2004 data, but new codes were created when the existing coding system did not capture 2004 responses.

Within the 1995 and 2004 survey groups, there are few statistically significant differences in opinions about the EHP according to age, sex or membership status of respondents. Since the interest here is in change over time, statistical analysis of results is restricted to comparing responses between years. Significance was determined using χ^2 tests (at 95% confidence level), where the frequency distributions of responses met the criteria for the test to be valid.

The 1995 survey results were supplemented with in-depth interviews with community members and Campbell's

observations made during eight months residency in Ostional. In 2004, Trow did not repeat formal interviews, but her observations during her 15 months in Ostional with the Peace Corp supplement survey data. Trow was specifically assigned to assist the Association and gained insight into both the operations of the EHP and the challenges it faced at the time.

RESULTS

Changing impacts of the project on the economy

In 1995, the EHP was the most important economic activity for 70% of all households surveyed (76% of member households). Twelve per cent of households identified casual labour as most important, and no other activities were identified as most important by >5% of respondents (Campbell 1998). In 2004, 63% of all households surveyed ranked the EHP as their most important economic activity (70% of member households), while 25% identified construction as such. Tourism-related jobs (cooking, cleaning, renting cabins, guiding, and working as an artisan) provided the most important source of income for 19% of households. No other jobs were identified by >2% of respondents as most important. The decrease in the proportion of households identifying the EHP as most important over the 10 years is not significant ($\chi^2 = 0.6210$, $p = 0.4307$ for all households; $\chi^2 = 0.4457$, $p = 0.5044$ for member households), and the most noticeable difference is the increased importance of construction and tourism-related jobs. In 1995, these were ranked as most important by only 3% and 7% of households, respectively.

In 1995, salaries paid to associates ranged from 5000 colones (US\$ 39 at 1995 exchange rates) to 10 000 colones (US\$ 77) per arribada, for approximately 19 hours of work. This maximum hourly rate of US\$ 4.04 compared favourably to wages for casual labour and construction (US\$ 1.08–1.70 hr^{-1}). In 2004, wages earned in the EHP averaged 40 000 colones per arribada (US\$ 80 at 2006 exchange rates), or an hourly rate of US\$ 4.20. Wages in casual labour and construction had increased to US\$ 1.40–3.00 hr^{-1} . The hourly wage earned in the EHP still compared favourably with other sectors, but the ephemeral nature of the arribada limited work hours. In contrast, opportunities in construction and tourism had grown, as had their relative value to some households. For example, while construction was identified by only 13% of households as one of the top three economic activities in 1995, 36% identified it as such in 2004.

Perceptions of the EHP's impacts on the economy, community and turtles

In both 1995 and 2004, the majority of survey respondents believed the EHP had positive impacts on the economy, community and turtles. Only opinions about impacts of the EHP on the community were significantly different between years, with a higher proportion of respondents seeing impacts as neutral in 2004 (Table 2).

Table 2 Perceived impacts (+ = positive, +/- = neutral, - = negative) of the EHP on the economy, environment and community in 1995 and 2004 by percentage of respondents (number of respondents shown in brackets). Percentages do not always equal 100 because 'don't know' and 'no answer' responses are not included in the table.

	<i>Economy</i>			<i>Turtles</i>			<i>Community</i>		
	+	+/-	-	+	+/-	-	+	+/-	-
1995 (<i>n</i> = 76)	72% (55)	17% (13)	3% (2)	72% (55)	12% (9)	0	63% (48)	17% (17)	9% (7)
2004 (<i>n</i> = 60)	71% (42)	17% (10)	5% (3)	81% (48)	17% (10)	0	63% (36)	35% (20)	0
χ^2		0.5414			0.2338			7.068	
<i>p</i>		0.7629			0.6287			0.0292	

Table 3 'Best' and 'worst' things about the EHP identified by respondents in 1995 and 2004. Rankings show the top 3 most frequently cited 'best' and 'worst' things, and only things identified by more than 10% of respondents are included (for example, in 1995, only two things were identified by more than 10% of respondents as the 'best' thing about the project).

	<i>Best thing about the EHP</i>		<i>Worst thing about the EHP</i>	
	1995	2004	1995	2004
1	Income/work (24%)	Protecting the turtles (37%)	Problems with Junta (25%)	Problems with some people (15%); Illegal harvesting (15%)
2	Community benefits (20%)	Community benefits (23%)		Organizational issues (12%)
3		Income/work (20%)		

Table 4 Protection activities identified by percentage of respondents (number of respondents shown in brackets) in 1995 and 2004.

	<i>None</i>	<i>Hatchling release</i>	<i>Guarding</i>	<i>Beach cleaning</i>	<i>Predator control</i>	<i>Egg removal</i>	<i>Guiding</i>
1995 (<i>n</i> = 76)	9% (7)	79% (60)	24% (18)	18% (14)	17% (13)	0	1% (1)
2004 (<i>n</i> = 60)	0	83% (50)	45% (27)	82% (49)	22% (13)	22% (13)	20% (12)
χ^2		0.4171	6.881	53.91	0.4512		13.54
<i>p</i>		0.5184	0.0087	<0.0001	0.5018		0.0002

In terms of economic benefits, justifications for positive rankings changed. In 1995, 61% of respondents cited the EHP's provision of income and work to explain their positive rankings, while only 35% of respondents did so in 2004. In both years, positive perceptions of economic impacts were reaffirmed when 24% (1995) and 20% (2004) of respondents identified money or work as the 'best' thing about the EHP (Table 3).

In terms of community benefits, justifications for rankings were vague in both years, with 63% (1995) and 50% (2004) of respondents offering no supporting justification. Among those who did, there were some notable differences. For example, in 1995, 30% of respondents referred simply to unity to explain positive rankings, and 24% identified lack of unity and problems with the Junta in spite of positive rankings. In contrast, these justifications were almost absent in the 2004 responses, with each identified by only 2% of respondents. A second difference is that, in 2004, 15% of respondents identified the EHP's provision of income and work to explain positive community rankings, a justification that was absent in 1995. The importance of other community benefits (such as unity in the village, equitable distribution of benefits, construction of community buildings and community learning) was reaffirmed when they were identified by 20% (1995) and 23% (2004) of respondents as the 'best thing' about the EHP (Table 3).

In terms of impacts on turtles, respondents were generally vague in explaining their positive rankings in both years, referring to their efforts to care for the turtles and nature (in 2004, 29%; in 1995, 23%), rather than to specific protection activities linked to the EHP. When asked directly about protection (i.e. what does the EHP do to protect the turtles?), respondents were aware of specific activities in both years, but with higher levels of awareness in 2004, sometimes significantly so (Table 4). Egg removal was only identified as a protection activity in the 2004 survey.

In 2004, 37% of respondents identified protecting the turtles as the 'best thing' about the EHP, in contrast to 5% of respondents who did so in 1995. This was the most frequently cited 'best thing' in 2004, as opposed to income or work in 1995 (Table 3). In both years, respondents expressed their willingness to do more to protect the turtles (67% in 1995, 78% in 2004) and, in 2004, no one believed protection levels should decrease (5% did in 1995). In 2004, 5% of respondents believed more should be done to restrict fisheries and tourism development in order to protect turtles.

Threats to the project

In 1995 and 2004, 30% and 25% of respondents, respectively, perceived no threats to the EHP. Among those who did perceive threats, bad internal management/conflict (18%),

enemies of the project (14%) and illegal harvesting (8%) were most commonly cited in 1995. In 2004, these were government (32%), enemies of the project (10%), illegal harvesting (7%) and tourism development (7%). While the identification of illegal harvesting as a threat to the EHP did not change, it tied as the most often cited 'worst thing' about the project in 2004 and was not identified as a 'worst thing' in 1995 (Table 3).

Concerns about existing and potential conflicts between the EHP and tourism were evident in both 1995 and 2004, but had increased in 2004 (40% versus 25% in 1995 believed there were current conflicts; 69% versus 55% in 1995 saw potential for future conflicts). The source of existing and potential conflicts included: tourists not liking the EHP, tourists not wanting to pay fees to visit the beach and the impacts of tourism development and land speculation on the economy, community and environment.

DISCUSSION

Factors contributing to success

The EHP continues to provide significant and highly valued economic benefits to households in Ostional. The overall importance of the EHP to some households may be decreasing as economic opportunities in other sectors have increased, but the majority of households continue to rank it as their most important source of income. Furthermore, households with other incomes recognize the importance of the EHP to the village economy and to the community as a whole.

The legal framework of the EHP has changed little since 1995, but in contrast to 1995, legal issues were not discussed by survey respondents in 2004. There are several ways to interpret this. One way is related to methods; whereas legal issues were mentioned by a small proportion of survey respondents in 1995, Campbell's (1998) conclusions about the importance of the legal structure were also based on in-depth interviews. These were not repeated in 2004, and legal issues might have resurfaced if they had been. However, there are at least two other explanations. First, fewer associates likely remember a time when the project was illegal (i.e. > 20 years ago). Second, in the past 10 years, the Project's ability to withstand legal challenges has been proven. These possibilities suggest that the EHP's legal status may now be taken for granted.

Administratively, the structure of the EHP continues to encourage community participation and ownership, adherence to rules and self-policing. One important administrative change has been MINAE's increased presence, and two consequences predicted by Campbell (1998) are evident. First, MINAE is now the most often cited threat to the future of the project. Concern about MINAE's presence is in part based on historical relationships of distrust and a long-standing rumour that MINAE would like to move people out of the Refuge. It is also linked to tourism, as some respondents were concerned that MINAE will take over guiding or close the EHP owing to perceived conflicts between it and tourism. Whether or not concerns about MINAE have led to reduced

conflict in the Association is impossible to determine, but it does appear that anxiety about the Junta in 1995 has been replaced with anxiety about MINAE in 2004. Second, tourists must now pay guides when viewing turtles on the nesting beach, because of a MINAE by-law. Ten per cent of the guide fee goes to the Association and this is the only direct financial benefit from tourism that it captures (individual members benefit through private investment).

Evolving challenges

In 1995, Campbell (1998) identified problems with the Junta and the potential for increased membership in the Association as two important challenges to the EHP, and results suggest these had been overcome in the 10-year interim. First, few respondents identified problems with the Junta in the 2004 survey; this may reflect a real decrease in problems and local institutional strengthening, the transfer of hostilities to MINAE or the realization after years of deflecting outside legal challenges that the Junta is the least of the Association's problems. Second, few respondents expressed concerns over membership pressures in 2004 and membership levels had stayed at approximately the same level over the 10-year period. Association activities may have assisted in overcoming these challenges, but it is difficult to isolate such effects. For example, membership rules have been tightened since 1995, but other demographic factors may be at work. The changing regional economy has also played a role. For example, greater diversification of Ostional's economy and the EHP's decreased importance for at least some households may lead some members to be blasé about EHP politics; problems with the Junta may not seem as important as they once did. Economic diversification may also have reduced concerns about limiting membership. This does not imply EHP members think membership should be closed (concerns for equity also drive opinions), but economic hardship associated with exclusion may be perceived as reduced.

In 2004, new challenges were evident, specifically community concern about the role of MINAE in Ostional and tourism development. Tourism and related development was the third most often cited threat to the project in 2004, and concern about existing and potential conflicts between tourism and the EHP increased from 1995 to 2004. However, the 2004 survey found continued high levels of support for increased tourism (79% of respondents) and mostly positive rankings of tourism's impacts on the economy, community and turtles. These mixed attitudes may be accounted for by the different types of tourists visiting Ostional, in other words regular tourists versus volunteer tourists who come to work with turtles (see Gray & Campbell 2007). The 61% of respondents who ranked tourism's impacts on the turtles as positive and justified this by tourists coming to help with the turtles, were likely referring to volunteer tourists. In contrast, respondents who cited negative impacts of tourists on the environment, including use of lights and cameras on the beach, were likely referring to traditional tourists. As both types of

tourism continue to increase, attitudes towards tourism may be further complicated and this may impede the Association's attempts to regulate tourism development.

Evolving incentives for CBC

Although economic benefits of the EHP remain substantial and highly valued, several results taken together suggest that their importance at the household level is decreasing, whereas the importance of community benefits (economic and otherwise) is increasing. In 2004, fewer people cited the EHP's provision of income and work to explain positive economic rankings or identified them as the 'best thing' about the project. A similar percentage of respondents identified community impacts as the 'best thing' about the project in both years, but by 2004, these ranked more highly than economic benefits (Table 3). Income and work were seen as a community benefit in 2004, but not in 1995. Because the Association has continued to invest in community development, households that do not participate in, or that are increasingly less reliant on, the EHP continue to benefit from it in other ways and maintain interests in it.

These results confirm a number of previous findings on incentives for CBC. First, economic benefits are important, but community benefits (including unity in the village and community learning, similar to the less tangible benefits of Berkes 2004 and Brechin *et al.* 2002) are often valued as, if not more, highly. These benefits interact, with community control informing economic investments; Wunder's (2000, p. 465) 'incentive structure inherent in the mode of participation' is relevant in this case. Second, economic benefits can be perceived as beneficial at the household and/or community level. While the complex relationship between community and household level economic benefits has been explored by others (see Alexander 2000; Infield & Namara 2001), the longitudinal approach in this study illustrates that the importance attached to either is not static over time. Finally, results highlight the significance of positioning a CBC project in a wider economic context (Agrawal & Gibson 2001; Wunder 2000), since the changing regional economy has clearly influenced the evolving role of household versus community incentives in the EHP.

One of the most noticeable changes from 1995 to 2004 is increased importance and awareness of conservation. In 2004, a higher percentage of respondents were aware of protection activities and new activities were identified. There was increased investment in some activities, like guarding, and increased concern over illegal harvesting. The most striking change, however, is the 37% of respondents who identified protecting the turtles as the 'best thing' about the project, a response that surpassed both community and economic benefits. Like community benefits, environmental benefits appear to be increasingly important as incentives for CBC. Since they are most often seen as an outcomes of CBC (but see Jantzi *et al.* 1999), this issue warrants further attention.

It is tempting to be cynical about the increased environmental concern and interpret it as reflecting community

awareness of what external agents want to hear, or as a strategic move to defend community rights to resources (Li 1996; Sundberg 2003). In the Ostional case, environmental rhetoric is too widespread and manifests itself in too many ways to be dismissed so easily. Furthermore, dismissing locally expressed environmental concerns just because they have been repeated elsewhere 'would be to miss completely the enormously interesting, complex, and crucial, but understudied, relationship between changes in government and related shifts in environmental practices and beliefs' (Agrawal 2005, p. 2).

Agrawal (2005) makes this claim in forwarding his theory of environmental subjectivities. The term refers to people who have come to think and act in new ways in relation to the environment as a result of their participation in institutional structures of monitoring, enforcement and regulation. Participation is necessary to 'generate the concern for conservation that renders environmental protection a moral act' (Agrawal 2005, p. 22). Regulation is not simply about stopping people from breaking rules, but a means for producing awareness of resource vulnerability to which livelihoods are tied. Environmental actors can come to understand their subject positions as mistaken when their beliefs about the environment and their role in it lead to unanticipated outcomes (such as resource depletion), and this provides a motive for reconsidering existing subjectivities and for creating new ones (Agrawal 2005).

After 20 years of participating in governance of the EHP, it may be that the environmental subjectivities of some Ostional residents have evolved or strengthened. However, there is at least one important difference between the Ostional case and the Indian case study described by Agrawal (2005), namely the role of resource scarcity and depletion. Unlike the forests in India, the turtle population at Ostional has never been seen as threatened or endangered, and local people believe sea turtles are abundant (even those who believe there were more in the past; see Campbell 1997). While the government's initial desire for management in Ostional was based in part on concern about the potential long-term impacts of unregulated harvesting, it also stemmed from the nature of the resource itself; sea turtles are charismatic wildlife, highly valued by some portions of the population (Campbell & Smith 2005, 2006), and laws protecting them in Costa Rica date from 1948 (Campbell 1998). Although local subjectivities may be changing, in this case change cannot be accounted for by individual views of the negative impacts of their actions on the resource. Other motivating factors are at work, and the role of such potential motivations (such as the desire to maintain order, to assert community control or to be leaders in CBC) in the development of environmental subjectivities warrants future exploration.

CONCLUSIONS

The cases of successful CBC in the literature are few. The common problems arising when implementing CBC, namely failure to account for context, to fully implement participation

and to link conservation and development outcomes, and oversimplification of community, are revisited here in the context of how the EHP has overcome or avoided them.

The external context in which the EHP operates was taken into account when the project was established. For example, membership rules were designed to decrease the likelihood of immigration, national wildlife laws were modified to allow for the EHP and the national demand for sea turtle eggs was considered; prices for Ostional eggs are kept artificially low with the aim of reducing black market trade (Campbell 1998).

The wider context, like everything else, is changing, as illustrated by three examples. First, demand for eggs has decreased and is currently considered a problem for the EHP; a shrinking market could ultimately determine whether the EHP continues. Second, tourism development and foreign land ownership were minimal when the EHP was established. Embedding the guiding programme in the Association has been one way to ensure that the community captures some of the benefits of tourism and establishes some congruence of interests between the EHP and tourism, but the ultimate impacts of an expanding tourism industry on the EHP remain to be explored (Campbell 1999). Third, Costa Rica's overall approach to sea turtle conservation has become increasingly protectionist. Costa Rica considers itself as a leader for sea turtle conservation, and recent regional agreements, like the Inter-American Convention for the Protection and Conservation of Sea Turtles, could potentially lead to the closure of the EHP (Campbell *et al.* 2002; Campbell 2007). Overall, it is not sufficient to consider context only at the outset of CBC projects; close monitoring and flexible adaptive management structures are required to deal with ongoing contextual change.

Perhaps the most significant achievement of the EHP is the extent to which it has realized participation in practice (Campbell 1998). An example where community control has not led to overexploitation or anti-conservation decision-making, but rather to increased investments in environmental protection and community development, may help assuage concerns about devolving responsibilities for resource management to communities. Although some of Ostional's accomplishments might have been made under alternative management regimes (for example government or non-governmental organization control), the point is that, in this case, they have been made under community control.

When the EHP was established, the original definition of community was geographic (Campbell 1997). Within this geographic boundary, there are divisions, primarily along family lines, and these have sometimes proved problematic, as when particular family groups dominate the Junta. However, the democratic structure of the Project is essentially stable; problematic Juntas are ultimately replaced (Campbell 1998). The structure of the Project that prevents individuals, families or other elite groups from dominating may link back to the EHP's origins. Four local men representing the main families in the area formed a committee to explore the possibilities for an egg harvest (Campbell 1997). While there are no formal

records from their original negotiations with biologists and government officials, their individual concerns that other families not dominate any resulting arrangements may have led to the EHP's democratic structure.

As far as linking conservation and development are concerned, profits from the EHP are re-invested in conservation and associates undertake protection activities. This is facilitated not only by the money generated by the EHP, but also because the legal status of the Project allows for long-term investments, and the community's participation in and control over determining what those investments are.

While one successful project cannot advance the CBC concept on its own, the Ostional example can assist in countering current calls to desert the approach altogether. Biologists interested in sea turtle conservation often refer to the uniqueness of the EHP owing to arribada nesting (Campbell 1997). However, Ostional is also unique in that it has negotiated, overcome or avoided many of the common problems experienced with CBC in practice over its 20-year history. Those problems have less to do with the resource in question than with the incentive, administrative and legal structures in place. It is the lessons learned from Ostional regarding these structures that are perhaps most widely applicable, regardless of the resource in question or the type of conservation project. More examples of successful CBC are needed, as are studies that follow CBC projects through time. While there is much to be learned from failures, success stories provide equally relevant lessons, ones that conservationists might try to replicate rather than avoid.

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References

- Adams, W.M. & Hulme, D. (2001) Conservation and community: changing narratives, policies and practices in African conservation. In: *African Wildlife and Livelihoods: The Promise and Performance of Community Conservation*, ed. D. Hulme & M. Murphree, pp. 9–23. Oxford, UK: James Curry Ltd.
- Adams, W.M. & Thomas, D.H.L. (1996) Conservation and sustainable resource use in the Gadejia – Jama'are Valley, Nigeria. *Oryx* 30: 131–142.
- Agrawal, A. (2005) *Environmentality: Technologies of Government and the Making of Subjectivities*. Durham, NC, USA and London, UK: Duke University Press.
- Agrawal, A. & Gibson, C.C. (2001) The role of community in natural resource conservation. In: *Communities and the Environment: Ethnicity, Gender, and the State in Community-Based Conservation*,

- ed. A. Agrawal & C.C. Gibson, pp. 1–31. New Brunswick, NJ, USA: Rutgers University Press.
- Alexander, S.E. (2000) Resident attitudes towards conservation and black howler monkeys in Belize: the community baboon sanctuary. *Environmental Conservation* 27(4): 341–350.
- Ballesteros, J. (1994) Plan de manejo para los huevos de la tortuga marina Lora (*Lepidochelys olivacea*) en el Refugio Nacional de Vida Silvestre de Ostional, Santa Cruz, Guanacaste, Costa Rica. Unpublished management plan. Ostional Wildlife Refuge, Ostional, Costa Rica: 20 pp.
- Ballesteros, J., Arauz, R.M. & Rojas, R. (2000). Management, conservation, and sustained use of olive ridley sea turtle eggs (*Lepidochelys olivacea*) in the Ostional Wildlife Refuge, Costa Rica: an 11 year review. In: *Proceedings of the 18th Annual Symposium on Sea Turtle Biology and Conservation*, compiled F.A. Abreu-Grobois, R. Briseño-Dueñas, R. Márquez-Millán & L. Sarti-Martínez, pp. 4–5. NOAA Technical Memorandum NMFS-SEFSC-436, NOAA, USA.
- Barrett, C.B., Brandon, K., Gibson, C. & Gjertsen, H. (2001) Conserving tropical biodiversity amid weak institutions. *BioScience* 51: 497–502.
- Barrow, E. & Murphree, M. (2001) Community conservation: from concept to practice. In: *African Wildlife and Livelihoods: The Promise and Performance of Community Conservation*, ed. D. Hulme & M. Murphree, pp. 24–37. Oxford, UK: James Currey Ltd.
- Belsky, J.M. (1999) Misrepresenting communities: the politics of community-based rural ecotourism in Gales Point Manatee, Belize. *Rural Sociology* 64(4): 641–666.
- Berkes, F. (2004) Rethinking community-based conservation. *Conservation Biology* 18(3): 621–630.
- Brechin, S.R., Wilshusen, P.R., Fortwangler, C.L. & West, P.C. (2002) Beyond the square wheel: toward a more comprehensive understanding of biodiversity conservation as social and political process. *Society and Natural Resources* 15: 41–64.
- Brockington, D., Igoe, J. & Schmidt-Soltau, K. (2006) Conservation, human rights, and poverty reduction. *Conservation Biology* 20(1): 250–252.
- Brosius, J.P. & Russell, D. (2003) Conservation from above: an anthropological perspective on transboundary protected areas and ecoregional planning. *Journal of Sustainable Forestry* 17(1/2): 35–60.
- Campbell, L.M. (1997) International conservation and local development: the sustainable use of marine turtles in Costa Rica. PhD thesis, Department of Geography, University of Cambridge, Cambridge, UK: xiii + 347 pp.
- Campbell, L.M. (1998) Use them or lose them? The consumptive use of marine turtle eggs at Ostional, Costa Rica. *Environmental Conservation* 24: 305–319.
- Campbell, L.M. (1999) Ecotourism in rural developing communities. *Annals of Tourism Research* 26(3): 534–553.
- Campbell, L.M. (2000) Human need in rural developing areas: perceptions of wildlife conservation experts. *The Canadian Geographer* 44(2): 167–181.
- Campbell, L.M. (2002) Conservation narratives in Costa Rica: conflict and co-existence. *Development and Change* 33(1): 29–56.
- Campbell, L.M. (2007) Local conservation practice and global discourse: a political ecology of sea turtle conservation. *Annals of the Association of American Geographers* 97(2): 313–334.
- Campbell, L.M. & Smith, C. (2005) Volunteering for sea turtles? Characteristics and motives of volunteers working with the Caribbean Conservation Corporation in Tortuguero, Costa Rica. *MAST* 3/4(2/1) 169–194.
- Campbell, L.M. & Smith, C. (2006) What makes them pay? Understanding values of conservation volunteers in Tortuguero, Costa Rica. *Environmental Management* 38(1): 84–98.
- Campbell, L.M., Godfrey, M.H. & Drif, O. (2002) Community based conservation via global legislation? Limitations of the Inter-American Convention for the Protection and Conservation of Sea Turtles. *Journal of International Wildlife Law and Policy* 5: 121–143.
- Chaloupka, M. & Zug, G.R. (1997) A polyphasic growth-function for the endangered Kemp's ridley sea-turtle, *Lepidochelys kempii*. *Fishery Bulletin* 95: 849–856.
- Chaves, C.G. (2002) Plan de aprovechamiento para la utilización racional, manejo y conservación de los huevos de la tortuga marina lora, *Lepidochelys olivacea*, en el Refugio de Vida Silvestre de Ostional, Santa Cruz, Guanacaste, Costa Rica. Unpublished Management Plan. School of Biology, University of Costa Rica, San José, Costa Rica: 17 pp.
- Cornelius, S.E., Alvarado Ulloa, M.A., Castro, J.C., Malta de Valle, M. & Robinson, D.C. (1991) Management of olive ridley sea turtles (*Lepidochelys olivacea*) nesting at playas Nancite and Ostional, Costa Rica. In: *Neotropical Wildlife Use and Conservation*, ed. J.G. Robinson & K.H. Redford, pp. 111–135. Chicago, USA: University of Chicago Press.
- Freese, C.H. (1997) The 'use it or lose it' debate: issues of a conservation paradox. In: *Harvesting Wild Species: Implications for Biodiversity Conservation*, ed. C.H. Freese, pp. ix–xii. Baltimore, USA: Johns Hopkins University Press.
- Gray, N. & Campbell, L.M. (2007) A decommodified experience? Exploring aesthetic, economic, and ethical values for volunteer ecotourism in Costa Rica. *Journal of Sustainable Tourism* (in press).
- Honarvar, S., Plotkin, P. & Spotila, J.R. (2006) Where have all the riddles gone: the decline of the arribada at Playa Nancite Costa Rica. In: *Book of Abstracts. Twenty-sixth Annual Symposium on Sea Turtle Biology and Conservation*, Compiled Frick, M., Panagopoulou A., Rees A. F. and K. Williams, p. 298. International Sea Turtle Society, Athens, Greece.
- Hope, R.A. (2002) Wildlife harvesting, conservation and poverty: the economics of olive ridley egg exploitation. *Environmental Conservation* 29(3): 375–384.
- Infield, M. & Namara, A. (2001) Community attitudes and behaviour towards conservation: an assessment of a community conservation programme around Lake Mburo National Park, Uganda. *Oryx* 35(1): 48–60.
- Jantzi, T., Schelhas, J. & Lassoie, J.P. (1999) Environmental values and forest patch conservation in a rural Costa Rican Community. *Agriculture and Human Values* 16: 29–39.
- Kellert, S.R., Mehta, J.N., Ebbin, S.A. & Litchtenfeld, L.L. (2000) Community natural resource management: promise, rhetoric, and reality. *Society and Natural Resources* 13: 705–715.
- Li, T.M. (1996) Images of community: discourse and strategy in property relations. *Development and Change* 27: 501–527.
- March, E. (1992) Diagnostico sobre situacion social de la poblacion de Ostional, Provincia de Guanacaste. Ostional, Costa Rica: Asociación de Desarrollo Integral de Ostional.
- Monge Artavia, K. & Jiménez Gómez, G. (2001) El caso de Ostional. In: *Protección y conservación de las tortugas marinas a la luz de derecho internacional y nacional ambiental. Análisis de casos en Costa Rica*, pp. 95–114. Thesis, Faculty of Law, University of Costa Rica, San José, Costa Rica.

- Mortimer, J.A. (1995) Teaching critical concepts for the conservation of sea turtles. *Marine Turtle Newsletter* 71: 1–4.
- Murphree, M.W. (2002) Protected areas and the commons. *Common Property Resource Digest* 60: 1–3.
- Noss, A.J. (1997) Challenges to nature conservation with community development in central African forests. *Oryx* 31: 180–188.
- Oates, J.F. (1999) *Myth and Reality in the Rain Forest: How Conservation Strategies are Failing in West Africa*. Berkeley, CA, USA: University of California Press.
- Parry, D. & Campbell, B. (1992) Attitudes of rural communities to animal wildlife and its utilization in Chobe Enclave and Mababe Depression, Botswana. *Environmental Conservation* 19(3): 245–251.
- Redford, K.H., Robinson, J.G. & Adams, W.M. (2006) Parks as Shibboleths. *Conservation Biology* 20(1): 1–2.
- Richard, J.D. & Hughes, D.A. (1972) Some observations of sea turtle nesting activity in Costa Rica. *Marine Biology* 16: 297–309.
- Songorwa, A.N. (1999) Community-based wildlife management (CWM) in Tanzania: are the communities interested? *World Development* 27(12): 2061–2079.
- Stem, C.J., Lassoie, J.P., Lee, D.R., Deshler, D.D. & Schellhas, J.W. (2003) Community participation in ecotourism benefits: the link to conservation practices and perspectives. *Society and Natural Resources* 16: 387–413.
- Sundberg, J. (2003) Strategies for authenticity and space in the Maya Biosphere Reserve, Petén, Guatemala. In: *Political Ecology: An Integrative Approach to Geography and Environment-Development Studies*, ed. K.S. Zimmerer & T. J. Bassett, pp. 50–69. New York, USA: The Guilford Press.
- Terborgh, J.W. (1999) *Requiem for Nature*. Washington, DC, USA: Island Press.
- Western, D. & Wright, M.A. (1994) The background to community-based conservation. In: *Natural Connections: Perspectives in Community-Based Conservation*, ed. D. Western. & M.A. Wright, pp. 1–12. Washington, DC, USA: Island Press.
- Wilshusen, P.R., Brechin, S.R., Fortwangler, C.L. & West, P.C. (2002) Reinventing a square wheel: critique of a resurgent ‘protection paradigm’ in international biodiversity conservation. *Society and Natural Resources* 15(1): 17–40.
- Wunder, S. (2000) Ecotourism and economic incentives – an empirical approach. *Ecological Economics* 32(3): 465–479.
- Zug, G.R., Kalb, H.J. & Luzar, S.J. (1997) Age and growth in wild Kemp’s ridley sea turtles *Lepidochelys kempii* from skeletochronological data. *Biological Conservation* 80: 261–268.