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Influence of ecotourism on the conservation of wildlife and socioeconomic conditions of indigenous communities of the Yasuní National Park and its area of influence

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RESUMEN

Este artículo pretende aclarar la influencia del ecoturismo en la conservación de la fauna silvestre y las condiciones socioeconómicas de las comunidades indígenas que viven en y alrededor del Parque Nacional Yasuní. Para obtener los datos pertinentes, se aplicó una encuesta a 132 jefes de hogar (JH) de siete comunidades del parque. Los resultados revelan que, aunque los ingresos fuera de la finca son considerables y mejor pagados, sólo unos cuantos jefes de hogar ganan un sueldo y la mayoría de los pueblos indígenas todavía dependen en gran medida de la agricultura. En relación con el índice de riqueza (IR), no hay una relación significativa demostrada con el ecoturismo. Los hogares que trabajan en turismo y los hogares que no trabajan en turismo, tienen IR similar; sin embargo, los resultados obtenidos no deben generalizarse, ya que sólo un pequeño porcentaje de entrevistados trabajan en ecoturismo. En relación con el nivel de cacería, cuanto mayor es el número de JH que trabajan en ecoturismo, menor es la cacería. Los hogares que no trabajan en turismo cazan con más frecuencia que los hogares que lo hacen. Este hallazgo nos lleva a creer que, si más gente trabajara en ecoturismo, el nivel de cacería en el bosque podría caer sustancialmente.

En términos de impactos sociales positivos causados por el ecoturismo, los entrevistados usan el dinero del ecoturismo principalmente para alimentación, ropa, zapatos, medicamentos y útiles escolares. En relación con los principales impactos sociales negativos, mencionan que los hombres cazan y pescan menos debido a la falta de tiempo. También creen que están expuestos a otras costumbres y artículos traídos por los turistas y que los turistas los exponen a enfermedades. En relación con los impactos ambientales positivos, los encuestados dijeron que ahora es posible observar más animales que antes, porque los indígenas están cazando menos. Ellos piensan que la conservación de los animales silvestres y la naturaleza es importante para cualquier proyecto de ecoturismo. Importantes impactos ambientales negativos son la pesca de pirañas, el ruido y la contaminación de lagos y ríos con aguas residuales de los hoteles. El ecoturismo podría ser un aliado importante en la conservación de la biodiversidad, al proporcionar mayores ingresos a los pueblos indígenas, lo que a su vez permitiría a los hogares vivir mejor y reducir la tasa de cacería de los animales silvestres.

Palabras clave: Ecoturismo, cacería, ingresos, pueblos indígenas, impactos del turismo, índice de riqueza, carne silvestre, Parque Nacional Yasuní.

ABSTRACT

This article aims to illuminate the influence of ecotourism on the conservation of wild fauna and socioeconomic conditions of indigenous communities living in and around the Yasuní National Park (YNP). To obtain relevant data, a survey was applied to 132 household (HH) heads of seven communities from the park. Results reveal that although off-farm income is considerable and better paid, just a few family heads have any wage labor and most indigenous people still depend heavily on agriculture. In relation to the wealth index (WI), there is not significant relationship demonstrated with ecotourism. Households working in tourism and households not working in tourism, have similar WI; however, results obtained should not be generalized, since only a small percentage of interviewed respondents work in ecotourism. In relation to the level of hunting, the greater the number of HH working in ecotourism, the lower the amount of hunting. Households that do not work in tourism hunt more often than people who do. This finding leads us to believe that if more people worked in ecotourism, the level of hunting in the forest might fall substantially.

In terms of positive social impacts caused by ecotourism, interviewees use their money from ecotourism mainly for food, clothing, shoes, medicines and school supplies. In relation to the main negative social impacts, they say that men hunt and fish less due to the lack of time. They also believe that they are exposed to other customs and articles brought by tourists and that tourists expose them to disease. In relation to positive environmental impacts, responders said that it is now possible to observe more animals than before, because indigenous people are hunting less. They think that conservation of wild animals and nature is important for any ecotourism project. Important negative environmental impacts are piranha fishing, noise and pollution of lakes and rivers with waste-water from the hotels. Ecotourism could be an important ally in the conservation of biodiversity, by providing increased income to indigenous peoples, which in turn would allow households to live better and lower the hunting rate of wild animals.

Keywords: Ecotourism, hunting, income, indigenous peoples, impacts of tourism, wealth index, wild meat, Yasuní National Park.

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Abstract

This article aims to illuminate the influence of ecotourism on the conservation of wild fauna and socioeconomic conditions of indigenous communities living in and around the Yasuní National Park (YNP). To obtain relevant data, a survey was applied to 132 household (HH) heads of seven communities from the park. Results reveal that although off-farm income is considerable and better paid, just a few family heads have any wage labor and most indigenous people still depend heavily on agriculture. In relation to the wealth index (WI), there is not significant relationship demonstrated with ecotourism. Households working in tourism and households not working in tourism, have similar WI; however, results obtained should not be generalized, since only a small percentage of interviewed respondents work in ecotourism. In relation to the level of hunting, the greater the number of HH working in ecotourism, the lower the amount of hunting. Households that do not work in tourism hunt more often than people who do. This finding leads us to believe that if more people worked in ecotourism, the level of hunting in the forest might fall substantially.

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Résumé

Cet article vise à éclairer l'influence de l'écotourisme sur la conservation de la faune sylvestre et sur les conditions socio-économiques des communautés indigènes vivant dans le Parc National Yasuni (PNY). Pour obtenir des données pertinentes, une enquête a été menée auprès de 132 familles représentant 7 communautés du parc. Les résultats révèlent que, bien que le revenu du travail à l'extérieur est considérable et mieux payé, seulement quelques responsables familiaux ont un travail salarié et la majorité des populations indigènes reste fortement dépendante de l'agriculture. Par rapport à l'indice de richesse (IR), il n'y a pas de relation significative démontrée avec l'écotourisme. Les familles qui travaillent dans le tourisme et celles qui n'y travaillent pas ont un indice de richesse similaire. Pourtant les résultats obtenus pourraient ne pas être généralisables, étant donné le faible pourcentage de personnes interrogées travaillant dans l'écotourisme. Au niveau de la chasse, plus le nombre de familles travaillant dans le tourisme est grand, moins la chasse est pratiquée. Les familles qui ne travaillent pas dans le tourisme chassent plus que les autres. Cette découverte nous porte à croire que si plus de personnes travaillaient dans l'écotourisme, le niveau de chasse pourrait baisser substantiellement.

En terme d'impact social positif dû à l'écotourisme, les personnes interrogées utilisent l'argent gagné dans l'écotourisme principalement pour acheter de la nourriture, des vêtements, des chaussures, des médicaments et des affaires scolaires. Par rapport au principal impact social négatif ils déclarent que les hommes chassent et pêchent moins à cause du manque de temps. Nous croyons aussi qu'ils sont exposés à d'autres coutumes et articles et que les touristes les exposent à des maladies. Par rapport à l'impact environnemental positif, les sondés disent qu'il est maintenant possible d'observer plus d'animaux qu'avant, parce que les indigènes chassent moins. Ils pensent que la conservation de la faune et de la nature est important pour tout projet d'écotourisme. Les impacts environnementaux négatifs importants sont, la pêche des piranha, le bruit et la pollution des lacs et rivières par les eaux usées des hôtels. L'écotourisme pourrait être un allié important pour la conservation de la biodiversité, en fournissant un revenu accru aux populations indigènes, et pourrait, à son tour, permettre aux familles de vivre mieux et de diminuer la chasse des animaux sauvages.

Mots clés : Écotourisme, chasse, revenu, population indigène, impact du tourisme, indice de richesse, viande sauvage, Parc National Yasuni.

Introduction

The Ecuadorian Amazon has an approximate area of 116,284 Km², covers approximately 46,7% of the total area of Ecuador (256.370 Km²) and represents approximately 2% of the entire Amazon Basin. Despite its small size, this part of the Amazon represents one of the most biodiverse areas of the planet, according to different studies (Myers et al. 2000, Finer et al. 2009, Bass et al. 2010). This area is also culturally rich, it is the home for several indigenous groups that for centuries have lived in harmony with the forest and its creatures. Within the Ecuadorian Amazon is the Yasuní National Park (YNP), which is the largest protected area in Ecuador and also one of the richest areas in terms of biodiversity (Finer et al. 2009, Bass et al 2010). The YNP protects Amazonian ecosystems that are threatened by anthropogenic activities such as oil exploitation, road construction, deforestation, colonization, and commercial hunting of wild animals. These actions have resulted in a conflict between development and conservation central to the future of the Amazonian biome.

Conservation of the Amazon rainforest and improvement of the quality of life of local indigenous peoples are fundamental objectives that must be sought through the development of sustainable options. Among these options, ecotourism is currently considered an alternative to economic development because it is estimated to be less harmful than extractive activities such as agriculture, mining, and timber sales. Several communities in the Ecuadorian Amazon region are already involved in this activity, but to date no systematic evaluation of its effectiveness has been carried out in terms of contributing to the conservation of wildlife and promoting the improvement of socioeconomic conditions. If ecotourism is well managed, it can contribute to the conservation of biodiversity and the reduction of poverty for all those involved.

Within the context of development versus conservation, this research seeks to determine whether families that are more involved in ecotourism consume wild animals less frequently and have higher levels of wealth and income than households that are not involved in tourism. In general, this exploration attempts to analyse the potential influence of ecotourism on the conservation of wildlife and socioeconomic conditions of indigenous communities of Yasuní National Park and its area of influence. This study analyses the case of seven Kichwa communities that live within the YNP, of which some have ecotourism projects as an alternative to traditional activities.

Ecotourism, Hunting, and Income

The International Ecotourism Society (TIES) defines ecotourism as "responsible travel to natural areas to conserve the environment and improve the well-being of local people" (TIES, 1990). The General Assembly of the United Nations recognized ecotourism as a key element in "the fight against poverty, environmental protection and the promotion of sustainable development" (UN, 2012). The Assembly mentions that ecotourism can contribute to the eradication of poverty through the generation of

employment and the improvement of the living conditions of people through the income they receive from this activity.

Governments from different countries and NGOs have paid attention to ecotourism as an important ally in the conservation of nature, the cultural richness of peoples and as a good option for sustainable development (Stronza and Durham 2008, Mbaiwa and Stronza 2010, Zanotti and Chernela 2010). It is well established that ecotourism can be an ally of conservation, when it causes positive economic change (Stronza and Gordillo 2008), especially in protected areas (Guangming et al., 2008). Most ecotourism actions are focused on providing benefits to the local population and creating incentives for conservation (Brandon and Wells 1992).

Some developing countries consider ecotourism a sustainable development activity (Durst and Ingram 1988, Isaacs 2000), in which tourism and conservation of the environment can work together (Budowski, 1976). Moreover, ecotourism is considered a good strategy for the conservation of biodiversity (Kruger 2005, Stronza and Gordillo, 2008), but it is not as effective as the strict conservation of a natural area without the need for touristic activities. It can also contribute with resources for the development of a community, but only up to a certain level (Kiss 2004). Among conservationists, the hope is that tourism can protect biodiversity, improve people's livelihoods and generate sustainable development (Kruger 2005, Isaacs 2000). However, all tourist activity produces positive and/or negative impacts (Mc Kean 1982, Volkman 1990, Picard 1993, McArthy 1994, Dogan 1989, Jafari 1983, Craik 1991, Weaver 2002, Smith 1989, 2003, Vaughan 2000). Among the positive impacts of ecotourism can be mentioned its contribution to the economic development of indigenous peoples and the improvement of their quality of life (Mac Kean 1982, Mbaiwa and Stronza 2010, Zanotti and Chernela 2010). Ecotourism has contributed to obtaining public goods and services such as roads, electricity, drinking water, etc.; it has also contributed to the value of indigenous lands thereby encouraging them to better manage common property (Becker 2003, Haller et al., 2008, Jamal and Stronza 2009). Among the negative impacts, in the Amazon rainforest, tourism has threatened indigenous knowledge, intellectual property rights, cosmovision, social structure and traditions, as well as other customs (McLaren, Ramer 1999, Smith 2003); it has also disrupted religious ceremonies and even brought diseases such as tuberculosis to some indigenous communities (McLaren & Deborah Ramer, 1999). The effects of tourism on indigenous peoples have led to acculturation and modernization (Carter and Beeton, 2007). Indigenous communities are potentially the most vulnerable to negative impacts of ecotourism (McLaren, Ramer, 1999), while it is uncertain how investment of income produced by tourism activities might negatively feedback on environment and culture.

On the other hand, studies conducted in the Amazon on wildlife use indicate that mammal hunting is the most important source of animal protein for Indian communities (Redford and Robinson 1987, Mena et al. 2000, Wildlife Conservation Society 2007). Amazonian fauna is characterized by its great diversity of species, but with a low number of individuals, so any alteration in normal abundance, such as

that provoked by commercial hunting, can affect its subsistence. The type and number of animals hunted depends on the ethnic origin of the group, but in general terms everything is hunted from small animals like rodents, to large animals like the tapir. In a study of Bolivia's indigenous Amazonian group, Tsimane, it was found that the main threat to wildlife is related to the increase in their wealth, especially a permanent income, which allows them to acquire and use firearms for hunting (Godoy et al., 2010).

In several countries, ecotourism has been shown to directly contribute to the conservation of wild animals (Isaacs 2000, Troeng and Drews 2004, West 2006, Stronza 2007). For example, in Papua New Guinea, Conservation International (CI) has promoted birdwatching ecotourism, so that the residents of Maimafu, receive financial incentives and stop hunting birds (West 2006). In Costa Rica, in Tortugero National Park, local people receive an important economic income from the observation of nesting turtles, which translates into support for the conservation of turtles (Troeng and Drews 2004). In Inferno (Peru), employment generated by ecotourism has contributed to the reduction of agriculture and hunting (Stronza, 2007), but some individuals have continued to hunt in spite of internal regulations of the community, indicating that the income from tourism is not enough. In Ecuador, in the Cuyabeno Wildlife Reserve, employment and income opportunities have also been important incentives for community participation in conservation actions (Wunder, 1999).

So far, the effectiveness of ecotourism for the conservation of nature at the community level has had mixed response (Wesche 1993, Isaacs 2000). In the Ecuadorian context, it is uncertain how ecotourism in indigenous communities is interacting with other economic or subsistence activities, in this case, hunting. It is important to do this type of analysis to provide quantitative data that can be used in sustainable economic development plans of indigenous peoples and biodiversity conservation plans.

Study area: The Ecuadorian Amazon and the Yasuní National Park

The study was carried out during the month of March 2016, in several communities located within the Yasuní National Park (PNY) and its influence zone. The PNY was created in 1979 and has an extension of 1'022.736 ha. This protected area is also part of the Yasuní Biosphere Reserve created in 1989. This area is of a great importance in terms of conservation, because it is part of one the Pleistocene refugees, the Napo-Ucayali, characterized by its abundant biodiversity and high endemism (Campos 1998, Bass et al. 2010, Finer et al. 2009).

In the northwest part of the YNP and its influence zone there are various human settlements including the Kichwa, Shuar and Waorani as well as some mestizo squatters. This research is restricted to some of the Kichwa communities along the Napo River, whose main economic activities are agriculture and ecotourism, among

others. The communities that participated in this research are Pañacocha, Santa Elena, San Roque, Sani Isla, Pilchi, Nueva Providencia and Indillama.

The Kichwas of the Ecuadorian Amazon are distributed throughout the region. Kichwas from the Napo area, also known as Napo Runas settled on the northern and southern banks of the Napo River, from the city of Puerto Francisco de Orellana, better known as Coca, to the parish of Nuevo Rocafuerte in the canton Aguarico. These groups have different origins, the Napo Runas, of recent arrival, settled mainly on the southern shore of the Napo River (Rivas and Lara, 2001); another group arrived from the Tena and Archidona; and the Kichwas of the Curaray River originating from the Canelos of Pastaza (Jorgenson et al., 2005).

This ethnic group is dedicated to traditional tasks such as hunting, fishing and food collection; however, due to oil exploitation and all the changes that came with it, the life of local indigenous people has changed. Their contact with the Western world has manifested itself in greater consumerism, so they must look for other sources of income. Kichwas sell timber, grow agricultural products for sale, some work in oil companies, others in ecotourism projects, among other activities (Jorgenson et al., 2005; Cabodevilla, 1998, personal information).

On the other hand, in the Ecuadorian Amazon tourism began in the Napo area in 1969 with a single lodge, just after the beginning of oil exploration and colonization (Healy 1988, Drumm 1991, Lemky 1992). In 1992 there were nine inns (hosterías) distributed along the Napo River and lagoons present in the area. There was also a floating hotel: the "Flotel Orellana" that operated between Coca and Limoncocha until 1990, and then moved to the Aguarico River area of the Cuyabeno Wildlife Production Reserve (Drumm 1991, Wesche 1993). Also, other ecotourism operations were developed in the northeast of the Ecuadorian Amazon.

In the YNP area there are a few tourism lodges and two floteles that have been working for several years. The largest and most important operations are La Selva Lodge, Sacha Lodge, Napo Wildlife Center (NWC) and Sani Lodge. La Selva Lodge and Sacha Lodge are privately owned and have been operating for many years already; the owners of the lodges have agreements with neighboring Kichwa communities to restrict hunting on the land that belongs to the lodges and also offer work to the local inhabitants (Lu et al. 2012, personal information). Staff working in these two hotels are from Tena and communities close to the hotels. Sani Lodge belongs to the community of Sani Isla and NWC belongs to the Añangu community. There are a few indigenous people working in the different lodges, depending on the case, most of them being men. The natives who work in tourism activities, perform various tasks such as: cleaning of rooms, canoe paddles, boat drivers and native guides. In addition to the hotels, a few communities in the last years have opened what is known as a Warmi Center (WC). Warmi is a Kichwa word that means woman. A WC is a native house that has a kitchen and a living room where the handicrafts made by women are displayed. They also have an orchard where tourists

are shown the plants they grow for food and medicinal use; tourists pay for the visit and buy handicrafts.

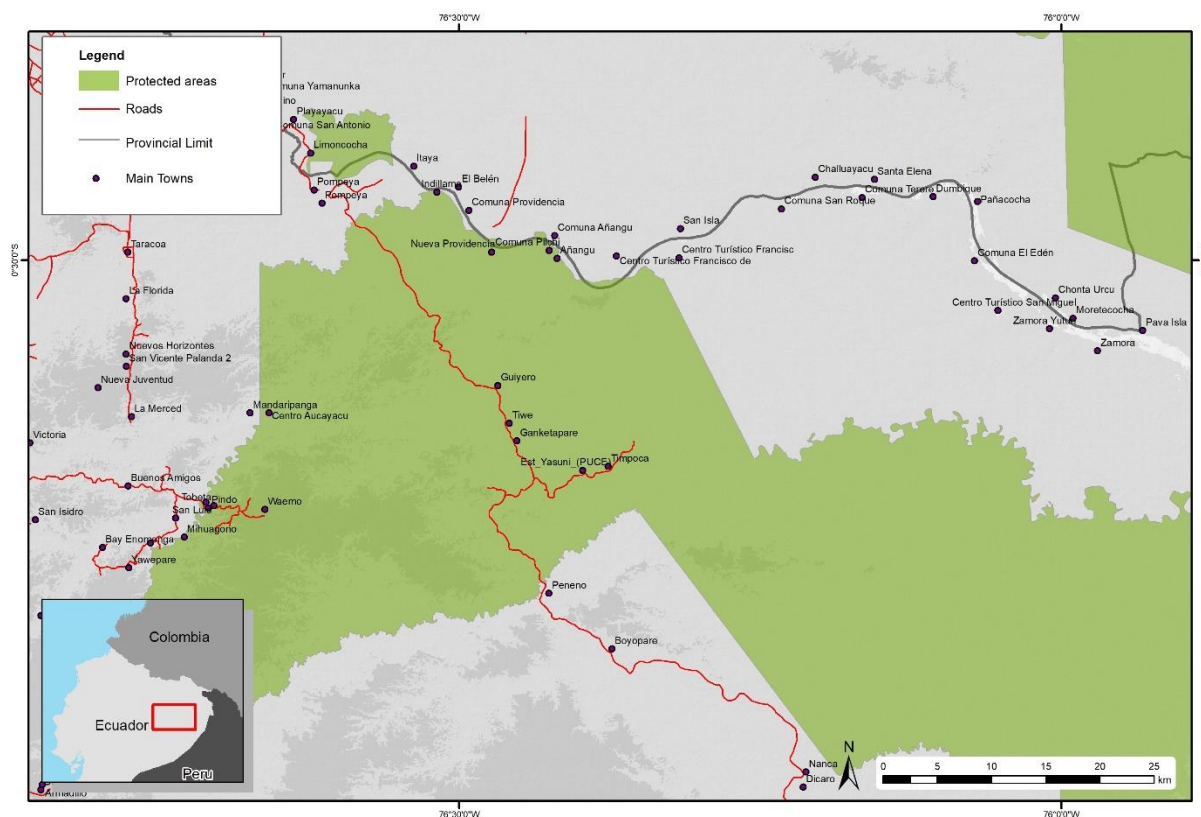


Figure 1. The study area, showing the survey communities (circles) where people were interviewed along the Napo River in 2016.

Data and Methods

Data

The data used here come from a household survey conducted in the northern portion of the YNP in March, 2016. Criteria for the selection of the communities that participated in the study, included accessibility, participation in ecotourism, and willingness to participate in the study. Due to limited resources, seven communities were selected Pañacocha, Santa Elena, San Roque, Sani Isla, Pilchi, Nueva Providencia and Indillama. One community refused to participate in the study. Most of the communities are only accessible by boat and some have ecotourism operations.

For the surveys, households within a community were selected using random sampling. For the household' surveys, we applied a structured questionnaire that was composed mainly of close questions. In the design of the survey was taken into consideration demographic, economic, social and environmental variables. The questionnaire was divided into different sections. The first part covered general

information: age of the head, place of birth, household size/ composition, land tenure, materials used for the construction of the house (observation), facilities in the house, home appliances, family patrimony, sale of crops and cattle, wage employment and means of transportation. The second component included questions on ecotourism: interest in working in ecotourism, women working in Warmi Centers, women's income, positive and negative impacts of ecotourism. Third, is a section related to the use of wildlife, hunting, frequency of consuming wild meat, animals most often hunted, among others.

A total of 132 household heads participated in this survey. We interviewed mainly male household heads, but when he was not present, we interviewed his spouse. The interview was conducted by male and female interviewers in Spanish. The research also applied a community-level survey to six community leaders (presidents), with questions about land tenure, population size, community infrastructure, facilities, zoning of the territory, use of wildlife, regulations, contact with external institutions, facilities of the lodge and other questions related to tourism.

Methods

For this study, I tried to cover the breadth of variation of systems, from communities that are not engaged in tourism activities to communities that have been already working in ecotourism for several years. I carried out an analysis where the independent variable or explicative variable was the household income and the main response variables were the wealth index, frequency of consumption of wild animals in the diet and hunting. In order to obtain the wealth index for each HH, I considered the infrastructure of the house and household items and assigned weights to the different items, according to their importance and economic value. I unified male and female incomes of the HH that work in tourism, into one single total because this reflects the true income from tourism for the household. The design of the questionnaire was based on the chosen variables, then testing and correction of the survey were done. I first applied the survey to university students and some indigenous people who live or work in the YNP area, with the purpose of checking times and understanding of the questions. Afterwards, we proceeded to field implementation of the survey.

Once the information was obtained, we passed the information of the closed questions to Excel and continued to do the data cleaning. We eliminated the non-significant information obtained in the surveys and also eliminated open questions. I deleted the open questions from the tabulation, because respondents could not express their answers clearly due to the lack of understanding of the topic. I used some of the information they gave to corroborate the answers they had chosen among given options.

To perform the analysis, we used descriptive statistics, where the data were collected, organized, presented, analysed and interpreted in a way that easily and quickly describes the essential characteristics of such information through the use of

tabular or numerical methods. We obtained frequency totals, percentages and proceeded to cross tabulation, which is the process of creating a contingency table from the multivariate frequency distribution of statistical variables. This tool is regularly used in research with surveys and allows analysis of relationships between two variables. Results obtained in the survey were tabulated and then evaluated with inferential statistics so as to reach conclusions or generalizations which provide more specific information from the original data set. We used correlations to measure the degree of association, dependence, or interdependence between variables, being in this case, the household income and the relation with their wealth index and the use of wild life.

In this project, a multiple linear regression which involves two or more predictor variables, was used to determine which variable is statistically significant. We wanted to know the magnitude of the effect of the independent variable on the dependent variable.

Results

The approximate population and number of households () in the communities involved at the moment of the survey were: Indillama 254 (55), Pañacocha 500 (78), Pilchi 220 (40), Nueva Providencia 91 (21) San Roque 210 (42), Sani Isla 600 (80), and Santa Elena 50 (10). The current study presents findings from 132 households from various communities. The questionnaires were answered by 80.30 % (106) male heads, 13.64 % (18) were the spouses and 6.06 % (8) other family members. Most of the male heads were born in the area, more specifically 40.15% in Cantón Orellana and 29.55% in Cantón Shushufindi and the rest in other places of the Ecuadorian Amazon. The mean age of the male head was 41 years and the mean household size was 6% (Table 1) and varied widely from 1 to 16 members. Fertility rate was not considered in this article.

Table 1. Diagnosis. Selected Variables in Studied Communities

	Indillama	Pañacocha	Pilchi	Providencia	San Roque	Sani Isla	Sta. Elena	Total
Population ^a	254	500	220	91	210	600	50	2175
No. Households	55	78	40	21	42	80	10	271
Interviewed	22	31	15	8	20	32	4	132
%	0,17	0,23	0,11	0,06	0,15	0,24	0,03	1,00
Selected Demographic Variables. Mean with 95% confidence								
Household size	6,50	5,45	6,80	5,63	5,65	6,78	6,75	6,18
Men	2,23	1,29	1,80	2,25	1,75	1,75	1,25	1,74
Women	1,45	1,16	1,60	1,38	1,55	1,88	1,25	1,51
Children	2,82	3,00	3,40	2,00	2,35	3,16	4,25	2,93
Male head age	45,18	40,65	39,80	47,00	39,90	40,88	34,25	41,44
Selected Off-Farm Monthly Income. Mean US\$ (Number of people)								
Agriculture	52(21)	84(17)	81(11)	45(7)	30(15)	38(14)	32(3)	54(88)

Livestock	-	35(2)	-	-	60(1)	-	17(1)	37(4)
Timber sale	-	67(1)	-	-	-	-	-	67(1)
Oil company employee	-	750(2)	880(1)	-	-	-	287(2)	591(5)
Ecotourism	240(1)	366(1)	511(3)	433(2)	-	344(9)	-	381(16)
Teacher	695(4)	-	-	-	800(1)	-	-	716(5)
Day laborer	-	10(1)	-	-	-	-	-	10(1)
Canoe driver	-	-	250(1)	-	-	-	-	250(1)

Selected Reference Tools (number of people who own)

Canoe with engine	5	9	4	-	12	10	3	43
Canoe without engine	3	8	4	7	6	13	1	42
Without its own transport	14	14	7	-	2	9	-	46
Chainsaw	19	18	8	2	12	18	4	81
Shotgun	17	6	4	5	12	13	3	60

^a Estimated

Table 1. The majority 72.73% (88) of male head income comes from agriculture. Income from on-farm activities includes annual and perennial crops, mainly coffee, cocoa and corn plantations interspersed with other sporadic crops like banana, cassava, fruits, palms and occasionally the sale of chickens.

The second most important activity is tourism with 13.22 % (16) of all heads working in the different lodges present in the area. Only 4.13 % (5) work as oil company employees; this is a sporadic activity and they work only for a few months at a time. Teachers represent 4.13 % (5); they earn a good salary, but it is difficult for indigenous people to acquire teaching credentials because of the tremendous time commitment away from home.

Men engaged in livestock husbandry corresponds to 3.31 %(4). There are only three community' heads who own cattle Pañacocha (2), San Roque (1) y Sta. Elena (1). These communities are not involved in ecotourism and having a cow is very important for them as they sell it at a good price that will allow them to help their families for an extended period.

In relation to other activities like timber sales, boat driver and day laborer, there is only one male head 0.83 % working in each activity.

Table 2. Selected Tourism Variables. Mean Monthly Income US\$ with 95% confidence (Number of people)

	Indillama	Pañacocha	Pilchi	Providencia	Sani Isla
HH Interviewed	22	31	15	8	32
%	0,17	0,23	0,11	0,06	0,24

Male head in tourism	13,64 (1)	14,39 (1)	107,47 (3)	128,25 (2)	99,50 (9)
Women in Warmi Center	0(0)	-	55,42 (12)	-	181,4 (8)
Sale of handicrafts by women	5(1)	-	76,5 (8)	-	41(8)
Household income in Ecotourism	13,86 (2)	14,39 (1)	192,60(13)	128,25(2)	155,09 (15)

Table 2. Five of the seven communities have male heads that work in tourism with an average monthly income of: Indillama \$13.64; Pañacocha \$14.39, Pilchi \$107.47; Providencia \$128.25 and Sani Isla\$ 99.50. San Roque and Santa Elena do not appear in the table because they do not have male heads or women working in tourism.

Providencia, Pilchi and Sani Isla are the communities with male heads with the greatest income, because they have been working in tourism for several years already. The community of Indillama has a small lodge known as Sacha Runa Ecolodge, they receive tourists occasionally and the income they obtain is only used for the maintenance of the hotel and the payment of the staff that works there. In the case of Pañacocha, they have a beautiful lagoon in their territory, but they do not have a lodge built by the community. On the lagoon there are a couple of lodges, but they are privately owned. The community at the moment receives only a small fee (\$10,00) from the tourists that visit the lagoon and the money is used to pay a guard and for community needs. Nueva Providencia does not have a lodge, but they have a museum the Yaku Kawsay (Yaku means water and Kawsay life, so it means the way of life). This museum, has received visitors for a few years already. At the moment of the survey they did not have the WC ready. Now it has opened; the center, "Casa Nativa", is located in the museum area and is visited by tourists from Sacha Lodge. In San Roque they do not have a hotel yet, but there is a project for the construction of a small lodge with the help of Petroamazonas. Santa Elena, according to what Mrs. Dolores Aviles, president of the community mentioned in the interview, they used to receive tourists in their land some years ago, but they had some internal problems and stopped doing it. Nowadays, they want to re-establish their touristic operation, since they have in their territory a forest in good condition and a lagoon that could be one of the main attractions for tourists.

Pilchi is a community that shares the lagoon with La Selva Lodge, and they are also the owners of a part of the forest that is visited by the tourists of the lodge. The community has had for several years an agreement with the owners of the hotel. The people from La Selva can use some trails that belong to the territory of Pilchi and in return the community receives a monthly income from the lodge. In this agreement, the indigenous people from this community were asked not to fish in the lagoon and not to hunt in the area. This is specifically how the community has benefited from tourist activity for several years. The members of the community of Pilchi are also building a camp site for tourists, known as Mandi Forest. Additionally, this community has a Warmi Center that they built approximately two years ago. The name of the

project is Mandi Warmi and the house name is Mandi Wasi (Mandi is the name of a plant and wasi means house). The center is very well designed and organized and is already receiving tourists; 28 women from the community work in four groups that rotate. Not all the women of these communities participate in this project because some of them live at distances that make it difficult to arrive to the center. Women receive a fee of \$ 5.00 from each tourist visiting the center and the money is shared by all the women who worked during the week. In addition, each woman makes and sells handicrafts.

Sani Isla, is a community that has its own lodge named Sani Lodge, they have been receiving tourists for several years already and they also have a WC known as Sani Warmi. In this WC 34 women work; the overall operation is very much like Pilchi. In Sani, men and women from the community work in the hotel for six months at a time and then they are replaced by another member of the community. In this way, the staff is rotated throughout the years, so eventually all the members of the community have the opportunity to receive money from tourism more directly. The president of the community at the moment of the survey, Mr. Alex Jipa, mentioned that the money obtained from the lodge is used to meet different needs of the community such as education, health care, canoes, aid bonds for the elderly (\$100.00), scholarships for students, food for community events/celebrations, among others.

At the moment of the survey there were only two communities actively working with a Warmi Center: Pilchi and Sani Isla. Women's mean monthly income for Pilchi was 55.42 (12) and for Sani Isla 181.4 (8). The average monthly income for the sale of handicrafts was \$76.5 and \$41 respectively. In one particular case, there was a maximum income of \$400.00. This information makes us understand that indigenous women today play a very important role in the household as they contribute with money for the maintenance of their families. Years ago that was not the case, men did not allow women to work, and women were also too shy to participate in a project of this kind, but the present economic situation has motivated women to work and men have understood this situation.

The total income for HH that work in ecotourism (Table 2), represents the male head's income who works in tourism, women working in a WC and women's income from the sale of handicrafts. In this way, the communities with the highest average monthly income are Pilchi \$192.60 with 13 HH working in tourism; Providencia \$128.25 (2HH) and Sani Isla \$155.09 (15HH). For Indillama is \$13.86 (2) and Pañacocha \$14.39 (1).

Table 3. Cross No Tourism vs. Tourism. Mean Monthly Income US\$ and Wealth Index.

	Indillama	Pañacocha	Pilchi	Providencia	San Roque	Sani Isla	Sta. Elena
HH Interviewed	22	31	15	8	20	32	4
Male head age	45,18	40,65	39,80	47,00	39,90	40,88	34,25
Wealth index	18,05	18,90	16,53	14,88	17,25	17,38	25,50

Household income Not tourism	175,95	100,15	134,40	39,25	66,65	16,44	172,00
Household income in Ecotourism	13,86	14,39	192,60	128,25	-	155,09	-
No. days HH ate wild meat last month	1,32	0,90	0,40	1,63	2,05	2,00	1,75
Male head that hunted last month	12 (55%)	10 (32%)	3 (20%)	4 (50%)	8 (40%)	9 (28%)	4 (100%)

Table 3. Mean male head age varies from 34 to 47 years. Santa Elena is the community with the highest wealth index (WI): 26. They have this index because several members of the family work in oil companies and they also own cattle (Table 1). This index is followed by: Pañacocha 19, Indillama 18, Sani Isla 17, San Roque 17, Pilchi 17 and finally Providencia 15. The wealth index does not vary significantly among all the HH from the different communities.

The households who do not work in tourism have an income that comes, according to most interviewees, from agriculture. Average monthly income is over one hundred dollars: in Indillama \$175.95, Santa Elena \$172, Pañacocha \$100.15 and Pilchi \$134.40; in the other communities is as follows: Providencia \$39.25; San Roque \$66.65 and Sani Isla \$16.44. For more detailed information, please, see Table 1.

In the case of the households that work in ecotourism, Pilchi is the community with the highest income. The reason for this finding is that Pilchi has more women (12) participating in the WC (Table 2).

In relation to the number of days the households ate wild meat in the last month, the results are as follows: in Indillama and Pañacocha, one time per month; in Providencia, San Roque, Sani Isla y Sta. Elena, two times per month. Providencia and Sani Isla have ecotourism projects, but they continue to hunt and in Sta. Elena they hunt, despite having a good income. In Pilchi they ate less wild meat than in the other communities because this community works in tourism and members are very conscientious about the conservation of wild animals for the success of the ecotourism projects, according to interview content.

The male heads hunted the month previous to the survey, approximately two times per month, and the number of male heads that hunted varies depending on the community. In Indillama and Providencia, 50% of male heads hunted. In Santa Elena, although the sample was very small (because the rest of the heads were working in the field), all interviewed heads hunted. This community does not have an ecotourism program, however several heads work in oil companies and receive a good income, but despite this, they continue to hunt.

Table 4. Selected Hunting Variables. Mean (95% confidence) and Percentage

	Indillama	Pañacocha	Pilchi	Providencia	San Roque	Sani Isla	Sta. Elena
HH Interviewed	22	31	15	8	20	32	4
%	0,17	0,23	0,11	0,06	0,15	0,24	0,03

Head has shot gun	0,77	0,19	0,27	0,63	0,60	0,41	0,75
Head that hunts in the forest	17 (77%)	20 (65%)	8 (53%)	6 (75%)	17 (85%)	22 (69%)	4 (100%)
Duration of the hunt (hours)	5,64	7,17	4,83	3,83	7,68	7,04	5,50
Finding animals today is: (easier, more difficult)	5/17	0/29	4/10	0/7	0/20	0/29	0/4
There is demand for wild meat on the market	12 (55%)	16 (52%)	3 (20%)	4 (50%)	8 (40%)	18 (56%)	2 (50%)
Head that hunts animals to sell	2 (9%)	5 (16%)	0 (0%)	1 (12%)	2 (10%)	0 (0%)	3 (75%)

In table 4, it is observed that most of the heads do not have a shot gun. The reason is that nowadays, is forbidden by the government to have and use rifles and they also mentioned that bullets are expensive in Ecuador. Most of the male heads in all the communities still hunt in the forest, but in Pilchi only 8 of the 15 interviewed still hunt. Many of the heads from this community mentioned to us that they prefer not to hunt because they want to conserve the animals for the tourism activities.

The duration of a hunting trip varies from 4 to 7 hours; the total time depends on the difficulty of finding animals. They mentioned that nowadays this task is more difficult than before, because there are more people in the communities, which means more hunting and also more noise. This information was also corroborated by the presidents of the communities.

With reference to the demand of wild meat in the market, respondents said that some people still ask for this type of meat, mainly in Pompeya, but much less than before, because there is more control from the Ministry of the Environment. All the indigenous people interviewed are aware about the control, however a few respondents 10% of the total (13 heads), still hunt wild animals to sell, but in comparison to other years, the hunting rate has dropped significantly.

Table 5. Selected Variables for The Most Hunted Animals. Total Number

	Indillama	Pañacocha	Pilchi	Providencia	San Roque	Sani Isla	Sta. Elena
HH Interviewed	22	31	15	8	20	32	4
%	0,17	0,23	0,11	0,06	0,15	0,24	0,03
White-lipped Peccary (<i>Tayassu pecari</i>)	21	11	9	8	20	27	1
Collared Peccary (<i>Pecari tajacu</i>)	5	10	4	5	12	6	3
Paca (<i>Cuniculus paca</i>)	6	18	4	3	3	2	1
Black agouti (<i>Dasyprocta fuliginosa</i>)	10	16	12	4	15	17	4
Green Acouchi (<i>Myoprocta pratti</i>)	-	-	-	-	-	1	-
White Tailed Deer	1	7	1	1	2	-	1

<i>(Mazama americana)</i>							
Tinamou sp.	1	1	2	-	3	1	-
Wild turkey sp.	1	1	-	-	7	9	-
Nine-banded Armadillo	2	4	-	-	-	2	2
<i>(Dasypus novemcinctus)</i>							
Caiman sp.	-	1	-	-	-	-	-
South American Tortoise	-	1	-	-	1	-	-
<i>(Chelonoidis denticulata)</i>							
Salvin-s Curassow	-	-	-	-	3	1	-
<i>(Mitu salvini)</i>							
Chachalaca	1	-	-	-	-	-	-
<i>(Ortalis guttata)</i>							
Monkey sp.	-	2	2	1	2	-	-

The first most hunted animal (Table 5) in general and also hunted successfully (Table 7) the last month previous to the survey, according to the answers given by the interviewees were the White-lipped Peccary locally known as guangana (*Tayassu peccary*). The guangana is a wild pig that weights between 25 and 45 Kg (Tirira 2007); in intact situations, it moves in groups of hundreds of individuals, and when the indigenous people go hunting they have many chances to hunt at least one individual. The second most hunted, is the Black Agouti o guatusa negra (*Dasyprocta fuliginosa*), weighing from 3.5 to 6 kg (Patton and Emmons, 2016). The guatusa frequently visits the chacras in order to find fruits, and according to what the interviewees mentioned, it is easier to find and kill these animals. The black agouti is very commonly consumed by the Kichwas of the region (Museo de Zoología, PUCE). The third most hunted is the Collared Peccary (*Pecari tajacu*) locally known as saíno, which weighs 17-35 Kg (Tirira 2007); it moves in groups of 3 to 20 animals (Museo de Zoología, PUCE). Wild pigs are animals of a good size that can provide abundant meat for the household, and that is the main reason why they are often hunted. The Paca (*Cuniculus paca*) o guanta de tierras bajas is the fourth most hunted animal. This is a large rodent that weighs between 5 and 13 Kg (Tirira 2007) and according to the interviewees, there is a taste preference for the meat. This preference list corroborates information obtained in previous research (Cueva 2005). Other animals that are also hunted frequently are: white tailed deer, armadillo, green acouchi o guatín, guans, South American Tortoise, sporadically caimans and monkeys (species were not specified).

Table 6. Wild Animals Eaten Last Month. Total Number

	Indillama	Pañacocha	Pilchi	Providencia	San Roque	Sani Isla	Sta. Elena	Total
HH Interviewed	22	31	15	8	20	32	4	132
%	0,17	0,23	0,11	0,06	0,15	0,24	0,03	1,00
Black Agouti	5	4	2	-	10	6	1	28
Paca	1	2	-	-	-	-	1	4
White-lipped Peccary	5	2	-	2	5	14	-	28
Collared Peccary	1	2	-	-	2	-	1	6
White Tailed Deer	1	2	-	-	-	-	-	3

South American Tortoise	-	-	-	-	1	-	-	1
Nine-banded Armadillo	3	-	1	-	-	-	-	4
Guan sp.	-	-	-	-	-	2	-	2
Green Acouchi	1	-	-	-	1	-	-	2

The interviewees were also asked about what kind of wild animal they had eaten in the last month previous to the survey. Table 6 shows that the four animals most commonly eaten in order of frequencies were: the black agouti, white lipped-peccary, collared peccary and the paca. This list of animals matches the information about the most hunted animals (Table 5) and animals hunted successfully the month previous to the survey (Table 7). The four animals always mentioned by the indigenous people interviewed are hunted by the reasons already explained before. It is noteworthy that the communities of Sani Isla, San Roque and Pañacocha hunt and eat wild meat more often than the other communities.

Table 7. Animals Hunted Successfully the Last Month Previous to the Survey. Total Number

	Indillama	Pañacocha	Pilchi	Providencia	San Roque	Sani Isla	Sta. Elena	Total
HH Interviewed	22	31	15	8	20	32	4	132
%	0,17	0,23	0,11	0,06	0,15	0,24	0,03	1,00
White-lipped Peccary	7	3	3	2	5	16	-	36
Collared Peccary	1	4	-	-	3	1	-	9
Paca	1	7	-	2	1	3	2	16
Black Agouti	5	9	4	-	10	7	-	35
Lowland Tapir (<i>Tapirus terrestris</i>)	-	-	-	-	1	1	-	2
Birds sp.	1	-	-	-	-	1	-	2
Tinamou sp.	-	-	-	-	-	1	-	1
White Tailed Deer	1	-	-	-	1	-	-	2
South American Tortoise	-	-	-	-	1	-	-	1
Nine-banded Armadillo	2	-	1	-	-	-	-	3
Green Acouchi	1	-	-	-	-	-	-	1

Social and environmental impacts cause by Ecotourism

Table 8. Perceived Positive Social Impacts. % (HH that work in tourism)

	Indillama	Pañacocha	Pilchi	Providencia	Sani Isla
HH Interviewed. Total	22 (2)	31 (1)	15 (13)	8 (2)	32 (15)
	16,67	23,48	11,36	6,06	24,00
School Supplies	14,29	-	28,57	9,52	47,62
Medicines	7,69	3,85	26,92	7,69	53,85
Food	11,43	2,86	31,43	8,57	45,71

Clothes, shoes	10,34	3,45	31,03	10,34	44,83
Purchase of goods	7,69	7,69	15,38	7,69	61,54
Revaluing culture	11,76	5,88	23,53	5,88	52,94
More communicative women	6,67	6,67	33,33	6,67	46,67
Reinforcement of knowledge of medicinal plants	7,69	7,69	23,08	7,69	53,85
Hotel training	7,14	7,14	21,43	-	64,29
Training in tourism projects	25,00	-	25,00	-	50,00
Learning a foreign language	16,67	5,56	11,11	11,11	55,56
Specialized guides courses	22,22	11,11	11,11	11,11	44,44
Permanent job	12,50	6,25	6,25	12,50	62,50
Better home care	14,29	14,29	14,29	-	57,14
Free transportation	9,09	-	27,27	9,09	54,55

In relation to the general impacts that ecotourism has caused in the household, most interviewees did not respond to these questions because they do not work in tourism. Only 42 heads responded, and of this figure 29.55% (39) think that the impacts of Ecotourism in general are positive 1.52% (2) negative and 0.76% (1 person) positive and negative impacts. In order to find out more details about the impacts, interviewees were given a few options from which they could choose the most important to them. Regarding positive social impacts, interviewees mentioned that they use the money that comes from ecotourism mainly for food, clothes, shoes, medicines and school supplies (Table 8).

Table 9. Perceived Negative Social Impacts. % (HH that work in tourism)

	Indillama	Pañacocha	Pilchi	Providencia	Sani Isla
HH Interviewed. Total	22 (2) 0,17	31 (1) 0,23	15 (13) 0,11	8 (2) 0,06	32 (15) 0,24
Tourists do not value indigenous knowledge	-	-	-	100	-
Disrespect to beliefs and traditions	33,33	-	-	-	66,67
Exposure to other customs and articles	9,09	-	18,18	18,18	54,55
Less privacy	-	-	-	-	100,00
Greater alcoholism	-	-	12,50	25,00	62,50
Migration	-	-	-	-	100,00
No longer care for the chacra	14,29	-	28,57	14,29	42,86
Men fish less	18,18	-	18,18	18,18	45,45
Men hunt less	16,67	-	16,67	16,67	50,00
There are more conflicts at home	-	-	-	33,33	66,67

In relation to the negative social impacts (Table 9), 12 people responded that men hunt less, due to the lack of time and also the difficulty of finding animals nowadays. Eleven respondents also mentioned that men fish less, due to the lack of time as

well. Other answers include exposure to other customs, clothing and/or technological articles that tourists bring, and 10 respondents think that tourists bring diseases, especially flu.

Concerning the positive environmental impacts (Table 10), respondents from Pilchi and Sani Isla have the highest frequencies for all questions. These are precisely the communities that are most involved with ecotourism. They have observed more closely the changes that have occurred as a result of this activity. In general terms, the majority of interviewees 75.76% (100) answered that conservation of wild animals is important for an ecotourism project and that ecotourism is a good alternative for the conservation of nature 76.52% (101), much better than oil extraction or timber sale. The interviewees also mentioned that it is now possible to observe more animals than before, at least in the areas dedicated to tourism operations, because indigenous people are hunting less. One of the reasons for this finding is that many communities have their own internal regulations or agreements with private ecotourism projects in which they are prohibited from hunting in areas expressly designated for the tourist operation. Indigenous people have realized that the opportunity to observe wild animals more often is very pleasing to tourists, therefore at the end of the trip, they are happy with the experience that will eventually bring more tourists to the area, which means more money to support their families. The locals also now cut fewer trees than before, principally because it is prohibited to cut and sell trees illegally. They also responded that they are learning about waste management, especially people who work in hotels, where they are trained to handle and recycle the waste properly (personal information).

Table 10. Positive environmental impacts. % (HH that work in tourism)

	Indillama	Pañacocha	Pilchi	Providencia	Sani Isla
HH Interviewed. Total	22 (2)	31 (1)	15 (13)	8 (2)	32 (15)
	0,17	0,23	0,11	0,06	0,24
Reduction of wild animal hunting	11,43	2,86	40,00	8,57	37,14
More animals are observed	12,50	-	43,75	9,38	34,38
People cut fewer trees	12,12	3,03	42,42	9,09	33,33
Improved waste management	14,29	-	33,33	9,52	42,86
Negative environmental impacts					
Noise	-	-	-	18,18	81,82
Pollution of lagoons and rivers	11,11	-	11,11	22,22	55,56
Pollution due to improper waste disposal	12,50	-	12,50	-	75,00
Trampling vegetation	-	-	-	50,00	50,00
Manufacture of handicrafts with parts of wild animals	-	-	-	-	100,00
Catching wild animals to show tourists	-	-	-	50,00	50,00
Piranha fishing	8,33	8,33	25,00	8,33	50,00

The most important negative environmental impacts caused by ecotourism according to the interviewees is piranha fishing, which was practiced heavily before. Now the administration of the YNP, has new regulations (Ministerio Ambiente Ecuador, 2015) about this activity and it is not allowed to fish piranhas anymore to delight tourists. Another problem is noise, which comes mainly from lodge generators, which has to work constantly to provide electricity. Local people believe that noise disturbs animals. They also mentioned that there is pollution in the lagoons and rivers with waste waters that come from the lodges.

To test the hypothesis that households more involved in ecotourism activities are more likely to have a higher wealth index and consume fewer wild animals than the households of communities that do not work in tourism, a Pearson correlation analysis was conducted. For this analysis, taken into consideration were household income, wealth index, number of days the household ate wild meat the last month and if the male head hunted the last month.

Table 11. Pearson correlation between Household' incomes and selected variables

		Wealth Index	Income HH not tourism	Income HH Ecotourism	No. days HH ate game meat last month	Head that hunted last month
Wealth Index	Correlación de Pearson	1	1,349**	,208	-,048	-,179*
	Sig. (bilateral)		,001	,246	,587	,040
	n	132	95	33	132	132
Income HH not tourism	Correlación de Pearson		1	,242	-,072	,062
	Sig. (bilateral)			,349	,486	,554
	n		95	17	95	95
Income HH Ecotourism	Correlación de Pearson			1	,052	,299
	Sig. (bilateral)				,775	,091
	n			33	33	33
No. days HH ate wild meat last month	Correlación de Pearson				1	-,177*
	Sig. (bilateral)					,042
	n				132	132
Head that hunted last month	Correlación de Pearson					1
	Sig. (bilateral)					
	n					132

** . The correlation is significant at the 0.01 level (bilateral).

* . The correlation is significant at the 0.05 level (bilateral).

The main correlation results, tell us that when the income for the HH who do not work in ecotourism increases, their wealth index increases too (1.35). The greater the wealth index the lower the level of hunting (-.18).

Table 12. Regression results showing the dependent variable: **Wealth Index**

Variable	B	Std Error	
(Constant)	13,949	2,236	***
Males	,800	,480	*
Age	,015	,042	
Distance	,407	,580	
Tourism	1,407	1,452	
Cattle	4,279	2,776	
Oil	5,487	2,476	**
Teacher	3,541	2,863	
Warmi	,935	1,370	

The regression results in table 12, show no significant relationship between wealth index and tourism. All the households that participated in this study, whether they work or not in tourism have similar wealth index, but it is important to take into consideration that the sample size for households that work in tourism interviewed (33) is a small number in relation to the total interviewed (132). The number of males in the HH is positive related to Wealth Index and statistically significant, which means that with more men in the household the WI increases. The same, the greater the number of male heads working in an oil company, the higher their WI.

Table 13. Regression results showing the dependent variable: **“Hunting”**

Variables	B	Std Error	
(Constant)	3,708	1,590	**
Males	,610	,298	**
Head Age	-,053	,026	***
Distance	1,193	,359	***
Tourism	-2,257	,900	**
Cattle	3,556	1,733	**
Teacher	-,090	1,786	
Warmi	-,430	,851	

In this table the number of men within the HH is statistically significant, which has a positive relation with hunting, the greater the number of males in the house the greater the amount of hunting. Age is statistically significant and negatively related to hunting hours: more advanced age, less hunting. Probably the most significant result of the regression is the negative and statistically significant relationship between tourism and hunting. The greater the number of households working in ecotourism, the lower the hunting, controlling for all other factors. Households geographically

distant from the touristic operation center hunt more, as expected. Probably because they do not have a wage salary, they do not have enough money to buy other kinds of meat and are relegated to acquiring animal protein from nature. Cattle ranching is also related to hunting, but in a positive way. Additionally, for each person who works as a teacher, the number of hours of hunting is reduced and for each woman working in a Warmi Center hunting is also reduced.

Discussion

It is important to analyze the current situation regarding the use of wildlife by indigenous communities in the Ecuadorian Amazon. The average daily consumption of wild meat among the Shuar is 71 gr / day (Zapata et al. 2009), 56 g / day among the Kichwa (Zapata 2001) and 91 gr / day among the Waorani (Mena et al. 2000). The Kichwa natives of the Napo River depend on protein from wild animals for family consumption, a different use of wildlife is made depending on the economic conditions of each community (Wildlife Conservation Society 2007).

Indigenous peoples have hunted for millennia, in ancient times indigenous people were constantly moving in the forest, in such a way that ecosystems had the opportunity to recover. The problem that arises today is that indigenous people live in a sedentary way and after a short time they have overexploited the resources of the surrounding environment and finding wild animals to hunt (Table 4) becomes more difficult. Some of them do not carry out a subsistence hunt, which consists in not substantially reducing the population size of the hunted animals, but only satisfying the nutritional needs of the families. Unfortunately, some indigenous people now hunt wild animals not only for their own consumption which is legal and likely sustainable, but also for sale in local markets (Suárez et al., 2009) or parts of animals for various uses (Cueva 2005). Reaching a viable solution to this problem is imperative, since hunting has negative ecological impacts on wild animal populations, causing them to decline (Redford 1992, Milner-Gulland and Akçakaya 2001) and sometimes to become extinct (Oates et al., 2000, Mena et al., 2000); also the dynamics of ecosystems could be affected in the medium and long term (Terborgh 1988, Dirzo and Miranda 1990). In addition, the reduction of average body size of the prey species and changes in the geographical distribution of the hunted animals (Bennett and Robinson 2000) have been documented. A good option to contribute in some way to solving this problem could be ecotourism. The income obtained from ecotourism activities has allowed the indigenous people to buy chickens or ducks to raise them in their homes for food, or buy beef or pork to supplement their protein consumption. The purchase of meat of domesticated animals, lowers the pressure exerted on wild species.

In the analysis presented in this article we provide information about the importance of ecotourism in the reduction of hunting wild animals. Among the sample of seven communities we found important similarities as well as differences. Most of those surveyed responded that hunting today is more difficult than in the past due to the decrease of wild animals, probably because of over hunting. In addition, today is

forbidden to hunt for commercial porpoises and it is controlled by the Ministry of the Environment, therefore is more difficult to sell wild meat in the markets. They also mentioned that is more difficult to go hunting because ammunition is expensive and rather complicated to acquire in Ecuador, so local hunters often turn to Peruvians to make these purchases.

According to the results obtained, when there are more people working in ecotourism, the level of hunting decreases. This could be explained by the fact that a good income, not only from their salaries but also from tips, allows them to buy other types of meat. Also many of them are very aware of the conservation need of wild animals for the success of tourism operations. This finding is very important, because it means that ecotourism indeed contributes to the reduction of wild meat consumption.

In addition, the highest percentage of heads that hunt and eat more often wild meat are in Sani Isla, San Roque and Pañacocha. Sani is a community that has a large population (approx. 600 inhabitants, 80 HH), therefore the percentage of hunting goes up and also seems to include preferences for eating wild game instead of other kinds of meat. Several interviewees mentioned to us on several occasions that the people of Sani hunt more. Pañacocha does not get much income from tourism due to previously explained circumstances, and in San Roque they do not have an ecotourism project operating, therefore they probably hunt more wild meat for their families and also for sale. I surmise that if more households had been surveyed, especially households belonging to the community of Añangu, heavily involved with ecotourism, the results could change significantly. Unfortunately, permission to conduct the survey in this community was not granted.

In relation to the wealth index, there is not much difference between HH who do not work in tourism and HH working in tourism. The information obtained, should not be generalized since the number of households surveyed working in ecotourism was not representative (a mere 32 of 132 households). When we compare the total average income, just a few HH who do not work in tourism have good incomes that come from agriculture, work in oil companies and as teachers. Off-farm employment provides an important source of income for many families, but, it is not easy for them to find a job. In regards to the households working in ecotourism, they have a good income that allows them to have a better quality of life and they also receive training in hospitality and learn about conservation. Additionally, results obtained in this research reveal that women play a very important role as they contribute significantly to the household wealth index and also to the reduction of hunting hours.

In previous studies, ecotourism has been found to contribute to the economic development of indigenous peoples and to the improvement of their quality of life (Mbaiwa and Stronza 2010, Zanotti and Chernela 2010). The ideal scenario would be for indigenous people to operate their own projects so that they receive direct income and can use those resources to improve their living conditions. An example of this type of ideal management is the case of the Kichwa Community of Añangu in

Ecuador, which has been operating its lodge successfully since 2008 (History of the Community Kichwa Añangu 2013). The benefits of ecotourism have resulted in individual and collective improvements. Ecotourism has become an economic activity that constitutes an important source of income for the indigenous people who participate in it. The money that people earn working in the lodge, or through the sale of handicrafts, is utilized in education, health, purchase of goods and articles of personal use. When the lodge is run by the community, like in the specific cases of Sani Isla and Añangu, a good part of their income is indeed used for activities related to education, medical care, purchase of medicines and general improvement of community services. This type of experience could be reproduced in other communities with potential tourist attractions.

There are several researchers who have reported the impacts of tourism on indigenous groups (Mc Kean 1982, Volkman 1990, Picard 1993, McArthy 1994). Positive and negative impacts depend on the location and type of tourism being carried out (Dogan 1989). Smith (1989) has mentioned that when the flow of tourists is small and sporadic the cultural impact is minimal and when the visitor group is large, the cultural heritage of the peoples is jeopardized (Jafari 1983, Craik 1991).

In relation to the positive impacts ecotourism has brought to surveyed households, of money specially to buy clothes, shoes, food and for education, among others, as mentioned before (Table 8). These findings are very similar to results obtained in a previous study carried out in 2001 in the northern region of Amazonian Ecuador (Lu et al., 2001) with five indigenous groups: the Kichwa, Shuar, Cofán, Secoya and Waorani where they indicated a preference to buy items such as: pots, ammunition, machetes, cook stoves, sewing machines, outboard motors, generators, televisions; personal items such as clothing, shoes, watches, cosmetics for women, school supplies and toys for children. All indigenous communities in the Ecuadorian Amazon are moving from their traditional lifestyle to a more western lifestyle, becoming more involved with wage labor, buying and selling products on the market, buying artifacts and articles of various kinds. (Lu et al. 2001). The results of previous studies and the present research reflect what is happening with all the indigenous people of eastern Ecuador and possibly in other parts of the Amazon Basin.

The main negative impacts found in this study, are that men are hunting and fishing less than before, because they work and do not have enough time for these activities, therefore there is less consumption of protein in the HH. In this case, sometimes the oldest son or another member in the household will go hunting, although most of the time they will simply not eat wild meat. They also mentioned that they are exposed to other customs and articles brought by foreign tourists. The entrance of money received by the tourist operation changes the culture of the people since it facilitates travel out to cities and the exposure to other customs and conveniences (Smith 2003). The problem must be handled with resistance and resilience within communities in order to make the necessary changes and buffer the disturbance (Carter and Beeton 2007). All indigenous peoples are exposed to

changes and pressures offered by a westernized, modern world and for that reason, they are in need of finding other sources of economic income to meet expenses.

Conclusions

Although off-farm income including tourism is considerable and better paid, most of indigenous people still depend heavily on agriculture for their survival. Due to the low fertility of the Amazonian soils, affordable and non-contaminant fertilizers could be used to increase production and obtain higher incomes. Local authorities should consider developing and financing organic coffee, cocoa and corn production projects in all indigenous communities, to give people the opportunity to have a more stable, permanent income.

There is no relationship between people who work in tourism and wealth index, which means that ecotourism does not necessarily improve socioeconomic conditions of indigenous people, while other economic activities do. However, it must be considered that the scenic beauty, biodiversity and cultural richness of the Amazon rainforest presents all the necessary conditions for the development of sustainable economic activities such as ecotourism.

Ecotourism can contribute to the reduction of hunting and consequently, conservation of wild fauna. In general ecotourism can contribute to the conservation of nature, since for the development of this activity there is no need to destroy the forest. On the contrary, it must be preserved in order to offer the tourists a natural environment without alteration. The interest of the people for the conservation of nature has increased with the passage of time. This is one of the fundamental reasons ecotourism has grown in recent years, and tourists from all over the world come to the Amazon to enjoy its scenic beauty, diversity of species and also the opportunity to know and learn about various ethnic groups. Ecotourism could become an important ally in the conservation of biodiversity, by providing an income to the indigenous people, which in turn would allow households to have a better standard of living, lower the hunting rate and eliminate the commercial sale of wild meat.

The government and more private organizations should help indigenous people carry out new ecotourism projects or improve the ones that already exist with the full participation of the communities. Special attention needs to be paid to the group of indigenous women who are participating in Warmi Centers. In many cases, the woman is the only member of the family who provides an economic income to the household. Today women increasingly play a fundamental role in changing the socioeconomic conditions of households. Local governments need to financially support communities to develop such projects and develop workshops that allow all indigenous men or women to obtain better training in the development of handicrafts using their own skills and local materials. In general, people interested in the well-being of communities and in the conservation of nature should provide training in different areas that would allow indigenous people to find a job, compete in the market and lower pressure on natural resources.

Ecotourism constitutes an alternative of economic development for indigenous people, which does not endanger the conservation of nature. However, all tourist activity produces positive and negative impacts. Negative impacts on nature and culture of indigenous peoples should be minimized through regional or national guidelines to allow proper management and development of tourism in the Ecuadorian Amazon. The government could request environmental and cultural impact assessments of tourism projects before implementation. These activities should focus on the conservation of nature and the strengthening of the culture of local people.

It is necessary to continue this type of studies to delve deeper into the subject and to better evaluate the role of ecotourism in the conservation of wildlife and in the socioeconomic conditions of indigenous peoples. Results obtained from this study may contribute to the development or improvement of ecotourism programs that allow indigenous people to improve their quality of life and at the same time reduce the use of wild animals for the common good of the people and the Amazon ecosystem. It is very important to develop strategies to improve the relationship between ecotourism, conservation and sustainable development.

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