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Reducing tourism's threats to biodiversity: effects of a voluntary sustainability standard and training program on 106 Latin American hotels, lodges and guesthouses

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ABSTRACT

The tourism industry can negatively affect wildlife, plants and natural ecosystems through habitat destruction, pollution, over-exploitation of natural resources and visitor impacts to sensitive ecosystems. One approach to mitigate such threats is the application of voluntary sustainability standards, supported by training of tourism enterprises and verified by external audits. The Rainforest Alliance standard defines 78 criteria (requirements) for sustainable environmental, social and business practices, and has been adopted by over 600 tourism enterprises – including hotels, lodges and tour boats – in 12 countries. We examined the performance of 106 hotels in six Latin American countries against 29 of the sustainable tourism criteria most directly related to biodiversity conservation. Independent audits were used to assess hotel performance at baseline followed by a repeat assessment after training, about two years later. Mean conformance with the 29 biodiversity criteria increased significantly during this interval, from 44% to 58%. Improvements were greatest for businesses in the lowest third of performance at baseline (laggards) and smallest for hotels in the highest third (leaders). The results indicate that a voluntary sustainability standard and training program can serve both to recognize existing good actors and to drive incremental improvement in enterprises that were previously less sustainable.

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Introduction

Tourism is among the world's largest economic sectors, generating about 9% of global gross domestic product, almost 9% of the world's employment and a primary source of foreign exchange for many developing countries (WTTC, 2012). As a sector overall, tourism generates substantial negative environmental externalities – ranging from water pollution to greenhouse gas emissions to various indirect effects associated with visitor and worker influx – and can place severe pressure on the very ecosystems and local cultures that tourists are drawn to visit (Buckley, 2011). On the other hand, tourism has been hypothesized as a potential contributor to environmental protection and sustainable development, to the extent that it offers an economic development pathway that is more environmentally benign than typical rural enterprises, such as agriculture, hunting, logging or mining (Christ, Hillel, Matus, & Sweeting, 2003). Efforts to enhance the social, environmental and economic benefits

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of tourism, while minimizing or mitigating negative impacts, are referred to generally as "sustainable tourism" – a broad concept that may apply to all forms of tourism (both mass and niche) in all types of destinations (UNEP and UNWTO, 2005). Ecotourism applies principles of sustainable tourism to nature-oriented destinations and tourism facilities, and has been hypothesized as a way to support biodiversity conservation by generating revenue for conservation and providing important economic and political rationale for nations and local jurisdictions to conserve biodiversity (Brandon, 1996; Buckley, 2010). Sustainable tourism management may also improve the financial performance of small- and medium-sized tourism enterprises (Garay & Font 2012; Koens, Dieperink, & Miranda, 2009).

However, there is mixed evidence that sustainable tourism actually benefits biodiversity, with disparate findings based on the location, size and operation of the tourism enterprise as well as the types of affected wildlife species or habitats (Krüger, 2005). Even where tourism can generate benefits for conservation, its ultimate net impact depends on the management practices of tourism businesses and their effects on local people and the environment. In other words, for tourism to be considered sustainable, it must simultaneously minimize negative impacts and generate affirmative benefits for conservation and community development (Honey, 2002).

In light of the massive scale of tourism worldwide (WTTC, 2012) and its potential either to benefit or harm biodiversity in key conservation hotspots (Buckley, 2011), numerous initiatives have been put forth to improve the effects of the tourism sector on biodiversity and environmental quality (e.g. CBD, 2007). Voluntary sustainability standards, certification and eco-labels are one mechanism to define, encourage, evaluate and formally recognize socially and environmentally responsible tourism (Buckley, 2002; Honey, 2002). These standards define codes of good practice – typically consisting of a set of principles, criteria and indicators – for socially, environmentally and economically sustainable tourism practices and/or outcomes. Independent certification or verification audits are conducted to assess the degree of conformance with the standard, and, typically, businesses that meet a defined performance threshold may use a sustainability label to differentiate their product in the marketplace.

Tourism sustainability standards have been used since at least the early 1990s. As of mid-2014, 19 such standards were recognized as aligning with the Global Sustainable Tourism Council's international criteria (GSTC, 2014), but the actual number of standards is much higher (Buckley, 2011; Skinner, Font, & Sanabria, 2004). While there is a modest literature on tourism standards and certification, there has been very little empirical evaluation of the social or environmental effects of these standards systems. A 2011 review turned up only five empirical studies meeting basic quality parameters for evaluation research, and none of these addressed environmental performance in a tropical context (Blackman & Rivera, 2011). An additional important component of many voluntary standards systems is training offered to tourism enterprises to facilitate conformance with standards and support continuous improvement. The integrated package of training and standards is intended to address what has been a primary barrier to the mainstreaming of sustainable tourism, namely the lack of training and other effective implementation mechanisms to promote the adoption of good practices, particularly among small- and medium-sized tourism enterprises and their local vendors (UNEP and UNWTO, 2012).

The purpose of this study is to evaluate the effects of a tourism sustainability standard and associated training program on threats posed to biodiversity. For the purpose of this study, and consistent with the framing in the Convention on Biological Diversity (CBD), we construe biodiversity broadly to include not only the diversity of living organisms but also the terrestrial and aquatic ecosystems of which they are part (United Nations, 1992). In addition to recognizing multiple facets of biodiversity, the CBD, through its strategic plan and Aichi Biodiversity Targets, also recognizes a range of societal actions necessary to conserve biodiversity, ranging from direct protection of species and habitats to increased awareness and knowledge to a reduction of specific threats, such as pollution and invasive species (United Nations, 2010). In view of this contemporary approach to defining and protecting biodiversity, we developed and applied an analytical framework (described further below) for identifying and quantify a range of potential threats to biodiversity associated with tourism hospitality facilities.

The study focuses on small- and medium-sized hotels, lodges and guesthouses in Latin America that advertise or self-identify as sustainable tourism facilities. In augmenting the currently meager evidence base on tourism sustainability standards and biodiversity, the study aims to provide tourism enterprises, conservationists and the standards community with a strong empirical basis to design and apply standards to advance conservation objectives and help mainstream sustainable tourism practices. We focused on the Rainforest Alliance sustainable tourism standard, which is implemented in concert with a training program for small- and medium-sized tourism enterprises.

The Rainforest Alliance sustainable tourism standard and training program

The Rainforest Alliance sustainable tourism standard contains 78 criteria (i.e. specific requirements) oriented around three sustainability themes: environmental, socio-cultural and business. These criteria address a wide range of practices and outcomes related to biodiversity and ecosystem conservation, pollution, natural resource use, environmental education, worker safety and wellbeing, community development, business management and others (Rainforest Alliance, 2012). The associated training program provides access to knowledge and technical assistance to help tourism enterprises improve management systems, implement sustainability practices and conform to the Rainforest Alliance standard. In the case of the hotels, lodges and guesthouses included in this study (hereafter referred to simply as "hotels"), training takes place through a series of regional workshops held in six different Latin American countries. Hotels invited to participate have to fulfill a series of requirements related to their sustainability efforts or intentions. The workshops range from half-day awareness-raising seminars to three-day intensive trainings, depending on participant needs and resource availability in each location. In some countries, hotels also receive one-on-one technical assistance to address specific challenges identified during pre-training baseline audits. In other cases, group technical assistance sessions are held to address common challenges identified during the initial audits. For simplicity, we hereafter use the term "training" to refer to both workshops and technical assistance sessions.

The training focuses on topics in the three sections of the Rainforest Alliance standard, and is supported by topical training manuals (Rainforest Alliance, 2015). Related to environmental sustainability, the training addresses biodiversity protection, rational water and energy use, climate change and the conservation of natural areas. In terms of socio-cultural sustainability, the training addresses legal and ethical employment practices, contribution to local development, respect for local cultures and peoples, protection of historical and cultural heritage, corporate social responsibility and socio-economic impacts on communities. In relation to business practices and skills, the training addresses sustainability policy, safety and security, human resources management and best practices in food and beverage management.

Analytical framework

The environmental component of the Rainforest Alliance standard focuses more heavily on requirements to reduce and mitigate negative impacts than on steps to affirmatively support conservation programs or restore biodiversity, which often cannot be satisfactorily achieved at the level of a single enterprise. Given this focus on reducing negative impacts, we developed a threat reduction framework for structuring the analysis. Threat reduction assessment uses sets of proxy measures to develop a practical, context-specific system for tracking key conservation threats and detecting short-term effects of conservation interventions on such threats (Salafsky & Margoluis, 1999). Based on this approach, we developed a framework that identifies the most salient threats posed to biodiversity by tourism enterprises and then quantifies the degree of change in specific management practices that would be expected to mitigate or exacerbate such threats. These management practices are a subset of those specified in the Rainforest Alliance standard and evaluated during the audit process. Consistent with prior guidance on indicator development in the tourism sector, the indicators within this framework are easy to measure, objectively verifiable and address results (i.e. changes in practices or proximate environmental outcomes), not only inputs or expenditures (UNWTO, 2004)

Table 1. Threat reduction assessment framework used to evaluate the effects of the Rainforest Alliance sustainable tourism standard and training program on biodiversity threats of tourism enterprises.

Threat	Description and relationship to biodiversity conservation
Habitat destruction or degradation	Direct alteration to natural ecosystems during facility development or operation; habitat destruction is a leading threat to biodiversity
Impacts to wildlife	Negative effects on wildlife other than through habitat alteration, such as hunting or harvesting, harassment by visitors, or night lighting
Over-exploitation of other natural resources	Use of water, energy or other natural resources; such use can have direct impacts (e.g. reduced stream flow affecting aquatic organisms) or indirect impacts (e.g. increased demand for grid energy generated in environmentally damaging ways) on biodiversity
Water contamination	Pollution of fresh and marine waters by facility effluents, which may diminish or alter patterns of aquatic biodiversity
Soil and land contamination	Contamination of land with pesticides, other toxins or solid waste, which may render lands unfit as wildlife habitat or cause wildlife injury or death (e.g. from ingesting plastic wastes)
Lack of environmental awareness	Tourism workers and travelers unaware of (or unconcerned with) the environmental impacts of their actions or best practices to mitigate these impacts; such behavioral choices are likely to influence strongly the occurrence and magnitude of the above threats
Lack of robust management and monitoring tools	Tourism enterprises lack systems to manage and mitigate biodiversity impacts; such systems are a key step in improving the sustainability of tourism enterprises

Biodiversity threats posed by the tourism sector are well known, and include habitat destruction and resource extraction for initial tourism facility development; ongoing habitat degradation due to facility operations; over-extraction of water resources, plants or wildlife; pollution of water, soil, air and land; visitor impacts on local natural areas; increased spread of invasive species, fire and pathogens; and indirect effects related to enterprises' sourcing decisions, importation of labor and other factors (CBD, 2004). From this list of threats, we selected a subset that intersects most strongly with the Rainforest Alliance standard and is most relevant to the types of biodiversity threats potentially caused by small- and medium-sized hotels in Latin America, on which this study focuses (Table 1).

We applied this threat reduction framework to address the following research questions: (1) Do training and verification of hotels relative to the Rainforest Alliance sustainability standard improve rates of conformance with biodiversity-related criteria? (2) Which threats to biodiversity do hotels address most frequently? Which are addressed least frequently? (3) Does training improve hotel performance similarly across the board, or does it disproportionately affect the laggards, the leaders or the middle? (4) Are there significant country-level differences in any of the above results? Based on the answers to these questions, we then evaluate the strengths and weaknesses of the system overall to mitigate biodiversity threats, and to recommend ways in which sustainable tourism initiatives might effectively address biodiversity threats in the future.

Methodology

We selected for analysis 106 hotels trained and audited by the Rainforest Alliance between 2006 and 2011 for which full audit data were available for both the baseline condition (prior to training and verification) and the post-intervention condition (approximately 18–24 months later, following training and verification). These enterprises were located in Belize (10), Costa Rica (14), Ecuador (37), Guatemala (4), Mexico (18) and Nicaragua (23). With the exception of a handful of urban hotels in Mexico and Nicaragua, all hotels in the study were located in rural forested or coastal locations. We used the audit data to assess changes between the two time periods in the level of conformance of the subject hotels with biodiversity-related criteria in the Rainforest Alliance standard. Differences between the baseline and post-intervention condition were understood to represent changes attributable to the Rainforest Alliance training and verification system.

At the outset, we reviewed the Rainforest Alliance sustainable tourism standard and identified the 29 of the standard's 78 total criteria that pertain to biodiversity conservation or threat mitigation. We grouped these 29 criteria into the seven threat categories identified in Table 1 to provide a framework

for the threat reduction analysis. We obtained audit data for all 106 hotels for both the baseline and post-intervention time periods. During the audit process, auditors evaluate each criterion relative to one or more indicators, i.e. specific practices or aspects of the hotel's performance that auditors can assess through interviews, document review or direct observation. These audit data are believed to be a reliable and objective characterization of hotels' practices and performance, as auditors are entirely independent from the enterprises they evaluate (i.e. they have no personal or financial interest in the enterprise); undergo extensive training in audit procedures to ensure objective and consistent evaluations; and must subject their work to additional quality-control mechanisms instituted by the verification body (i.e. the auditors' employer) and by the standard system itself.

For each combination of criterion, hotel and time period, we calculated the percent conformance with the criterion by dividing the number of indicators with which the operation complied by the total number of applicable indicators. This resulted in a score for each criterion ranging from 0 (representing complete non-conformance) to 1 (representing full conformance). Partial conformance with any indicator, as determined by the audit, was scored as 0.5 for the purpose of this calculation. In cases where a criterion had no applicable indicators (e.g. none of the requirements applied to a given tourism operation), the entire criterion was coded as non-applicable for that operation and eliminated from further summary analysis.

We calculated unweighted arithmetic means to summarize percent conformance for each criterion for each time period at the country level and across all six countries. We also calculated means to summarize percent conformance for each time period across all of the applicable criteria within each threat category. These threat-level conformance figures were then also averaged to summarize hotel performance at the country level and across all six countries.

For each level of summary aggregation (criterion level per country, criterion level study-wide, threat category level per country and threat category level study-wide), we used paired *t*-tests to evaluate the significance of differences the between baseline and post-intervention performance. We corrected *p*-values for multiple tests following Benjamini and Yekutieli (2001). We also computed distributional statistics (mean, median and standard error) for performance of the 106 hotels at the level of threat category study-wide to understand the spread of performance in the baseline case, the post-intervention case and the magnitude of net change. To address research question 3, we used a linear model to assess whether baseline performance was a significant predictor of net change. To address question 4, we used a linear model with Tukey's HSD (Honest Significant Difference) test to determine whether country was a significant predictor of final performance.

Finally, to gain additional insight into the factors that contributed to the observed results, we interviewed seven Rainforest Alliance trainers and auditors to collect qualitative information on the observed patterns of conformance and hotels' stated or implied reasons for choosing whether make specific sustainability improvements.

Results

Results are presented below in relation to the four research questions.

Rates of conformance with biodiversity-related criteria

Before training, hotels received an average conformance score of 0.44 $\pm$ 0.04 ($\pm$ standard error of the mean, SEM) across all 29 biodiversity-related criteria. After training, that number increased to 0.58 $\pm$ 0.03, a statistically significant difference ($T = -8.49$, $p = < 0.0001$). Before training, hotels averaged a score of 0.50 or higher for 10 out of the 29 criteria; after training, scores crossed this threshold for 17 criteria. Table 2 shows average conformance scores before and after training for each biodiversity-related criterion.

Table 2. Average conformance score of tourism operations before and after training for 29 criteria in the Rainforest Alliance sustainable tourism standard that address biodiversity threats. All standard errors of the mean were $< = 0.05$. The table also indicates which criteria were used to calculate aggregate threat-level conformance for each of the seven threat categories. Scores are calculated on a scale from 0 to 1, with 0 indicating non-conformance by all operations and 1 indicating full conformance by all operations. The column labeled "*p*-value" indicates the significance level of the difference between the average before score and the average after score as determined in a paired *t*-test. We corrected *p*-values for multiple tests following Benjamini and Yekutieli (2001).

Threat category	Criterion description (and criterion code from the sustainable tourism standard)	Before	After	*p*-Value
Habitat destruction and degradation	Avoid introducing pests and exotic species in sensitive areas (10306)	0.36	0.50	0.029
	Participate in and support conservation and management of natural area(s) in the region (10401)	0.43	0.57	<0.001
	Implement measures to appropriately channel, use and dispose of rainwater (10705)	0.71	0.82	0.069
Impacts to wildlife	Do not consume, sell, or traffic products from species in danger of extinction or originating from non-sustainable practices (10301)	0.59	0.76	<0.001
	Do not keep wild animals in captivity, except for captive breeding, rescue or reintroduction, in accordance with the law and best practices (10302)	0.93	0.97	0.62
	Avoid artificial feeding of wild animals, except for the cultivation of host plants or food plants (10304)	0.44	0.57	0.014
	Protect wildlife from noise and lighting (10305)	0.76	0.87	0.028
Over-exploitation of other natural resources	Adopt water saving methods (for potable water, sprinklers, pools and others) and, when applicable, water saving devices (10103)	0.54	0.62	0.077
	Use energy efficient equipment and devices (10209)	0.72	0.79	0.13
	Manage the business's organic waste for an appropriate and productive use, such as compost, fertilizer, ground cover or domestic animal food (10605)	0.60	0.73	0.020
	Use eco-friendly supplies, such as recycled or non-traditional paper, organic foods, and certified wood (30903)	0.78	0.85	0.32
Water contamination	When possible, use highly efficient and high performance equipment (i.e. four stroke engines for boats) (10210)	0.59	0.70	0.32
	Manage sewage and gray water to avoid pollution and threats to public health (10701)	0.48	0.53	0.75
	Do not contaminate water bodies with toxic or dangerous products, or with excessive nutrient runoff (eutrophication) (10703)	0.28	0.42	0.020
	Use biodegradable and non-eutrophying cleaning and cosmetic products (10708)	0.51	0.58	0.19
Soil and land contamination	Identify and implement actions to separate waste (10601)	0.33	0.49	<0.001
	Adopt a program to minimize purchase of waste-producing supplies (10602)	0.39	0.58	<0.001
	Separate construction waste and other waste for reuse, recycling or appropriate disposal (10603)	0.40	0.56	<0.001
Lack of environmental awareness	Communicate water-saving policies and measures to guests, employees and owners (10104)	0.16	0.48	<0.001
	Provide environmental education to neighboring communities, guests, employees and owners (10801)	0.33	0.49	0.0019
	Support existing environmental educational programs in the area, or encourage their creation (10802)	0.32	0.48	0.014
	Encourage responsible behavior of visitors (10803)	0.27	0.47	<0.001
	Inform visitors about protected area regulations (10804)	0.30	0.45	0.035
	Ensure that guests, employees and managers understand the business's sustainability policies (30102)	0.14	0.42	<0.001
	Train personnel on environmental aspects related to business activities (30601)	0.17	0.26	0.023
Lack of robust management and monitoring tools	Abide by national and international labor legislation (30101)	0.19	0.47	<0.001
	Establish and maintain documented procedures to define responsibilities for carrying out the business's policies (31001)	0.14	0.35	<0.001
	Establish a mechanism to receive guest evaluations, complaints and comments, and to analyze these and take appropriate corrective actions (31002)	0.43	0.53	0.18
	Monitor and critically analyze corrective and preventive management actions to ensure continuous improvement (31003)	0.38	0.44	0.93

Performance for the seven biodiversity threat categories

Before training, hotels achieved the highest conformance scores for the set of criteria related to over-exploitation of natural resources, followed by the sets of criteria addressing impacts to wildlife and habitat destruction or degradation (Figure 1). Baseline performance scores were lowest for the sets of criteria addressing lack of environmental awareness and lack of robust management and monitoring tools. After training, the increase in mean conformance across each threat category ranged from 0.09 to 0.19, and these increases were statistically significant at $p \leq 0.01$ for all seven threat categories (Table 3). The relative performance ranking for the various threat categories remained unchanged for the post-intervention period, with the exception of water contamination and soil contamination, which changed places.

Differential effects of training on leaders versus laggards

For all criteria combined, a regression analysis showed that hotels performing worse before technical assistance made significantly larger improvements in criteria conformance than those performing better before technical assistance ($R^2 = 0.17$; $p < 0.0001$).

A larger improvement among poorer performers was also observed when threat categories were examined individually. We found that for all threat categories, the hotels that performed the lowest before technical assistance made the largest improvements. Results of a regression analysis showed that three threat categories (habitat destruction and degradation, impacts to wildlife and over-exploitation of natural resources) had relatively high R^2 values (ranging between 0.40 and 0.58), meaning that roughly half of the observed change can be explained by the initial score. Other categories had R^2 values ranging between 0.10 and 0.18.

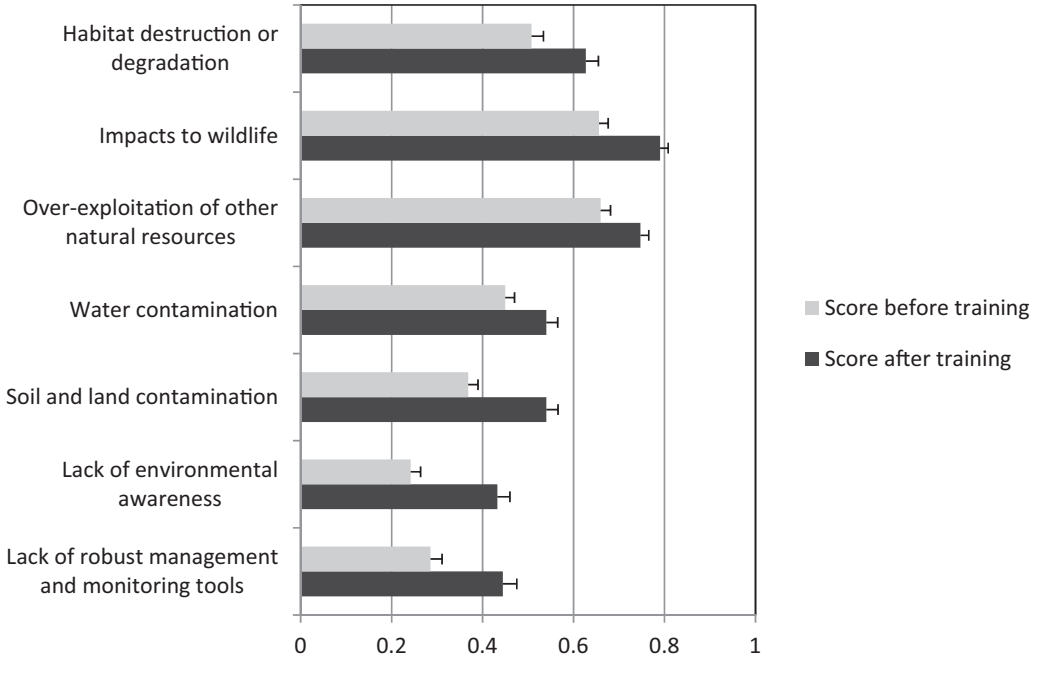

Figure 1. Average conformance score of tourism operations before and after training, for seven biodiversity threat categories. All before–after comparisons are significant at $p \leq 0.01$. Conformance scores are calculated on a scale from 0 to 1, with 0 indicating non-conformance by all operations and 1 indicating full conformance by all operations. Error bars show standard error of the mean. We corrected *p*-values for multiple tests following Benjamini and Yekutieli (2001).

Table 3. Average change in hotel conformance with criteria in each of the seven biodiversity threat categories. Change in conformance equals the mean conformance score at the verification audit (post-training) minus the mean conformance score at the baseline audit (pre-training). Conformance scores are calculated on a scale from 0 to 1; thus a change of 0.10 indicates a mean increase of 10% in conformance to the criteria within a particular threat category. Change scores are indicated for all hotels overall (left column of numbers) and disaggregated into three groups based on baseline performance. All standard errors of the mean were $<=$ 0.06.

	Change in score			
Threat category	All hotels	Lowest third	Middle third	Highest third
Habitat destruction and degradation	0.12	0.25	0.13	−0.08
Impacts to wildlife	0.13	0.27	0.13	−0.05
Over-exploitation of other natural resources	0.09	0.26	0.08	−0.09
Water contamination	0.08	0.18	0.03	0.01
Soil and land contamination	0.17	0.33	0.12	0.06
Lack of environmental awareness	0.19	0.24	0.24	0.09
Lack of robust management and monitoring tools	0.16	0.27	0.17	0.00
Total of all threat categories	0.13	0.26	0.13	−0.01

To explore further the impact of training, we grouped hotels into three groups according to their baseline performance. We then calculated the change in score for each third separately, for each threat category. On average, the worst performers (lowest third) increased their score by 0.26 after training; the average performers (middle third) increased their score by 0.13 and the best performers (highest third) registered a mean change of −0.01 (Table 3).

Country-level differences

For each country, we averaged each hotel's score before and after training (Figure 2). Before training, country performance ranked as follows (highest to lowest): Mexico, Guatemala, Costa Rica, Ecuador, Belize and Nicaragua. After training, Mexico still performed best (with an increase of 0.20 and an average post-training score of 0.69), but Costa Rica and Nicaragua made the largest improvements, 0.25 and 0.21, respectively (Figure 3).

When threat categories were examined separately, we found that country contributed most to explaining differences in performance for the following three categories: lack of environmental awareness ($R^2 = 0.35$), water contamination ($R^2 = 0.31$) and soil contamination ($R^2 = 0.21$). Country was not strongly related to performance for the other threat categories ($R^2 < 0.1$).

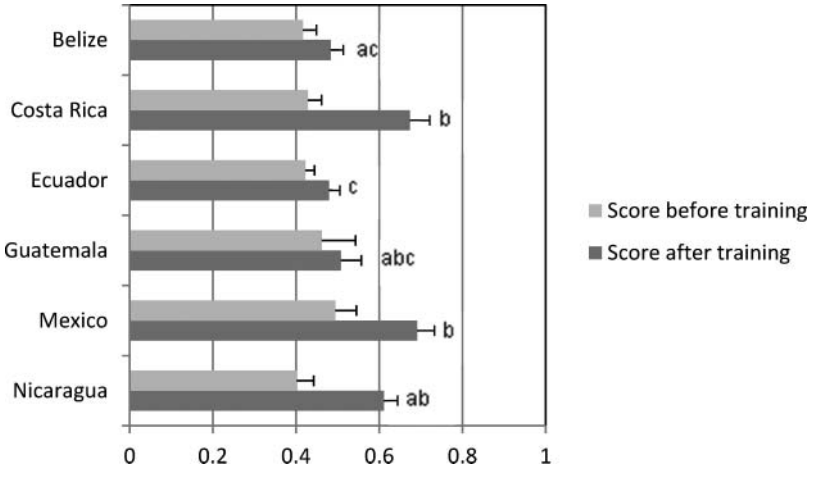

Figure 2. Average hotel conformance for all 29 biodiversity-related criteria, before and after training, disaggregated by country. Conformance scores are calculated on a scale from 0 to 1, with 0 indicating non-conformance by all operations and 1 indicating full conformance by all operations. Countries that do not have a lower case letter in common differ significantly in post-training conformance scores. Error bars show standard error of the mean.

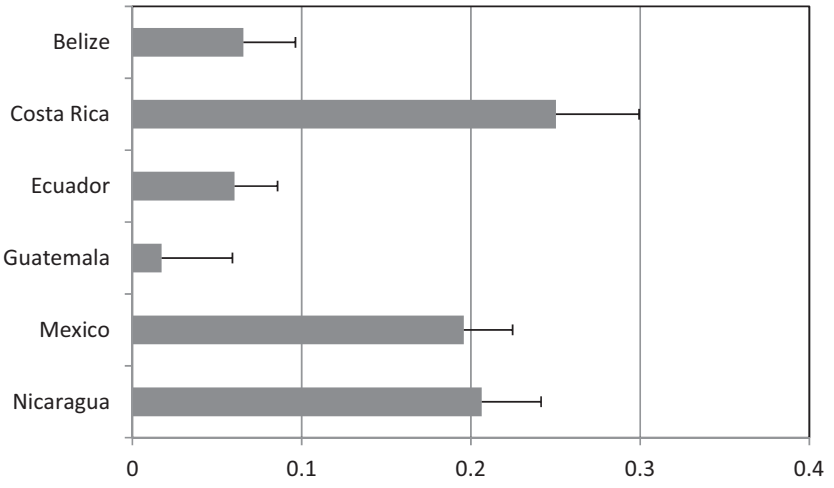

Figure 3. Average change in hotel conformance for each country. Change in conformance equals the mean conformance score at the verification audit (post-training) minus the mean conformance score at the baseline audit (pre-training) for 29 biodiversity-related criteria. Conformance scores are calculated on a scale from 0 to 1; thus a change of 0.10 indicates a mean increase of 10% in conformance across all enterprises within a particular country. Error bars indicate standard error of the mean.

Discussion

Overall, we found broad improvement in hotels' performance from the pre-training baseline to the post-training period relative to the 29 biodiversity-related criteria in the Rainforest Alliance sustainable tourism standard. Performance increased the most for those hotels that were sustainability laggards at baseline, suggesting that the standards and training system is serving both to recognize existing good actors and to drive incremental improvement for operations that were previously less sustainable. On the other hand, hotels in the top third of baseline performance did not improve their performance at all, on average. We suggest two explanations for this "plateauing" phenomenon, in which a certain level of performance is widely attained while complete or near-complete conformance to all criteria remains uncommon. First, the structure of the Rainforest Alliance standard at the time the study was conducted did not include any requirements or incentives to pursue continuous improvement beyond an established threshold of acceptable performance. Absent the opportunity to gain additional recognition for exceptional performance, hotels may have lacked motivation to pursue further improvements, except when these improvements yielded cost savings or other specific economic benefits.

Second, based on discussions with trainers and auditors, the high cost and technical or managerial difficulty of implementing certain sustainability measures may be hindering uptake, even when hotels are interested in making such improvements. Access to finance has been identified as a particularly acute barrier for small- and medium-sized tourism enterprises to adopt sustainability improvements (UNEP and WNWTO, 2012). The suite of practices (criteria) that hotels perceive as practical and economically beneficial appears to vary from place to place depending on the costs and benefits of conformance in the hotel's specific geographic and economic context. For instance, in dry regions of Mexico, hotels tended to invest in water conservation, whereas in parts of Central America characterized by costly or unreliable grid electricity, energy conservation criteria were more frequently addressed.

In light of these explanations, the fact that the standards system did not result in full conformance with all criteria does not necessarily represent a failure. Rather, it may be seen as a desirable consequence of the standard's flexibility, which encourages businesses to pursue sustainability through those actions that are most relevant and cost-effective within a particular context. The economically

oriented nature of many of the sustainability improvements undertaken, as well as the performance plateauing phenomenon, suggests that the impetus for sustainability progress may be driven at least as much by business rationale as by owners' environmental values, in contrast to findings for small-scale tourism enterprises in Europe (Font, Garay, & Jones, 2014).

The remainder of the discussion reviews and interprets salient results for each of the seven biodiversity threat categories.

Destruction or degradation of natural habitat

Hotels complied with the three habitat-related criteria to a moderate degree (0.51 at baseline, rising to 0.63 post-training, on average). Perhaps the most important of these criteria is the requirement to participate in and support conservation and management of local natural areas (Buckley, 2009), whether they be on-site (owned by the hotel) or off-site (a nearby protected area or other natural area). This provision encourages operations to provide affirmative benefits for biodiversity, rather than simply reducing negative impacts. A few factors appeared to affect conformance with this criterion. In some countries (e.g. Costa Rica), legal and institutional frameworks encourage and facilitate the hotels' participation in local conservation efforts. However, in other places there is little precedent or expectation to provide such contributions: local institutions were not prepared to accept support from hotels and did not have clear mechanisms for using such support. Additionally, hotels in destinations where local protected areas are a primary attraction, such as Costa Rica, were more inclined to support such protected areas than those in destinations where visitor activities are concentrated on hotel premises.

Exploitation of wildlife

Three of the four wildlife protection criteria were generally straightforward to implement and were characterized by high levels of conformance (>0.75 each by the post-training period). These included a prohibition on selling or trafficking endangered species or products originating from unsustainable practices; prohibition on keeping wild animals in captivity; and requirement to protect wildlife from noise and lighting. However, the criterion prohibiting artificial feeding of wild animals saw only moderate conformance levels (0.44 before training and 0.57 after). Auditors reported that it is very common for hotel staff to feed wild animals, such as birds, turtles, fish, crocodiles and monkeys to attract these species and entertain guests. Guests and employees alike tend to view this as a harmless activity. The increase in conformance following training suggests that education can be helpful in changing such attitudes, but may require perseverance where attitudes toward wildlife feeding are entrenched through local norms and visitor expectations.

Over-exploitation of other natural resources

The 106 hotels included in this study were generally quite proactive in their resource protection efforts related to water conservation, energy conservation, organic waste management and sustainable sourcing (mean conformance of 0.66 before training and 0.75 after training). The relatively high baseline performance for these criteria suggests that there may already be a strong business case for investing in such practices, even in the absence of a sustainability standard. For instance, nearly three-quarters of hotels were already employing energy efficient equipment prior to training, likely reflecting the high cost of electricity or generator fuel in many locations. Whereas water and energy conservation investments can be economically sound in a range of contexts, auditors noted that on-site organic waste management and sustainable sourcing practices were most common among higher end operations. These activities may represent net costs to the hotel when considered as stand-alone investments, but may be economically rational as part of an overall strategy to cultivate

a particular image and visitor experience, which in turn can be monetized through the hotel's marketing and pricing structure.

Water contamination

Conformance scores for the four criteria related to water contamination were only middling, overall. Hotels were more apt to adopt specific prescribed products or equipment for protecting water bodies (e.g. four-stroke boat engines and biodegradable cleaning and personal care products) than to address water quality, sewage, runoff and waste liquids more comprehensively. The barriers to fuller conformance and more robust water quality protection appear to be threefold. First, throughout the tourism sector in many Latin American countries, there is a general lack of awareness about the proper methods to dispose of wastes such as used cooking oil and toxic chemicals. Training can help to introduce good practices and establish these as new norms among staff. Second, even where there is strong awareness, the infrastructure to collect and manage toxins and other waste may be inadequate, leaving the hotel few options for disposing of waste substances. Third, at the time the data for this study were collected, the criterion related to wastewater management provided insufficient guidance (e.g. specific indicators or targets) to help hotels and auditors identify, implement or assess the expected good practices. Such guidance is important to help translate a broad goal (e.g. avoiding contamination of water bodies) into specific practices or quantitative outcomes (e.g. fecal coliform levels in treated sewage) that hotels can adopt or achieve.

Soil and land contamination

The three criteria on soil and land contamination (i.e. solid waste management) experienced a substantial increase in conformance associated with implementation of the sustainability standard and training (mean of 0.37 at baseline and 0.54 after training). Improved waste management practices were addressed in training modules and proved to be feasible and attractive to many of the hotels. As with the previous threat category, limitations in local infrastructure (e.g. recycling facilities) may have limited conformance with some of these criteria.

Lack of environmental awareness

The environmental awareness threat category was characterized by the lowest baseline performance (mean score of 0.24) but registered the largest improvement following training (mean score of 0.43, or a 0.19 improvement). Three of the criteria (communicating water-saving policies, informing visitors about protected area regulations and encouraging responsible behavior of visitors) generally require little investment from the hotel, other than to adjust written and verbal communications, and witnessed large gains in conformance. Interestingly, the other two environmental awareness criteria, focusing on the provision of environmental education to local communities, guests and employees, had higher baseline conformance levels even though they generally require greater effort to establish and implement education offerings. Overall, conformance with the environmental awareness criteria remained relatively low even after the trainings. This finding suggests that there is considerable room for improvement in socializing the concepts of sustainable tourism and environmental stewardship among all groups with whom hotels interact (guests, staff and local communities).

Lack of tools for sustainable management and monitoring

Management tools and processes are helpful, if not essential, for ensuring that businesses adopt and systematically implement sustainability initiatives. Criteria related to management and monitoring tools registered the second-lowest baseline conformance level (mean score of 0.29) but a substantial improvement following training (mean post-training score of 0.44, or a 0.15 improvement).

Nevertheless, even after training, most hotels lacked systems to identify corrective actions and ensure continuous improvement toward sustainability goals; programs to train personnel on environmental aspects related to the business or documented procedures and lines of responsibility to implement key business policies. These deficiencies may be less significant for small operations, where sustainability efforts might be effectively advanced in a less formal fashion through the initiative of individual employees or managers. However, in larger hotels where sustainability initiatives require coordination and planning among multiple functions, such as procurement, facility maintenance, guest services and food services, the lack of robust management systems to effectuate sustainability commitments may bode poorly for the long-term delivery of such commitments.

Implications for scalability in the tourism industry

Prior studies and commentary have called into the question the viability of tourism sustainability standards and certification from the standpoints of weak traveler demand, questionable cost-effectiveness as a policy instrument, industry capture and limited scalability as a financially self-sustaining mechanism (e.g. Buckley, 2009, 2013; Epler-Wood & Halpenny, 2001; Rivera, 2002). Without entirely negating these critiques, this case study of the Rainforest Alliance system suggests two reasons why such limitations need not relegate sustainability standards to a marginal position within the tourism industry. First, since a high proportion of the 106 hotels we studied never proceeded to use the Rainforest Alliance Verified™ seal for marketing or communication purposes – but nevertheless substantially improved their sustainability performance – it appears that the training provided in association with the standard was effective in encouraging hotels to adopt more sustainable practices for a variety of reasons other than recognition through certification. These reasons likely included cost savings, improved operational efficiency, improved visitor experience and contribution to the hotel's brand and image (apart from any use of the verification seal).

Second, the results suggest the value of providing a structured sustainability framework and codified requirements (criteria) to guide business decisions and technical assistance for the tourism industry. Third-party sustainability standards and certification are not the only way to promulgate and apply such frameworks; government regulation, environmental impact assessment, land-use planning and zoning and voluntary industry efforts outside the realm of standards and certification can also play important roles (Mycoo, 2006). Experience from systems such as the Rainforest Alliance standard can help inform the development of analogous sustainability frameworks through these other channels.

Conclusions

Sustainability standards and certification provide an integrated framework to address many of the best practice guidelines for biodiversity-friendly tourism development (CBD, 2004). They provide detailed, codified requirements for what constitutes sustainable tourism, and include regular independent audits against specific indicators to guide adherence to core requirements and promote continuous improvement (UNWTO, 2004). Here, we report evidence that the Rainforest Alliance sustainable tourism standard and associated training program contributed significantly to improvements in sustainability practices linked to biodiversity threat reduction across 106 small- and medium-sized hotels in Latin America. While the sustainability performance of most hotels after participation in the program still left room for improvement, we documented substantial increases in key practices and outcomes including wildlife protection, support for nearby protected areas, improved waste management, reduced water pollution and improved environmental awareness on the part of visitors and employees. Taken together, these improvements are expected to reduce negative impacts on biodiversity. It now remains to expand such gains beyond localized demonstrations of what is possible, toward mainstream practice across the tourism sector. Doing so will require a much more concerted effort to disseminate good practices, offer training and support especially to

small- and medium-sized enterprises, and help address specific barriers such as access to finance for sustainability improvements.

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Two of the paper's four authors are affiliated with the organization that implemented the tourism sustainability standard and training program that is the subject of this study (Rainforest Alliance). However, none of the authors was involved in implementing the program or collecting the audit data on which the analysis is based. The two affiliated authors are members of a distinct evaluation and research unit within the organization that is charged with providing independent scientific assessment.

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