Using cultural heritage sites in Mexico to understand the poverty alleviation impacts of protected areas

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Abstract
Win—win outcomes between biodiversity conservation and local economic development are now a goal of many governments and conservation organizations but can be difficult to achieve. Where they occur, reductions in poverty from protected areas are often thought to be driven by economic gains from tourism that are sufficient to outweigh losses due to restrictions on land-use or resource extraction. However, evidence about this channel is scarce. In this paper, we explore the potential compensatory effect of tourism by comparing poverty alleviation outcomes for cultural heritage sites in Mexico across two decades from 1990 to 2010. These sites are similar to protected areas in terms of attracting tourists, but they do not impose substantial restrictions on local land or resource use, allowing us to isolate tourism as a possible channel for economic development. Overall, we find mixed evidence that proximity to cultural heritage sites is associated with poverty reduction. During the first study period (1990–2000), localities close to cultural heritage sites saw reduced poverty of 0.034 standard deviations for each additional site. However, during the second period (2000–2010), localities close to heritage sites saw less poverty reduction than the comparison group (−0.014 standard deviations for each additional site). In both periods, poverty alleviation effects were not consistently correlated with the total number of visitors, but were larger further from cities, where baseline poverty was higher, and in the Yucatán Peninsula. This heterogeneity indicates that variability in the ability of local communities to capture benefits from tourism depends on a particular combination of institutional and geographic factors—as was the case in the Yucatan peninsula, where cultural heritage sites had consistent poverty alleviation effects over two decades.

Keywords
conservation, Latin America, Mexico, poverty alleviation, protected areas, tourism
1 | INTRODUCTION

As the world seeks to meet the Millennium Ecosystem and Development Goals, researchers must understand the relationships between biodiversity conservation and human development in order to adequately inform policy decisions. A crucial question has been whether conservation instruments such as protected areas (PAs) promote or hinder local development (e.g., Roe, Fancourt, & Sandbrook, 2015, Oldekop, Holmes, Harris, & Evans, 2016). Protected areas are crucial because of their central role in land conservation, with more than 15.2% of the globe’s land surface (excluding Antarctica) currently set aside in spatially explicit areas in which land use and resource extraction are regulated or restricted. Protected areas may lead to increased economic activity through touristic visitation or ecosystem functioning, but may also decrease the pace of poverty alleviation by restricting access to local resources or stopping conversion to more profitable land uses (e.g., Dixon & Sherman, 1990).

In the past decade, thanks to the availability of local-scale data, it has been possible to begin to research conservation impacts at larger spatial and temporal scales. Several studies have now demonstrated rigorously that conservation can have positive economic development impacts (e.g., Andam, Ferraro, Sims, Healy, & Holland, 2010; Canavire-Bacarreza & Hanauer, 2013; den Braber, Evans, & Oldekop, 2018; Naidoo et al., 2019; Sims, 2010), but there is also evidence for negative impacts on development trajectories in some cases (e.g., Brockington & Wilkie, 2015; Sims & Alix-Garcia, 2017). Few studies, however, have examined the potential mechanisms that might explain the widely observed variation in outcomes (Ferraro, Hanauer, & Sims, 2011; Oldekop et al., 2016). Identifying and understanding these channels is critical to the successful design of policies that enable governments and societies to address conservation and poverty in an effective way (Ferraro & Hanauer, 2015). Tracing mechanisms is challenging, however, because it is difficult to isolate specific channels such as tourism from other changes associated with protected areas, such as investments in infrastructure or increases in local ecosystem services.

In this study, we seek to learn more about the channel of touristic activity by studying the livelihood impacts of the cultural heritage sites in Mexico (“INAH” sites; administered by the Instituto Nacional de Antropología e Historia) and comparing them to the livelihood impacts of natural protected areas. Like protected areas, cultural heritage sites, most of which protect archaeological remains, have been designed to protect places that are considered to have high public value, with some even designated as World Heritage sites by UNESCO. However, unlike most protected areas, restrictions on land use in cultural heritage sites are typically limited to a small area and are focused on regulating architectural styles and other aesthetic elements. Touristic visitation is substantial for both cultural heritage sites and protected areas, but considerably larger for the heritage sites (Table 1).

Therefore, we use data on heritage sites to inform our understanding of the possible mechanisms for protected area impacts. Both heritage sites and protected areas attract tourists and are likely to generate local employment through site management and visitor-serving businesses. However, in contrast to protected areas, heritage sites do not have the downside for local communities that may come from restrictions on land use and resource extractions. In this way, heritage sites enable us to isolate the role of tourism in facilitating or limiting the poverty alleviation benefits of protected areas.

Heritage sites are also of intrinsic interest. Cultural heritage sites experience threats and challenges, such as increased tourist demand over time and limited carrying capacity (Shackley, 2006), and can be central protagonists in social and political conflict scenarios (Labadi, 2017). Yet, despite the importance of cultural heritage sites, quantitative studies exploring their effect on local economic indicators are surprisingly scarce, and the complexity of these linkages has mostly been examined from a qualitative perspective (Hampton, 2005). To our knowledge, we provide the first national-scale assessment of the potential poverty alleviation impacts of cultural heritage sites.

2 | CONSERVATION AND POVERTY REDUCTION

While PAs have been shown to contribute substantially to protecting biodiversity and other ecosystem benefits.

| TABLE 1 | Budget and visitation for agencies overseeing cultural heritage sites (INAH) and protected areas (CONANP) |
|----------|---------------------------------------------------------------|
| Number of sites/PAs | 180<sup>a</sup> | 182 |
| Total budget in 1995 (million USD) | 19.5 | 0.55 |
| Total budget in 2010 (million USD) | 166 | 54 |
| Total visitation in 1996 | 9,229,316 | NA |
| Total visitation in 2010 | 10,647,310 | 1,007,181<sup>b</sup> |

<sup>a</sup>INAH also manages 116 museums across the country but these were not part of our study.

<sup>b</sup>Estimated from entrance fees data.
(Börner et al., 2018; Gray et al., 2016), the designation of PAs and their central role in conservation has been controversial. According to West, Igoe, and Brockington (2006), the institutional “genetics” of many PAs carry a legacy of oppression and inequality rooted in their colonial origins. Indeed, many of the contemporary criticisms of PAs focus on their character as external impositions on resource uses by local communities (West et al., 2006) and concerns that they will lead to local poverty traps, impeding access to land resources by local or native rural communities that may already face challenging socio-economic conditions (Roe, 2008; Roe & Elliott, 2006).

Substantial literature has highlighted the negative effects that can be created by the direct or indirect displacement of people when PAs are designated or after they start operating, or by institutional marginalization (Holmes & Brockington, 2012). In the Congo basin, for example, thousands of people were displaced and impoverished due to national parks establishment and management (Cerna & Schmidt-Soltu, 2006). In Australia, the management and decision-making process has been shown to discriminate against native communities, although recent changes may improve these relationships (Leverington, 2012; Rose, 2012; West et al., 2006). In Latin America, PAs may inadvertently provide an exploitative gateway into indigenous communities for commercial agriculture or resource extraction interests while providing few local benefits (West et al., 2006). Indeed, Miranda, Corral, Blackman, Asner, and Lima (2016) found that while protected areas in Peru reduced deforestation, they did not robustly reduce poverty.

Multiple studies have, however, found robust positive impacts of PAs on poverty reduction using quantitative analyses that seek to account for the non-random placement of protected areas through regression-based or matching approaches. For example, Sims (2010) found that National Parks and Wildlife Sanctuaries in Thailand increased consumption and reduced poverty rates. Andam et al. (2010) and Robalino and Villalobos (2015) found significant poverty reduction benefits from PAs in Costa Rica. In Bolivia, Canavire-Bacarreza and Hanauer (2013) found that municipalities with protected areas experienced greater poverty reduction than similar municipalities without PA coverage. At smaller spatial scales, in Uganda, Naughton-Treves, Alix-Garcia, and Chapman (2011) found that households located closer to the perimeter of Kibale National Park faced less risk of being forced to sell their land due to economic pressures. Similarly, in Cambodia, households bordering PAs showed increased socioeconomic benefits compared to control localities (Clements, Suon, Wilkie, & Milner-Gulland, 2014) and in Nepal, PAs reduced overall poverty and extreme poverty at the local level (den Braber et al., 2018).

There is also evidence for moderate positive socio-economic impacts of protected areas in more wealthy countries. In the United States, for example, evidence of increased economic performance linked to the extent of protected lands has been demonstrated for the non-metropolitan U.S. West (Rasker, 1993; Rasker, Gude, & Delorey, 2013) and the New England region (Sims, Thompson, Meyer, Nolte, & Plisinski, 2019).

Several of these studies highlight the importance of tourism as the most likely channel driving poverty alleviation associated with PAs. In the cases of Thailand, Costa Rica and Nepal, there are clear links between tourism and poverty alleviation (Andam et al., 2010; Ferraro & Hanauer, 2015; Robalino & Villalobos, 2015; Sims, 2010). Studies in Germany and the US document the specific economic contributions of visitation to national parks (Koontz, Thomas, Ziesler, Olson, & Meldrum, 2017; Mayer, Müller, Woltering, Arnegger, & Job, 2010). Likewise, national parks in Austria have been found to significantly contribute to local economies, mainly through tourism but also by attracting new investments and companies (Getzner, 2003). A recent analysis of PA impacts on local poverty and children’s health across 34 developing countries indicated that living near PAs, especially those with substantial tourism, significantly reduces poverty, increases household level wealth, and reduces stunting in children (Naidoo et al., 2019).

Still, the specific channel between tourism and poverty alleviation impacts of PAs is understudied, particularly in developing and middle-income countries. Mexico’s case provides a pertinent example. Despite the fact that Mexico has high rates of tourism, Sims and Alix-Garcia (2017) found that on average PAs had no statistically significant overall positive impacts on local changes in poverty between 2000 and 2010. In fact, they found that the most restrictive types of protected areas, mainly federal national parks, sanctuaries and monuments, had a statistically significant negative impact on poverty alleviation when compared to other similar localities. In contrast, biosphere reserves, which allow for sustainable resource use and have generally received more funding in Mexico, were found to be associated with significant positive poverty alleviation in some locations. In addition, Sims and Alix-Garcia found no association between tourism visitation and poverty reduction levels, except for in locations that were far away from urban areas, where the opportunity cost of land was likely low.

These results from Mexico and in the literature as a whole raise questions about why PAs may provide benefits in some middle- or lower-income countries but not in others. For example, Thailand and Costa Rica have made...
strong investments in their PA systems, have had successful eco-tourism sectors, and in general have experienced accelerated macroeconomic growth in the last decades (Andam et al., 2010). Mexico shares many of these characteristics. Specifically, Mexico has had relatively stable macroeconomic growth during the past 25 years, and the contribution of the tourism industry and service economies to GDP has also risen significantly (WTTC, 2018). Furthermore, there is a strong institutional framework to manage protected areas, through the National Commission of Natural Protected Areas (CONANP) which was instituted in 2000. While the revenue collected by CONANP from PA tourist access fees does not necessarily return in the form of investments to the PAs from where it was collected (former head of advisers of the National Commissioner of CONANP, personal communication), it would still be logical to expect more visitation to translate into local economic benefits.

One possibility is that the positive economic benefits from PAs in contexts such as Mexico are being offset by the negative effects of resource-use restriction. An alternative possibility is that local economies are not able to use tourism flows to reduce poverty. In the following sections, we use evidence from cultural heritage sites to explore these competing explanations.

3 | PROTECTED AREAS AND CULTURAL HERITAGE SITES IN MEXICO

Terrestrial federal PAs in Mexico cover approximately 11% of the country, of which nearly 82% is found on private lands (individual or collective private property) (Quadri & Quadri, 2016). While PAs decrees over private lands usually undergo a process of negotiation and consensus building before being established, the law ultimately forces landowners to accept these decrees even if conflicts are not resolved (Quadri & Quadri, 2016). The median size of Mexico’s PAs is 6,378.4 ha, and they range in size from 0.6 to 2,521,987.6 ha. A relevant and distinct institutional characteristic of Mexico when compared to other nations is its small amount of publicly-owned land. Mexico’s territory is only 2% public land, with the remaining 98% being either individual or collective private property (Quadri & Quadri, 2016). This is a key consideration because land-use restrictions over privately owned land could have large opportunity costs for those owners. Compared to PAs, cultural heritage sites are small in size. Teotihuacan, the largest of these sites, extends over an area of only 246 ha, and many sites are just a few hectares in size. Thus, any potential negative economic impact caused by land use restrictions in cultural heritage sites should be minimal and only experienced by a few landowners. This is a clear and important difference with PAs which, as explained above, cover extensive areas and thus land use restrictions may affect hundreds or thousands of landowners.

In Mexico, the National Institute of Anthropology and History (INAH) is the agency directly responsible for the management of the country’s cultural heritage areas. In the case of PAs, CONANP (National Commission of Natural Protected Areas) is the agency responsible for their management. Table 1 provides comparative data on budgets and tourism visitation for the two agencies, and Table S1 provides a list of sites where there is overlap between cultural heritage sites and protected areas. Visitations to cultural heritage sites during the first period was high, with approximately 10 million tourists per year. In contrast, protected areas saw visitation of approximately 1 million tourists by 2010. Although the budget for INAH increased over this period, the number of people visiting sites stayed fairly similar across time (Figure S1).

4 | METHODS

4.1 | Using INAH’s cultural heritage sites to understand mechanisms for poverty impacts

If the restrictions imposed by PAs over Mexican landowners are neutralizing the positive effects from tourism in PAs, then, by simulating the removal of land- and resource-use restrictions, we should see substantial and consistent net benefits to local communities. To test this reasoning, we use cultural heritage sites in Mexico as a surrogate system for protected areas and estimate their effects on poverty reduction between 1990 and 2010 in localities across 20 states of Mexico.

Based on the institutional and administrative differences described above, and based on prior literature, we propose several hypotheses. Our main hypothesis is that localities that have more nearby cultural heritage sites should experience more poverty reduction than similar localities without cultural heritage sites. Second, we expect that the amount of visitation should matter, with more potential for poverty alleviation where there are both more sites and more tourists. Third, we expect localities in regions with more developed tourist infrastructure, like the Yucatan Peninsula, or those that are closer to major sources of domestic and international tourism, like Central Mexico, to benefit more from proximity to cultural heritage sites. If a strong tourism sector is one of the main channels through which conservation can
reduce poverty at local scales, then we should expect higher levels of poverty reduction in localities that are near tourism hubs. Similarly, we expect that being closer to urban areas should produce more poverty alleviation from cultural heritage sites by being closer to sources of tourism and markets, even after accounting for overall regional differences in poverty alleviation. Finally, we expect based on prior literature that localities that were poorer at baseline would benefit more from cultural heritage sites.

In addition to hypotheses about cultural heritage sites themselves, we also assess how the impacts of cultural heritage sites compare to those of protected areas. As noted above, we expect more positive poverty alleviation from heritage sites.

4.2 | Unit of analysis and response variables

Our unit of analysis is the locality, which represents the smallest administrative entity in Mexico. Spatial data on the localities are from the National Institute of Statistics and Geography of Mexico (INEGI).

Our dependent variable is “poverty alleviation” which is measured as the change in the poverty (or “marginality”) index of each locality from 1990 to 2000 and from 2000 to 2010. The marginality indices themselves have higher values for more poverty, so we invert the values of the difference in order to measure poverty alleviation. The poverty index is CONAPO’s “index of marginality”—a weighted indicator that incorporates a variety of aspects including rates of illiteracy, prevalence of primary schooling, availability of potable water and sanitation, electricity access, and housing characteristics which are collected by INEGI during the census. The weights are established by principal components analysis performed by CONAPO (Consejo Nacional de Población, 2010). We use the data from Sims and Alix-García (2017), which includes two modifications of the index. First, because the source data represent each locality as a point feature and there are changes in the locations of some points across years, Thiessen polygons are used to create area-weighted averages where needed to harmonize data across time. Second, the poverty indices for each year are normalized to have mean zero and standard deviation of one.

In our analysis, we use the subset of 10,465 localities that have one or more cultural heritage sites within 50 km of network road distance. This allows us to compare localities that vary in their local proximity to the cultural heritage sites but are relatively similar on other dimensions. Conceptually, restricting the analysis to a subset of geographically proximate localities is similar to the matching approach used in previous studies (Andam et al., 2010; Costedoat et al., 2015; Sims & Alix-García, 2017) as both have a similar goal of ensuring common support of covariates.

Our study area is shown in Figure 1. Note that we exclude northern parts of Mexico which contain very few archaeological sites, as most of the great cities and infrastructure of the pre-colonial civilizations were built in central and southern Mexico, south of the 21°N parallel.

4.3 | Treatments and covariates

Spatial data on cultural heritage sites were obtained through the archaeological Geo-Portal System, and visitation data for cultural heritage sites were downloaded from the Institutional Visitor Statistics System. Visitation data has been recorded since 1996, but not every site has complete records for this period; a few sites were not opened to the public until after 1996, and a small number were open in early years but have now been closed to the public (Table S2). After matching sites with visitation records to those that have spatial reference data, we retained 141 cultural heritage sites distributed across 20 states in the southern half of Mexico that we grouped by geographic region (Central, South, Yucatan Peninsula, Gulf Coast, and North).

We obtained a detailed network dataset of Mexico’s roads from OpenStreetMap (OSM) and used ArcMap 10.2 to calculate the network or road distance between every locality and every cultural heritage site for those up to 50 km away. We then calculated the number of cultural heritage sites found within the 30 km band. We considered localities to be “treated” if there were any sites within with 30 km network distance. The other approximately half of the localities in our dataset are “controls” which are defined as having a cultural heritage site within the 30 - 50 km network band but having no sites within the 0 – 30 km network distance band.

Visitation data were assigned to each locality as the sum of the mean annual visitation between 1996 and 2011 of all the corresponding cultural heritage sites within 30 km. Because a few sites in Mexico receive disproportionately more tourism than most other sites, visitation values were log transformed. We have also checked robustness of the results to dropping the top five most visited sites in each period and found the results to be similar.

We recognize that there are confounding factors that might be correlated with the locations of cultural heritage sites and also affect poverty alleviation. For instance, although all cultural heritage sites are by definition...
historical, and so pre-date our outcome variables, many of them exist in less economically productive locations, or in majority indigenous areas that are politically and socially disadvantaged. If appropriate controls are not included, this type of relationship could erroneously lead to the conclusion that cultural heritage sites are creating poverty. Previous literature has used both matching-based methods and multiple regression to account for such potential underlying differences when estimating relationships. In order to facilitate comparison with the existing analysis of protected area impacts in Mexico (Sims & Alix-Garcia, 2017), we use a regression-based approach and a similar set of covariates to control for confounding variables and estimate causal impacts. Specifically, our covariates are: baseline population size, distance to towns with more than 5,000 people, average topographic slope as a biophysical indicator of agricultural potential and rural poverty (Van Velthuizen et al., 2007), distance to main roads, distance to urban centers, proportion of indigenous population, baseline poverty, and the proportion of the locality’s land that is found within a protected area. In addition, we control for geographic regions, proportion of the local population, and other unobserved variables.

Table 2 shows summary statistics of covariates for localities with at least one cultural heritage site within 30 km of road distance (“treated”), and all other localities within 50 km of road distance (“controls”). This indicates that localities close to heritage sites were, at baseline, actually somewhat less poor than the comparison group.

We model the change in poverty as a linear function of two main predictors (site density and visitation levels) and of the covariates listed above that control for geographical, institutional, and historical socioeconomic differences across localities. Because Mexico underwent significant demographic and economic transitions during the entire study period, we split our sample into two decades (1990–2000 and 2000–2010). However, we also use a fully interacted model with “period” as a dummy variable to confirm our results (Table S3). Our main estimating equation is of the following form:

$$Pov_{Allev}_{it} = SiteDensity_{it} \beta_1 + \log Visitation_{it} \beta_2 + Z_{it} \Gamma + E_{it}$$

where $Pov_{Allev}_{it}$ is the change in the poverty index in locality $i$ and decade $t$ (1990–2000, and 2000–2010), $SiteDensity$ and $\log Visitation$ are vectors of the main predictors, and $Z_{it} \Gamma$ is a vector of controls, as listed above, and their coefficients. All models run are linear regressions on standardized values of the variables. Similar
magnitudes and significance levels on the coefficients of interest were obtained from a generalized linear model, with the specification based on Akaike’s Information Criterion.

5 | RESULTS

Summary statistics of the change in individual components of the poverty alleviation index between 1990 or 1995 and 2000 and between 2000 and 2010 are presented in Table 3. In the second study period, we see that every individual component shows improvement with respect to these basic poverty indicators, regardless of the number of nearby cultural heritage sites. In the first study period, poverty alleviation seems to be less overall, and there were actually more consistent reductions in poverty for the localities that did not have archeological sites. These indicators highlight both the rapid overall economic growth in the second period as well as the importance of assessing changes in poverty rather than levels and of controlling for potential confounding variables.

Table 4 shows the results of our regression model. We find mixed results for our first hypothesis that additional INAH cultural heritage sites reduced poverty. We find that the relationship between the number of cultural heritage sites and poverty reduction, conditional on controls, is positive and statistically significant between 1990 and 2000 (0.0449, SE[0.0096], \( p < .001 \)), but negative and also statistically significant between 2000 and 2010 (−0.019, SE[0.0081], \( p = .019 \)). Because we run all models using standardized values of the variables, we can interpret the coefficients in terms of standard deviations. Given that the standard deviation of the number of sites is 1.31, this means that each additional site was associated with positive poverty alleviation of 0.034 standard deviations in the first period and less poverty alleviation of 0.014 SD during the second period.

In Table 5, we introduce variations to the base model and include relevant interaction terms. All models include the same set of covariates but differ according to the variables shown. Regarding our second hypothesis, we find that the average associations with visitation, conditional on the number of sites, are statistically insignificant in both decades. This is the case regardless of whether number of sites (our other main predictor) is included in the model or not (Table 5). When we removed the top five most visited sites, we detected a small positive and marginally significant effect of visitation during the second decade (0.016, SE[0.007], \( p = .047 \); Table S4).

When assessing the interaction between number of sites and visitation (Table 5 and Figure S3), we find that
### Table 3: Summary statistics for percent change in specific indicators of poverty by number of INAH sites

#### (A) 1990/1995–2000

| Number of sites within 30 km | Observations | Δ% of population that is illiterate | Δ% without primary school | Δ% with dirt floor | Δ% without refrigerator | Δ% without piped water | Δ% without electricity |
|-----------------------------|--------------|------------------------------------|---------------------------|-------------------|------------------------|------------------------|------------------------|
| None                        | 3,624        | -1.45                              | NA                        | -0.98             | NA                     | -1.95                  | -3.94                  |
| One                         | 4,416        | -1.43                              | NA                        | 0.19              | NA                     | 0.03                   | -3.16                  |
| Two                         | 1,333        | -1.74                              | NA                        | 0.39              | NA                     | 0.21                   | -1.62                  |
| Three or more               | 1,092        | -1.89                              | NA                        | 5.53              | NA                     | 3.04                   | -1.30                  |

#### (B) 2000–2010

| Number of sites within 30 km | Observations | Δ% of population that is illiterate | Δ% without primary school | Δ% with dirt floor | Δ% without refrigerator | Δ% without piped water | Δ% without electricity |
|-----------------------------|--------------|------------------------------------|---------------------------|-------------------|------------------------|------------------------|------------------------|
| None                        | 3,624        | -6.00                              | -13.95                    | -21.53            | -40.33                 | 30.96                  | -12.33                 |
| One                         | 4,416        | -5.36                              | -13.80                    | -15.47            | -39.25                 | 23.82                  | -9.60                  |
| Two                         | 1,333        | -4.63                              | -12.15                    | -12.66            | -35.85                 | 22.66                  | -6.11                  |
| Three or more               | 1,092        | -3.74                              | -9.89                     | -8.70             | -29.10                 | 20.69                  | -6.59                  |

**Note:** Localities by number of INAH Sites within 30 km during (A) 1990-2000 and (B) 2000-2010. Data on specific indicators from the first period that is publicly available is limited. Table shows the reported changes in percent illiterate (1995 data); dirt floor (1990 data); piped water (1995 data) and electricity (1995 data).
during the first decade, having more sites nearby was associated with more poverty alleviation when sites also received less total visitation ($-0.0514$, SE($0.022$), $p < .05$).

During the second decade, the sign of this interaction term is the same, but not significantly different from zero ($-0.028$, SE($0.015$), $p > .10$).

We find that the relationships between cultural heritage sites and poverty alleviation do vary by region, as shown in Figure 2 and the “regional differences” specification in Table 5. The Yucatan Peninsula (states of Campeche, Quintana Roo and Yucatan) is the only region in which positive and significant effects of cultural heritage sites are found during both decades (sum of main and Yucatan coefficient = 0.22, SE($0.048$), $p < .001$, and 0.136, SE($0.041$), $p < .01$) for each period. In contrast, the south, central, and Gulf of Mexico regions saw positive effects during the first decade and negative during the second one (South: 0.74, SE($0.026$), $p < 0.01$ and $-0.053$ SE($0.022$), $p < .05$; Central: 0.045, SE($0.009$), $p < .001$ and $-0.0263$, SE($0.0091$), $p < .001$; (0.89, SE($0.045$), $p < .05$).

The North region did not see statistically significant impacts in either decade.

With respect to our hypothesis about distance to cities, we find that being further from a city is associated with more poverty reduction of cultural heritage sites in both study periods (coefficient on interaction term for 1990–2000:0.145, SE($0.024$), $p < .001$), (coefficient on interaction term for 2000–2010 is 0.0619, SE($0.02$), $p < .01$); see Figure S4 for combined values, indicating estimates at different distances.

Next, results from an interaction between the number of sites and baseline poverty of every locality indicate that during both decades, poverty reduction effects are greatest in poorer localities ($0.171$, SE($0.017$), $p < .001$ for the first period, and $0.044$, SE($0.044$), $p < .05$ for the second period); also see Figure S4. In fact, for localities that are already poor at baseline, the estimated impacts of additional INAH sites on poverty alleviation are always significantly positive in both of the decades.

| Predictors | Poverty alleviation 1990–2000 | Poverty alleviation 2000–2010 |
|------------|-------------------------------|-------------------------------|
|            | Estimates SE p                 | Estimates SE p                 |
| Intercept  | $-0.0828$ 0.0069 $<.001$       | $-0.0388$ 0.0059 $<.001$       |
| Number of sites | 0.0449 0.0096 $<.001$ | $-0.0191$ 0.0081 .019 |
| Log visitation | 0.0162 0.0097 .94       | $-0.009$ 0.0072 .21           |
| GULF       | $-0.0835$ 0.0135 $<.001$       | 0.0743 0.0113 $<.001$          |
| NORTH      | 0.0675 0.0137 $<.001$          | 0.0798 0.0108 $<.001$          |
| SOUTH      | $-0.1422$ 0.0136 $<.001$       | $-0.0592$ 0.0115 $<.001$       |
| YUC        | 0.0054 0.0218 .805             | 0.0256 0.0184 .164            |
| Baseline poverty | 0.6496 0.0107 $<.001$ | 0.6291 0.0087 $<.001$         |
| Distance to City | $-0.0413$ 0.0105 $<.001$ | $-0.0894$ 0.0088 $<.001$     |
| In urban area | $-0.037$ 0.0181 .040          | 0.0746 0.0152 $<.001$         |
| Distance to Loc > 5,000 | 0.0059 0.0103 .567          | 0.0064 0.0086 .456            |
| Average slope | $-0.1068$ 0.010 $<.001$    | $-0.0584$ 0.0085 $<.001$     |
| Distance to 4 lane road | $-0.0268$ 0.0108 .013     | 0.0344 0.0091 $<.001$         |
| Baseline population | 0.0041 0.0085 .627      | $-0.0012$ 0.0072 .870        |
| Majority indigenous | $-0.1352$ 0.0163 $<.001$ | $-0.1648$ 0.0137 $<.001$     |
| Share PA bios. Reserve | $-0.0041$ 0.0096 .668     | 0.018 0.0081 .026             |
| Share PA strict | 0.0177 0.0086 .040        | $-0.0316$ 0.0073 $<.001$     |
| Share PA mix use | 0.0292 0.0084 $<.001$    | $-0.0065$ 0.0071 .359        |
| Observations | 10,465                      | 10,465                        |
| $R^2$/adjusted $R^2$ | 0.306/0.305                | 0.405/0.404                   |

Note: Summary of linear regression using standardized values of all variables. Dependent variable is the normalized change in the poverty index. Robust standard errors are shown in middle columns. Omitted region is Central Mexico which includes the most populated states in the country. Visitation data for the first period is only from 1996 to 2000 and from 2001 to 2011 for the second period.
### Table 5: Heterogeneous relationships between cultural heritage sites and poverty alleviation

|                    | 1990–2000                                                                 | 2000–2010                                                                 |
|--------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|
|                    | Base model (only # of sites)                                                | Base model (only # of sites)                                                |
|                    | (only # of sites and visitation)                                            | (visitation)                                                               |
| Number of sites    | 0.0455*** (0.009)                                                           | 0.0449*** (0.0112)                                                          |
| <30 km             | 0.0489* (0.014)                                                             | 0.0317* (0.0125)                                                            |
|                    | 0.0818*** (0.0141)                                                          | 0.0961*** (0.0110)                                                          |
|                    | −0.0293* (0.0081)                                                           | −0.0190* (0.0084)                                                           |
| Regional differences | −0.0190 (0.0112)                                                            | −0.0283* (0.0082)                                                           |
| Distance to cities | 0.0154 (0.0097)                                                             | 0.0163 (0.0097)                                                             |
| Baseline poverty   | −0.0094 (0.0071)                                                            | −0.0099 (0.0068)                                                            |
|                    | −0.0090 (0.0068)                                                            | −0.0099 (0.0071)                                                            |
|                    | −0.0078 (0.0068)                                                            | −0.0089 (0.0065)                                                            |
|                    | −0.0103 (0.0068)                                                            | −0.0103 (0.0064)                                                            |
| Log visitation     | 0.0378 (0.0096)                                                             | 0.0361 (0.0097)                                                             |
|                    | 0.0158 (0.0097)                                                             | 0.0163 (0.0097)                                                             |
|                    | 0.03110 (0.0097)                                                            | 0.03110 (0.0097)                                                            |
| Number of sites*   | GULF 0.058 (0.046)                                                           | GULF 0.064 (0.039)                                                          |
|                    | NORTH −0.006 (0.046)                                                         | NORTH 0.066 (0.038)                                                          |
|                    | SOUTH 0.038 (0.027)                                                          | SOUTH −0.023 (0.023)                                                         |
|                    | YUCATAN 0.19*** (0.05)                                                      | YUCATAN 0.162*** (0.042)                                                    |
|                    |                            0.145*** (0.0245)                                     |                            0.0619** (0.0207)                                           |
|                    |                             0.171*** (0.0176)                                    |                             0.044** (0.016)                                             |
| Number of sites*   | distance to cities                                                         | Number of sites* baseline poverty                                            |
|                    | −0.0514* (0.022)                                                            | −0.028 (0.01506)                                                            |
| Number of sites*   | Number of sites* visitation                                                 | Number of sites* visitation                                                 |
| Observations       | 10465                        | 10465                        |
|                    | 10465                        | 10465                        |
|                    | 10465                        | 10465                        |
|                    | 10465                        | 10465                        |
|                    | 10465                        | 10465                        |
|                    | 10465                        | 10465                        |
|                    | 10465                        | 10465                        |
|                    | 10465                        | 10465                        |
|                    | 10465                        | 10465                        |
|                    | 10465                        | 10465                        |
|                    | 10465                        | 10465                        |
|                    | 10465                        | 10465                        |
| R²/adjusted R²     | 0.301/0.289                   | 0.301/0.289                   |
|                    | 0.306/0.305                   | 0.306/0.305                   |
|                    | 0.307/0.306                   | 0.307/0.306                   |
|                    | 0.309/0.306                   | 0.309/0.306                   |
|                    | 0.312/0.311                   | 0.312/0.311                   |
|                    | 0.301/0.289                   | 0.301/0.289                   |
|                    | 0.309/0.306                   | 0.309/0.306                   |
|                    | 0.307/0.306                   | 0.307/0.306                   |
|                    | 0.309/0.306                   | 0.309/0.306                   |
|                    | 0.307/0.306                   | 0.307/0.306                   |
|                    | 0.309/0.306                   | 0.309/0.306                   |
|                    | 0.312/0.311                   | 0.312/0.311                   |
| Note: Signif. codes: *** 0.001; ** 0.01; * 0.05; ' 0.1. Coefficients and robust standard errors in parentheses for different models with relevant interaction terms. Each column is a different model and each row includes main predictors and the interactions of interest. All covariates from the base model in Table 4 are also included in these models. The omitted region in the interaction terms is Central Mexico. Visitation data for the first period is from 1996 to 2000 and from 2001 to 2011 for the second peri.
Lastly, we analyze the relationships between protected areas and poverty for this sample (Figure 2; Tables S5 and S6). Under our model, and splitting PAs by management category—following Sims and Alix-Garcia (2017)—we see that strict and mixed-use PAs had positive and significant effects on poverty reduction in the earlier decade, between 1990 and 2000 (Table 4) but not in the more recent decade. Biosphere Reserves, in contrast, which were mainly designated during the late 1990s, had a positive and significant impact in our data during the 2000s.

In addition, we similarly find positive and significant relationships for PAs for the Central Region and Yucatan Peninsula during the first decade (Table S5 and Figure 2) (for the Yucatan, sum of the main and coefficient on interaction is 0.19, SE(0.043, \(p < .001\)) and for the Central Region it is 0.037 SE(0.0115), \(p = .001\)). During the second decade, the North region shows significant and positive effects of PAs (0.035, SE(0.014), \(p = .0109\)), while the Center region shows significant and negative effects (−0.0439 SE(0.0094), \(p < .001\)).

6 | DISCUSSION

Mexico is a nation with one of the largest tourism industries in the world (WTTC, 2018), with moderate but stable macroeconomic growth, and with established institutional and management agencies such as INAH, whose budget has been steadily increasing in the past decades. In such an economic and institutional scenario, it would be reasonable to expect potentially measurable positive local economic benefits though tourism from both cultural heritage sites and PAs. Therefore, our results indicating that positive poverty alleviation associated with cultural heritage sites occurs in the earlier period and is greater for more remote and poorer localities, deserve additional discussion.

Before considering potential interpretations of our results, we first address the extent to which they have a causal interpretation. Certainly, any observational study provides less conclusive evidence on causal impacts than a randomized experiment. However, our research design restricts our control group to localities that are geographically proximate to our treatment group of localities with heritage sites. Because of this proximity, we compare localities that are similar on both observed and unobserved dimensions, and we also control for observable characteristics such as baseline poverty and geographic determinants of productivity. Moreover, by virtue of being historically determined, the locations of heritage sites were established prior to the study periods. Given our empirical strategy, we feel our results do plausibly reflect causal estimates.

6.1 | Visitation: More is not necessarily better; distance from cities matters

Contrary to one of our main expectations, visitation to cultural heritage sites has no significant (\(p > .05\)) effect on local poverty after controlling for the number of sites. As explained earlier, our theory of change features spending on local goods and services by tourists as a main driver of local economic benefits and thus we expected greater numbers of visits to provide a development advantage for localities near cultural heritage sites compared to those further away. One possible explanation for this lack of impact could be related to potential differences in the type of tourists who visit popular sites—those that receive high visitation—and those who visit less popular sites. Accordingly, it is possible that visits organized through private tour companies bypass nearby local communities, operating as enclaves and preventing visitor interactions in local markets (Mbaiwa, 2005; Wallpole & Goodwin, 2000). This may be especially true for popular sites such as such as Chichen-Izta or Teotihuacan, which attract a large number of tourists but where a high proportion of them are transported door to door by private tours. In contrast, tourists who visit less popular sites far from cities may be more likely to consume local goods and services (e.g., spending the night in local accommodations, buying local foods, or hiring local guides). This is further supported by the small but positive effect of visitation on poverty reduction during the second decade that we detected after removing the top five most visited INAH cultural heritage sites from the dataset (Table S4).

This possibility is also suggested by the results from the interaction between number of sites and number of visitors, and number of sites and distance to cities, and has been documented in Bwindi Impenetrable National Park in Uganda, where the length of stay of visitors turned out to be a stronger predictor of locally retained spending than visitor’s socioeconomic profile (Sandbrook, 2010). Our dataset does not disaggregate visitor type, but future research could usefully investigate any differential impacts of visits by independent groups compared to organized private tours in contexts where such data are available.

6.2 | Regional differences and baseline poverty effects

Our expectation was that wealthier regions with potentially better levels of tourism-related infrastructure (e.g., roads, airports, and education) would see greater local benefits from proximity to cultural heritage sites.
Accordingly, the Yucatan Peninsula, which has the highest GDP per capita of the regions in our sample (Figure S2), is the only region in which proximity to cultural heritage sites seems to have generated sustained socioeconomic benefits over time. This also concurs with previous research: conservation strategies on the Yucatan Peninsula seem to have been more successful than in nearby regions due to local institutions that have reduced economic and political inequality among land owners (Rodriguez Solorzano & Fleischman, 2018).

At a smaller geographic scale, however, the opposite relationship holds: greater poverty alleviation benefits occur in poorer localities and in localities that are more distant from cities, and these relationships hold across both study periods. The results from the interaction between the number of sites and baseline poverty concur with those found in Thailand and Costa Rica (Ferraro et al., 2011), where poorer localities at baseline benefited the most from the designation and management of protected areas. Economic theory would suggest that it is easier for PAs to reduce poverty when they are designated over marginal lands with low opportunity cost of forgone agricultural activities. From this perspective, it makes sense that more isolated and marginalized localities benefited more from being close to cultural heritage sites.

Together, our analyses suggest that localities that were poorer or more remote at baseline but that are in states or regions that are wealthier or with better infrastructure were more likely to experience poverty alleviation benefits from being close to cultural heritage sites. This presents a potential hypothesis about tourism benefits that could be productively tested in other countries.

### 6.3 Possible ephemeral benefits from tourism

Perhaps the most puzzling result from our analysis is the difference in impacts of the cultural heritage sites between decades. Only the Yucatan peninsula region recorded positive and significant effects during both decades. Two regions that had positive and significant impacts in the first decade had negative ones in the second decade and the other two regions had statistically insignificant impacts in the second decade. Any explanation is necessarily speculative. However, one possibility relates to changes in the national economic picture over the two decades, which is highlighted by the differences in specific indicators in Table 2. During the 1990s, the cultural heritage sites may have provided a type of development insurance against the national background crisis that started in the country in 1995, by providing a moderate but sustained influx of income to nearby localities. After 2000, the Mexican economy was steadily recovering and in fact experiencing an economic transition toward a stronger manufacturing economy (Vázquez, 2017; Villareal & Fergusson, 2014), and poverty indicators were generally improving. These more widespread improvements may have accelerated economic growth in non-tourism based localities, leaving behind more tourism-dependent ones. Likewise, the role of better government poverty reduction programs and remittances from migrant workers to the US has also been highlighted as one of the main drivers of improvements in equality and income between 2000 and 2010 (Esquivel, 2011). Possibly, outmigration was higher from areas with less tourism potential, or conversely, additional in-migration into

![FIGURE 2](https://example.com/figure2.png)

**FIGURE 2** Regional differences in the estimated relationships between cultural heritage sites or protected areas and poverty alleviation across periods. Higher values represent more poverty alleviation by either PAs or INAH Sites. Regions are ordered from lowest (SOUTH) to highest (YUCATAN) GDP per capita; Points represent linear combinations of coefficients; lines represent 95% CIs. Model specifications for INAH cultural heritage sites are from Table 5 and for protected areas from Table S4.
areas benefitting from tourism might dilute the impacts. Interestingly, the apparent pattern of ephemeral benefits seems to be the case for PAs too in several regions. Overall, the results suggest a generalized trend over time in which both cultural heritage sites and PAs seem to provide initial benefits, but these may not persist. Additional years of data would be needed to definitively establish time trends.

7 | CONCLUSIONS

This study explores the mechanisms behind the poverty reduction potential of protected areas, through using the analogous system of cultural heritage sites. While assessments of protected area impacts must include both the opportunity cost of land and natural resources for local communities within PAs and the benefits from tourism, our study seeks to isolate the impact of tourism alone. Overall, our findings provide mixed evidence for the idea that PAs and cultural heritage sites contribute to local development through tourism (Nijkamp, 2012). In particular, our results highlight the idea that tourism benefits may be quite heterogeneous, depending on regional differences or outside opportunities for development.

We make two important contributions to the existing literature on conservation and development. First, we provide evidence suggesting that for tourism to outweigh the losses that PAs impose through land-use restrictions, a very particular combination of institutional factors might be required, as is the case in the Yucatan peninsula where only cultural heritage sites—with less land-use restrictions relative to PAs—had consistent poverty alleviation effects over two decades. However, the regional differences show that the lack of poverty alleviation benefits from tourism through PAs may not only be the product of compensatory negative impacts due to land use restrictions imposed by PAs. Instead, other structural characteristics such as local institutions, infrastructure, and social and human capital, may also determine the ability of local populations to take advantage of the tourism industry associated to PAs and cultural heritage sites. Second, we provide the first national level quantitative study measuring the influence of cultural heritage conservation sites on local economies—an influence that becomes increasingly relevant as UNESCO World Heritage designations rise as key tourism destinations, and as these sites could be integrated along with PAs to generate conservation-poverty alleviation synergies in some megadiverse countries.

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CONFLICT OF INTEREST

Authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Paulo Quadri: conceived research idea, collected data, analyzed data, wrote manuscript. Kate Sims: collected data, analyzed data, wrote manuscript. Adam Millard-Ball: collected data, analyzed data, wrote manuscript.

Data Availability

All data for this research project is public and accessible at: https://github.com/Liquidambar99/CPS-PQ-Data/upload/main.

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REFERENCES

Andam, K. S., Ferraro, P. J., Sims, K. R. E., Healy, A., & Holland, M. B. (2010). Protected areas reduced poverty in Costa Rica and Thailand. Proceedings of the National Academy of Sciences, 107, 9996–10001.

Börner, J., West, T. A. P., Blackman, A., Miteva, D. A., Sims, K. R. E., & Wunder, S. (2018). National and subnational forest conservation policies: What works, what doesn’t. In A. Angelsen, C. Martius, V. De Sy, A. E. Duchelle, A. M. Larson, & T. T. Pham (Eds.), Transforming REDD+: Lessons and new directions (pp. 105–115). Bogor, Indonesia: CIFOR.

Brockington, D., & Wilkie, D. (2015). Protected areas and poverty. Philosophical Transactions of the Royal Society B, 370, 20140271.

Canavire-Bacarreza, G., & Hanauer, M. M. (2013). Estimating the impacts of Bolivia’s protected areas on poverty. World Development, 41, 265–285.

Cernea, M. M., & Schmidt-Soltzau, K. (2006). Poverty risks and National Parks: Policy issues in conservation and resettlement. World Development, 34, 1808–1830.

Clements, T., Suon, S., Wilkie, D. S., & Milner-Gulland, E. J. (2014). Impacts of protected areas on local livelihoods in Cambodia. World Development, 64, S125–S134.

Consejo Nacional de Población. (2010). Metodología de estimación del índice de marginación por localidad.

Costedoat, S., Corbera, E., Ezzine-de-Blas, D., Honey-Rosés, J., Baylis, K., & Castillo-Santiago, M. A. (2015). How effective are biodiversity conservation payments in Mexico? PLoS One, 10, e0119881.
den Braber, B., Evans, K. L., & Oldekop, J. A. (2018). Impact of protected areas on poverty, extreme poverty, and inequality in Nepal. Conservation Letters, 11, e12576.

Dixon, J. A., & Sherman, P. B. (1990). Economics of protected areas: A new look at benefits and costs. Washington, DC: Island Press.

Esquivel, G. (2011). The dynamics of income inequality in Mexico since NAFTA. Economia, 12, 155–188.

Ferraro, P. J., & Hanauer, M. M. (2015). Through what mechanisms do protected areas affect environmental and social outcomes? Philosophical Transactions of the Royal Society B, 370, 20140267.

Ferraro, P. J., Hanauer, M. M., & Sims, K. R. E. (2011). Conditions associated with protected area success in conservation and poverty reduction. Proceedings of the National Academy of Sciences, 108, 13913–13918.

Getzner, M. (2003). The economic impact of national parks: The perception of key actors in Austrian national parks. International Journal of Sustainable Development, 6, 183–202.

Gray, C. L., Hill, S. L. L., Newbold, T., Hudson, L. N., Börger, L., Contu, S., ... Scharlemann, J. P. W. (2016). Local biodiversity is higher inside than outside terrestrial protected areas worldwide. Nature Communications, 7, 12306.

Hampton, M. P. (2005). Heritage, local communities and economic development. Annals of Tourism Research, 32, 735–759.

Holmes, G., & Brockington, D. (2012). Protected areas - what people say about well-being. In D. Roe, J. Elliott, C. Sandbrook, & M. Walpole (Eds.), Biodiversity conservation and poverty alleviation: Exploring the evidence for a link (pp. 160–172). Chichester, UK: John Wiley & Sons, Ltd.

Koontz, L., Thomas, C. C., Ziesler, P., Olson, J., & Meldrum, B. (2017). Visitor spending effects: Assessing and showcasing America's investment in national parks. Journal of Sustainable Tourism, 25, 1865–1876.

Labadi, S. (2017). UNESCO, world heritage, and sustainable development: International discourses and local impacts. In P. G. Gould & K. A. Pyburn (Eds.), Collision or collaboration. Archaeology encounters economic development (pp. 45–60). Switzerland: Springer, Cham.

Leverington, A. (2012). Opportunities for enhancing conservation management and resilience through tenure resolution in Cape York peninsula. In P. Figgis, J. Fitzsimons, & J. Irving (Eds.), Innovation for 21st century conservation (pp. 94–99). Sydney: Australian Committee for IUCN.

Mayer, M., Müller, M., Woltering, M., Arnegger, J., & Job, H. (2010). The economic impact of tourism in six German national parks. Landscape and Urban Planning, 97, 73–82.

Mbaiwa, J. E. (2005). Enclave tourism and its socio-economic impacts in the Okavango Delta, Botswana. Tourism Management, 26, 157–172.

Miranda, J. J., Corral, L., Blackman, A., Asner, G., & Lima, E. (2016). Effects of protected areas on Forest cover change and local communities: Evidence from the Peruvian Amazon. World Development, 78, 288–307.

Naiddo, R., Gerkey, D., Hole, D., Pfaff, A., Ellis, A. M., Golden, C. D., ... Fisher, B. (2019). Evaluating the impacts of protected areas on human well-being across the developing world. Science Advances, 5, eaav3006.

Naughton-Treves, L., Alix-Garcia, J., & Chapman, C. A. (2011). Lessons about parks and poverty from a decade of forest loss and economic growth around Kibale National Park, Uganda. Proceedings of the National Academy of Sciences, 108, 13919–13924.

Nijkamp, P. (2012). Economic valuation of cultural heritage. In G. Liciardi & R. Amirthahmasebi (Eds.), The economics of uniqueness. Investing in Historic City cores and cultural heritage assets for sustainable development (pp. 75–106). Washington, DC: The World Bank.

Oldekop, J. A., Holmes, G., Harris, W. E., & Evans, K. L. (2016). A global assessment of the social and conservation outcomes of protected areas. Conservation Biology, 30, 133–141.

Quadri, G., & Quadri, P. (2016). México, un estado sin tierra: hacia una propiedad pública de la tierra en áreas naturales protegidas. In Políticas públicas serie. Mexico City: MA Porrúa.

Rasker, R. (1993). Rural development, conservation, and public policy in the greater Yellowstone ecosystem. Society & Natural Resources, 6, 109–126.

Rasker, R., Gude, P. H., & Delorey, M. (2013). The effect of protected Federal Lands on economic prosperity in the non-metropolitan West. Journal of Regional Analysis and Policy, 43, 110–122.

Robalino, J., & Villalobos, L. (2015). Protected areas and economic welfare: An impact evaluation of national parks on local workers' wages in Costa Rica. Environment and Development Economics, 20, 283–310.

Rodriguez Solorzano, C., & Fleischman, F. (2018). Institutional legacies explain the comparative efficacy of protected areas: Evidence from the Calakmul and Maya biosphere reserves of Mexico and Guatemala. Global Environmental Change, 50, 278–288.

Roe, D. (2008). The origins and evolution of the conservation-poverty debate: A review of key literature, events and policy processes. Oryx, 42, 491–491.

Roe, D., & Elliott, J. (2006). Pro-poor conservation: The elusive win-win for conservation and poverty reduction? Policy Matters, 14, 53–63.

Roe, D., Fancourt, M., & Sandbrook, C. (2015). Biodiversity conservation and poverty reduction: what's the connection? A systematic mapping of the evidence. London: International Institute for Environment and Development.

Rose, B. (2012). Indigenous protected areas–innovation beyond the boundaries. In P. Figgis, J. Fitzsimons, & J. Irving (Eds.), Innovation for 21st century conservation (pp. 50–55). Sydney: Australian Committee for IUCN.

Sandbrook, C. G. (2010). Local economic impact of different forms of nature-based tourism. Conservation Letters, 3, 21–28.

Shackley, M. (2006). Visitor management at world heritage sites. In A. Leask & A. Fyall (Eds.), Managing world heritage sites (pp. 83–93). London: Routledge.

Sims, K. R. E. (2010). Conservation and development: Evidence from Thai protected areas. Journal of Environmental Economics and Management, 60, 94–114.

Sims, K. R. E., & Alix-Garcia, J. M. (2017). Parks versus PES: Evaluating direct and incentive-based land conservation in Mexico. Journal of Environmental Economics and Management, 86, 8–28.

Sims, K. R. E., Thompson, J. R., Meyer, S. R., Nolte, C., & Plisinski, J. S. (2019). Assessing the local economic impacts of land protection. Conservation Biology, 33, 1035–1044.
Van Velthuizen, H., Huddleston, B., Fischer, G., Salvatore, M., Ataman, E., Nachtergaele, F. O., ... Bloise, M. (2007). **Mapping biophysical factors that influence agricultural production and rural vulnerability.** Rome: Food & Agriculture Organization.

Vázquez, B. H. M. (2017). El impacto del TLCAN en las finanzas y la economía de México: una mirada desde las MIPYMES. *RICEA Revista Iberoamericana de Contaduría, Economía y Administración*, 6, 110–133.

Villareal, M. A., & Fergusson, I. F. (2014). NAFTA at 20: Overview and trade effects. Washington, DC: Congressional Research Service.

Walpole, M. J., & Goodwin, H. J. (2000). Local economic impacts of dragon tourism in Indonesia. *Annals of Tourism Research*, 27, 559–576.

West, P., Igoe, J., & Brockington, D. (2006). Parks and peoples: The social impact of protected areas. *Annual Review of Anthropology*, 35, 251–277.

WTTC. (2018). *Travel and tourism. Economic impact 2018*. London, UK, Mexico London: World Travel and Tourism Council.

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Additional supporting information may be found online in the Supporting Information section at the end of this article.

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