DOES TOURISM ECO-CERTIFICATION PAY? COSTA RICA'S BLUE FLAG PROGRAM

Allen Blackman[1], María A. Naranjo[2], Juan Robalino[2],
Francisco Alpízar[2], Jorge Rivera[3]

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[1]Resources for the Future, Washington, DC; blackman@rff.org
[2]Environment for Development Center for Central America, Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), Turrialba, Costa Rica; mnaranjo@catie.ac.cr; robalino@catie.ac.cr; and falpizar@catie.ac.cr
[3]George Washington University, Washington, DC; E-mail: jrivera@gwu.edu

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Abstract. Tourism associated with beaches, protected areas, and other natural resources often has serious environmental impacts. The problem is especially acute in developing countries where nature-based tourism is increasingly important and environmental regulation is typically weak. Eco-certification programs—voluntary initiatives certifying that tourism operators meet defined environmental standards—promise to help address this problem by creating a private-sector system of incentives, monitoring, and enforcement. But to do that, they must provide incentives for tourism operators to participate such as higher prices and more customers. Yet rigorous evidence on such benefits is virtually nonexistent. To help fill this gap, we use detailed panel data to analyze the effects of the Blue Flag Program, a leading international eco-certification program. We examine its effects in Costa Rica, a country struggling to mitigate widespread environmental damages from nature-based tourism. We use new hotel investment to proxy for private benefits and fixed effects and propensity score matching to control for self-selection bias. We find that Blue Flag certification is significantly, albeit weakly, correlated with new hotel investment, particularly investment in luxury hotels. Moreover, this is an economically significant effect. In the country as a whole, BFP beach certification attracts more than 40 new hotels with more than 300 new hotel rooms per year. These findings provide some of the first evidence that eco-certification can generate private benefits for tourism operators in developing countries and therefore has the potential to improve environmental quality.

Keywords: Tourism, Eco-certification, Blue Flag Program, Costa Rica, propensity score matching

JEL codes: Q13, Q20, Q26; 013, Q54

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1. INTRODUCTION

Tourism associated with beaches, protected areas, and other natural resources often has serious environmental impacts (Buckley 2004; Holden 2000; Mieczkowski 1995). Hotels, cruise ships, and transportation operations along with roads and other supporting infrastructure generate pollution, destroy and degrade biodiversity habitat, and introduce invasive species. Moreover, they spur economic and population growth that multiplies these effects. The problem is especially acute in developing countries where nature-based tourism is increasingly important, representing the backbone of some economics (Balmford et al. 2009; Christ et al. 2003) and where land use planning, coastal zone management, and other types of environmental regulation are typically weak (Russell and Vaughan 2003; Blackman 2010).

According to advocates, private-sector voluntary schemes that certify tourism operations adhere to defined environmental process or performance standards can help address this problem (Honey and Rome 2001; UNEP 1998). First introduced in Europe in the 1980s, they have proliferated rapidly over the past 25 years (Dodds and Joppe 2005; Font 2002). Today, dozens are active in developing countries. Among the best known are the Blue Flag and Green Globe programs, which are international in scope, and the Certification for Sustainable Tourism (CST) program, which is based in Latin America (Dodds and Joppe 2005). In theory, initiatives like these create incentives for tourist operations to improve their environmental performance by widening the availability of reliable information about this performance, thereby enabling consumers, capital markets, and civil society to more easily reward green operators and sanction dirty ones. For example, armed with better information, vacationers can patronize or boycott certain hotels, and lenders can extend or withhold credit. Hence, in principle, eco-certification can create a private-sector system of incentives, monitoring, and enforcement, effectively sidestepping the problem of weak mandatory regulation.

But for tourism eco-certification programs to spur such environmental improvements, they also must provide eco-certified operators with significant private economic benefits such as higher prices and more customers (Blanco et al. 2009). The reason is twofold. Participation in eco-certification programs is costly: operators incur significant pecuniary and nonpecuniary costs to meet certification environmental performance standards and to pay for certification red tape (Sasidharan et al. 2002; Salzhauer 1991). In addition, by definition, participation is voluntary. Therefore, unless certification generates economic returns sufficient to offset these costs, few operators will participate.

Yet we know little about the private economic effects of tourism eco-certification in developing countries. One reason is that requisite producer-level data are scarce. In particular, data on profits and market share of tourism operators in developing countries are proprietary and tightly held. A second reason is that evaluating economic effects of eco-certification is challenging. To be credible, evaluations must control for the nonrandom selection of certain types of tourism operators into certification, that is, for self-selection bias. Already-green operators generally have strong incentives to participate because few additional investments are required to meet certification standards. Profitable operators also typically have strong incentives to participate because they can best afford to cover the requisite costs. Evaluations that fail to control for the disproportionate participation of such operators conflate the economic effects of certification with the effects of certified operators' preexisting characteristics.

It is perhaps not surprising then that credible evidence on the link between developing country tourism eco-certification and private economic benefits is quite thin. What's more, the evidence that we do have is very mixed. To our knowledge, the only published quantitative evaluation of this link is Rivera (2002), which examines CST hotel certification in Costa Rica. The author uses original survey data on 169 hotels along with a Heckman model to control for self-selection bias. He finds that CST certification does not boost prices or market share for the average hotel. But it does have price benefits for hotels with particularly strong environmental performance.

Three other strands of literature bear on the link between developing country tourism eco-certification and private economic benefits. However, their findings must be applied cautiously since they focus on economic sectors other than tourism and on countries outside the developing world—sectors and countries where the drivers of and links between environmental and economic performance are likely to be different. The first relevant strand of the literature is on the private economic benefits of eco-certification in nontourism sectors. This strand also is limited, however. Blackman and Rivera (2010) review the published literature on producer-level effects of eco-certification in five sectors where it is particularly prevalent: bananas, coffee, fish products, forest products, and tourism. Among the non-tourism sectors, they find 20 empirical retrospective studies of eco-certification's private economic effects, only eight of which control for self-selection bias. All eight focus on Fair Trade and/or organic certification of bananas or coffee in developing countries. Three find some evidence of economic benefits (Arnould et al. 2009; Bolwig et al. 2009; Fort and Ruben 2008a), and five find none (Fort and Ruben 2008b; Lyngbaek et al. 2001; Ruben and van Schendel 2008; Sáenz Segura and Zúñiga-Arias 2008; Zúñiga-Arias and Sáenz Segura 2008).

The literature on voluntary actions other than eco-certification that tourism operators take to improve environmental performance also is relevant. However, it too is quite thin. In their review of this nascent literature, Blanco et al. (2009) find just six published studies, only one of which—Kassinis and Soteriou (2005)—attempts to control for selection bias. Using a structural econometric model to examine a sample of high-end European hotels, the authors find that environmental management does not have an direct effect on economic performance, although it does affect it indirectly through customer demand.

Finally, the voluminous literature on the link between corporate social responsibility (CSR)—actions not required by law that firms take to improve environmental quality, workers' health and safety, and/or community welfare—and private economic benefits in industrialized countries has some bearing. Several recent meta-analyses conclude that on average the relationship, if it exists at all, is at best mildly positive so that while CSR does not usually entail significant losses, neither does it generate significant profits. In other words, most CSR essentially just pays for itself (Reinhardt et al. 2008; Margolis et al. 2007; Portney 2008).

Hence, overall, we have little rigorous evidence on the link between eco-certification and private economic benefits in the tourism sector of developing countries—or for that matter, any type of eco-certification in any sector in developing and industrialized countries. To help fill this gap, we examine the Blue Flag Program (BFP), an international program that certifies beaches and other tourist destinations, in Costa Rica. We focus on the BFP because, as noted above, it is one of the most prominent eco-certification programs in in the developing world (Dodds and Joppe 2005). We study Costa Rica because it is a global leader in nature-tourism and is struggling to mitigate this serious environmental damages this sector causes, particularly in coastal areas (Fonseca 2010; Lunmsdon and Swift 1998).

Our analysis aims to determine whether BFP certification of tourist beach communities generates significant private economic benefits for local hotels. We use detailed panel data on all 281 tourist beach communities in Costa Rica, compiled from a variety of sources including the country's national tourism and census agencies and from a geographic information system (GIS) comprising detailed data on beach communities' geophysical characteristics. We use fixed effects and propensity score matching to control for self-selection bias. Data directly measuring economic benefits—e.g., on hotel occupancy rates and room prices—are proprietary and/or quite noisy. Therefore, as a proxy, we use new hotel investment, which is closely associated with expected private economic benefits. By construction, a finding that, all other things equal, past BFP certification spurs new hotel investment would indicate that local hotels expect to garner significant private economic benefits from certification, while the opposite finding suggests they do not.

We find that past BFP certification is positively and significantly—albeit weakly—correlated with new hotel investment, particularly investment in luxury hotels. Moreover, this is an economically significant effect. In the country as a whole, BFP beach certification attracts more than 40 new hotels with more than 300 new hotel rooms per year. These findings provide some of the first evidence the case that tourism eco-certification in developing countries can generate significant private benefits for participating operator.

The remainder of the paper is organized as follows. The next section discusses possible causal links among BFP certification, private economic benefits, and hotels' location decisions. The third section presents background on tourism in in Costa Rica and the BFP. The fourth section discusses our empirical approach and data. The fifth section presents results, and the last section sums up and concludes.

2. ECO-CERTIFICATION AND HOTEL LOCATION

What are the causal links among BFP certification, private economic benefits, and hotels' location decisions? Two countervailing sets of links are possible, each implying a different relationship between BFP certification and hotel location. On one hand, hotels may locate in BFP certified areas because certification generates private economic benefits. In theory, the causal mechanism work as follows: Tourists value the overall environmental quality of beach communities, including sea water quality, drinking water quality, and lack of litter (Frampton 2010). But they are not able to assess this quality a priori since self-claims of environmental quality by local hotels are unreliable and independent assessments are not available. Hence, to the extent the BFP provide a credible independent signal of environmental quality, hotels in certified areas should attract more customers and/or higher price premiums, and new hotels should be more likely to locate there.

Notwithstanding these arguments, in principle, BFP certification could deter hotels building new facilities. The reason is that obtaining and maintaining certification may effectively require hotels to make costly investments in water treatment and other types of environmental protection (Brunnermeier and Levinson 2004). Empirical research on this deterrent effect of more stringent environmental standards has mostly focused on the effect of mandatory regulations on new investments in highly polluting industrial plants (Levinson 2010; Ambec and Lanoie 2008; Margolis and Walsh 2003). Although most studies find that environmental regulations do not have statistically significant effects on new plant location, these studies examine industries that are quite different from tourism hotel sector.

3. BACKGROUND

In 2008, two million tourists visited Costa Rica—an eight fold increase since 1987—making tourism one of the most important sectors of the national economy (ICT 2009). Surveys of tourists consistently show that beach and nature activities are regarded as the most important reasons to visit the country (ICT 2009; Rivera 2002). Unfortunately, however, negative environmental effects from tourism are increasingly evident, particularly around heavily visited beaches and national parks (Fonseca 2010). The BFP may be seen as a response to that threat.

Launched in France in 1987, BFP has been implemented in 46 countries in Europe, Africa, Latin America, and the Caribbean and has certified more than 3,600 tourist destinations (Blue Flag 2012). The program, which administered by an international umbrella organization called the Foundation for Environmental

Education, requires public agencies, nongovernmental organizations, and businesses operating in a specific tourist destination to apply jointly to receive certification. In Costa Rica, the BFP was established in 1996 by the national Water and Sewer Agency (AyA) with the support of the Tourism Business Chamber and the Ministries of the Environment, Education, Health, and Tourism. The purpose was to maintain the appeal of beach communities that are a key attraction of the country's booming tourism industry (Mora Alvarado 2001).

To obtain Blue Flag certification in Costa Rica, which is valid for one year, a beach community must first apply to the BFP, and then undergo an independent evaluation by the National Water Laboratory, a government organization. It must obtain a score of at least 90 out of 100 points based on the five performance criteria: sea water quality, drinking water quality, litter control, beach safety, and environmental education (Table 1).

[Insert Table 1 here]

Each year between 2001-2008, 60-87 of the 281 tourist beach communities in Costa Rica applied or reapplied for BFP certification and each year between 60-80 percent of those applicants were certified (Table 2). In 2008, the most recent year for which we have data, 87 beach communities applied to the BFP and 60 were certified or recertified. Figure 1 maps the location of the 281 communities in our data and the 60 that were certified in 2008.

[Insert Table 2 and Figure 1 here]

In 2008, roughly 2,600 hotels were operating in Costa Rica. Remarkably, more than three quarters of these hotels were build in the last 25 years (ICT 2009; Rivera 2002). Most hotels are small, offer basic services, compete based on price, and are located close to national parks and beaches. In Costa Rica's 281 tourist beach communities, the number of hotels grew from 136 to 161 between 2001-2008 and the number of hotel rooms from 4,463 to 9,172 (Table 2).

4. METHODS

4.1. Empirical approach

A naive approach to modeling the effect on new hotel investment of BFP certification would posit that the number of new hotels in a given beach community in a given year—hereafter, a "community-year"—depends on the community's BFP certification in previous years, a vector of the time invariant social and economic control characteristics, and year dummy variables. That is

$$Y_{it} = \alpha + \boldsymbol{\beta}\mathbf{X_i} + \chi C_{it-z} + \boldsymbol{\delta}\mathbf{W_t} + \varepsilon_{it}, \quad (1)$$

where i is a community index; t is a year index; Y is the number of hotels in community i in year t; **X** is a vector of time invariant social and economic control variables; C is a dummy indicating BFP certification; **W** is a vector of year dummies; α, $\boldsymbol{\beta}$, χ, δ are parameters or vectors of parameters to be estimated; and ε is error term. The parameter χ measures the BFP's effect. However, this measure is likely to be biased upwards because C_{it-z}, the BFP certification dummy, is endogenous (i.e., correlated with ε_{it}). The reason is that BFP certification is not randomly assigned across beach communities. Rather, communities already meeting BFP certification standards are almost certain to disproportionately self select into certification because the costs of certification are relatively low (since no further environmental protection investments are needed to obtain certification). A failure to control for this self-selection effect would conflate the effect on hotel location of the pre-existing superior environmental quality of BFP beaches with the causal effect of BFP certification on environmental quality, thereby biasing χ upwards.

We use two strategies to control for self-selection bias. The first is fixed effects (Wooldridge 2002). That is, we use ordinary least squares (OLS) to estimate

$$Y_{it} = \alpha + \chi C_{it-z} + \boldsymbol{\delta} \mathbf{W_t} + \boldsymbol{\gamma} \mathbf{G}_i + \varepsilon_{it}, \qquad (2)$$

where $\mathbf{G}_i$ is a vector of community dummy variables, and $\boldsymbol{\gamma}$ is a vector of parameters. The fixed effects control for unobserved heterogeneity of communities, including that generated by self-selection. We omit the time invariant social and economic control variables in $\mathbf{X_i}$, because they are perfectly correlated with the community dummies in $\mathbf{G_i}$. We use a six-year (2003-2008) panel of 1,686 community-years comprised of a treatment group of 337 BFP certified community-years and control group of 1,349 uncertified community-years, all drawn from the population of 281 tourist beach communities. We effectively drop the first two years of our panel (2001 and 2002) to accommodate a two-year lagged independent variable—BFP certification.

In addition, we control for self-selection by using matching to “pre-process” our data (Rosenbaum and Rubin, 1983; Caliendo and Kopeinig, 2008; Ho et al., 2007). Intuitively, this strategy amounts to identifying a “matched” control group of uncertified beach communities that are similar to the treatment group of certified communities in terms of characteristics that drive certification (including proxies for pre-existing environmental performance), dropping unmatched control communities from the regression sample, and then running a parametric regression to estimate χ, the parameter that measures the effect of the BFP. Given this preprocessing, any residual effect of BFP certification on new hotel investment can reliably be attributed to the program.

We use propensity scores for each community—the predicted probability of treatment (here BFP certification) from a probit regression—to match certified and uncertified communities. Propensity scores can be interpreted as weighted indices of the characteristics that drive treatment (here certification) and, therefore, are an appropriate metric for matching treatment and control observations (Rosenbaum and Rubin, 1983). We implement propensity score matching as follows. First we use a probit model to estimate propensity scores for each community in each year. The model is specified as

$$C_i = \alpha \mathbf{X_i} + \varepsilon_i \quad (3)$$

where C_i is a dummy equal to one if the community was BFP certified in any year of our panel, α is a vector of regression coefficients for community-level variables, all of which are time invariant, and ε_i is error term.

Second, we comprise a control group of uncertified beach communities by matching BFP certified communities with non-certified communities on their basis of propensity scores. We use a nearest neighbor 1-to-4 matching method with replacement and a caliper of 0.01 to identify up to four non-certified matches for each certified community (Cochrane and Rubin 1973). The caliper requires that the propensity scores for certified and matched uncertified communities do not differ by more than 0.01. Fifteen certified communities not on the common support were dropped. This approach generates a sample of 822 community-years comprised of a treatment group of 417 BFP certified community-years and control group of 405 matched uncertified community-years, all drawn from 137 beach communities.[1]

[1] Matching with replacement implies that some uncertified observations are used as matches for more than one certified observation and as a result, the number of certified observations exceeds the number of matched uncertified observations.

Third, we assess the similarity of the BFP certified communities and matched uncertified communities by using t-tests to compare the mean of each covariate variable ($\mathbf{X_i}$) for each group. We verified that no statistically significant differences exist between the mean characteristics of the two groups.

Finally, using the matched sample, we estimate equation (2) above employing weighted OLS regressions with community and year fixed-effects. We weight uncertified observations that constitute the control group based on the number times they were included as matches to calculate robust regression standard errors (Abadie and Imbens 2006).

4.2. Data and variables

The spatially explicit data used in our analysis were derived from four sources. The first source are lists of tourist beach communities that applied for BFP certification each year from 2001-2008, and of communities that were actually awarded certification (PBAE 2008). The second are national registries of hotels by year for the same eight-year period maintained by the National Tourism Institute (ICT 2008). The third is the Digital Atlas of Costa Rica, a rich compendium of GIS data (ITCR 2008). The final source is the 2000 National Census at the census tract-level (INEC 2000). Data from these four sources were merged by census tract using Arc-GIS and used to create the variables described below (Table 3).

[Insert Table 3 here]

Dependent and independent variables. Our dependent variable, *hotels*, is the total number of hotels located within the census tract that comprises the beach community by year. As a robustness check, we also use *hotel rooms*, the number of hotel rooms, and hotel rooms of different quality, by year. The independent variable of interest, *BFP certification* is a dummy variable equal to one if the beach community was awarded BFP certification in a given year and zero otherwise.

Control variables. We control for a variety of socioeconomic and geophysical characteristic of beach communities. As for geophysical characteristics, *distance national park* and *distance river* are distances measured in kilometers from the census tract centroid to the nearest national park and river. *Primary roads* and *secondary roads* are the kilometers of each type of road within the census tract. Finally, *rainfall* is the average precipitation measured in millimeter per year in the census tract.

As for socioeconomic characteristics, *foreign population* is the proportion of residents in the census tract that were not Costa Rican citizens in 2000. *Income inequality* is the 2000 Gini coefficient for the canton (county) where each beach community is located. This variable ranges from zero to one with higher values indicating more inequality. *Population density* is the number of residents per square kilometer in the census tract in 2000. *Poverty* is the percentage of households in the census tract with a per capita income equal to or below the poverty line in 2000. *Safety* is the 2006 canton safety index ranging from 0 to 1, with higher values indicating more safety. This index is based on the rate per 100,000 inhabitants of three crimes: intentional homicide, domestic violence, and robbery (Madrigal 2006).[2] *Education* is the average number of years of education in households in the census tract. Finally, *political participation* is the percentage of eligible voters from a given beach community that took part in the 2006 presidential election.

Tables 3-6 provide descriptive statistics and correlation coefficients for the variables used in our regression analysis and for the full (not matched) sample of hotels. The correlation matrix indicates that *BFP certification* lagged one year and *BFP certification* lagged two years both are significantly ($p<0.05$) and positively correlated with the total number of hotels and hotel rooms located on a beach community (Table 4). These summary statistics provide a preliminary indication that hotels are more likely to be located in BFP certified areas. It remains to be seen whether these results persist after controlling for beach community characteristics and for self selection into the BFP.

[Insert Table 4 here]

5. RESULTS

5.1. Probit model of Blue Flag certification

Table 5 presents the results of the probit model of BFP certification, which is

[2] The safety index is based on National Citizen Security Survey 2006 developed by the Ministry of Public Security and Ministry of Justice, with support from United Nations Program for Development.

used to estimate propensity scores for each community-year. The likelihood ratio χ^2 test indicates that the independent variables indicates are jointly significant ($p<0.01$). Turning to the results, among the geophysical covariates, BFP certification is strongly positively correlated ($p<0.05$) with proximity to a national park and abundance of primary roads, and is weakly correlated ($p<0.10$) with proximity to a river and lack of secondary roads. Among the socioeconomic covariates, BFP certification is strongly correlated with higher foreign population, higher population density, lower poverty, and higher political participation and is weakly correlated with lower income inequality, and higher safety.

[Insert Table 5 here]

The main purpose of the probit certification model is not to identify the drivers of certification. Rather, it is to estimate propensity scores used to correct for self-selection bias. Therefore, we confine our discussion of the model to assessing whether that the results comport with intuition and have plausible explanations. In general, they do. The correlations between BFP certification and at least four variables likely reflect each variable's underlying correlation with community's preferences for environmental amenities. In other words, these variables likely pick up the community's' 'green' preferences. They include: proximity to national parks (a proxy for green preferences because one would expect relatively green tourists to stay in beach communities with access to parks); lower poverty (because wealth is generally correlated with green preferences); higher foreign resident population (because in Costa Rica, most foreign residents of beach communities are from industrialized countries where green preferences tend to be relatively strong); and higher primary road density (because these communities are more accessible to, and accessed by, foreign tourists). The correlations between BFP certification and at least four other variables may reflect each variable's underlying correlation with community's cohesion, internal communication, and cooperation. They include: lower income inequality, higher population density, higher levels of safety, and higher levels of political participation.

5.2. Propensity score matching

We use propensity scores derived from the probit certification model to identify a matched sample of uncertified communities. Difference in means tests indicate that this procedure is effective in constituting a control group of communities that is similar to group of BFP certified communities. Before matching, eight covariate means for BFP certified communities are significantly different from those for uncertified communities (Table 6). These differences reflect self-selection of certain types of communities into the BFP program: those with more roads, more foreign residents, etc. After matching however, differences in covariate means for certified and uncertified communities are not longer significant.

[Insert Table 6 here]

5.3. Ordinary least squares models of hotel investment

Table 7 presents results from fixed-effects regressions explaining the number of hotels and the number of hotel rooms for the unmatched samples (Models 1 and 3) and matched samples. As noted above, in the matched sample regressions (Models 2 and 4), the uncertified communities that comprise the control group are weighted based on the number times they are included as matches to calculate robust regression standard errors (Abadie and Imbens 2006). The coefficients of BFP certification lagged two years are positive and significant in each of the four models, albeit only at the 10 percent level in three of the models. The coefficients of BFP certification lagged one year are not significant in any of the four models, which likely reflects the fact that building hotels or hotel rooms typically takes more than one year. For the matched sample regression that explains number of hotels (Models 2), the estimated coefficients on the two-year lag certification dummy indicate that BFP certification results in 0.07 new hotels per year at the average beach community, or 4.2 new hotels per year among all 60 BFP certified beach communities in Costa Rica (2008). Over a 10 year period, that amounts to more than 40 new hotels in BFP certified beaches—economically a very significant figure.

Turning to the matched sample regression that explains the number of hotel rooms (Model 4), the estimated coefficients on the two-year lag certification dummy indicate that BFP certification results in 5.35 new rooms per year, more than 300 new rooms per year over all 60 BFP certified beaches in Costa Rica (2008). Over a 10 year period, that amounts to more than 3000 new hotel rooms in BFP certified beaches—again, economically a very significant figure. Hence, these results provide limited support for the hypothesis that new hotels are more likely to locate in BFP certified communities, all other things equal.

[Insert Table 7 here]

To determine whether the effect of BFP-certification on hotel location was driven by the location of decisions of certain types of hotel, i.e., quality classes, we replicated Models 3 and 4 in Table 7 using alternative dependent variables, namely, the number of hotels and hotel rooms of different quality (zero to five stars) (Table 8). The regressions explaining 4-5 stars hotels and hotel rooms (Models 7 and 10) generate positive and significant coefficients for BFP certification lagged two years, but again significance is at the 10 percent level. These models provide additional support for our finding that BFP attracts new hotel investment and suggest that in particular, it attracts new luxury hotel investment.

[Insert Table 8 here]

6. CONCLUSION

We have used 2001-2008 panel data on all 281 beach communities' communities in Costa Rica to measure the effect of BFP on investment in new hotels.

We used fixed effects and propensity score matching to control for self selection of certain types of communities—presumably already "green" ones—into the BFP. We found that past BFP certification is positively and significantly, albeit weakly, correlated with new hotel investment, particularly investment in luxury hotels. Estimated coefficients suggest this is an economically significant effect. In the country as a whole, BFP beach certification attracts more than 40 new hotels with more than 300 new hotel rooms per year.

These findings suggest that BFP has significant private benefits for local hotels. Although we have not tested it directly, we assume that the causal mechanism for the correlation has to do with signaling. Presumably, BFP certification provides a credible signal of overall environmental quality of beach communities to tourists, and therefore increases demand for hotel rooms in certified beach communities. BFP's effects on new investment may stem from the fact that it has design characteristics shown in other studies to characterize eco-certification programs that have reliably reflect environmental performance, namely reliance on environmental performance (versus process) standards , periodic third-party audits , and public rewards and sanctions (Darnall and Carmin 2005; Prakash and Potoski 2007; Rivera 2002).

What are the policy implications of our findings? They provide some of the first evidence that tourism eco-certification programs can generate private benefits for local operators in developing countries. As a result, they are apt to attract operators and at least have the potential to improve environmental quality. Moreover, they may boost local economies. These capabilities are particularly important in the developing country context where conventional command-and-control environmental management tools are often if not typically ineffective and where concerns about economic growth often trump concerns about environmental protection. One cautionary note, however, is that if eco-certification attracts new businesses, it also will put additional pressure on the environment and presumably on local communities ability to meet certification standards.

Finally, it is important to note that our study has several imitations. Our key results are only statistically significant at the 10 percent level. Also, we have used data with a limited geographical scope (Costa Rica) and a limited temporal scope (2001-2008). Hence, our results must be viewed with some caution until confirmed by further research from different geographical and temporal contexts.

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Table 1. Blue Flag Program evaluation
criteria and scoring system

Evaluation parameters	Score
1. Drinking water quality	15
2. Beachfront ocean water quality	35
3. Beach quality (solid waste and wastewater management)	30
4. Environmental education efforts	10
5. Beach safety and administration	10
Total	100

(Source: AyA 2006)

Table 2. Number of hotels and hotel rooms and Blue Flag Program (BFP) participation in Costa Rica's 281 tourist beach communities, 2001-2008

Year	Hotels		BFP certification			
	hotels	rooms	applied	certified	not applied	total
2001	136	4,463	60	36	221	281
2002	149	6,536	64	44	217	281
2003	152	7,133	70	56	211	281
2004	147	8,019	74	50	207	281
2005	154	8,328	80	57	201	281
2006	153	8,073	82	57	199	281
2007	150	6,099	86	57	195	281
2008	161	9,172	87	60	194	281

(Sources: ICT 2008 and PBAE 2008)

Table 3. Variables and sample means for unmatched sample of tourist beach community-years

Variable	Source	Notes	Mean		
			all (n= 2,248)	**BFP certified** (n=417)	**uncertified** (n=1,831)
Dependent					
BFP certified (0/1)	PBAE (2008)	Beach-community-level	0.25	1.00	0.00
Hotels (no.)	ICT (2008)	Census tract-level	0.53	0.80	0.44
Hotel rooms (no.)	ICT (2008)	Census tract-level	25.72	41.57	20.36
Geophysical					
Distance ntl. park (km)	ITCR (2008)	From census tract centroid	15.31	13.88	15.80
Distance river (km)	ITCR (2008)	From census tract centroid	2.56	2.36	2.63
Secondary roads (km)[1]	ITCR (2008)	Census tract-level	11.53	8.69	12.49
Primary roads (km)[1]	ITCR (2008)	Census tract-level	0.51	0.89	0.38
Rainfall (mm)	ITCR (2008)	Census tract-level	2844.96	2846.95	2844.28
Socioeconomic					
Foreign population (%)	INEC (2000)	Census tract-level	14.83	22.82	12.13
Income inequality (0-1)	INEC (2000)	Census tract-level	0.49	0.48	0.49
Population density (p/km)	INEC (2000)	Census tract-level	56.40	124.08	33.51
Poverty[2] (%)	INEC (2000)	Census tract-level	21.73	16.91	23.36
Safety[3]	ITCR (2008)	Canton-level	0.62	0.64	0.61
Eduation[5]	INEC (2000)	Census tract-level	7.00	7.83	6.71
Polit. participation[5]	ITCR (2008)	Canton-level	0.59	0.60	0.59

[1] kilometers of road.
[2] Percent of households with a per capita income equal to or below the poverty line in 2000.
[3] 2006 county-level safety index ranging from 0-1 with higher values indicating more safety.
[4] Average number of years of education by household.
[5] Percent of eligible voters that took part in the 2006 presidential election.

Table 4. Correlation matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Hotels	1.00																	
2	Hotel rooms	0.58 *	1.00																
3	BFP certification	0.15 *	0.15 *	1.00															
4	BFP certification (t-1)	0.15 *	0.14 *	0.86 *	1.00														
5	BFP certification (t-2)	0.16 *	0.15 *	0.81 *	0.85 *	1.00													
6	Distance ntl. park (km)	-0.11 *	-0.01	-0.07 *	-0.07 *	-0.06 *	1.00												
7	Distance river (km)	-0.02	0.12 *	-0.05 *	-0.05 *	-0.05 *	-0.08 *	1.00											
8	Primary roads (km)	-0.02	-0.01	0.14 *	0.14 *	0.14 *	0.06	-0.08 *	1.00										
9	Secondary roads (km)	-0.05 *	0.14 *	-0.12 *	-0.12 *	-0.13 *	-0.16 *	-0.05 *	0.04 *	1.00									
10	Rainfall (mm)	0.05 *	-0.13 *	0.01	0.00	-0.01 *	-0.27 *	-0.02	0.10 *	-0.27 *	1.00								
11	Rainfall^2 (mm)	0.05 *	-0.12 *	-0.03	-0.03	-0.04 *	-0.29 *	-0.03	0.06 *	-0.28 *	0.98 *	1.00							
12	Income inequality	0.07 *	0.03	-0.15 *	-0.15 *	-0.16 *	-0.15 *	-0.13 *	-0.25 *	0.28 *	-0.30 *	-0.28 *	1.00						
13	Poverty	-0.07 *	-0.08 *	-0.21 *	-0.21 *	-0.21 *	0.03	-0.03	0.06 *	-0.01	0.18 *	0.20 *	-0.04	1.00					
14	Safety	-0.07 *	-0.18 *	0.09 *	0.08 *	0.08 *	0.06 *	-0.04	-0.22 *	-0.05 *	-0.22 *	-0.24 *	-0.08 *	0.05 *	1.00				
15	Political participation	-0.02	0.11 *	0.03	0.03	0.03	0.23 *	-0.20 *	0.06 *	0.26 *	-0.46 *	-0.47 *	0.31 *	-0.33 *	0.10 *	1.00			
16	Population density	-0.03	-0.05 *	0.10 *	0.10 *	0.09 *	0.19 *	0.00	-0.05 *	-0.20 *	-0.10 *	-0.08 *	-0.02	-0.08 *	0.04	0.04	1.00		
17	Education	0.29 *	0.09 *	0.25 *	0.24 *	0.25 *	-0.10 *	0.10 *	-0.09 *	0.00	-0.17 *	-0.19 *	0.06 *	-0.50 *	0.05 *	0.18 *	0.18 *	1.00	
18	Foreign population	0.21 *	0.23 *	0.30 *	0.30 *	0.31 *	-0.19 *	0.02	-0.06 *	-0.13 *	0.10 *	0.11 *	-0.15 *	-0.19 *	0.01	-0.04	0.00	0.43 *	1.00

*$p<0.05$; τ $p<0.10$

Table 5. Probit model of Blue Flag Program certification (unmatched sample)

Variable	Marginal effect [s.e.]
Geophysical	
Distance national parks (km)	-0.01***
	[0.00]
Distance river (km)	-0.03*
	[0.02]
Secondary roads (km)	-0.00*
	[0.00]
Primary roads (km)	0.04**
	[0.02]
Rainfall (mm)	0.00
	[0.00]
Rainfall squared (mm)	-0.00
	[0.00]
Socioeconomic	
Foreign population	0.01***
	[0.00]
Income inequality	-2.81*
	[1.49]
Population. density	0.00**
	[0.00]
Poverty	-0.01**
	[0.00]
Safety	0.29*
	[0.17]
Education	0.02
	[0.02]
Political participation	0.81**
	[0.42]
N	281
Log-Likelihood	-119.76
Likelihood Ratio χ^2	78.15
Pseudo R-Squared	0.25

*** p<0.01, ** p<0.05, * p<0.10

Table 6. Matching balance: Variable means

Variable	Unmatched sample (n=1,831)			Matched sample (n=822)		
	certified	**uncertified**	**diff.**	**certified**	**uncertified**	**diff.**
Geophysical						
Distance ntl. park (km)	13.88	15.80		14.85	14.94	
Distance river (km)	2.36	2.63		2.34	2.10	
Secondary roads (km)	8.69	12.49	***	10.27	11.15	
Primary roads (km)	0.89	0.38	**	0.91	0.91	
Rainfall (mm)	2,846.95	2,844.28		2,917.56	2,880.33	
Rainfall squared (mm)	8.84m	9.21m		9.20m	9.15m	
Socioeconomic						
Foreign population	22.82	12.13	**	19.32	19.02	
Income inequality	0.48	0.49	***	0.48	0.48	
Population. density	124.08	33.51	***	41.73	40.11	
Poverty	16.91	23.36	***	17.96	17.99	
Safety	0.64	0.61	*	0.62	0.63	
Education	7.83	6.71	***	7.52	7.33	
Political participation	0.60	0.58		0.60	0.61	

*** p<0.01, ** p<0.05, * p<0.10

Table 7. Ordinary least squares fixed effect regression models (dependent variable)

Variable	**Model 1 Full sample (Hotels)**	**Model 2 Matched sample (Hotels)**	**Model 3 Full sample (Hotel rooms)**	**Model 4 Matched sample (Hotel rooms)**
BFP certification (t-1)	0.01	-0.01	-1.97	-2.53
	[0.03]	[0.04]	[3.33]	[3.16]
BFP certification (t-2)	**0.10*** **	**0.07***	**5.45***	**5.35***
	[0.03]	[0.04]	[3.28]	[3.11]
d2003	-0.02	-0.07***	-6.94***	-8.91***
	[0.02]	[0.03]	[1.83]	[1.95]
d2004	-0.05***	-0.06**	-3.86**	-6.46***
	[0.02]	[0.03]	[1.82]	[1.96]
d2005	-0.02	-0.03	-3.03*	-4.96***
	[0.02]	[0.02]	[1.82]	[1.80]
d2006	-0.03	-0.04	-3.78**	-5.37***
	[0.02]	[0.02]	[1.82]	[1.84]
d2007	-0.04**	-0.04	-10.94***	-11.42***
	[0.02]	[0.03]	[1.81]	[3.03]
Constant	0.55***	0.74***	31.94***	43.76***
	[0.01]	[0.03]	[1.53]	[1.98]
Fixed effects	yes	yes	yes	yes
Observations	1,686	822	1,686	822
Prob > F	0.00	0.09	0.00	0.00
Number of communities	281	137	281	137

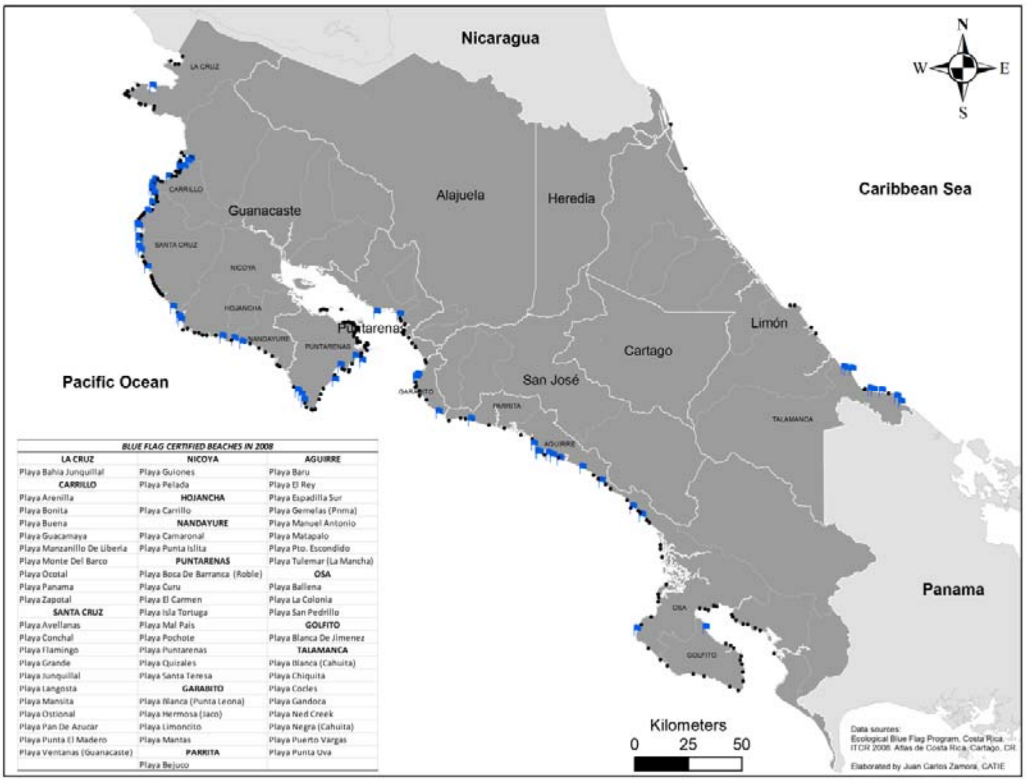
*** p<0.01, ** p<0.05, * p<0.10
Standard errors in brackets

Table 8. Ordinary least squares fixed effect regression models for matched sample using alternative dependent variables—hotel and hotel rooms of different quality (dependent variable)

Variable	**Model 5 (0-1 star hotels)**	**Model 6 (2-3 stars hotels)**	**Model 7 (4-5 stars hotels)**	**Model 8 (0-1 star hotel rms)**	**Model 9 (2-3 stars hotel rms)**	**Model 10 (4-5 stars hotel rms)**
BFP certification (t-1)	-0.04	0.03*	0.00	-0.83	-0.47	-1.23
	[0.03]	[0.02]	[0.02]	[0.60]	[0.50]	[3.08]
BFP certification (t-2)	-0.00	0.03	**0.05***	0.01	0.34	**5.01***
	[0.03]	[0.02]	[0.03]	[0.47]	[0.59]	[3.02]
d2003	-0.01	-0.02	-0.04***	-0.32	-2.26***	-6.33***
	[0.02]	[0.02]	[0.01]	[0.42]	[0.72]	[1.79]
d2004	-0.01	-0.03	-0.02	-0.37	-2.24***	-3.85**
	[0.02]	[0.02]	[0.02]	[0.33]	[0.73]	[1.81]
d2005	-0.02	-0.01	-0.01	-0.54	-1.89***	-2.53
	[0.02]	[0.02]	[0.01]	[0.36]	[0.72]	[1.64]
d2006	-0.01	-0.02	-0.01	-1.07**	-1.96***	-2.34
	[0.02]	[0.02]	[0.01]	[0.50]	[0.71]	[1.65]
d2007	-0.00	-0.01	-0.03*	-0.18	-3.38***	-7.86***
	[0.02]	[0.02]	[0.01]	[0.32]	[0.99]	[2.86]
Constant	0.12***	0.42***	0.20***	1.94***	11.96***	29.86***
	[0.02]	[0.02]	[0.01]	[0.39]	[0.74]	[1.83]
Fixed effects	yes	yes	yes	yes	yes	yes
Observations	822	822	822	822	822	822
Prob > F	0.59	0.33	0.04	0.30	0.03	0.01
Number of communities	137	137	137	137	137	137

*** p<0.01, ** p<0.05, * p<0.10
Standard errors in brackets

Figure 1. Blue Flag certified beaches, 2008



BLUE FLAG CERTIFIED BEACHES IN 2008		
LA CRUZ	**NICOYA**	**AGUIRRE**
Playa Bahia Junquillal	Playa Guiones	Playa Baru
CARRILLO	Playa Pelada	Playa El Rey
Playa Arenilla	**HOJANCHA**	Playa Espadilla Sur
Playa Bonita	Playa Carrillo	Playa Gemelas (Pnma)
Playa Buena	**NANDAYURE**	Playa Manuel Antonio
Playa Guacamaya	Playa Camaronal	Playa Matapalo
Playa Manzanillo De Liberia	Playa Punta Islita	Playa Pto. Escondido
Playa Monte Del Barco	**PUNTARENAS**	Playa Tulemar (La Mancha)
Playa Ocotal	Playa Boca De Barranca (Roble)	**OSA**
Playa Panama	Playa Curu	Playa Ballena
Playa Zapotal	Playa El Carmen	Playa La Colonia
SANTA CRUZ	Playa Isla Tortuga	Playa San Pedrillo
Playa Avellanas	Playa Mal Pais	**GOLFITO**
Playa Conchal	Playa Pochote	Playa Blanca De Jimenez
Playa Flamingo	Playa Puntarenas	**TALAMANCA**
Playa Grande	Playa Quizales	Playa Blanca (Cahuita)
Playa Junquillal	Playa Santa Teresa	Playa Chiquita
Playa Langosta	**GARABITO**	Playa Cocles
Playa Mansita	Playa Blanca (Punta Leona)	Playa Gandoca
Playa Ostional	Playa Hermosa (Jaco)	Playa Ned Creek
Playa Pan De Azucar	Playa Limoncito	Playa Negra (Cahuita)
Playa Punta El Madero	Playa Mantas	Playa Puerto Vargas
Playa Ventanas (Guanacaste)	**PARRITA**	Playa Punta Uva
	Playa Bejuco	