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Research article

Whale-watching tourism as a driving force for socioeconomic development in Puerto López, Machalilla National Park, Manabí, Ecuador

El turismo de avistamiento de ballenas como motor de desarrollo socioeconómico en Puerto López, Parque Nacional Machalilla, Ecuador

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ABSTRACT

We aim to analyze the socioeconomic impact of the whale-watching industry in one of the poorest areas in Ecuador. Puerto López, in Manabí, went from being a fishing village to leading the whale-watching industry in Ecuador. Thanks to the tourist attraction of humpback whales, the number of tourists in the area has increased by 15,000% since 1980, concentrated mainly around the whale season months of June to September. As a result, tourism services and employment opportunities also increased, bringing development and a better lifestyle to the region. The industry has become so important to the region that its value was estimated at USD 4.5 million in 2019. However, we consider this to be a conservative estimate and suggest that the real value may be even greater. Whale-watching benefits are not only economic: whales have brought a sense of identity to the region, which has worked to promote whale conservation laws at the national level. In recent years, the emergence of illegal whale-watching tour operators has become a threat to the industry, the region's economy, and the protection of the species, necessitating immediate action by the authorities.

Keywords: Balaenopteridae, Humpback whale, marine mammals, *Megaptera novaeangliae*, socioeconomics.

RESUMEN

Nuestro objetivo fue analizar el impacto socioeconómico de la industria de la observación de ballenas en una de las zonas más pobres de Ecuador. Puerto López, en Manabí, pasó de ser una zona pesquera a liderar la industria del avistamiento de ballenas en Ecuador. Gracias al atractivo turístico que ofrecen las ballenas jorobadas, el número de turistas en la zona aumentó en un 15 000 % desde 1980, concentrándose principalmente en los meses de la temporada de ballenas, que van de junio a septiembre. Como consecuencia, los servicios turísticos y las oportunidades de empleo también han aumentado, aportando desarrollo y un mejor estilo de vida a la región. La industria se ha vuelto tan importante que su valor fue de unos 4,5 millones de dólares en 2019. Sin embargo, consideramos que esta estimación es conservadora y el valor real podría ser incluso mayor. Los beneficios del avistamiento de ballenas no son solo económicos: las ballenas han aportado un sentido de identidad a la región, que ha trabajado por la conservación de estos animales a nivel nacional, promoviendo leyes a favor de su conservación. En los últimos años, la aparición de operadores ilegales se ha convertido en una amenaza para el sector, la economía de la región y la protección de la especie, lo que urge a las autoridades a tomar medidas inmediatas.

Palabra clave: Balaenopteridae, Ballena jorobada, mamíferos marinos, *Megaptera novaeangliae*, observación de ballenas, socioeconomía.

INTRODUCCIÓN

Ecuador is a small country with a coastline of 2237 km and is situated in the southeast Pacific, on the western coast of South America. Six of its provinces are located on the country's coastline and are home to almost half of the nation's population (INEC, 2020). Although Ecuador has one of the highest levels of inequity and poverty in Latin America, the country also has one of the fastest-growing tourism industries in the region (Croes & Rivera, 2015).

Machalilla National Park (MNP) is part of the National System of Protected Areas and is located in the coastal province of Manabí, Ecuador. The park is one of the most extensive protected areas on the Ecuadorian coast, spanning a total area of 531.8 km² between 417.5 km² of land and 144.3 km² of marine area, encompassing La Plata and Salango Islands and bordering the Cantagallo Marine Reserve. MNP forms part of three cantons: Jipijapa, Montecristi, and Puerto López, with eight coastal communities located within its area of influence (INEFAN et al., 1997) (Figure 1).

The population of this entire area, including several villages found outside the park limit, is dependent on the marine resources found within the park. Canton Puerto López is the MNP headquarters, covering an area of 429.4 km² with a population of 20,451 inhabitants (INEC, 2020). The canton is divided into two rural parishes, Puerto Machalilla and Salango, and the cantonal seat Puerto López (GADMPL, 2020).

The province of Manabí has one of the highest concentrations of poverty (Correa-Quezada et al., 2018), and Canton Puerto López is no exception: 44% of the canton's population lives in extreme poverty (GADMPL, 2015). Fishing and commercial trade have historically been the main economic activities in Puerto López (INEFAN et al., 1997), with more than 60% of its residents depending on them (Coello, 1993).

Tourism has become one of the world's largest and fastest-growing industries (Choi & Turk, 2011; Dwyer & Forsyth, 2008; Jafari, 1974), representing a significant source of income for national economies (Balaguer & Cantavella-Jorda, 2002), with effects including increased tax revenue and population income, hard currencies, and greater employment opportunities leading to higher standards of living (Seetanah, 2011). Tourism helps to reduce poverty and brings benefits to underdeveloped regions (Croes & Vanegas, 2008); but tourists demand four main goods and services in a location: accommodation, food, transportation facilities, and entertainment services (Eugenio-Martin et al., 2004).

In 1998, the whale-watching industry was estimated to be worth USD 1 billion worldwide, and it continues to grow at a 12% rate annually. In 2008, it is estimated that 886,000 people went whale-watching in Latin America, resulting in

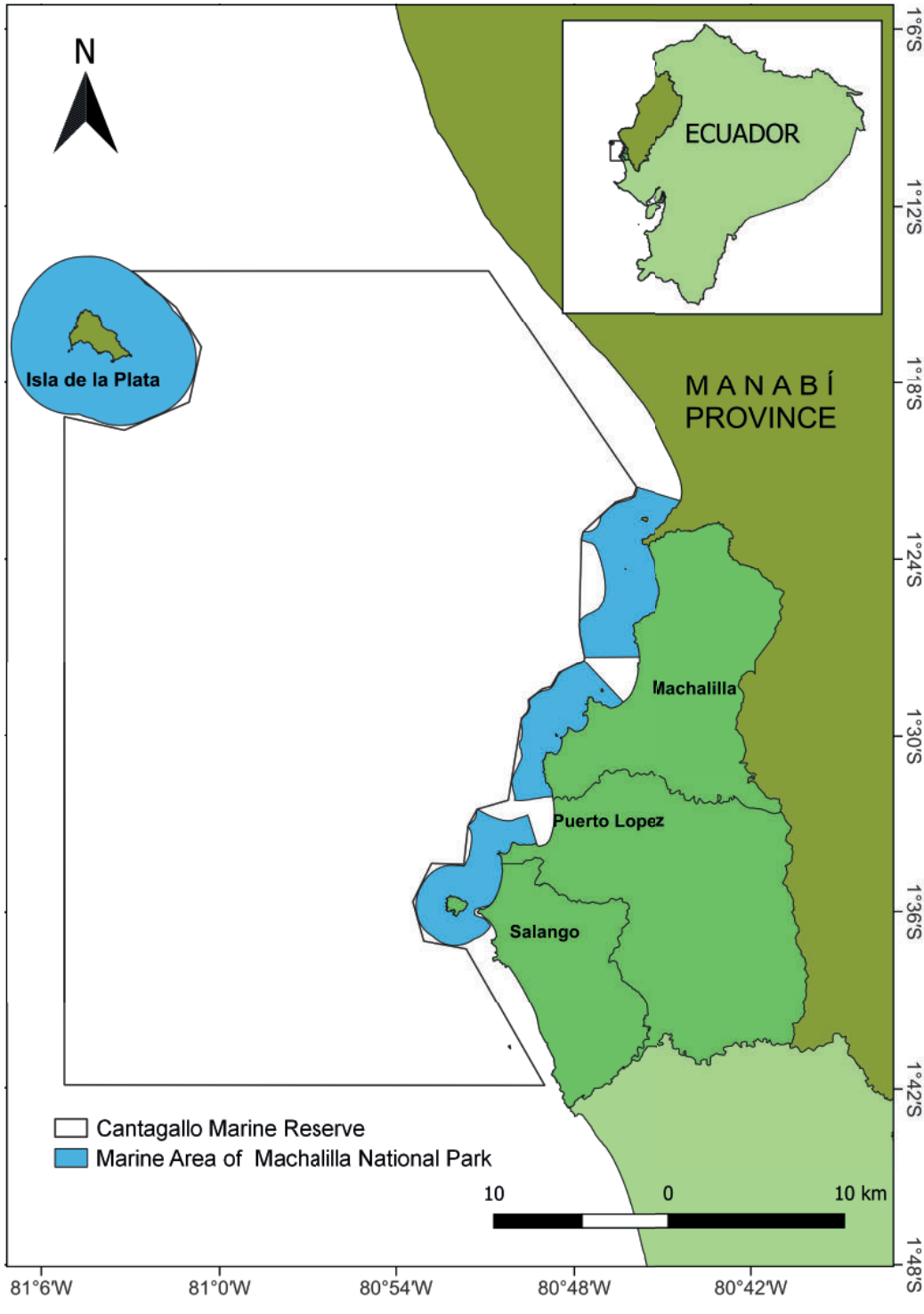

FIGURE 1. Study area: Marine area of Machalilla National Park and Cantagallo Marine Reserve.

USD 278 million in direct and indirect expenditures (Hoyt & Iñíguez, 2008). Non-lethal use of cetaceans through whale-watching is expanding in most Latin American countries, with Ecuador among the top 5 whale-watching destinations in the region and internationally recognized as one of the best humpback whale-watching destinations in the world (Hoyt & Iñíguez, 2008).

The small coastal village of Puerto López has become Ecuador's main port for whale-watching enthusiasts. Before the early 1990s, Puerto López was a quiet fishing town. Although whale-watching began in the early 1980s with the creation of MNP, which promoted tourism as a conservation tool as fishermen in the area took the few tourists to Isla de la Plata informally, the industry did not start to take off until 1994 (Hoyt & Iñíguez, 2008). Puerto López is now a central part of coastal tourism and is known for the tourist attraction of humpback whales (*Megaptera novaeangliae*), benefiting from the fact that MNP has one of the primary humpback concentrations off the coast of Ecuador (Castro & Gonzales, 2002; Scheidat et al., 2000).

The industry has brought enormous community benefits, such that the humpback whale is part of the community identity and is reflected in all areas of everyday life; furthermore, the protection of the species has become a motto for the region (Castro et al., 2015). *The Festival de las Ballenas* [Whale Festival] celebrates the presence of humpback whales every year and announces the beginning of the whale season (Cabrera, 2014), which the local and national governments alike cheerfully welcome and promote. Additionally, June 22nd was declared as "Whale Day" by the national government; in Puerto López, this date is celebrated with artistic and cultural festivals, academic forums, and other events in honor of the cetaceans.

Even though many whale and dolphin species can be observed along the Ecuadorian coast, such as bottlenose dolphins (*Tursiops truncatus*), spotted dolphins (*Stenella attenuata*), and Bryde's whales (*Balaenoptera edeni*) (Tirira et al., 2021), the industry relies mainly on the humpback whale.

Humpbacks migrate close to the coast, so they are accessible at a relatively short distance. During the season, whale numbers are high, which guarantees successful sightings. The species is also highly acrobatic, frequently offering a spectacular show. Humpbacks are found in Ecuadorian waters from June through September, traveling from Antarctic waters to warmer areas in the tropics in order to breed and give birth (Castro et al., 2008). These whales are part of the Breeding Stock G (IWC, 1998), the breeding grounds of which extend from Peru to Costa Rica, including Ecuador, Colombia, and Panama (Acevedo & Smultea, 1995; Castro et al., 2011; Castro & Gonzales, 2002; Félix & Haase, 2001; Flórez-González et al., 1998; Pacheco et al., 2009; Pacheco et al., 2011; Rasmussen et al., 2007; Scheidat et al., 2000).

A growing whale-watching industry in Canton Puerto López, located in one of the provinces with the highest poverty rates in Ecuador, would be expected to have significant financial returns creating positive socioeconomic changes in these poor communities. In this study, we attempt to determine the socioeconomic and environmental effects of whale-watching tourism in Canton Puerto López through temporal analysis of the variation in the number of tourists and tourism services and the job opportunities derived from tourism services; additionally, we recreate the fiscal period of one whale season.

METHODS

Socioeconomic Impact

We analyzed the following factors to determine the socioeconomic impact of the whale-watching industry in Puerto López: the development of the number of tourists, the number of tourism services, and jobs related to tourism.

a. Number of tourists

In regards to the number of visitors, we collected data based on the number of tourists who visited MNP as well as the number of visitors that attended whale-watching tours departing from the Puerto López pier, using three different sources:

1. From 1988–2011, data on the number of visitors was recorded daily by means of income derived from a mandatory fee for each vehicle and visitor that entered protected areas. By 2011, the fee was USD 35 per person, although it was reduced later that year and was finally abolished in 2012, granting free entrance to this protected area for two years (2012 and 2013).

2. In 2012, Canton Puerto López implemented a mandatory tax of USD 1 per visitor, paid at the time of departure from the Puerto López tourist pier, by means of which the number of visitors that entered the marine area could be obtained. However, data for this year from the municipality was not available.

3. Starting in 2013, the Ministry of Environment implemented a Digital Tourist Information System (SIB) that gives exact information on the number of visitors. Although SIB was implemented in 2013, data from this system was not available for this year.

All visitor records were statistically analyzed to evaluate the evolution of visitor numbers over 39 years (1980 to 2019). Data from 2012 and 2013 were discarded; given that free entrance to the park was granted during these years, there was no way to tell how many visitors had entered the marine area. In addition, the tax implemented by Canton Puerto López and SIB system data were not available for these two years.

b. Tourism services

The Ministry of Tourism recognizes three types of tourism services: accommodation, restaurants, and tour agencies. Each establishment must have a unique registration number. Data regarding the number of tour agencies, accommodation units, and restaurants registered in the Tourism Department in Canton Puerto López was obtained from the Ministry of Tourism website (Ministerio de Turismo, 2021) and the Puerto López Tourism Department. Data over the years was patchy; records were found for 1997 and 1999 to 2019, encompassing 22 of the 39 study years. All records were statistically analyzed to evaluate the evolution of the tourism services over the 22 years from which data is available. Data here only reflects legally registered businesses.

c. Job opportunities related to tourism services

Data on the number of jobs related to the tourism sector were obtained from the Tourism Department of Canton Puerto López for the period from 2001 to 2014. All records were statistically analyzed to evaluate the evolution of jobs related to tourism services during those 14 years.

Fiscal Period

To establish the economic impact of the whale-watching industry, we carried out an exercise using costs current as of 2019, taking this year as an example, since it is the last year encompassed in our study. The exercise aims to estimate the amount of money that the whale-watching brings to the community (during June to September). For the exercise, tourist expenses were listed as direct and indirect, following the methodology used by Hoyt and Iñíguez (2008). Direct expenses refer to the expenses related to the industry: in this case, the cost of the whale-watching tour. Indirect expenses refer to the rest of the expenses that tourists incur when visiting the area; this category includes food, accommodation, local transportation, and souvenirs.

There are two types of whale-watching tours offered in Puerto López. A full-day tour called “Isla de la Plata” combines snorkeling, hiking on the island, whale-watching, and observation of other marine wildlife. The average cost of this tour was USD 40 in 2019. This tour has a duration of seven hours, which means the tourists who participate stay overnight in the region. Therefore, accommodation expenses for a minimum of one night and food expenses for two days were quantified for these tourists. The other tour is referred to as a “Short Whale Tour”; it includes coastal snorkeling on small islands near Puerto López as well as

whale-watching. The average cost of this tour was USD 25 in 2019, and the tour duration was three hours. Food expenses for one day and no accommodation expenses were calculated for these tourists.

Indirect expenses were calculated based on the following rates per day, except for souvenirs, which were calculated only once per tourist (Table 1).

Table 1. Expenses type and cost (prices for 2019).

Expense	Price (USD)
Food	15
Accommodation	25
Arrival transport	20
Local transport	5
Souvenirs	20
Total per day	**85**

RESULTS

Socioeconomic Impact

a. Number of tourists

The number of MNP visitors entering the marine area increased from 517 tourists in 1980 to 77,625 in 2019 (Figure 2), with an astonishing total growth rate of 15,000%. Over the 39 years (1980 to 2019), the area recorded a 24% average annual visitor increase, with a maximum increase of 295% in 1984, followed by 125% in 1987, and a maximum decrease of 58% in 1998. Historical numbers were reached in 2011 with the arrival of 83,386 tourists. An increase of 70% was recorded for this year. In 1999, the Festival de la Ballena was established, and the growth rate for this year was the third largest increase for the study period.

In a more detailed analysis of the years 1988 to 2019 (available data specify the number of visitors per month), we noted that since 1994, when the whale-watching industry became popular, the number of tourists was higher during July, August, and September, corresponding to the top humpback whale season (June to September), which is now referred as the peak season (Figure 3).

When separating the data before and after the increase in popularity of the industry in 1994, is clear that the general increase in visitor num-

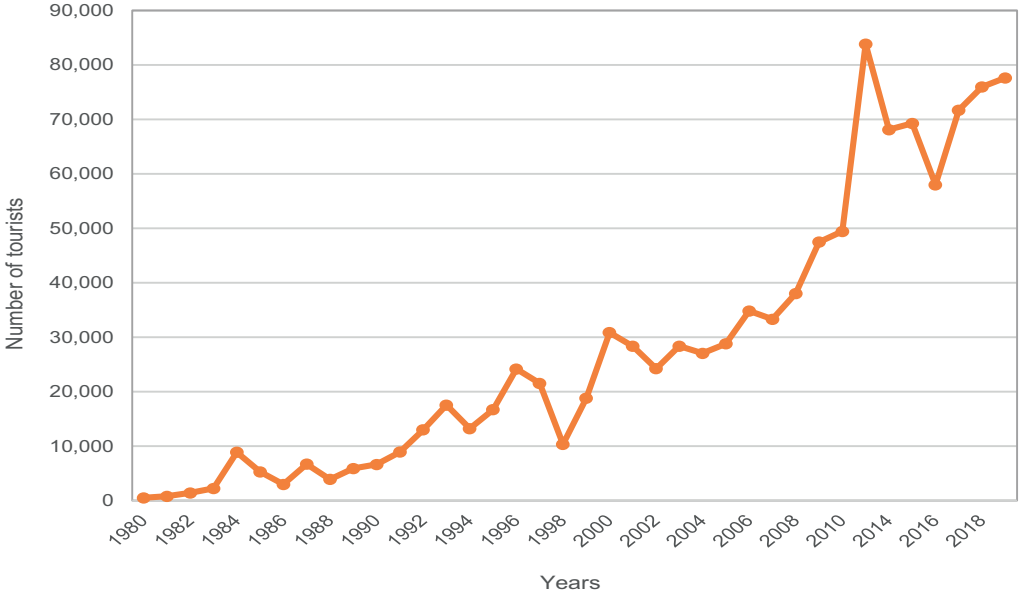

Figure 2. Annual number of tourists entering the marine area of the Machalilla National Park. The trend is represented by the dotted line.

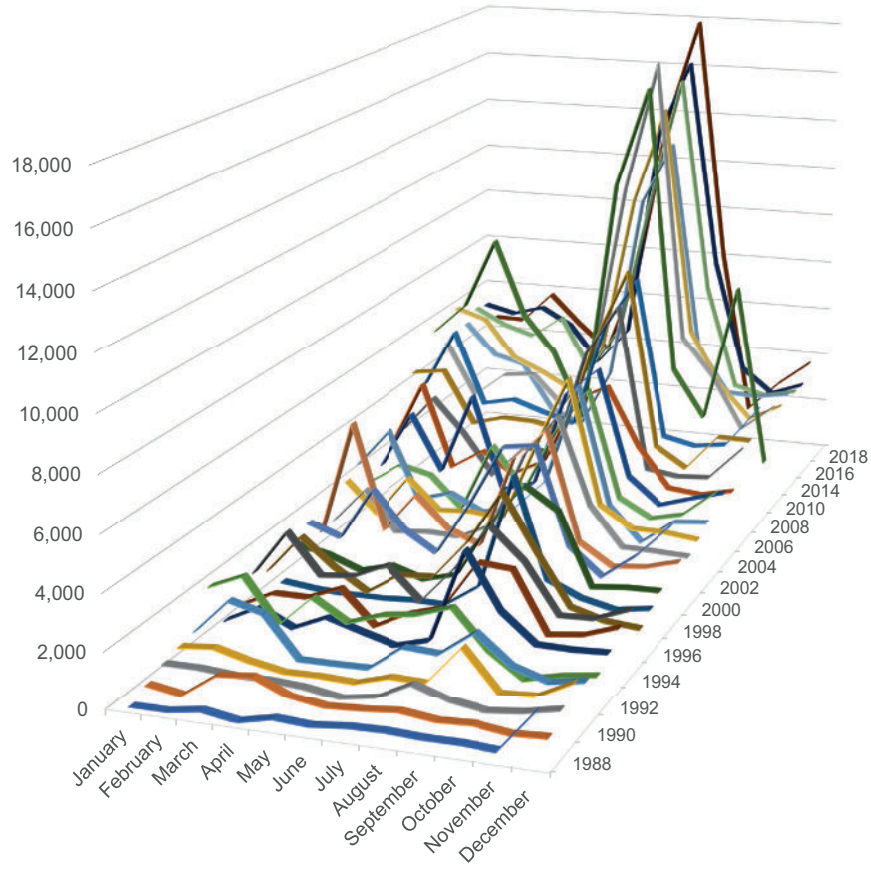

FIGURE 3. Number of tourists per year and month that visited the Machalilla National Park from 1988 to 2019, showing only values from even years.

bers corresponds to the whale season (Figure 4). Before 1994, tourist numbers in the area were more constant throughout the year, with a slight increase in February, August, September, and December; numbers for these months represented 44% of visitors. The months corresponding to the current peak season (June to September) represented 37% of tourists. In contrast, data after the increase in popularity of whale-watching shows a marked difference in tourist numbers during the peak season, representing 52% of visitors. The increase occurs especially during July and August, representing 15 and 22% of tourists, respectively. Tourist numbers during February and December decreased by 3 and 5% respectively; the highest concentration of tourists occurs in August, reflecting an increase of more than double.

b. Tourism services

In general, all tourism services have increased in Canton Puerto López. Numbers have grown from 13 tourism providers corresponding to five accommodation units, five restaurants, and three tour agencies in 1997, to 169 tourism providers by 2019: 71 accommodation units, 54 restaurants, and 44 tour agencies (Figure 5). These data represent a growth of 1200%. Restaurants show a lower average annual growth rate (18%), with a peak in 2011. However, the restaurant category has the largest number of informal establishments, which are not reflected here. In the case of tour agencies, growth has been steady, progressing to meet the needs of the area with an average annual growth of 19%. However, the

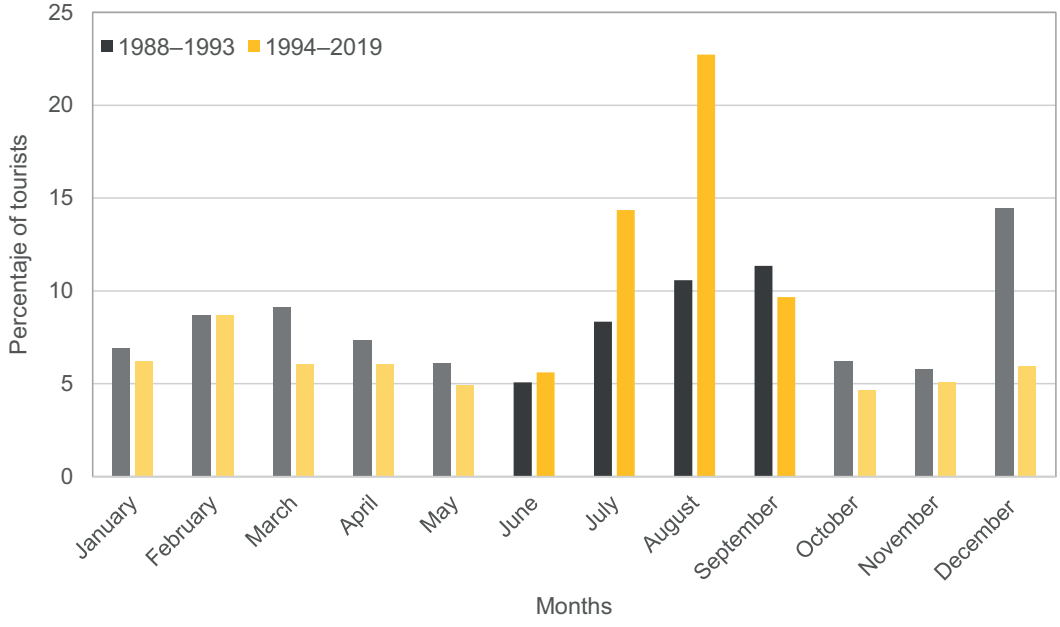

FIGURE 4. Percentage of tourists that visited the Machalilla National Park by months, before and after 1994, when the whale-watching industry increased in popularity. The darker colors mark the whale season.

number of tour agencies is limited by the Ministry of Tourism, which does not grant permits for new operators in order to control MNP cargo capacity. Although accommodation units show a higher average annual growth of 20%, they also have the highest periods of negative growth. The fluctuation in these numbers is probably due to the tendency to open and close regularly because of high costs of operation and low demand in off-peak season.

c. Job opportunities related to tourism services

With the increase in tourism services, there is also an increase in the number of jobs (Figure 6): 18% total growth for the entire period (2001 to 2014), and an average annual growth of 3% per year. However, this period encompasses most of the years with negative growth in tourism services, which causes the real job growth of the entire study period to be underestimated. Although accommodation units represent 58% of the jobs on average, followed by tour agencies with 22%, and finally restaurants corresponding to 20%, tour agencies experienced the greatest growth (80%) in terms of job creation during this period, while jobs in accommodation units and restaurants grew by 16 and 3%, respectively.

FISCAL PERIOD

During the peak season of 2019 (four months), 77,625 visitors entered the MNP marine area, which represents 60% of the number of tourists that year. Most of these tourists (96%) went on a whale-watching tour: 32% went on the Isla de la Plata Tour, and 68% on the Short Whale Tour. The Isla de la Plata Tour generated USD 565,560 in direct expenses and an additional USD 1,413,900 in indirect expenses. In contrast, the Short Whale Tour generated USD 766,375 and USD 1,839,300 in direct and indirect expenses, respectively. As a result, the whale-watching industry income was estimated at USD 1,331,935 in direct expenses and USD 3,253,200 in indirect expenses, for a total of USD 4,585,135 in

FIGURE 5. Increase in the number of tourism services in the Machalilla National Park between 1997 and 2019. Trends are represented by the dotted lines.

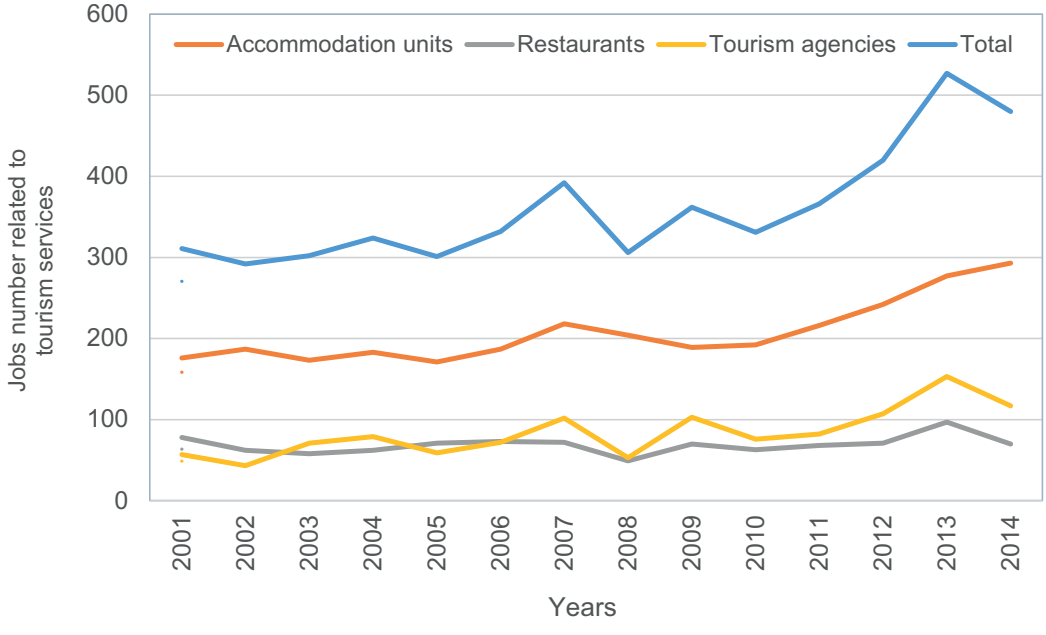

FIGURE 6. Increase in jobs related to tourism services opportunities in the Machalilla National Park, categorized as jobs in accommodation units, restaurants, and tourism agencies, between 2001 and 2011. Trends are represented by the dotted lines.

2019, during only the four months of the whale peak season.

The tour costs (direct expenses) represent 29% of the total income. Although the Short Whale Tour implied fewer expenses for tourists (40% less), it generated 57% of the total income due to the large number of tourists who chose this option (Figure 7).

DISCUSSION

We aim to determine the socioeconomic and environmental effects of whale-watching tourism in Canton Puerto López, a small area that transformed from a fishing village into a tourism center. The trend began with the few tourists who came to the area desiring to see the whales. Gradually, the whale-watching industry grew and took hold in the area until it became the major economic driver. Without a doubt, the arrival of the whale-watching industry has brought an important source of income to Canton Puerto López, fostering the creation of new jobs and businesses in tourism-related services.

As expected, the growth of tourism has brought with it an increase in tourism services. Restaurants, tour agencies, and accommodation services increased in the area by 1,200% since 1997. As a result of this growth, Puerto López has experienced development in commerce, construction, and real estate, among others.

This increment also brought an increase in the number of jobs. In 14 years (from 2001 to 2014), the number of jobs grew by 105% (Figure 6). However, these calculations are all conservative, since values from informal businesses and other emerging businesses linked to tourism are not reflected. Historically, the coastal population of Ecuador has had the highest poverty rates in the nation (Castillo & Andrade, 2015). Before the whale-watching industry was established in the area, employment opportunities were scarce, entrenching the local population in poverty. The presence of humpback whales has sparked whale-watching tourism, giving the coastal communities new opportunities for social and economic development.

During our recreation of a fiscal period, it was calculated that the amount of USD 4,585,135 was the minimum income supplied to the area of Puerto López by the whale-watching industry during just four months of 2019,

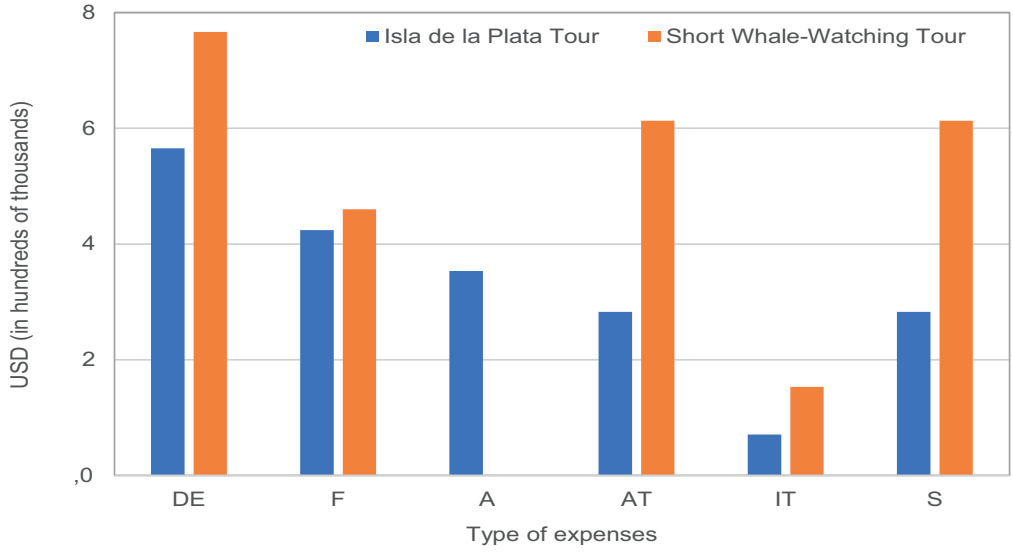

Figure 7. Whale-watching industry income calculation for 2019 in Machalilla National Park, detailed by direct (DE) and indirect expenses: food (F), accommodation (A), arrival transportation (AT), local transportation (IT), and souvenirs (S).

representing a significant economic benefit for the region. This amount becomes even more significant when considered alongside the fact that the national minimum monthly wage in Ecuador was USD 394 during this year (Ministerio de Trabajo, 2019). However, these tourism income calculations represent a conservative measure of the economic benefits of whale-watching (Hoyt, 2009). Results obtained using a different method from an area in northern Peru with a similar economy to Puerto López estimated that about 8500 tourists went whale-watching in 2018, representing an estimated income of USD 3 million for the region. Peruvian tourist numbers represent only 11% of the tourists in Puerto López in the same year (Guidino et al., 2020).

Comparing these results to those obtained by Ávila et al. (2021) in Colombia, where a similar methodology to that used in this study was applied, the Uramba Bahía Málaga Natural National Park received 21,198 whale-watchers in 2019, representing only 28% of the tourists received by Puerto López in the same year. However, the calculated income represents 31% of that of Puerto López, signifying that the estimated income per tourist in Colombia is 10% higher than that of Puerto López. Nevertheless, Ávila et al. (2021) considered that all tourists spent at least one night and two days, while we consider that only 32% of tourists stayed overnight. This gives us an idea of the conservative nature of the analysis in this study and the possible scope of the industry in Puerto López.

This income in Puerto López also generates dynamism in the local and national economies. For instance, the government levied fees for individual visitors entering the marine area of MNP, tourism patents, and municipal licenses, among others. Small local businesses, such as laundry services, souvenir shops, transportation, life jacket rentals, boat engine repair shops, advertising, bakeries and fruit shops where products are purchased to offer as snacks for tours, and many more are directly benefited by the industry, creating local economic growth and generating more job opportunities and a better standard of living as a result.

Although, whale-watching was the first and remains the most important tourist attraction in the area, other activities such as diving, sport fishing, horseback riding, and bird-watching tours have been offered in recent years, expanding the attraction and thus the tourism value of the region. In addition, tourism has supported and motivated the region in the generation of sustainable employment sources, which contribute to the tourism value. For instance, family businesses make organic and high-quality artisanal chocolate from cocoa cultivated in the area, produce organic coffee, and create jewelry made from the scales and skin of locally-caught fish. Sandalwood-derived products are offered under a brand with a sustainable ecological and social background. All these companies and employment alternatives would be unthinkable without the tourism framework in the region.

In addition to socioeconomic development, the whale-watching industry also introduced the implementation of new environmental and civil policies to preserve this source of income and improve tourism management as well as motivating the creation of new protected areas. The country has generated several public policies that support the protection of biodiversity along with the optimization of natural resources and the socioeconomic development of coastal communities. The new policies seek not only to regulate the whale-watching industry in the country but also to support and promote the conservation of humpback whales and other cetaceans present on the coasts of the country. The most relevant policies are found in Appendix 1 (Supplemental Material).

For 25 years, MNP was the only protected area encompassing a marine zone in mainland Ecuador. In 2004, refuges and marine reserves for humpback whales and other marine species began to be created. Currently, Ecuador has a total of 21 coastal protected marine areas in addition to the Galapagos archipelago. Protected areas such as Galera San Francisco in Esmeraldas, Pacoche and Cantagallo in Manabí, Puntilla de Santa Elena and El Pelado in Santa Elena, and El Morro in Guayas are part of the Ecuadorian system of national protected areas (Bustamante Ponce, 2016). The protection of these areas has been achieved thanks to agreements aimed at saving whales and other marine species (Bustamante Ponce, 2016).

The Puerto López community has witnessed how its economy, society, and town have changed for the better, gaining a sense of identity and considerable pride. This is reflected in the cooperative efforts of the residents to ensure the protection of their resources, especially those that relate to the humpback whale. The community also celebrates the *Festival de la Ballena* enthusiastically, since they know their economy depends on these beautiful animals. Local residents honor the arrival of the whales to Ecuadorian waters, recognizing the beginning of the peak season and an important economic influx.

However, in recent years, illegal tour operators (those without permits) have become active in the area, taking advantage of the lack of local governmental control (C. Castro, pers. obs.). These operators follow unsafe practices such as overbooking, exceeding vessel capacity, and failing to maintain proper safety equipment. They do not pay taxes, municipal license fees, or MNP tourist entry fees. This gives them the ability to offer lower prices, economically affecting the industry. These illegal operators do not follow whale-watching regulations, drive erratically near whales at high speeds, and do not maintain the appropriate distance from the whales. These practices occur because illegal operators have neither the knowledge nor the necessary training to carry out this activity. As a result, illegal operators undermine conservation efforts which the community and whale-watching industry have worked hard to maintain. International tourists in particular demand ethical whale-watching practices, resulting in bad publicity for the region if these practices are not followed. Therefore, the region urgently needs this problem to be addressed before there are unfavorable repercussions for the industry and, consequently, for the entire community.

In Puerto López, a great amount of development and change has taken place. It continues to be one of the main ports for whale-watching tourism in South America, despite not having many basic services. Its tourism potential is still enormous, since the growing preference for ecotourism and activities such as whale-watching suggests that there is greater potential for this sector, which in some regions has shown a much higher growth rate than tourism in general (Curtin, 2003).

CONCLUSIONS

Whale-watching provides valuable and sometimes crucial income to a community through the creation of new jobs and businesses. It helps foster an appreciation of the importance of marine conservation and provides a ready platform for research. Whale-watching offers communities a sense of identity and considerable pride. In some places, the effects of whale-watching transform the community, and Puerto López is an example of a community that has been transformed by whales.

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Author contributions: CC conceived the idea for this project. The manuscript was written by CC and JC with contributions and reviews by WG. The data were analyzed by CC and JC.

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