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## Social and environmental effects of ecotourism in the Osa Peninsula of Costa Rica: the Lapa Rios case

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Ecotourism comes with a definitional promise to promote responsible travel to natural areas, to make a positive contribution to environmental conservation, and to enhance the well-being of local communities. This article summarises a study designed to test whether the Lapa Rios Eco-lodge of the Osa Peninsula of Costa Rica, a widely acclaimed example of the species, delivers on these promises and to what degree. The study uses an interdisciplinary nested-scale analysis, combining careful on-the-ground interview methods with remote sensing analysis of forest and land-use impact of the Lapa Rios (LR) lodge. This combination of methods allows us to reject the null hypothesis, confirming that LR lodge has made substantial contributions to both local livelihoods and environmental conservation, including the highest rates of *reforestation* of all areas studied in the Osa Peninsula. We conclude that LR fulfils the definitional promise of ecotourism and delivers social, economic, and environmental benefits in the region.

**Keywords:** ecotourism; socioeconomic impact; environmental impact; Costa Rica; Osa Peninsula; nested-scale analysis

### Introduction

Costa Rica is widely regarded as one of the world's leading examples of environmental conservation, with more than a quarter of its landscape in protected areas (Quesada-Mateo, 1990). During the 1970s and 1980s, however, it ranked among the countries with rapid deforestation (Sanchez-Azofeifa, Harriss, & Skole, 2001), reaching rates as high as 16.6% in the early 1980s (Sader & Joyce, 1988). Forest loss rates fell by the mid-1990s to 1% a year (Busch, Satheye, & Sanchez-Azofeifa, 2000), through both the expansion of protected areas and innovative forest protection of other kinds, including ecotourism on private lands (Snider, Pattanayak, Sills, & Schuler, 2003).

The Osa Peninsula lies in the southwest corner of Costa Rica on the Pacific Coast. The peninsula includes Parque Nacional de Corcovado (PNC), the largest protected region (~425 km<sup>2</sup>) of tropical wet forest in Central America. The biodiversity contained within

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the Osa Peninsula, and specifically within the PNC, includes over 700 tree species (the largest tree species diversity in Central America) as well as 4–5000 plant, 375 bird, and 124 mammal species (Barrantes et al., 1999), among others.

The peninsula experienced the same high rates of deforestation and habitat fragmentation as the rest of the country during the 1970s and 1980s (Sanchez-Azofeifa, Daily, Pfaff, & Busch, 2003; Sanchez-Azofeifa, Rivard, Calvo, & Moorthy, 2002; Sanchez-Azofeifa et al., 2001). Adding to direct land conversion were the effects of wildfires, logging, and extraction of non-timber forest products. Estimates of logging alone showed that as many as 14,000 trees may have been selectively extracted from forested areas in the peninsula between 1997 and 1999 alone (Barrantes et al., 1999). Edge effects from forest fragmentation may have affected as much as 44% of all forested areas on the peninsula in 1997 (Sanchez-Azofeifa et al., 2002, 2003).

The Osa is also home to a variety of human land uses, including oil palm and banana plantations, small-scale agriculture, cattle pasture, and gold mining, with a similarly diverse array of land tenure arrangements and economic conditions (Rosero-Bixby, Maldonado-Ulloa, & Bonilla-Carrión, 2002). Many of these uses have blossomed hand-in-hand with increase in human population numbers and density, producing a strong correlation between increasing population size and decreasing forest cover for the time period 1940–1995 (Rosero-Bixby et al., 2002). One would expect the trend to continue in the future, unless land-use practices change drastically.

One relatively new land use on the Osa Peninsula and elsewhere – ecotourism – may help. A special form of responsible travel to natural areas, ecotourism seeks to promote conservation of natural resources and habitats at the same time as it promotes local livelihoods. Ecotourism has recently become a major enterprise in Costa Rica, with tourism in general increasing 60-fold from US \$10 million in 1964 to \$661 million in 1995 (Weaver, 1999), with more than one million tourists visiting Costa Rica annually (Instituto Costarricense de Turismo, 1998).

While ecotourism's intentions are certainly laudable, the challenge to ecotourism is to deliver on its definitional promise: 'responsible travel to natural areas that conserves the environment and improves the well-being of local people' (TIES, 2006). Most scholars take this challenge to have three parts: ecotourism must simultaneously (a) minimise environmental impact and thus have a small ecological 'footprint', (b) contribute to conservation either through direct efforts (e.g. on-site reforestation, habitat restoration, etc.) or through financial benefits, and (c) promote local livelihoods through political empowerment and a combination of culturally appropriate social and economic benefits to local people (Blamey, 1997; Ceballos-Lascurain, 1987; Honey, 1999).

On the positive side, these goals are all empirical phenomena that have been studied for years in such fields as environmental science, conservation biology, environmental economics, and ecological anthropology. Therefore, we should be able to measure and monitor. On the negative side, however, it is certainly not easy to do 'all good' through ecotourism as many studies have shown (Stem, Lassoie, Lee, & Deshler, 2003a), and even to do 'some good' requires certain far-from-ubiquitous conditions (Krüger, 2005). Moreover, it is decidedly difficult to do even 'some good' in all three dimensions at the same time, especially given a competitive marketplace – the familiar problem of the 'triple bottom line'. Compounding the problem are difficulties in deciding just what to measure, when, and who is qualified to do it.

The result is that ecotourism has been subject to partial or uneven successes and 'greenwashing' (after Greer & Bruno, 1996). Worse still, an enduring institutional pressure is also at play, a pressure 'toward subordinating concern for environmental conservation and

respect for local communities . . . to concern for attracting tourists and their money' (West & Carrier, 2004, p. 491). The challenge to ecotourism is thus to go beyond the measurement problems, the greenwashing, and the institutional pressure to deliver the goods.

Our surmise was that ecotourism had the best chance of delivering on its promise if backed by a clear set of standards, consistently applied, as would be the case in an area with a national or regional ecotourism certification programme (on certification, see Honey (2002)). Evaluating an ecotourism operation in such a setting, we thought, might allow us both to test its value as a conservation and development tool and also to demonstrate by an example the utility and value of the supporting certification system. The Certification for Sustainable Tourism (CST) system of Costa Rica (see <http://www.turismo-sostenible.co.cr/EN/sobreCST/about-cst.shtml>) offered a fitting certification system, one which monitors a large number of social and environmental impacts, including management of emissions and waste, protection of flora and fauna, economic benefits, cultural development, and we chose for our assessment one of its top-ranked businesses, the Lapa Rios Eco-lodge located on the Osa Peninsula. If there *were* tangible benefits to ecotourism – environmental, social, and/or economic – this would likely be one good place to find them. Our specific research questions are:

- (1) What have been the main social, economic, and environmental impacts – positive and negative – of ecotourism at Lapa Rios (LR)?
- (2) Have conservation efforts at the lodge been of sufficient magnitude and duration to alter deforestation trends in the property and surrounding areas as compared with the Osa Peninsula in general?
- (3) Has LR had an identifiable impact on local environmental awareness, and specifically, has it contributed to the spread of a conservation ethic among local residents?

Early in our research, we opted for an interdisciplinary 'nested-scale' methodology, combining land cover analyses through remote sensing with on-the-ground assessment via participant observation, interviews, and questionnaires. We decided on four levels of data collection and analysis as shown in Figure 1: landscape, community, household, and lodge. The following sections outline the methods we employed for each specific scale.

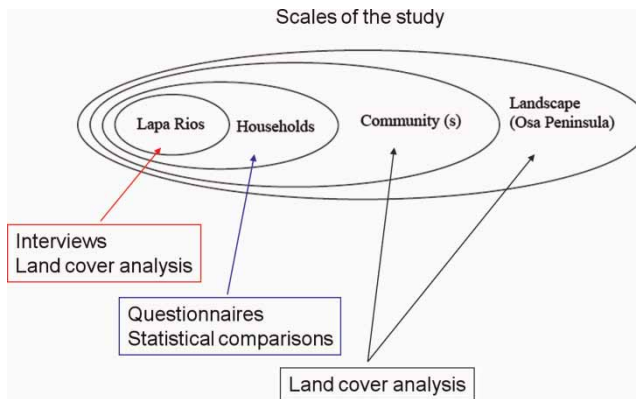


Figure 1. Nested scales of analysis used in this study, showing key methods used at each level to assess the impact of ecotourism on the Osa Peninsula, Costa Rica.

Our hope was that complementary scales and methods would lead to a good clear understanding of the diverse impacts of ecotourism in the study area.

## Methods

### *Study site description*

Lapa Rios Eco-lodge is a privately owned luxury ecotourism lodge in primary lowland rainforest on the southwestern tip of the Osa Peninsula (see Figure 2 for map). It consists of 16 bungalows, a gourmet restaurant with bar, plus an open-air lobby and deck. The average cost per all-inclusive night stay per person at LR is approximately US \$250–350. The establishment includes a swimming pool, a hikers' hut and meeting place, and an extensive system of rainforest-exploration trails through its own 389 ha private reserve. Employees' living quarters are situated nearby.

LR provides a nearly ideal setting for a study of the local impact of ecotourism. First, the lodge is situated in a relatively remote corner of the Osa Peninsula, which means that changes in the surrounding forests, including deforestation and habitat fragmentation, are necessarily recent and thus part of the profound changes that have come to the Osa in recent decades. It should therefore be possible to test whether the lodge has had a positive counter-effect or not since it opened for business in the early 1990s. Second, LR employs a substantial number of men and women living on the peninsula and was one of the first eco-lodges – or tourist enterprises of any kind, for that matter – to operate in this part of the peninsula. There has, therefore, been adequate time and employment history for assessing the lodge's social and economic impact on the region. Third, LR is viewed as one of the best examples of ecotourism in the Americas. It has won numerous awards, including the Conde Nast 'Green List' in 2004 and 2005, and the US Secretary of State's 'Award for Corporate Excellence' (ACE) in 2005 for commendable business practices. Last but not least, it is one



Figure 2. Map of LR location in Costa Rica. Provided courtesy of LR website.

of the only two businesses in Costa Rica that first reached the highest certification level – five leaves – of the CST certification system.

### ***Socioeconomic component***

Socioeconomic data were gathered during the fieldwork period, June–August 2005. Interviews were carried out with the owners, operators, managers, and team leaders of LR as well as with locals involved in its community projects. Information on LR's expenditures for goods and services from October 2001 to August 2005 was provided by their accounting office. A random sample of 30 employees, representing 61.2% of the total employees ( $N = 49$ ), were selected for an in-depth survey conducted at each employee's home. Twenty of these 30 employees were asked to identify their closest neighbours not employed by a tourism-related company. The same in-depth survey was conducted with these neighbours, providing a control for issues of spatial auto-correlation. Statistical analyses were performed on all 50 in-depth surveys. *T*-tests were used to compare each variable for LR employees and their neighbours.

In order to calculate the percentage of household income spent on different household categories, interviewed heads of household were provided with a printed 'checkerboard' of the categories and 40 beans representing total household income. They were asked to distribute the beans across the topics, assigning more beans to the categories where more income was spent. In addition, households were asked to identify each month from 2001 to 2005 as good or bad for income. These data were averaged by month to estimate within-year income volatility.

We compare employees and neighbours with regard to mean scores on knowledge of conservation, biodiversity, and ecotourism. This information was collected by asking two questions of household heads: what they thought a given concept meant and what its importance was, if anything, and why. Answers were coded by the authors using a scale of zero to five, where five meant an answer that brought up all important elements of the concept. These codings were checked against blind codings of 36 of the same interviews by a Spanish-speaking Stanford graduate student not affiliated with the study.

Locals' perceptions of the impact of tourism on the peninsula were gathered by providing household heads with a list of 11 topics for which they were asked: (1) had it increased, decreased, or remained the same in recent years; (2) was the increase/decrease/no change good or bad, and (3) was it related to tourism? For the latter question, they were asked to use a 'face scale' where '1' (very sad face) meant a very negative impact, '3' (neutral face) meant no impact, and '5' (very happy face) meant a very positive impact. To assess the perceived impact of LR, employees were asked to compare the impact of tourism at LR with the impact of conventional tourism on the peninsula.

The comparison of household-level questionnaires between current employees and non-employee neighbours allowed a better appreciation of their similarities and differences. Five groups of variables were developed from these data: (1) background information, including indicators of household demography and education; (2) household expenses and income stability; (3) knowledge of ecotourism and related concepts of conservation and biodiversity; and (4) land use and activities on household property. Information on former employees was provided by the management through consultation with their team members. Information on community projects was provided by the owners, the managers, the records of the Carbonera School journal (the only school located near LR), and the lodge's 2003 Certificate for Sustainable Tourism Evaluation (CST, 2003).



### Spatial component

Landsat satellite imagery from 1979 to 2001 was acquired from an online database (Tropical Rainforest Information Center, <http://www.trfic.msu.edu>) and georeferenced to an orthorectified base image (<http://glcf.umiacs.umd.edu/portal/geocover/>). A maximum likelihood algorithm was used to classify each 28.5 × 28.5 m Landsat pixel per satellite image into forest and non-forest classes based on manually selected regions encompassing >5000 pixels spread throughout the peninsula. Oil palm (primarily *Elaeis guineensis*) and Melina (*Gmelina arborea*) plantations were classified as forests 100% of the time. Plantation areas were removed from the study area using data from the Instituto Nacional de Biodiversidad de Costa Rica (INBIO). Cloud masks were created by manually delineating cloud and cloud shadow areas within each image. Areas outside the Osa Peninsula, as well as the lake within Corcovado National Park, were also removed from the study area. Final classifications for years 1979, 1998, and 2000–2001 image pairs were merged to create forest/non-forest maps with a minimum mapping unit of 2 pixels. An accuracy assessment was performed using 100 field-verified points collected during summer 2005 spread throughout agriculture, pasture, secondary forest, intact forest, and oil palm and Melina plantations. Analyses of our year 2000 classifications yielded high-quality classifications with pasture and agricultural areas being classified 92% of the time as non-forest and secondary and intact forests 84% of the time as forests. Our final user's accuracy and kappa coefficient were 90% and 0.79, respectively.

Analyses of land cover changes were performed at four spatial scales (Figure 3): (1) a 2.5 km buffer surrounding the four main towns within which LR employees lived, (2) the LR property, (3) a 5 km buffer surrounding LR property, and (4) across the entire Osa peninsula. The area of each scale is provided in Table 1. These scales enabled an assessment of how land cover changes in the LR property compared with those in the surrounding areas and those on the entire peninsula. The town scale comparison enabled an assessment of the

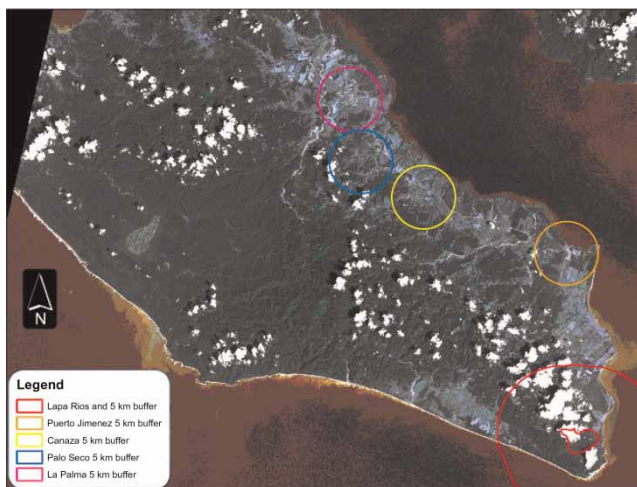


Figure 3. Study areas used in the spatial analysis. The LR property was compared with land cover changes in the surrounding terrestrial 5 km, and 2.5 km buffers around the four principal towns within which LR employees lived. Green areas on the peninsula are forested areas, whereas light blue areas are pasture or agriculture fields. Areas of water are black, red, orange, and yellow for areas with lower to higher silt concentrations, respectively. Bright white areas occurring primarily over the terrestrial surface are clouds.

Table 1. Area (ha) of study scales after excluding areas of atmospheric interference and forest plantations.

Study scale	Area (ha)
Osa Peninsula	105,706
Lapa Rios (LR)	366
>5 km from LR	5135
Puerto Jimenéz	1288
Cañaza	1781
Palo Seco	1968
La Palma	1760

general impacts of LR employees and their neighbours on peninsula forest cover. The temporal scale was designed to cover 1990–2000, when the LR property was acquired and converted to a private nature reserve.

## Results

### *Lapa Rios Eco-lodge background*

The original owners of Lapa Rios Eco-lodge, Karen and John Lewis, a professional musician and a lawyer, respectively, from Minneapolis, Minnesota, arrived in Costa Rica for the first time in 1990 on a bird-watching expedition. They fell in love with Costa Rica and began to think of building a new, visionary lodge there. They returned the same year to conduct research on the lodging industry and ignoring well-intentioned advice they visited the Osa Peninsula and decided that it was the perfect location for their enterprise. After 3 months searching, they purchased 389 ha from a local Costa Rican for US \$400,000. At the time, primary forest covered 307 ha (78.9%), whereas the other 82 ha were in pasture or crops. To finance this purchase, as well as subsequent lodge construction, Lewis sold all their US assets, including retirement funds, and they procured loans from friends and family. The lodge officially opened with 14 bungalows in March 1993.

### *LR community projects*

LR has been involved in numerous community projects since its inception. The Carbonera School, adjacent to LR property, was the first community project sponsored by the lodge. With the help of donations from various sources, including the US Corps of Engineers, the Carbonera School opened its doors to 26 students in March of 1993 (Lewis, 1993). During our summer 2005 visit, the school provided education to 17 students belonging to seven families, all Costa Rican nationals. Currently, the Carbonera School receives financial aid from the Costa Rica/Minnesota Foundation and from LR guests. A recycling programme was established at the school in 2002, which may go on to function as a recycling centre for the general area.

The Carbonera School has continuously faced three main challenges: the lack of regular involvement of parents in school matters, the irregular attendance of students, and the irregular attendance of teachers. Currently, six of the seven families (86%) who send kids to the Carbonera School are employed as caretakers on foreigners properties, moving in and out of the area with available employment opportunities. When the school opened in 1993, only 35% of the families were caretakers for the property owned by non-nationals.



LR is involved in an array of other community projects. Since 1993, the Costa Rican Ministry of Transportation and LR have worked together to design a 'no-cut canopy roadway' in the area. Since 2002, a locally run turtle project has operated in the Piro Beach area of the Osa Peninsula, funded by guided 'turtle tours' for the LR guests. At the request of employees, LR has organised various community education activities during the last several years, including a talk to local school children about the dangers of drugs, a workshop for school teachers on recycling and organic fertiliser usage, and a discussion of illegal hunting and logging for other hotel owners. In addition, LR has made donations of equipment to schools and to the town of Puerto Jimenéz and also pays for the salary of a full-time park ranger at CNP.

### ***LR economy and employment***

LR spent just over US \$2.6 million from October 2001 to August 2005, with 24.2% of the total known expenditures going into the local peninsula economy, whereas 20% could not be categorised, with the information available, as either within the peninsula or outside. In summer 2005, LR had 49 permanent employees, with 40 employees at the lodge itself, located in the rural community of Carbonera, and 9 at the company office in Puerto Jimenéz which is home to reservation and operations management. The larger teams are restaurant (8), restaurant kitchen (8), and cleaning (7). Nine of the employees (18.4% of the total) were females who performed cleaning, front desk, restaurant and office tasks. The majority of LR employees (47 of 49) live on the Osa Peninsula. Our study focuses on the towns of Puerto Jimenéz, Cañaza, Palo Seco, and La Palma as they represent 45%, 4%, 16% and 10% of employee residences, respectively. The remaining employees live within four smaller towns to the N-NW of Puerto Jimenéz. During work sessions, employees live at LR full time and are given 1 free day each week. The employees have the option of accumulating free days to spend longer periods away. While most employees live within the Osa Peninsula a number of them were born outside the peninsula. Table 2 presents the birth location for a random sample of 30 employees whose jobs require, or do not, direct contact with customers. The comparison shows similar percentages of people born in and outside the peninsula, 75% and 71.4%, respectively. An analysis of the time of residence within the peninsula for the same groups shows that those employees who have direct contact with customers have lived in the peninsula an average of 12 years, whereas those who do not, have lived in the peninsula for an average of 24 years.

The average duration of full-time employment by July 2005 was 3.8 years. A third of the employees had been working there for <2 years and one-fifth of the employees had been working there for more than 8 years. Ten of the 17 employees (58.8%) who have worked for <2 years are part of the front desk (4), office (3), and restaurant (3) teams.

Table 2. Birth location and time of residence within the Osa Peninsula for LR employees in positions requiring (or not) direct customer contact.

	Born within the peninsula	<i>N</i>	Percentage	Mean (Standard) years of residence in the Osa
Direct customer contact	No	12	75.0	12.9 (11.6), <i>N</i> = 14
	Yes	4	25.0	
No customer contact	No	10	71.4	24.6 (12.0), <i>N</i> = 14
	Yes	4	28.6	

Data are not available for all former LR employees but, from the lodge management and team leaders, we were able to collect information on 64 former employees. Most former employees worked in the restaurant (14), followed by those who worked in cleaning (11) and then at the front desk (8) and maintenance (8). Turnover rates are higher in the categories: restaurant, nature guide, and cleaning, and lower in: kitchen, office, and management. Data on the current positions of former LR employees show that nearly half (27 of 64) are currently working in tourism-related jobs. They are either freelance employees (10, e.g. taxi drivers and guides) or employees at other lodging businesses (17). Seven of them have reached high positions in other establishments. Five (18.5%) have achieved team leader positions at their current place of work and two (with no previous training other than LR) are presently the managers of other lodges within the peninsula.

### *Employees and neighbours*

Table 3 shows a comparison between employees and neighbours for mean values of background variables. The only significant differences ( $p < 0.1$ ) were the age of female heads of household and percentage of male heads of household who were born within the peninsula. Female heads of household tended to be younger among LR employee's households than among their neighbours. A greater proportion of male heads of household among the neighbours were born within the Osa Peninsula than among the employees.

Table 4 compares percentages of household income spent in nine key areas. The table shows that food is the single most important expense in these two groups. However, the neighbours spend significantly larger percentages of their income on food (42.5%) than

Table 3. Comparison between LR employees and their neighbours on average values of background variables.

Variables	Mean (Standard deviation)		$N^*$		$p$ -Value	Test
	Neighbour	LR employee	Neighbour	LR employee		
<i>Female head of household</i>						
% born within the peninsula	44%	39%	18	18	0.74	cp
Years living in the Osa Peninsula	18.0 (11.5)	18.0 (12.4)	17	11	0.96	w
Years of education	7.4 (04.1)	7.9 (03.0)	16	18	0.56	w
Age	36.9 (11.7)	29.8 (09.9)	18	20	0.04	w
<i>Male head of household</i>						
% born within the peninsula	57%	29%	14	28	0.07	cp
Years living in the Osa Peninsula	18.9 (11.5)	17.0 (12.0)	13	27	0.61	w
Years of education	7.5 (03.9)	9.6 (03.9)	12	27	0.18	w
Age	34.5 (11.8)	33.4 (10.4)	13	28	0.69	w
Town of residence within the peninsula**			20	29	0.89	cp
Number of children	2.6 (02.1)	2.0 (02.3)	20	30	0.25	w

Note: cp: Contingency table and Pearson coefficients were used for both comparisons; w: Wilcoxon/Kruskal-Wallis tests (rank sums) was used.

\*Differences in sample size are due to the fact that not all households had both a female and a male head of household.

\*\*Compares the towns of residence of the 20 neighbours to the towns of residence of the 29 LR employees.

Table 4. Comparison between LR employees and their neighbours on average household expenses and income stability.

Variables	Means*		N		p-Value
	Neighbour	LR employee	Neighbour	LR employee	
<i>Distribution of household expenses; % of household income spent on:</i>					
Food	42.5 (20.5)	23.6 (17.6)	20	30	<0.01
Housing	05.7 (10.7)	07.9 (07.1)	20	30	0.08
Services	13.5 (09.4)	13.0 (05.8)	20	30	0.95
Transportation	06.1 (09.7)	09.1 (06.5)	20	30	0.03
Education	13.9 (15.3)	07.3 (08.4)	20	30	0.18
Recreation	06.0 (09.8)	09.5 (09.8)	20	30	0.07
Savings	04.2 (06.7)	09.7 (11.1)	20	30	0.07
Investment	06.1 (09.3)	13.0 (18.8)	20	30	0.14
Other	02.2 (05.6)	06.9 (09.1)	20	30	0.01
% of households that can afford new goods	42.1	86.7	19	30	<0.01
<i>Income stability**</i>					
% of income that comes from tourism	22.9 (35.6)	95.9 (07.8)	19	30	<0.01
% of tourism income that comes from LR	07.1 (23.7)	94.0 (16.9)	19	30	<0.01
Number of good income years***	04.7 (02.2)	03.5 (01.9)	6	16	0.25
Number of good income months from good years	05.0	07.6 (01.6)	1	12	0.17
Number of good income months from average years	07.0 (02.5)	05.2 (01.2)	8	18	0.09
Number of bad income months from average years	02.6 (00.7)	03.4 (01.3)	9	13	0.08
Income difference between best and worst months	09.0 (01.4)	10.5 (02.4)	5	17	0.26
Generosity of basic salary****	03.0	03.2 (00.9)	1	23	0.81
Generosity of complete payment****	03.3 (01.0)	04.6 (00.5)	18	30	<0.01

\*The Wilcoxon/Kruskal–Wallis tests (rank sums) was used for all comparisons except for the percentage of households that can afford new goods where the contingency table and Pearson correlation coefficients were used.

\*\*Based on current job.

\*\*\*Data on what respondents viewed as ‘good years’ for income were obtained from 28 households with a work history of at least 2 years, for a total of 219 categorised years. Good and bad months for income were obtained from 19 LR employees who, in total, rated 143 months and 9 neighbour households who, in total, rated 80 months (in each case, some months were rated ‘neutral’). A K–S test was used to compare the distributions of good months between employees and their neighbours.

\*\*\*\*The face scale (1–5) was used: numbers higher than 3 indicate a positive feeling, whereas lower than 3 indicate a negative feeling.

do employees (23.6%). Employees spend a larger proportion of their income on housing, transportation, recreation, savings, and other expenses (mostly remittances) than their neighbours. The majority of LR employees (86.7%) were able to afford new goods (considered unaffordable before they started to work for the lodge), in striking contrast to less than half (42.1%) of their neighbours. Table 4 shows that households of LR employees do depend primarily on their income from tourism. Specifically, 95.9% of their income comes from tourism and 94.0% of that comes directly from the eco-lodge. Interestingly, some neighbours also received a small portion of their income from LR (7.0%) by selling produce or doing temporary jobs for the lodge.

In an average year, lodge employees had significantly fewer ‘good’ months and significantly more ‘bad’ months than their neighbours. However, during good *years* employees experienced an average of 7.5 good months of income, significantly greater than their neighbours. Good years for employee households increased steadily from 10% in 2000 to 32% households reporting by year 2005, and good months occurred primarily during tourism high season (November–April) in those years. As shown in Figure 4, income volatility was greater for employees than for their neighbours (the Kolmogorov–Smirnov (K–S) test, however, showed no significant differences in their distributions;  $p > 0.05$ ), although the income of employees was also greater.

LR employees were significantly happier with their income than their neighbours, who, on average, felt neutral. However, when considering the base salary (pre-tips) only, the majority of LR employees also felt neutral. When asked why, they pointed out that the lodge pays the minimum wage established by the Costa Rican government, and that it is the tips that make the complete payment so attractive. During the best months tips roughly double the salary of LR employees.

Table 5 compares the two groups, employees and neighbours, with regard to mean scores on knowledge of conservation, biodiversity, and ecotourism. LR employees ranked significantly higher than their neighbours in knowledge of all concepts. On average, however, knowledge of the concepts is incomplete even among employees. ‘Biodiversity’ was the least understood concept – many interviewed heads of household had never heard the word before. This finding was most pronounced among the neighbours. The majority of neighbours were also not able to describe differences between tourism and ecotourism.

No statistically significant differences were found between LR employees and their neighbours regarding land-use practices and farm extent. The sample size for this analysis,

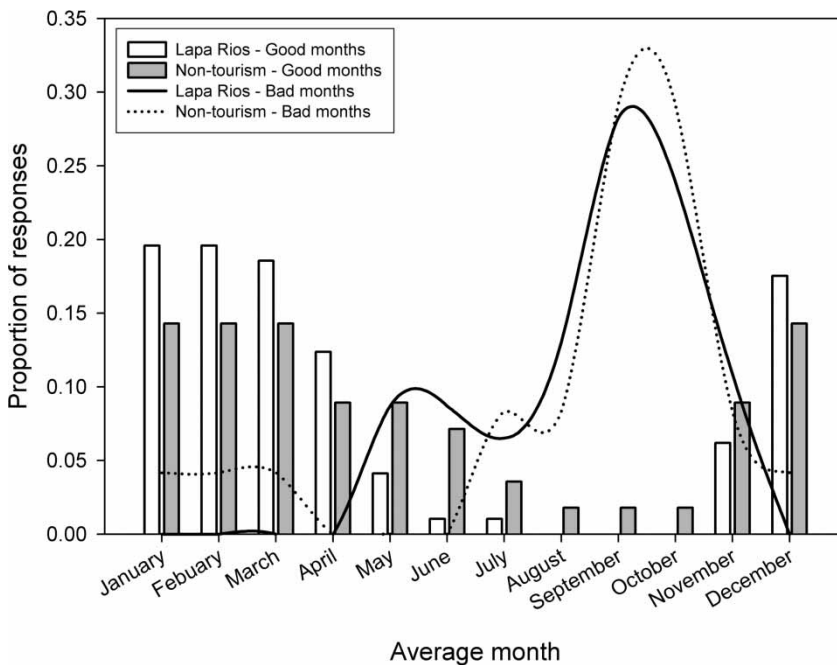


Figure 4. Proportion of LR employees and neighbour’s households categorising a given month as either particularly ‘good’ or particularly ‘bad’ for income.

Table 5. Comparison between LR employees and their neighbours on average scores concerning knowledge of environmental concepts.

Variables	Means*		N		p-Value
	Neighbour	LR employee	Neighbour	LR employee	
Knowledge**					
Conservation	2.35 (0.93)	3.10 (0.80)	20	30	<0.01
Biodiversity	0.55 (0.94)	1.90 (2.01)	20	30	0.02
Ecotourism	1.05 (1.28)	3.31 (1.14)	20	29	<0.01

\*The Wilcoxon/Kruskal–Wallis tests (rank sums) was used for all mean comparisons.

\*\*Knowledge was graded from 0 to 5, where 0 meant no knowledge and 5 meant good knowledge.

however, was very small: only one-third of the neighbours (6 households) and just over half of the employees actually owned farms (16 households). The results do suggest, however, that more LR employees own land and that they have larger areas under production (crops or pasture).

Table 6A compares what LR employees and their neighbours perceive to be the effects of tourism on the Osa Peninsula. Only one difference is statistically significant: all heads of households agreed that the value given to flora and fauna had increased as a consequence of tourism, but the change described by LR employees was larger than that of their neighbours. All heads of household said that an increase in tourism would be good for the flora and fauna, health, education, and job training, and most of them considered that these phenomena had already increased as a consequence of tourism. However, most also agreed that health services within the Osa Peninsula were very poor and that tourism had not helped to improve them.

All interviewed heads of household said that decreases in hunting, deforestation, alcoholism, drug addiction, and prostitution on the Osa would be good. In the case of hunting and deforestation the majority of the heads of household claimed that these variables had decreased as direct positive result of tourism. However, the majority also agreed that alcoholism, drug addiction, and prostitution within the Osa Peninsula have *increased* as a consequence of tourism in general.

Changes in the price of land or products were perceived as either good or bad depending on characteristics of the household. Most households regarded the increase in product prices as bad, but to a lesser extent among households who also sold products. All household heads interviewed agreed that land prices had increased recently in the region and the majority considered this somehow to be a consequence of tourism in the region. However, household heads who own land regarded the land price increase as a positive impact of tourism, while for household heads not owning land or currently acquiring it, the increase was a negative effect of tourism.

Even after considering the negative impacts of tourism, most households would like to see more tourists within 1 year and almost all of them would like to see more tourists within 5 years. When asked why, most household heads pointed out the need for jobs and more sources of income. LR employees noted in both time periods that they would like to see increases in ‘conscientious tourists’ – those who do not buy property locally, and are not involved with drugs, alcohol, or prostitution.

Table 6B compares the perceived impact of LR with the impact of conventional tourism. The only non-significant difference is ‘land price’. While all employees agreed that the price of land in the peninsula had increased as a consequence of tourism, they felt that LR itself did not have a negative impact in this regard. The majority of employees

Table 6. Comparison of Lapa Rios employees and their neighbours concerning the perceived impact of tourism on the Osa Peninsula.

Variables*	Means**		N		p-Value
	Neighbour	LR employee	Neighbour	LR employee	
<i>A. Perceived impact of conventional tourism on the Osa Peninsula</i>					
Health	2.79 (1.43)	3.06 (0.36)	17	26	0.86
Education	4.00 (0.77)	4.10 (0.87)	18	25	0.66
Job training	3.72 (1.07)	4.02 (1.00)	18	26	0.35
Hunting	3.88 (0.87)	4.00 (0.57)	16	26	0.86
Deforestation	3.67 (0.88)	3.98 (0.92)	15	26	0.17
Value of flora and fauna	3.92 (0.65)	4.50 (0.60)	18	26	<0.01
Land price	2.79 (1.43)	3.13 (1.60)	17	26	0.51
Products price	2.44 (1.09)	2.38 (1.02)	16	26	0.87
Alcoholism	2.92 (0.42)	2.69 (0.55)	19	26	0.2
Drug addiction	2.50 (0.79)	2.13 (0.74)	17	26	0.14
Prostitution	2.56 (0.63)	2.31 (0.88)	16	26	0.27
	Conventional tourism	LR	LR employee		
<i>B. Perceived impact of LR vs. conventional tourism on the Osa Peninsula</i>					
Health	3.06 (0.36)		26		
Education	4.10 (0.87)	4.60 (0.57)	25		<0.01
Job training	4.02 (1.00)	4.88 (0.33)	26		<0.01
Hunting	4.00 (0.57)	4.71 (0.53)	26		<0.01
Deforestation	3.98 (0.92)	4.73 (0.53)	26		<0.01
Value of flora and fauna	4.50 (0.60)	4.79 (0.45)	26		0.02
Land price	3.13 (1.60)	3.36 (0.91)	26		0.27
Products price	2.38 (1.02)	3.04 (0.96)	26		<0.01
Alcoholism	2.69 (0.55)	3.04 (0.20)	26		0.02
Drug addiction	2.13 (0.74)	3.04 (0.20)	26		<0.01
Prostitution	2.31 (0.88)	3.15 (0.46)	26		<0.01

\*The face scale (1–5) was used to do the ranking, numbers higher than 3 indicate a positive impact, numbers lower than 3 indicate a negative impact.

\*\*For A, the Wilcoxon/Kruskal–Wallis tests (rank sums) was used for all 11 mean comparisons. For B, the matched pairs method was used for all 11 mean comparisons.

replied that the lodge owners had bought the land to protect it, not resell it, and that LR guests do not buy land within the peninsula.

While tourism in general had a perceived positive impact on education, job training, hunting, deforestation, and the value of flora and fauna, the positive impact of LR was significantly greater. Most employees explained that the lodge provided financial and other assistance for the local school as well as other schools within the peninsula, that LR was the only lodge that hires inexperienced peninsula residents, and that LR had successfully instituted and enforced a ban on hunting and deforestation within its limits.

While alcoholism, drug addiction, and prostitution were all made worse by tourism in general, in the view of LR employees, the impact of LR was significantly positive. The employees explained that LR guests spend most of their time either at the lodge resting or participating in various nature tours. As the guests had little contact with the town, and seemed to be a different type of tourist from many in Puerto Jiménez, they do not generally contribute to these problems. Employees also mentioned that LR had strict rules regarding employees' conduct and that they were not allowed to work under the influence of alcohol or drugs. Some employees also mentioned that the lodge hosted talks on the



potential negative impacts of tourism in these three topic areas and had followed-up, on a request by a group of employees, to give a talk about drug addiction to the teachers of various primary schools within the peninsula.

### *Spatial analyses*

The average annual rate of net forest loss from across the peninsula study area (105,706 ha) from 1979 to 1987 was 0.5% per year, while from 1987 to 2000 there was a 0.08% annual net forest *gain*. These trends are similar to those of Sanchez-Azofeifa et al. (2003), who analysed the net change in forest cover for 15 ecological corridors in Costa Rica and found much greater deforestation rates from 1979 to 1986 than from 1986 to 1997. But our results show not just a slowing of deforestation for the Osa, they show a reversal in the more recent time interval.

A closer look at land cover in 1987 and 2000 for all study scales is provided in Figure 5. The figure shows that in 1987 the LR property had less forest cover than the peninsula as a whole (not surprising considering the presence of Corcovado National Park), but that by the year 2000 a greater proportion of the property had become forested. In fact, of all the scales studied in the year 2000, the LR property had the highest forest coverage of all. This finding speaks well of the protection afforded by the eco-lodge: large areas of the initial purchase were allowed to re-grow from agricultural fields or pasture starting in 1990. In Figure 5, one can also see that total forest cover in the four referent communities roughly covaries with remoteness, as judged from distance to either of the larger towns of Puerto Jiménez or La Palma, which had the lowest percentage of forest cover in both 1987 and 2000.

The change in the proportion of forest cover, however, presented in Figure 6 is even more revealing in two ways. First, LR is clearly a leader among the communities studied here in rate of *reforestation*, showing almost nine times the peninsula average increase in

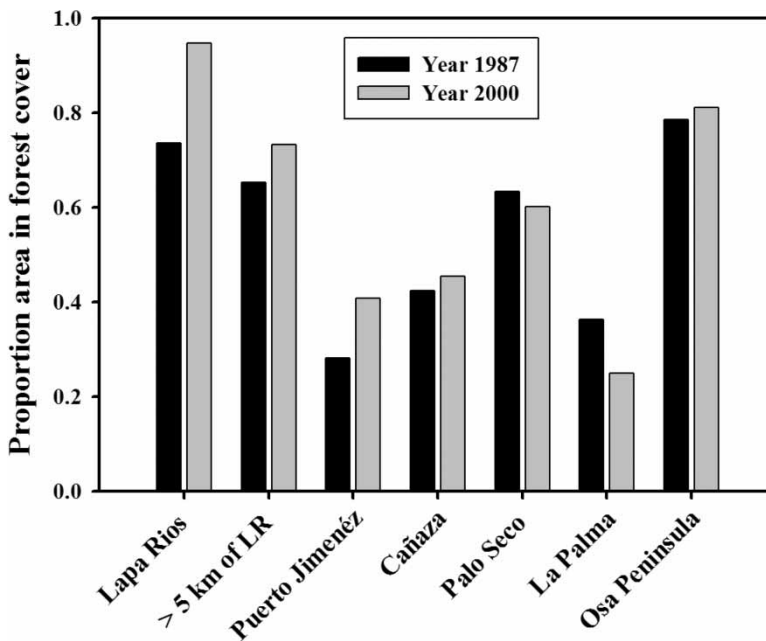


Figure 5. Proportion of forest cover for the different scales and locations of land cover analyses in the year 1987 and 2000. Locations are illustrated in Figure 2.

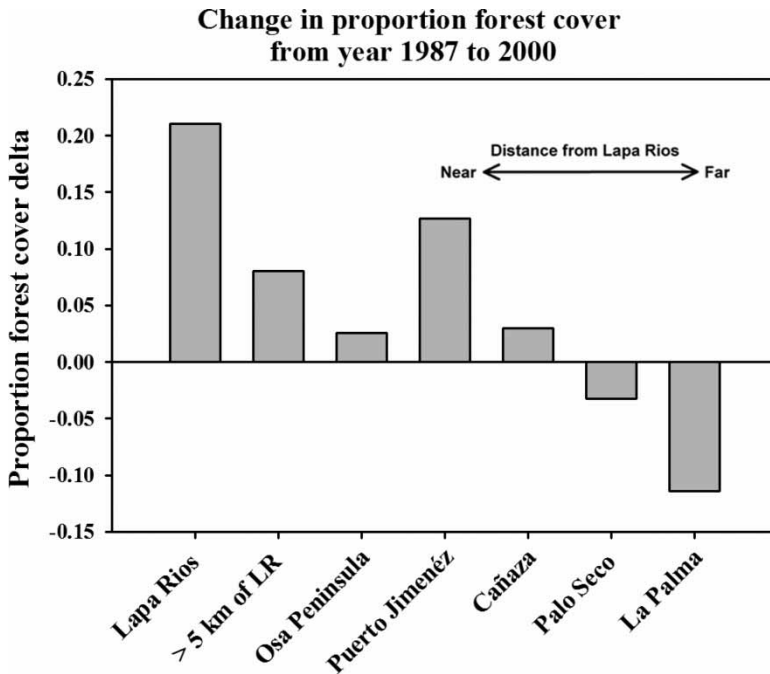


Figure 6. The changes in proportion of forest cover for the different scales and locations of study between the year 1987 and 2000. Bars above the line indicate reforestation; below the line, deforestation.

forest cover over the interval. Second, there is a striking correlation between proximity to LR and rates of reforestation. This correlation makes LR look highly influential, but it is surely the result of a multitude of factors, including rising land prices, promotion of conservation areas, the presence of more conventional tourism, including several small hotels and fishing operations in Puerto Jimenez, and abandonment of subsistence agriculture around the lodge.

In 1987, the proportional forest cover in LR was below that of the peninsula average owing to sizeable areas in pasture and cultivation. The Landsat images from 2000 clearly show the reforestation that gives LR the highest change in forest cover of all areas included in this study. Not only is lodge property undergoing rapid reforestation, but the edges of the property are subject to less 'edge effect' as forest cover throughout this entire section of the peninsula rapidly increases.

## Discussion

### *Social and economic impacts*

A highly desirable goal of tourism is for tourists' expenditures to remain among local residents rather than ending up in the USA or Europe (de Haas, 2003). However, this is often not the case in Costa Rica (Place, 1991; Weaver, 1999) or elsewhere (Wallace & Pierce, 1996). As ecotourism most often takes place in remote areas, the chances are higher than average that goods and services will have to be imported. However, a large percentage of LR expenditures are made within the Osa Peninsula and during our interviews LR was repeatedly mentioned as being the only lodge on the peninsula that actively buys products from local farms. However, many products and services are not

available locally and must be bought outside, for example auditing and manufactured goods. Given the all-inclusive nature of these data, a roughly 1:3 split of local/non-local expenditures is impressive for a lodge of this calibre, attesting to a deliberate, concerted effort to buy locally when possible. Further improvement in this regard would require major changes in the local economy and/or in the participation of locals in the national economy.

Provision of employment is another highly desirable outcome of tourism. However, a concern is the nature of the employment offered by tourism, where many of the jobs may be temporary due to seasonality or heavily influenced by external economic volatility. In contrast, LR has made most positions full-time year round, and although LR employees experienced lower income than their neighbours during early years, since 2002 they have had significantly more high-paying months than their neighbours. The distribution of available employment between locals and foreigners has been viewed as a potential problem area as higher-paying jobs, usually those requiring direct customer contact, are often held by foreigners (de Haas, 2003; Lindberg, Enriquez, & Sproule, 1996) or by people from outside the region, leaving locals with fewer opportunities for training or advancement to better positions (Wallace & Pierce, 1996). In research in Komodo, Goodwin (2003) found that employment in tourism was mainly held by young (under 30) males and that their levels of education and capital played important roles in determining their involvement in tourism-related industries. In contrast, since the initial construction period LR has provided employment preferentially to local families. Management positions, however, are not held by locals but by Costa Rican nationals, likely due to language or cultural barriers. In this context, LR may be preferentially providing those with fewer years living in the peninsula jobs requiring direct customer contact. Because a large amount of the payment comes from tips the implication is that those employees with direct customer contact have higher payments. LR management has tried to address this by redistributing tips more evenly among employees but has run into some legal walls as Costa Rican law requires that tips, especially those from the restaurant, to be distributed in a specific format.

The employment of males or females in the tourism industry and its effect on the local social structure is another highly debated topic. Crompton and Sanderson (1990) and Boo (1990) point out that employment in tourism demands a flexible working pattern, which ends up eroding gender segregation. On the other hand, Levy and Lerch (1991) found that women tend to work in less-stable, lower-paid, and lower-level jobs in the tourism industry. Women are often not involved in tourist guiding or in general contact with foreign tourists because they may then be perceived, rightly or wrongly, as prostitutes by villagers (Wilkinson & Pratiwi, 1995). In the case of LR, there is a notable bias towards employment of males over females. The management of LR noted that, at the beginning, they hired mainly females; however, the physical demands of the job of going up and down the hills around the bungalows made the tasks more fitted for males. Five of the nine female employees have positions of direct contact with customers, all of them young (<30 years). Maintaining a family poses a problem for many female employees. Female employees explained that it is difficult for a female with a family to work at the main lodge as it requires staying away from home 6 days a week. Not surprisingly, most of the females working in the main lodge are single, whereas those working at the Puerto Jiménez office maintained families.

Some authors have noticed that tourism may introduce wage labour opportunities that disrupt traditional subsistence activities and promote dependency on outside markets (Mansperger, 1995). Stem et al. (2003a) point out that it also can make local communities

highly vulnerable to unpredictable outside events. We found that households of LR employees depend heavily on income from tourism. This suggests that LR employees may be in a vulnerable position, especially since half of their income during the high season comes from tips. However, during our study period, the fact that the neighbours spend larger percentages of their income on food compared with the employees, that LR employees spend larger percentage of their income on housing and transportation (because some are either building or improving their houses and some were able to buy motorcycles) or on recreation, savings, and remittances than do their neighbours, suggests that they have more income to spend beyond basic needs. Ideally, savings from good periods could be then used to maintain economic viability during periods of low tourism.

Ecotourism enterprises are also expected to provide opportunities for their employees to learn about biodiversity, conservation, ecology, and related topics. In their study in the Brazilian Amazon, Wallace and Pierce (1996) found hardly any cases where tour operators or lodge owners had made their resources available for such purposes. In earlier research in Costa Rica, Stem et al. (2003a) found tour operators in general to have no significant effect in raising environmental awareness in local communities, and thus argued that ecotourism has poor chances of becoming an effective conservation strategy. Our work at LR does not confirm these earlier disappointments. Instead, it shows that LR employees have a better understanding of such topics as conservation, biodiversity, and ecotourism than do their non-employee neighbours. Employees were allowed to participate in the lodge's own nature tours free of charge during their free time. However, there was no evidence of a programme that would encourage employees to do so.

Goodman (2003) has pointed out that there are other cultural impacts of employment in tourism-related activities, including degradation of locals' dignity and erosion of traditional cultural practices. Tourism is often blamed for increases of crime, prostitution, and alcoholism, sometimes attributed to imitating the behaviour of tourists (de Haas, 2003). Other effects of tourism are the inflation of real estate prices and consumer goods in tourism centres. As a consequence, sometimes only those who participate in tourism-related activities can afford the new prices; those who do not are worse off than before tourism development (de Haas, 2003). Stonich (1995, 1998) found that tourism in Honduras caused significant environmental degradation that affected the health of local populations. Our study does not have the necessary historical depth to measure the cultural impacts of tourism and ecotourism in the area. However, LR employees and their neighbours both agree that tourism has brought more opportunities for education and job training and increased conservation. Unfortunately, tourism has had no discernable impact on public healthcare in the region and is, for tourism in general, associated with increased perception of alcoholism, prostitution, and drug addiction. Comparison with LR ecotourism shows significantly more positive effects than conventional tourism and that ecotourism has had little effect on alcoholism, drug addiction, and prostitution. These findings support the claim that ecotourism brings more benefits than conventional tourism. However, such benefits result from a concerted effort to reduce such activities, such as LR has enforced at the lodge for both tourists and workers since its inception.

The role of tourism on the increase of land prices is far from clear. This phenomenon is part of a national trend as many foreigners are attracted by the economic and political stability of Costa Rica and its beautiful beachfront properties. Informants pointed out that the main increase in land prices stemmed from land speculators who bought beachfront farmlands at low prices to subdivide and sell to foreigners, causing local land prices to skyrocket. At the time of this study there was *not one* known case of an LR guest who had bought land within the Osa Peninsula. However, it is possible that LR helped increase

land prices in the area by buying their property from a Costa Rican National in 1990 at a fair price. In any event, since LR has never sold or bought land after the initial purchase, and since none of their guests had purchased land within the peninsula, its effect in the increase of land prices can only be minimal and indirect.

In his broadly comparative study, Krüger (2005) reported that benefit for the local community is one of the most important factors in ecotourism sustainability. Our research shows that LR has, from the start, actively engaged in worthy community projects. At the same time, we found no evidence of efforts to offer conservation talks or nature tours to adult locals, despite their merit. It does seem reasonable for the lodge to consider, especially in the off-season, a programme for employees and neighbours to take part in the educational opportunities provided.

### ***Environmental impacts***

In principal, ecotourism requires an unambiguously positive contribution to environmental conservation. In practice, this has sometimes been difficult to achieve, if only because the links between ecotourism and conservation may take various forms, some of them indirect (as through household subsistence changes). For example, one research group (Stem, Lassoie, Lee, Deshler, & Schelhas, 2003b; Stem et al., 2003a) got mixed results for the effects of ecotourism on environmental conditions near Corcovado and Piedras Blancas National Parks. They found that large-scale ecotourism had the potential to offer economic benefits and therefore to discourage forest conversion into agriculture or pastures. However, they found little evidence that employment in ecotourism-related activities had any impact on conservation views or practices at the household level. In his review of 251 ecotourism case studies, Krüger (2005) found that household-level changes were often not apparent because ecotourism did not create enough revenues to prevent 'consumptive' land use (such as forest conversion to crops or pasture). Krüger (2005) also found that too many visitors to an area often led to unsustainable usage and subsequent degradation, as has also been found in some protected areas of Central America (Farrell & Marion, 2001). He argued that increased efforts at community environmental education and community participation would greatly improve conservation in the areas surrounding ecotourism ventures, helping locals to appreciate non-consumptive use of natural resources.

The matter of environmental impacts at LR is, we found, quite clear and unambiguous. First, the private LR nature reserve and immediately adjacent forest areas have shown pronounced forest re-growth since the beginning of ecotourism in the region in the 1990s – indeed the highest rates of reforestation of all the Osa Peninsula. Many efforts by LR staff have contributed to this trend – including land-use policies, educational efforts, employment practices, even role modelling of green alternatives – making it difficult to pinpoint their relative contributions. Second, the increasing numbers of tourists at LR has not led, in our estimation, to negative consequences because the company prepared for such increases from the start. For example, trails in the private nature reserve were designed to handle a number of simultaneous tours with dispersion, and trail policy rigorously limits the number of tours per day per trail (2) and guests per tour (to 8). In addition, it must be noted that the modest total size of the lodge – 16 cabins or 30-some visitors at one time – compared with the reserve land area – 389 ha – plays an important role in limiting negative impact.

Importantly, environmental impact of the lodge also extends beyond its own borders. The company has funded for several years the salary of a park ranger in Corcovado National Park. It is a fitting example of Buckley's (2003) observations that (1) in many developing

nations, ecotourism compensates for shortfalls in governmental regulation by providing private funds for the protection of natural areas and that (2) by providing alternative economic opportunities to local people, natural resource demands and environmental degradation may be reduced in the first place.

Interestingly, we found different results for environmental impacts at the household and community levels, similar to the findings of Stem et al. (2003a). Although our results at the household scale were not statistically significant, there was the suggestion of a trend among LR employees who are also farm owners to dedicate more of their farmland area to crops and pasture than to forest. Although the samples are small, our evidence even indicates that the parcels owned by employees have lost a far greater proportion of their initial area in primary forest than their non-tourism neighbours during the time they owned their property. This seems to be related to increased areas dedicated to cattle pasture and agriculture on these same farms. Though data are sparse, they do suggest that the increased economic advantages of employment in tourism may have provided the capacity to invest in land, and in alternative uses of land, that are largely unattainable to non-tourism affiliated neighbours. This inference is also supported by the lower proportion of farm ownership among the neighbours.

At the community scale, in contrast, we found a clear trend towards reforestation around communities located close to active ecotourism areas and towards deforestation around those located further away. Consider, for example, the two largest towns in the study area, Puerto Jiménez and La Palma: both showed roughly the same amount of deforestation (~70%) in 1987. Over the interval to the year 2000, the change in forest cover differed dramatically between the two sites, with Puerto Jiménez gaining about 11% forest cover and La Palma losing roughly the same percentage. Part of the difference here relates to the fact that a higher proportion of both LR employees and neighbours in La Palma were owners of farms and were thus investing in opening new land for crops and/or cattle. Although a close analysis of land prices in the region was beyond the scope of this study, it seems possible that a gradient of higher prices near Puerto Jiménez and LR would explain these differences.

## **Conclusions**

Our study reveals that LR has made impressive contributions to local livelihoods since its beginnings in 1992. It has met this goal by a concerted effort to purchase local goods and services, by providing full-time positions and by supporting education and other community projects within the Osa Peninsula. Local expenditures are a fitting achievement for LR; however, despite their efforts the largest part of their expenditures still take place outside the peninsula. Further improvement in this regard would require major changes in the local economy and/or in the participation of locals in the national economy. A second contribution to local livelihoods takes place through employment. LR has a strong record of preferentially employing locals, employment is full-time year round, and it provides good income and high-quality training on the necessary skills. However, LR employees make the minimum wage and a large part of their income comes from tips. Therefore, jobs of direct contact with customers, usually given to those with fewer years in the peninsula, pay more. LR efforts to better distribute tips among all employees have encountered legal walls. A better distribution of tips will require changes in Costa Rican law.

Two other employment-related issues are the time required to live at the lodge and the bias towards the employment of males over females. Most of the employees spend the week away from their families. Employees were happily making this sacrifice, but only those who live close to the lodge and have their own means of transportation would like to keep their



jobs for many years to come. A potential solution for the lodge to consider would be modifying the work schedule to require only 5-day work weeks or to generate shifts that may allow employees to spend more nights at home. This may also make it possible to hire more females to work at the lodge.

Studies of eco-lodges in other places have documented numerous negative impacts of tourism on local economy and cultural cohesion of local communities. Our study found that many of these same negative impacts of tourism were reported by both LR employees and their neighbours – namely, increases in prostitution, alcoholism, and in the prices of goods and land within the peninsula. However, we did not find that LR was responsible in any way for these detrimental effects; rather, our informants emphasised that such increases in prostitution, alcoholism, and drug addiction within the Osa Peninsula were caused by conventional tourism.

Our combination of methods also revealed that LR lodge has made impressive contributions to environmental conservation since its opening in 1993. We found the lodge property – which includes 389 ha of protected rainforest – to show the highest rates of reforestation between 1987 and 2000 of all areas of the Osa Peninsula that we analysed. Moreover, forest re-growth generalises beyond LR boundaries: we found a gradient of local reforestation rates that varies inversely with distance from LR. Because the lodge provided the earliest example of reforestation in the area, allowing forest to re-grow on areas previously used for grazing, and because it promoted a conservation ethic among its employees, LR became the centre of a regional gradient of reforestation. No doubt this gradient also reflects some influence of growing ecotourism at Corcovado National Park. However, since LR was the first major ecotourism operation on the western side of the Osa Peninsula, we believe it was pivotal in raising both awareness and forests in the area.

Finally, our study also provides evidence that LR has been successful in its campaign to educate employees on environmental issues. We found LR employees to have far better knowledge of the concepts of conservation, biodiversity, and ecotourism than do their neighbours. Additionally, LR contributes to the conservation of the Parque Nacional Corcovado and supports a several community projects. In this sense LR has shown itself to be an active participant in improving livelihoods, environmental awareness, and conservation throughout large parts of the peninsula.

We conclude that LR fulfils the definitional promise of ecotourism, delivering the range and magnitude of social, economic, and environmental benefits that one would expect from a lodge with 5-leaf CST certification. Although we point out several areas for potential improvement, we feel that LR serves as an example of successful ecotourism which other lodges in similar social and environmental conditions would do well to emulate.

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