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## Is biodiversity conservation possible?

A Case study on penguin conservation and local development in Chiloé, Chile.



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**Abstract:**

The loss of global biodiversity and the ongoing degradation of ecosystems are becoming increasingly prevalent. Shaped by habitat loss and fragmentation as well as unrestrained exploitation, scientists believe that we are entering a phase of global mass extinction of species. However, there are numerous projects all around the world, trying to combine biodiversity conservation and local community development in order to effectively protect the remaining intact ecosystems and their biodiversity.

The case study site of Puñihuil is located on the Island of Chiloé in southern Chile. The focus is a penguin conservation project, initiated by a Chilean NGO in 1997 that has led to the protection of the three islands colonized by Magellan and Humboldt Penguins, in close vicinity to the coastline. Representing an outstanding ecological value with the only known mixed colony of those two penguin species, the islands were declared a Natural Monument of Chile in 1999. However, once being a pristine beach with only a small number of local fishermen, Puñihuil is nowadays a bustling tourist attraction in the area, receiving an increasing number of visitors during the yearly season. Within ten years, the face of Puñihuil has changed. Higher revenues for the local population accompanied with more tourism infrastructure built, increased ecosystem degradation and questionable penguin conservation success are the most prevalent results.

The complexity of conservation issues is highlighted in this thesis and material and results claim that the continuation of the current trend has negative effects on the ecosystems, the biodiversity of the islands as well as the attractiveness of Puñihuil as a tourism destination. Thus, it is strongly advised to establish a management plan backed by government authorities and local stakeholders in order to achieve a more sustainable use of the local biodiversity combining conservation efforts and local development.

**Keywords:** Chiloé, Penguin conservation, Biodiversity, Local development, Tourism

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## List of Abbreviations

|            |   |
|------------|---|
| CBD        | – Convention on Biological Diversity  |
| CCC        | – Centro de Conservación Cetácea [Cetacean Conservation Center]                   |
| CITES      | – Convention on International Trade in endangered Species of Wild Fauna and Flora |
| CLD        | – Causal Loop Diagram   |
| CMS        | – Convention on Migratory Species   |
| CONAF      | – Coperación Nacional Forestal [National Forest Corporation]                      |
| CONAMA     | – Coperación Nacional de Medio Ambiente [National Environmental Commission]       |
| ENSO       | – El Niño Southern Oscillation  |
| FO         | – Fundación Otway [Otway Foundation]  |
| IUCN       | – International Union for Conservation of Nature                                  |
| MDG        | – Millennium Development Goals  |
| MEA        | – Millennium Ecosystem Assessment   |
| MEAS       | – Management and Exploitation Areas   |
| NGO        | – Non Governmental Organization   |
| SERNAPESCA | – Servicio Nacional de Pesca [National Fishing Service]                           |
| SERNATUR   | – Servicio Nacional de Turismo [National Tourism Service]                         |
| SWOT       | – Strength, Weaknesses, Opportunities and Threats                                 |
| TAC        | – Total Allowable Catch   |
| WTP        | – Willingness to Pay  |

## Currency Conversion Rates used in the thesis

Apart from governmental or other financial data, all monetary values will be displayed in Euros [€]  
Chilean Peso (\$) to Euro (€): \$700 = €, as of April 5th 2008

## **1 Introduction**

### **1.1 Problematique**

The global destruction of once pristine nature and ecosystems, coupled with an increasing human population, results in an escalating loss of species and ecosystems, jeopardizing the ecological services our society continuously receives (Costanza et al., 1997; Walker et al., 2005; WWF, 2006; MDG Report, 2007). This alarming development is of a greater than ever urgency and the best efforts so far have achieved no more than slowing the pace at which mass extinction gathers momentum, but they have not reversed it (Myers, 2003). The pressure which is put on our ecosystems is ever increasing and tough efforts to rebalance the human and the natural spheres are of utmost importance, not only for the survival of global biodiversity, but for our own (Walker et al., 2005). Moreover, global climate change puts additional pressures on the world's ecosystems and biodiversity, which represents a high probability to further increase global extinction rates (Stern Report, 2006).

The Convention on Biological Diversity [CBD], adopted in 1992 at the Earth Summit in Rio de Janeiro, has defined biodiversity or biological diversity as:

...the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems” (CBD, 2006).<sup>1</sup>

As a result, the global threat to biodiversity became an integral part of the United Nations General Assembly and was included in the Millennium Development Goals, under target seven (UN, 2000; UNDP, 2000). Still, habitat destruction is at present the major contributor to the increasing loss of species (Myers, 2003). Estimates say that 10 – 50 percent of well-studied higher taxonomic groups (mammals, birds, amphibians, etc. ) are currently threatened with extinction and among all bird species, penguins belong to one of the most threatened families with 10 of all 17 penguin species being under risk of extinction (Baillie et al., 2004).<sup>2</sup> Nevertheless, the real rate of biodiversity loss on a global level is still debated, but it is widely acknowledged among experts that extinctions are increasing globally (Pearce, 2007).<sup>3</sup>

National parks, nature reserves, natural monuments, marine reserves etc. form an important part of world-wide conservation efforts to protect global biodiversity. However, it was realized that conservation can only be successful if those efforts are combined with development and employment opportunities for stakeholders, thus encompassing not only biocentric but also social aims (McNeely, 1992; UNDP, 2000; Myers, 2003). It is essential for the success of any conservation project to involve the local communities which often carry the bigger share of costs associated with conservation efforts<sup>4</sup> (Chan et al., 2006). In 2002, the parties to the Convention on Biological Diversity committed themselves:

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<sup>1</sup> A more precise differentiation is ecosystem diversity, species diversity and genetic diversity (CBD, 2006)

<sup>2</sup> Baillie et al., 2004 referred to 58.8% of penguin species being threatened, representing 10 out of 17 penguin species

<sup>3</sup> It is unclear how many species there are on our planet and thus no real rate of extinction can be calculated (Pearce, 2007)

<sup>4</sup> This could include opportunity costs of giving up access to certain natural resources, hunting or fishing grounds, etc.

...to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth. (CBD, 2007a)

Subsequently, this target was endorsed by the World Summit on Sustainable Development (WSSD, 2002). As a consequence, efforts are reframed as 'biodiversity for development' and not 'biodiversity or development' (Brown, 2004).

Unfortunately, as of today we still lack a complete and realistic internalization of nature's services, valued at approximately \$US 33 trillion per year, into our economic system, valued at around \$US 48 trillion in 2006 (Costanza et al., 1997; Daly, 1999; WorldBank, 2008). This has implications on global conservation efforts which are often marginalized by short-term economic or social interests, generating higher profits at first without taking into consideration the long-term loss of natural capital and ecosystem degradation. Hence, the protection of biodiversity will be more successful through actions that acknowledge its economic merits (CBD, 2007b).

Yet, there are positive cases for species protection including the increasing importance placed upon the effects of tourism and its potential positive impacts for species and ecosystem conservation (Eagles, 2002; Tapper, 2006; Bishop, 2008). All over the world communities and businesses are realizing that the protection of biodiversity can exceed the income derived from destructive forms of exploitation and, if planned and managed well, tourism can contribute to a more sustainable form of development and increased welfare, on local, regional and national levels (Bishop, 2008). Among many others, there are prominent stories of success, such as the gorilla-watching tourism in Central Africa or the whale-watching and penguin tourism in Península Valdéz in Argentina (Tapper, 2006). Thus, there are projects that have proved how, foremost ecotourism and wildlife-watching generates higher income for local populations than the exploitation and other use of wildlife, thus contributing to the conservation and protection of species and ecosystems. Still, diverse aspects have to be considered and carefully analyzed if a conservation project linked to tourism shall be successful, such as the role of the government, stakeholder interests, and ultimately, the balance between economic and ecological management principles (Eagles et al., 2002; Tapper, 2006). Also, evidence and experience around the world have shown that rapidly increasing and badly planned tourism has negative consequences for the affected ecosystem (Gössling, 2002; Tapper, 2006; WWF, 2008).

Nevertheless, it is also argued that, above all, the biosphere in which species live has to be protected, but often this ecosystem approach is overruled by economic interests (Myers, 2003). Ethical questions also arise and many scholars have argued that sometimes conservation has to be done for: "...biodiversity's sake, not for its direct human benefits" (Chan et al., 2006:1). Although conservation in itself should be imperative for our society, the establishment of protected areas represents a necessary response to counteract the ongoing destruction and the loss of ecosystems. However, in order to mitigate the true cause one will have to address the underlying fundamental economic and social factors that threaten biodiversity (Gössling, 1999). As a consequence, already in the beginning of the 1990's, it was claimed that biodiversity

can not be separated from social and economic development and this was followed by a shift in protected area management strategies towards integrated development combining conservation and sustainable uses<sup>5</sup> (McNeely et al., 1990; WWF, 1995; Tapper, 2006; WWF, 2006).

It is obvious that functioning and healthy ecosystems are essential for sustainable development, especially with regards to providing the services that we and future generations depend on for life. Thus, biodiversity considerations have to be integrated into any poverty reduction strategy (CBD, 2007b). As a consequence, biodiversity protection is being addressed to a greater extent and increasingly receives global attention.

## **1.2 Scientific relevance and intended outcome**

The scope of this thesis encompasses a study of a small-scale conservation project and its effects on local and regional development. A transdisciplinary approach (Max-Neef, 2005) is used, focusing on tourism, its effects and implications on development and conservation. The case study site of Puñihuil is currently amid the crossroads of social, economic and environmental tensions, which makes this area an interesting case study, having applicable value for researchers and stakeholders. It further represents a real showcase where changes towards or away from sustainable development are happening.

The main aim of this thesis is to investigate to what extent the current development of tourism in Puñihuil is affecting penguin conservation and local economic development. The analysis of conflicts and obstacles will help to deepen the understanding of the functioning of conservation projects and their results as well as serve as an example of how to avoid conflicts. This can lead to more success in other conservation projects in similar settings.

Thus, in line with Yin (2003), having chosen a case study for my thesis allowed me to analyze a real life conservation project and to experience its positive and negative impacts first-hand under the contextual conditions of the case. The intended contribution to the theoretical debate shall be the provision of an example about how biodiversity conservation can enhance and influence regional development, mainly through tourism. Vice-versa, it shows how uncontrolled development and the lack of management strategies have negative consequences on the conservation success itself. Lincoln & Guba (in Gomm et al., 2000) say that transferability, defined as the degrees of fittingness to other cases, is important. The degree of fittingness is defined through the similarity of the case-study to conditions and environments in other places. Within a Latin-American context, this specific case study shall help to illustrate the local and regional impacts caused by a particular conservation project and will further analyze this development from a transdisciplinary perspective (Max-Neef, 2005). This is increasingly required for research on development

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<sup>5</sup> "Sustainable use" means the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations. (CBD, 2006)

and sustainability issues in order to seek systemic and holistic solutions to global problems (Mikkelsen, 2005).

Another contribution and intention is to give voice to and to provide support and help for the stakeholders involved in this particular conservation project, which, as Ragin (1994:83) said should be a social researcher's primary aim. This includes the local community, government officials, non-governmental organizations [NGOs] and the Otway Foundation which initiated the conservation work in Puñihuil. The economic impacts investigated in this study ought to show the actual importance of Puñihuil for the local and regional community and urge decision-makers to provide for a better management and a more sustainable use of the local biodiversity, as stated in Eagles et al. (2002).

### **1.3 Analytical framework**

Driven by the aforementioned rationale and under the different facets of sustainability, including economic, environmental and social perspectives, the following research questions served as guidance in the data and information collection. Qualitative research through literature review and interviews further clarified concepts and enhanced my understanding in order to answer the research questions (Ragin, 1994).

**Main research question:    What are the interrelations of species conservation and local development in this particular case?**

Sub-research questions:    To what extent does tourism in Puñihuil pose a threat to the protection of the penguin population?

How can obstacles that impede local development be overcome in order to more successfully conserve biodiversity?

Although the use of sustainability indicators often faces critiques as not being reductionist and trying to combine and encapsulate complex and diverse processes in a few simple measures, as acknowledged by Bell and Morse (1999), I will make use of some indicators in order to simplify the complexity of the situation in Puñihuil.

The indicators consist of economic indicators and ecological indicators about the penguin population (Section 4.1.), the tourism development and the generated income from tourism (Section 4.3.). Furthermore, a short section will present data about the local boat-tour operators (Section 4.5.).

## **2 Methods and Materials**

### **2.1 Methodological approach**

The case study approach is a research strategy in itself and aims at investigating a present-day phenomenon within its real-life context (Yin, 2003). I analyzed what conservation work, on the ground, actually implies. In order to obtain greater theoretical knowledge, social and natural science literature was reviewed, which, in turn, led to the identification of the key areas to be further analyzed. A trans-disciplinary approach was chosen and the resulting combination of qualitative and quantitative data from different disciplines

enhanced my perspective (Bryman, 2004). The use of qualitative research highlights knowledge, elaborates and refines images, clarifies concepts and uses those concepts for the sake of 'giving voice', one main intention of this thesis (Ragin, 1994:83). The quantitative research consisted of gathering data with relevance to the case study, which was analyzed in order to draw conclusions from it (ibid.).

Grounded theory and analytical induction played an important role in my research, as both combine inductive and deductive approaches, directing investigators to be aware of evidence that challenges or disconfirms whatever images are developed (Ragin, 1994; Bryman, 2001). Before the field study, I started off with a deductive approach for my research, where I had a general theory about conservation and the possible positive impacts on local development in mind, which was framed into the research questions.

However, the stay in Puñihuil and its specific characteristics directed my research towards a more inductive approach as I realized that the pre-understanding and the initial theory will apply only partly to my case-study setting. Hence, during the field stay, the collected data added new findings to my understanding of the case study and refined the tentative analytical framework of the research in an iterative process.

Within this methodological construct, I also conducted what is called evaluation research in order to find out if the conservation project did have a positive effect on the local development and the community, and vice versa (Ragin, 1994). This was mainly done through specific questions about the personal life situation of the local interviewees. Triangulation of data and sources was used in order to increase the value and the reliability of the acquired information (Yin, 2003).

## **2.2 Material and data availability**

Before the arrival on the case study site, the data collection included literature reviews about conservation and development-relevant issues; some was specific to Chile while other material was used to give a deeper understanding of the concepts and theories. However, the amount of published information about the case study site is very limited, so that most information was gathered and collected during the two month (January and February of 2008) I spent in the field, working as a volunteer for the Chilean NGO Fundación Otway [FO] in Puñihuil. The field research allowed me to make own observations and to establish valuable contacts among local stakeholders and tourists, who served as respondents. Researchers from another NGO, the Cetacean Conservation Center CCC [Centro de Conservación Cetácea], FO staff and government officials were valuable informants. Sampling of interviewees was based on convenience and accessibility as well as the snowball effect, where interviewees refer to new valuable contacts (Kvale, 1996). In total, 18 people were interviewed, including local fishermen who offer boat-tours during the season (Interviewees 10/11), tour operators and employees (Interviewees 2/12/13/14/17), scientists (Interviewees 3/5/8), FO staff (Interviewees 1/15), CCC staff (Interviewees 3/8/), government officials (Interviewees 4/5/6/7/16/18) and a hotel owner (Interviewee 9).<sup>6</sup> The obtained qualitative data was essential to acquire a better and deeper

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<sup>6</sup> A list of the interviewees with the respective number coding plus a set of questions is represented in Appendix 1 & 2

understanding of local habits and culture. Furthermore, the interviews aimed at finding out the general attitudes towards the penguin conservation project, the past and the present situation at the beach (social, environmental and economical), local conflicts, problems related to the development of tourism and to understand what role the government has with respect to biodiversity protection and local development at the case study site. The interviews were conducted in prearranged meetings, were semi-structured and the questions differed according to the professional occupation of the interviewee (Kvale, 1996).<sup>7</sup>

Furthermore, I conducted tourist surveys in the form of a questionnaire, in English and Spanish, in order to obtain some quantifiable data about the visitor's attitude, behavior and knowledge and also to gather information about possible reactions towards the introduction of a hypothetical management plan for the beach, which could serve as a future tool to improve the conservation work combined with more planned tourism development.<sup>8</sup> The survey aimed at tourists who had already gone on a boat-tour. At the end of each question there was an option for the respondent to add personal comments and some will be presented throughout the thesis. In total, 160 completed surveys were obtained. For this method, I approached tourists who came back from a boat-tour, asking them to fill out the questionnaire.

In addition, I constructed statistics about visitor arrivals to Puñihuil and the number of daily boat tours leaving for the islands based on my own observations.<sup>9</sup> Up to this point, there are no reliable records about visitor numbers from any of the past years. To construct the statistics, I did a visual count of visitors leaving for boat-tours per day, noting the number of tourists on the boat, the time of the day and the respective tour operator. This was done for a total of 16 days, which is preselected a week in advance, so that my choice would not be based on good or bad weather and included weekdays and weekends throughout the high-season of January and February. With the help of the collected data and information, a more complete picture of the current situation in Puñihuil will be constructed in the following chapters.

### **2.3 Limitations and system boundaries**

Up to this point, there are no comprehensive studies about the development of tourism, its effects on the local economy and its positive and negative consequences for the conservation in Puñihuil. My thesis represents an effort to close a gap and to provide local decision-makers, scientists and stakeholders with valuable insights, data and information to the recent development in a comprehensive way. In order to give a complete picture, I chose a broad approach versus going into depth of one specific issue.

Although Yin (2003) stated that a multiple case study design is often preferable, I opted for a single case study design, due to time and financial constraints. However, this case embodies representative features transferable to other cases, because fisheries, tourism and biodiversity conservation are interconnected activities which take place in many coastal regions (see Section 3.6/CLD 2 and Section

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<sup>7</sup> A sample of interview questions is provided in Appendix 2

<sup>8</sup> The questionnaire is provided in Appendix 3

<sup>9</sup> The list of days, number of daily tourists and boat tours as well as calculations, are provided in Appendix 4

4.9/CLD 3). Hence, there is a high degree of fittingness, used to characterize transferability, applicable to other settings (Lincoln & Guba, in Gomm et al., 2000)

Concerning the dilemma of objectivity, which has to be a researcher's primary intent, collecting data and information through interviews generally includes a certain level of misleading and incorrect information which has to be acknowledged. Every researcher is a human being and therefore, by definition, never 100 percent objective and unbiased, as opposed to the principle of positivism (Bryman, 2001). My mere presence as an outsider working for the Fundación Otway, who had a different stance and operated under a different paradigm than the local stakeholders made my research more difficult and during the stay in Puñihuil I had to build personal relationships to overcome mistrust. Furthermore, although I speak Spanish fluently it cannot be denied that certain language barriers complicated my research, as with any other language that is not one's mother tongue.

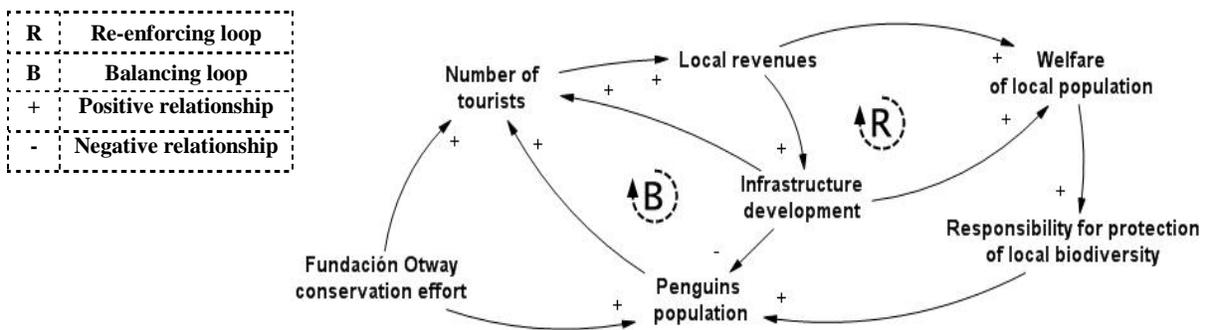
With regards to system boundaries, limitations had to be made with respect to specific ecological aspects. There are several local and regional ecological factors that influence the Puñihuil penguin population, especially as penguins are migratory birds. Hence, those factors cannot be fully taken into account as this would go beyond the scope of this thesis. Furthermore, even though local and regional fisheries have an important role in relation to penguin conservation, this paper will not analyze fisheries in detail as this would require further research. However, both aforementioned aspects are very important and in order to give some understanding of the complexities and interconnections in Puñihuil, some data will be represented to a certain extent. The temporal and spatial boundaries include the last ten to fifteen years, the community of Puñihuil and the administrative municipality of Ancud in north-western Chiloé.

### 3 The Setting

#### 3.1 The first impression

Upon arrival in Puñihuil, I thought that this case would be a positive example of how biodiversity conservation and ecotourism represent a mutually beneficial relationship, which is praised as the new tool for species protection and local development (Tapper, 2006). My pre-understanding of the system can be presented as the following Causal Loop Diagram<sup>10</sup> [CLD]:

**Figure 1 – CLD 1: The first impression of the system**



<sup>10</sup> Causal Loop Diagrams are used in systems analysis approaches to sustainability problems in order to understand the connections between a set of stakeholders and their actions and to see how those actions impact the system

The conservation efforts of the Fundación Otway had mainly two positive effects, it helped to stop the penguin population decline and it increased the number of tourists. The latter led to more local revenues, which in turn had positive effects on local welfare and on infrastructure development. With the local population realizing that the conservation work had overall positive effects on their well-being and their incomes, they would feel more responsible for the local biodiversity, which benefits the penguin population.

Yet, the main challenge was that infrastructure development would lead to negative effects for the ecosystem, here represented as the penguin population. In the course of my field work, I came to witness that this initial perception was flawed and the following chapters will investigate and give evidence why this is true.

### **3.2 Chile, Chiloé and Puñihuil Bay**

The South American country of Chile is a long narrow strip of land stretching along 38° latitudes, between the Pacific Ocean in the west and the Andes mountains in the east. The country has one of the highest ratios of coastal kilometers to territory per km<sup>2</sup> in the world. Although Chile has very different climatic and thus environmental zones (due to its more than 4,300 km north-south length), oceanographically it has greater ecological homogeneity due to the influence of the cold water Humboldt Current along almost its entire national coastline (Alvial et al., 1998). The majority of its 16 million inhabitants (IMF, 2008) live in the central parts of the country, in and around the metropolitan area of Santiago.

In Chile, 40 percent of the national territory constitutes one of the nine designated biodiversity hotspots in Latin America, the Chilean Winter Rainfall – Valdivian Forests Biodiversity Hotspot, characterized by numerous endemic animal and plant species (Conservation International, 2007).

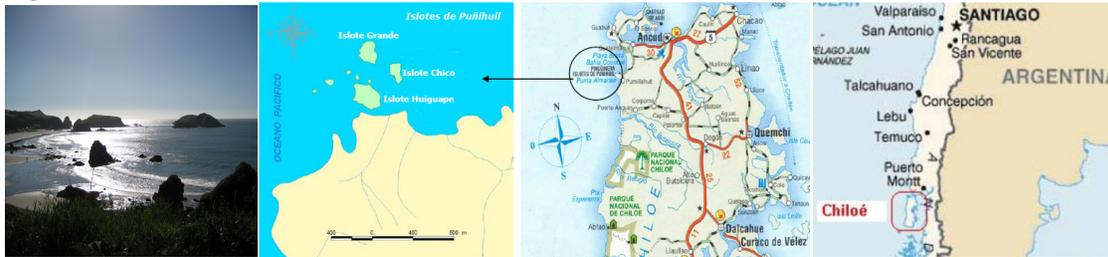
The greater island of Chiloé is situated roughly 1,000 km south of the capital city, Santiago de Chile. Chiloé belongs administratively to the 10th Region of 'Los Lagos', the Lake District. Being the second biggest island in South America with an area of around 9.181 km<sup>2</sup>, Chiloé has also been called 'The forgotten island' and still has a distinct culture compared to mainland Chile. The climate is characterized by a cool temperate type of weather with high rainfall all year around, to which the island owes its dense green forests making Chiloé a part of the Valdivian Forests Biodiversity Hotspot. (Barrett et al., 2002)

Principal economic activities in Chiloé are fishing, agriculture, aquaculture (mostly salmon and shellfish farming), forestry, and, increasingly, tourism. Aquaculture, as an economic sector, has gained importance for Chiloé in the past years, having enormous impacts on society and ecosystems, primarily on the east coast of the island, where most fish-farms are located (Barret et al., 2002; León-Muñoz, 2007).

The case study site of Puñihuil (meaning 'calm bay' in the local indigenous Huilliche language), situated in the north-western part of Chiloé on the shore of the Pacific Ocean, is a remote, one kilometer long, sandy beach. Some hundred meters of the beach, the three islets with the penguin colonies can be found. Administratively, Puñihuil belongs to the sector of Duatao, which in turn is part of the municipality

of Ancud, the former capital of Chiloé (Personal communication, Interviewee 18). Ancud is located approximately 45 minutes away and is reached by a 12 km gravel road and 11 km asphalt. The next bigger town is Puerto Montt, approximately three hours away by car.

**Figure 2 – Location of Puñihuil**



Source: Own photo, Google maps

The beach of Puñihuil was used as take-off point for local artisanal fishermen for a long time. However, with the rise of the Chilean Abalone fisheries [*Conchelapa Conchelapa*] (also called 'loco'), in the mid-1980's, a larger number of fishermen, mostly from northern Chile, migrated to this area. What followed was an increase in human settlements, the construction of fishing huts and more fishing boats. Before, only very few fishermen lived in Puñihuil and the area was nearly untouched and only little influenced by humans (Personal communication, Interviewees 1/5/9/10/11/13/15). These days, the beach counts two restaurants, one small food stand and a small hotel with cabins and an associated restaurant, all constructed after 1997.

### 3.3 The penguin conservation project

In the past years, penguins have become increasingly used as so called 'flagship marine species' (Fernández & Castilla, 2005) world-wide and recent films (e.g. 'March of the Penguins' from 2005, 'Happy feet' from 2006, 'Surf's Up' from 2007) probably resulted in increased public sympathy for penguins and made them a great tourist attraction in many places.

The Humboldt [*Spheniscus humboldti*] and Magellan [*Spheniscus magellanicus*] Penguin colonies on the islands of Puñihuil, relatively close to the beach, were first reported in 1985, although locals stated that there have been penguins as long as they remembered (Simeone, 1998; Personal communication, Interviewees 9/10/11/13/15). In 1997, the Fundación Otway started its conservation project in Puñihuil, buying a piece of land on the central part of the beach. Subsequently, a station house was built and the FO started to offer guided boat-tours for tourists around the penguin colonies. First, the tours were offered in collaboration with some local fishermen using their boats. Later, the FO purchased its own Zodiac boats in order to be more independent and to offer better quality and education for the tourists.<sup>11</sup>

The core aim of the project was the protection of the endangered Humboldt Penguin, which included an access-prohibition<sup>12</sup> for the islands, an increase in public attention<sup>12</sup> for the conservation work in Puñihuil and the enhancement of environmental education and awareness among the local population and the visitors

<sup>11</sup> The FO stopped offering tours in the fall of 2007, which will be explained in chapter 4.5

<sup>12</sup> Although the access-prohibition holds for everyone, scientists can get a permission from CONAF to enter the islands

(FO, 2008). In 1999, the three islands of Puñihuil were declared '*Monumento Natural Islotes de Puñihuil*', a Natural Monument of Chile, and officially protected by the Chilean Forestry Corporation, CONAF [Corporación Nacional Forestal], who is responsible for the management of the National Parks, the National Reserves and the Natural Monuments of the country (Boletín Informativo Marítimo N°5/2000, p.140)<sup>13</sup>. Puñihuil is currently the second smallest Natural Monument of Chile, with a surface of roughly nine hectares, encompassing only the actual land area of the islands and not the surrounding sea (CONAF, 2006).

The main reason why Puñihuil obtained the status of a natural monument is its unique feature of hosting a mixed breeding colony of Humboldt and Magellan Penguins, the only known spot in the world where both species nest side by side, thus representing an outstanding biological value (Simeone et al., 1998). It is only in northern Chiloé that the habitats of both penguin species overlap, because the area represents the most southern distribution of the Humboldt Penguin and one of the most northern ranges of the Magellan Penguin (BirdLife International 2007a/b).

The Humboldt Penguin is one of 17 penguin species on our planet. Its habitat lies along the coast of Chile and Peru where it has undergone drastic population fluctuations over the last decades (UNEP-WCMC, 2003). Currently, the species is listed as 'vulnerable' on the 2007 IUCN Red List with a population estimate of 3,330 to 12,000 individuals (BirdLife International, 2007a). The Convention on International Trade in endangered Species of Wild Fauna and Flora [CITES] and the Convention on Migratory Species [CMS] lists the Humboldt Penguin on its Appendix I.<sup>14</sup> A 30-year moratorium on its exploitation was adopted in 1995 (UNEP-WCMC, 2003). Major threats to the population are: Overfishing of anchovies and sardines, their main food source; the historical exploitation of guano<sup>15</sup> in Chile (still ongoing in parts of Peru); the use of adult penguins as baits for fisheries; egg collection and consumption; habitat loss; marine pollution; human disturbance; and the El Niño southern oscillation [ENSO], during which the availability of their main prey decreases, resulting in a population decrease (Herling et al., 2005; BirdLife International, 2007a). In Puñihuil, the Humboldt Penguin population was estimated to be around 210 individuals before the project started and the islands obtained their protection status in 1999 (Simeone et al., 1998).

The current population situation of the Magellan Penguin is more positive, due to its wider distribution range along the southern stretches of South America and the lower human impacts on its habitat. Population estimates state around 1,300,000 pairs in the wild, most of them in Argentina and the Falkland Islands. However, the status of the Magellan Penguin on the IUCN Red List is 'Near Threatened' (BirdLife International, 2007b).

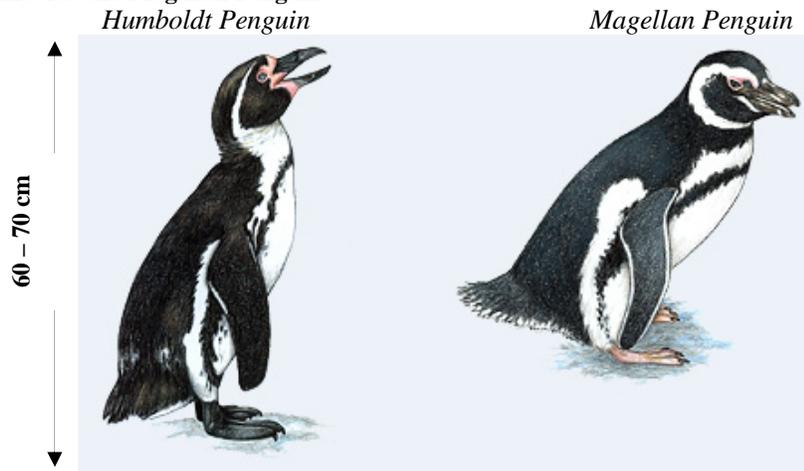
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<sup>13</sup> Official government declaration. *Decreto Exento N° 130. Ministerio de Agricultura, 28 Septiembre 1999*

<sup>14</sup> The CITES Appendix I includes the most endangered species among CITES-listed animals and plants, any commercial trade with these species is prohibited. See: <http://www.cites.org/eng/app/index.shtml>

<sup>15</sup> Guano is the mineral deposits of mainly bird excrements, which are used as fertilizers for agriculture. Its exploitation in northern Chile had drastic implications for the Humboldt Penguin as it destroyed breeding sites. The climate in Puñihuil is too humid for the build-up of guano deposits.

**Figure 3 – Humboldt and Magellan Penguin**



Source: Seaworld, 2008

In Puñihuil, the population of Magellan Penguins in 1997 was estimated to be about 561 individuals, which compared to the Humboldt Penguin population gave a ratio of approximately 3:1 (Simeone et al., 1998).<sup>16</sup>

An interesting characteristic of both species is that the majority of the penguins are only present on the islands during the southern hemisphere spring and summer, from October to March. During the southern winter, most of the penguins migrate to other locations. In general, however, their location during this time is still relatively unknown and as a consequence more research is required to effectively protect the Humboldt Penguin in its foraging and travel regions (Wallace et al., 1999; UNEP-WCMC, 2003). Apart from their habitat differences, the main physical distinction which separates the two species is the black breast band; the Humboldt Penguin has one and the Magellan Penguin has two. Furthermore, the Humboldt Penguin has more grayish shading and a fleshy-pink base to bill (BirdLife International, 2007a/b).

Apart from the two penguin species, the islands of Puñihuil are inhabited by a number of other animal species, most prominently, four different species of cormorants, kelp gulls, kelp goose and flightless steamer ducks, the endangered sea otter and the South American river otter. Frequently, Chilean dolphins and South American sea lions can be spotted in the waters of Puñihuil (Simeone, 2005 & Flores, 2005). All these species add to the ecological richness, magnificence and beauty of the place.

Already in the mid-1990s the biological value of the islands of Puñihuil was recognized and scientists started to raise the issue of protecting the islands against threats. As both penguin species nest in caves, introduced animals (mainly goats) and unregulated tourist visits lead to trampling and the destruction of caves and island vegetation, decreasing the breeding success and adding to the decline of both penguin populations (Simeone et al., 1998).

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<sup>16</sup> See Chapter 4.1

### 3.4 The local community

Out of the 140,000 inhabitants of Chiloé, more than 50 percent live in rural areas, where it is estimated that around 23 percent of the population lives in poverty (Barrett et al., 2002). The economic system in the sector of Duatao to which Puñihuil belongs can be described as a resource-use system within a diversified production strategy (Barrett et al., 2002).

Information obtained from the social office of the municipality Ancud reveals that the main economic activities of the population of Duatao are fishing, algae and shellfish extraction and, during the summertime, agriculture. Moreover, tourism seemed to become an increasing source of income in certain parts of Chiloé, whereas in others, salmon farming represents a major employment opportunity (Barrett et al., 2002). However, the economical situation of the inhabitants remains difficult and many families living in the sector of Duatao are classified as '*Familias Vulnerables*', vulnerable families, partly because the income varies throughout the year and is highly dependent on agricultural yields and fishing success. (Personal communication, Interviewee 18)

One of the main income sources from fishing was, and partly still is, the Chilean Abalone ('loco') which yields high prices on the world market and can be legally collected from April to June. This is also the reason why many fishermen and their families migrated to Puñihuil from more northern regions of Chile, where fish and shellfish stocks have been decreasing during the last decades (Fernández & Castilla, 2005; Personal communication, Interviewee 6). The number of families living in Puñihuil, part-time, is estimated to be around 50 (Personal communication, Interviewees 15/18). All of the operators offering boat-tours for the tourists are fishermen and still work in fishing, shellfish collection and algae extraction during the winter time (March-September). This allows them to maintain a fairly stable income throughout the year, with the tourist season from October to March and then to take part in the loco collection period between April and June (Personal communication, Interviewees 2/9/10/11/15, 2008).

### 3.5 The tourism development in Puñihuil

**I cannot see any interference from the tourist on the boats** (A 48-year old Chilean tourist who was asked if he thinks there is a conflict between tourism and penguin conservation in Puñihuil)

The international importance of travel and tourism is enormous and it is estimated that travel and tourism contributed to 10.4 per cent of the global GDP in 2007, being responsible for about 231 million jobs around the globe (WTTC, 2008). From a market integration perspective for developing countries and regions, tourism is an opportunity to integrate even remote areas into the globalized world economy (Gössling, 2003). The growth in demand for travel and tourism in Latin America averaged about 7.4 percent in 2007, placing the region at the second position of the fastest growing regions in the world for tourism and encouraging the Latin American governments to make travel and tourism a strategic priority for social and economic progress (WTTC, 2008).

A report published by Shell and IUCN recently stated that especially environmentally-friendly tourism is expanding at a rate of 20-30 percent annually, compared to nine percent for tourism as a whole (IUCN, 2008). In general, ecotourism denotes travel to natural areas where features of environmental conservation and the improvement of wellbeing for the local populations are given consideration (TIES, 1990). A more specific definition of ecotourism adopted by IUCN in 1996 expands the concept further:

Ecotourism is environmentally responsible travel and visitation to relatively undisturbed natural areas, in order to enjoy, study and appreciate nature (and any accompanying cultural features – both past and present), that promotes conservation, has low visitor impact, and provides for beneficially active socio-economic involvement of local populations. (Ceballos-Lascuráin, 1993; in Ceballos-Lascuráin, 1996:21)

However, the question regarding to what extent trans-national tourism, which involves long distance transport and, thus, high greenhouse gas emissions with impacts on global climate change, can be described as ecotourism or even sustainable, remains (Gössling, 1999; Gössling, 2002).

In Chile, tourism was estimated to have generated around US \$12.101 billion in revenues in 2007<sup>17</sup> and a forecasted annual growth rate of around 6.3 percent in the next years (WTTC, 2007). The number of international tourist arrivals to Chile was estimated to be 2.25 million for 2007 (SERNATUR, 2008).

The importance of protected areas, such as national parks and nature reserves, for the Chilean tourism industry is enormous. The 10th region of 'Los Lagos', the Lake District, received an increasing number of tourists visiting protected areas in the last 20 years. From 1987 to 2007 the tourist arrivals to the Lake District increased by around 600 percent to 717.724 visitors<sup>18</sup>. Compared to the national level the share of total tourists arrivals to the 10th region rose from 20 percent in 1987 to 43 percent in 2007 (CONAF, 2008).<sup>19</sup>

A report published by the national tourism agency SERNATUR estimated the tourist arrival to Chiloé for the high-season 2007 (January – March) at around 105.795 visitors with nature-related activities as the primary objective. Furthermore, approximately 20 percent went to visit the penguin colony in Puñihuil. On average, every visitor stays for 1.2 nights on the island and spends approximately €70 in Chiloé, which results in a total average income from tourism of about of €7.4 million.<sup>20</sup> (SERNATUR, 2007a)

For Puñihuil, unfortunately, there are no official figures, but only estimates about the past visitor numbers. When the Fundación Otway started the conservation project in 1997, 1000 to 1500 tourists came to visit Puñihuil every year, mostly backpackers who had heard about the place from locals or other travellers. They were taken out to the islands by the fishermen who would leave the tourists on the islands for a couple of hours (Personal communication, Interviewee 15). In the following years, the number of visitors to Puñihuil increased steadily and estimates for the season 2007/2008 claim about 30,000 to 35,000

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<sup>17</sup> The International Monetary Fund estimated the GDP of Chile at \$US 163.792 billion for 2007 (IMF, 2008)

<sup>18</sup> It has to be noted that this number includes national and international tourists. The number of international tourists to the Lake District is estimated at 134.514 (SERNATUR, 2008).

<sup>19</sup> For more information see Appendix 5

<sup>20</sup> Values displayed are converted from Chilean Pesos to Euros

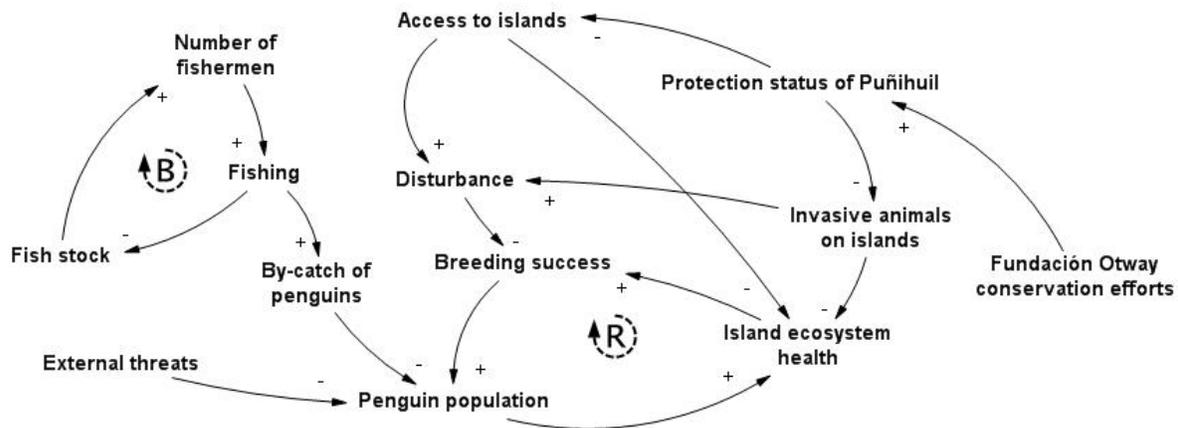
visitors (see Section 4.3 / Table 2). The primary objective of the tourists is evidently to go on one of the 30-minutes boat-tours in order to see the Humboldt and Magellan Penguins.<sup>21</sup>

Being declared a Natural Monument, the islands of Puñihuil fall under the IUCN management category III of protected areas, which has two key objectives: the preservation of species and genetic diversity (biodiversity); and tourism and recreation (IUCN, 1994; in Eagles et al., 2002). In the following chapters, data will be presented, analyzed and discussed in order to see the degree to which both objectives are being achieved in Puñihuil.

### 3.6 The situation in 1997

The Causal Loop Diagram 2 in Figure 4 describes, more graphically, the initial situation when the FO arrived in Puñihuil in 1997. At that time, the following problems existed: the fishing activities close to the islands and the resulting by-catch of penguins; the occasional collection of eggs; the catch of penguins for bait use; the uncontrolled access to the islands; and the invasive goats (Simeone & Schlatter, 1998). All factors had detrimental effects on the populations of both penguin species, through intentional and accidental killings, as well as through the deterioration of the island's ecosystem health, along with higher rates of disturbance and, thus, lower breeding success. However, with the protection status, the overall situation for the penguins improved over the years and also the health of the island ecosystem increased, which in turn improved the breeding success of the penguins.

Figure 4 – CLD 2: The situation in 1997



## 4 Results

### 4.1 The local penguin population

**The Penguins are reproducing; we don't suppose there is a problem** (A 32-year old Spanish tourist who was asked if she thinks there is a conflict between tourism and penguin conservation in Puñihuil)

<sup>21</sup> See Appendix 3 for personal statistics about visitor arrival to the Puñihuil Islands during January and February 2008

Concerning the populations of Humboldt and Magellan Penguins breeding on the islands of Puñihuil, the data available is very limited and there are only two reliable scientific reports of relevance, dating from 1997 and 2004 (Simeone & Schlatter, 1998; Simeone, 2005). As a result, there is evidence that an increase in total penguin numbers occurred, which is also in line with statements given by the local population. Additionally, the island closest to the shore just recently started to become a nesting site for Magellan Penguins (Personal Communication, Interviewees 1/15). Thus, it has not been included in the past censuses and the data in Table 1 only concerns the other two islands.

During the first census taken by scientists in 1997, the penguin population was estimated to be at around 210 Humboldt and 561 Magellan Penguins (Simeone & Schlatter, 1998). The census taken in 2004 revealed that the actual number of nests<sup>22</sup> increased by 48 percent and that the number of destroyed nests declined significantly (Simeone, 2005). This development can certainly be attributed to the FO protection campaign, which resulted in the recovery of the island ecosystem. Although the latest census did not give an estimate of actual penguin numbers, it stated that the observed increase in active nests represents a population increase (see Table 1 & Graph 1).

Additionally, interviews and conversations with locals and tourist guides revealed that they also have the impression that there are a lot more penguins than ten years ago. However, some interviewees also stated that during this year's breeding season they had the impression that there were fewer penguins than the years before (Personal communication, Interviewees 3/12). It is difficult to suggest that the project's main aim, the protection of the Humboldt Penguin population, has actually been successful, as the little scientific evidence for Puñihuil does not support that claim. Herein lays the main pitfall, as it does not matter for the tourists whether there are Humboldt Penguins or not, what matters most, is that there are penguins which can be observed.

As evidence suggests, the Magellan Penguins thrived and even colonized the third island, closest to the beach, in recent years. Their larger total population number at the projects beginning (Simeone & Schlatter, 1998) and their relative immunity to human disturbance are probably the two main reasons for this development. Interestingly, although both penguin species are very similar, different scientists have researched their respective behavior and response to disturbance and stress. It was found that there is a huge difference in behavior and sensitivity to stress in the two species: the Magellan Penguin is more adapted for tourism and observation compared to the Humboldt Penguin who is, by far, more sensitive to disturbance and reacts negatively to stress (Ellenberg et al., 2006; Walker et al., 2006).

Concerning the development of the breeding situation of both penguin species in Puñihuil, Table 1 represents the main indicators of the conservation situation, in total numbers and in percentages. It can be observed that the rate of destroyed nesting caves significantly dropped from 16 percent in 1997 to four percent in 2004, a decline attributed to the access prohibition to the islands.

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<sup>22</sup> In this context, nests are either caves dug in the ground or under dense vegetation and burrows

However, for the situation of the Humboldt Penguin population in Puñihuil, the data indicates that it has not changed much from 1997 to 2004. The number of active nests found on the islands remained constant at 76, whereas the number of active Magellan nests increased by 58 percent to 567 active nests (see Table 1). Unfortunately, there is no official or scientific explanation for that development. However, evidence from the Humboldt Penguin National Reserve<sup>23</sup> in north-central Chile, harboring the largest Humboldt Penguin breeding colony in Chile, suggests that sites with high numbers of visitors and the resulting level of disturbance have severe implications for the breeding success of Humboldt Penguins. There were significant differences in the number of successful breeding pairs, which was higher the less they were disturbed (Ellenberg et al., 2006).

Yet, there is a lack of scientific data and research about the difference of stress-related behavior of Humboldt Penguins when visitors approach on land which is what happens at the Humboldt Penguin National Reserve, or when there is open water between the tourists and the penguins, as it is the case in Puñihuil. This information gap is currently being closed by researchers who try to understand the correlation of distance, disturbance and effects of stress on the penguins (Personal communication, Interviewee 3).

For Puñihuil, a number of interviewees (Interviewees 3/12/15) stated that they think the number of penguins on the islands during the latest season (2007/2008) was smaller than the years before.

**Table 1 – Penguin population development**

| <b>Change in nest numbers and occupation</b>                       | <b>1997</b> | <b>2004</b> | <b>Change in % from 1997 to 2004</b> |
|--|-------------|-------------|--------------------------------------|
| Number of Magellan Penguins  | 561         | ?           | ?                                    |
| Number of Humboldt Penguins  | 210         | ?           | ?                                    |
| Number of active nests $\square$ (percentage of total nest number) | 366 (45%)   | 567 (47%)   | + 55%                                |
| Number of active nests occupied by Magellan Penguins               | 290 (79%)   | 458 (81%)*  | + 58%                                |
| Number of active nests occupied by Humboldt Penguins               | 76 (21%)    | 76 (13%)*   | +/- 0%                               |
| Ratio of Magellan to Humboldt Penguins (nests)                     | 4:1         | 6:1         | -                                    |
| Number of collapsed nests  | 133 (16%)   | 45 (4%)     | - 34%                                |
| <b>Number of nests in total</b>                                    | <b>814</b>  | <b>1207</b> | <b>+ 48%</b>                         |

$\square$  Active nests are nests which are actively used by a pair for breeding

\*The difference to 100 percent is due to the fact that some nests could be assigned to neither Humboldt nor Magellan Penguins and in some nests hybrids of both species were found; in 1997 no such incident was mentioned

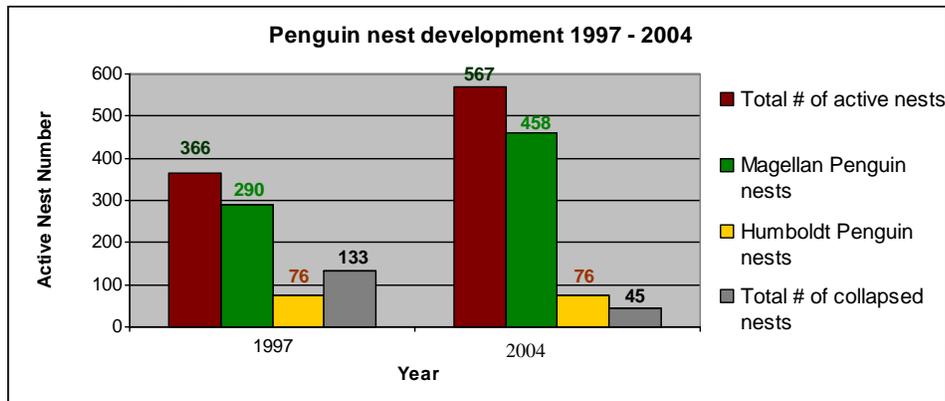
Source: Simeone & Schlatter, 1998; Simeone, 2005

NOTE: This table is simplified and combines both islands, for further information see Appendix 8

The numbers presented in Table 1 are estimations and have several limitations in their validity, as probably not all nests were counted due to time and access restrictions during the respective studies (Simeone & Schlatter, 1998; Simeone, 2005). Yet, these figures, as the only scientific information available, will be used as indicators to draw conclusions about the conservation status of both penguin species in Puñihuil. In Graph 1 the nest and population development from 1997 to 2004 is displayed visually.

<sup>23</sup> The reserve is situated in the 3<sup>rd</sup> and 4<sup>th</sup> region, around 300km north of Santiago and encompasses the three islands of Isla Damas, Isla Choros and Isla Chañaral; Tourists can camp on camp sites and walk on tracks (see Ellenberg et al., 2006)

**Graph 1 – Penguin nest development 1997 - 2004**



Source: Based on and adapted from Simeone & Schlatter, 1998; Simeone, 2005

## 4.2 Other environmental data

**The tourist visits don't seem to have a very heavy impact.** (A 24-year old US tourist who was asked if he thinks there is a conflict between tourism and penguin conservation in Puñihuil)

Evidence and experience from around the world suggests that uncontrolled and rapid development of infrastructure, as well as rapidly increasing tourism, almost inevitably lead to a variety of negative impacts on coastal ecosystems, beaches and coastal waters, such as leakage of nutrients into the coastal waters (Gössling, 2002; Tapper, 2006; WWF, 2008). In Puñihuil, a variety of data about the ecosystem health is missing, but some observations could be made.

Due to the increased traffic of tourist and fishermen's cars, as well as busses and transporters, the sand of the beach has been compressed to such a degree, that its natural micro-fauna practically does not exist anymore.<sup>24</sup> It is interesting to note that it is forbidden in Chile, by law, to drive on beaches. However, the lack of information and control allow for this situation to continue in Puñihuil (Personal communication, Interviewees 5/7). Moreover, the increase in wastewater from households and restaurant operations, will certainly affect the chemical composition and the nutrient levels in the coastal water with respective consequences on flora and fauna in the ecosystem (George, 2008).<sup>25</sup>

It is hard to tell to what extent the artisanal fishing activities have an impact on the ecosystem, but there have been indications that algae collection and fishing around the islands and its associated traffic lead to increased stress for the penguins and to an increased number of dead individuals, entangled and drowned in fishing nets (Personal communication, Interviewees 1/3). Especially in the past years, discrepancies between fishermen and the local boat tour operators arose due to the appearance of numerous dead penguins around Puñihuil, which have most probably drowned in fishing nets, although these are accidents and unintentional effects of fishing. As a consequence, a voluntary agreement between the fishermen and their

<sup>24</sup> On some days with high visitation, more than 40 cars were counted at the beach at once, having the appearance of a street rather than a beach at some points

<sup>25</sup> Currently, wastewater from restaurant and the hotel is collected in sewage tanks underground from where it seeps into the ground and eventually into the sea

fellow colleagues working in tourism was made, which limited fishing with nets in a nine km circle around the islands (Personal communication, Interviewees 1/6/10/11). This voluntary agreement represents a positive development in combining conservation efforts and tourism with traditional artisanal fishing. However, due to the fact that penguins often swim long distances to their feeding grounds and migrate even further away during winter, fishing activities in other regions continue to represent a severe threat (Herling, 2005).

Another interesting development is the practical disappearance of one bird species which used to breed in Puñihuil, the Sooty Shearwater or 'Fardela Negra' (*Puffinus griseus*) (BirdLife International, 2008). When the islands obtained their protection status in 1997, it was stated in the official declaration document that Puñihuil is one of the most northern breeding sites of this species (Boletín Informativo Marítimo N°5/2000, p.140). Yet, none was observed nor was any confirmation about their presence given (Personal communication, Interviewee 3). Unfortunately, there is no data available explaining why they have disappeared from Puñihuil, thus it remains unclear whether anthropogenic effects or natural phenomena are to blame, but its disappearance might signify an underlying cause which has to be further investigated.

#### 4.3 Visitation statistics and revenues

In 1997, with the start of the FO activities in Puñihuil, the number of visitors per season was estimated at around 1,500. Within ten years, the number of visitors arriving to Puñihuil has increased by more than 23 times to around 35,000 tourists for the season of 2007/08 (Personal communication, Interviewees 1/2).

A yet unpublished report from the Cetacean Conservation Center [Centro de Conservación Cetacea; CCC] forecasted an average of 16,310 tourists to Puñihuil for the season of 2007/2008, which was, as the results show, underestimated and it is furthermore questionable if the estimation from 2006/2007 with nearly 16,000 people (CCC, 2008) was not an underestimation as well. In Table 2, some key numbers for Puñihuil are represented, which are primarily obtained through my statistics and through interviews.

**Table 2 – Tourism and revenues**

|  |                                  |
|--|----------------------------------|
| <b>Average number of tourists per day</b> (January – February 2008)± | 393 ( $\sigma = 134$ )           |
| Highest observed number of passengers a day (18/02/2008) ±           | 627                              |
| Lowest observed number of passengers a day (12/01/2008) ±            | 192                              |
| <b>Average number of tours per day (09:00 – 20:00)</b>               | <b>39.81</b> ( $\sigma = 8.17$ ) |
| Highest observed number of tours a day (17/02/2008)                  | <b>53</b>                        |
| Lowest observed number of tours a day (12/01/2008)                   | <b>27</b>                        |
| Recommended maximum number of tours per day ж                        | <b>30</b>                        |
| <b>Average passenger number per tour</b>                             | 9.86 ( $\sigma = 2,80$ )         |
| <b>Estimated number of tourists in January and February</b>          | <b>22,777</b>                    |
| Estimated number of tourists in total (October - March)⊠             | 35,000                           |
| Average price per tour per person                                    | 4.5 €                            |
| Estimated revenues generated by boat tours (January - February)      | 102,300 €                        |
| Estimated revenues from boat-tours in total per season               | <b>157,500 €</b>                 |
| <b>Estimation of average distance of boats to islands * ж</b>        | <b>12 m</b>                      |

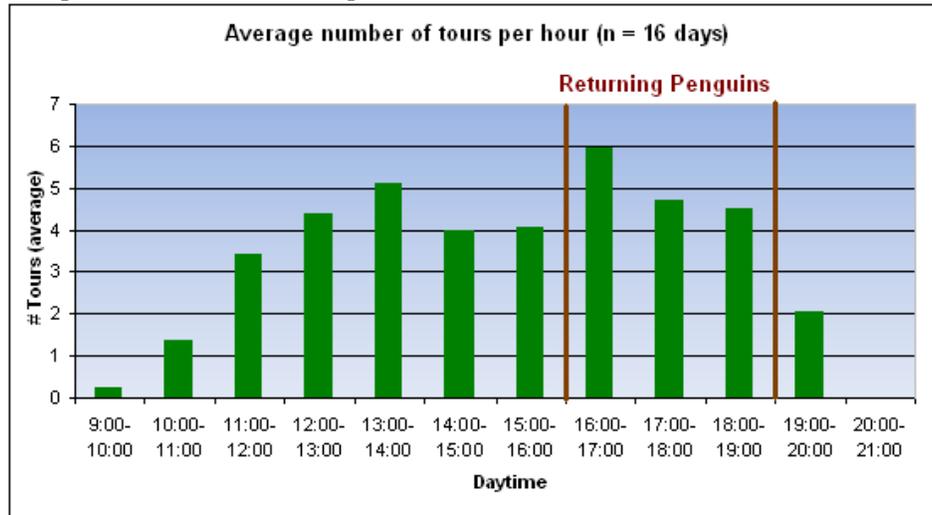
Note: ± only tourists going on a tour were counted; small children and babies were not included

Source: ⊠ Interviewee 1; ж Muñoz et al., 2007; \* Interviewee 3

One can detect that based on the estimated numbers of visitors per season (35,000) and the average price per tour per person (€4.5), a total estimated direct revenue from the boat tours of €157,500 is generated.<sup>26</sup> Adding the additional expenses of tourists for food, drinks and the overnight stays of some tourists in the small hotel, the revenue generated in Puñihuil is much higher.

In Graph 2 the average number of tours per hour is shown. It can be observed that the highest number of boat tours around the penguin colony take place around 1 pm and from 4 to 6 pm.

**Graph 2 – Trend of boat tours per hour**



As a consequence, during these high visitation times, a boat passes by the islands on average every ten minutes and this will most probably have negative effects on the stress level of the penguins, foremost the Humboldt Penguin (Personal communication, Interviewees 1/3/5/8/17). The recommended number of 30 tours per day, as calculated in the tourism capacity study (Muñoz et al, 2007), was frequently exceeded by ten tours on average and sometimes more than 50 tours were made during the course of just one day (Table 2). The resulting boat traffic around the islands is very likely to impact the ecosystem negatively (Personal communication, Interviewees 1/3/5/8/17). Moreover, the number of fishing boats which frequently pass the islands having a higher speed and less awareness about disturbance of the animals add to the overall traffic and its negative consequences.

In addition to the number of daily tours around the islands, the specific time at which these tours take place has also different impacts on the penguins. During the breeding season, which falls into the same time as the tourism season, the adults leave the islands to swim to their foraging regions, often up to 40 km away to feed on fish (Hennicke in Ellenberg, 2006; Personal communication, Interviewees 1/3). They leave early in the morning and come back in the late afternoon and their arrival from foraging regions falls into the same time when boat traffic is comparatively high from 4 to 7 pm (see Graph 2) (Muñoz et al., 2007; Personal communication, Interviewees 3/10/11/15).

<sup>26</sup> The per capita GDP in Purchasing Power Parity is estimated at US\$14,400 for 2007 (CIA, 2008)

Many tourists often come specifically during the late afternoon because it is said in tourist guides that the number of penguins is higher at this time than during the middle of the day.

#### **4.4 Local stakeholders, boat tour operators and NGOs in Puñihuil**

The number of people working in tourism during the season is estimated to be around 50, with roughly 30 people working directly in the boat operations (captains, assistants and marketers<sup>27</sup>) and another 20 in the three restaurants, the small food kiosk and the hotel. Not all of those 50 people are locals, but around half of them originate from Ancud or other regions in Chile. The amount of people working in tourism is far higher if one also includes the tourism companies, who transport tourists, and the hostels in Ancud, where most of the visitors coming to Puñihuil stay overnight (Personal communication, Interviewees 12/13/14). Consequently, the revenues from tourists visiting Puñihuil are far higher outside than at the actual beach. Thus, the importance of Puñihuil for the regional tourism sector is significant and many people benefit from it (SERNATOUR, 2007; Personal communication, Interviewees 2/7/16).

Another problem, in Chiloé and southern Chile is the seasonality of tourism, constricted to the southern summer from October through March, with a peak in January and February during the national holiday time (Personal communication, Interviewees 2/7). Therefore, many economic activities are still based around fishing and agriculture to provide income throughout the year.

##### **4.4.1 Fishing**

In order to obtain a complete picture about the local situation, the fisheries have to be shortly analyzed. Typically, the fishermen work during the same time of the day as the tourist visits take place. For the tourists, this represents an attractive feature and many like this special 'charm' of local culture and naturalness of the beach. Nevertheless, as it was stated earlier, artisanal fishing continuously represents a menace to the penguins, as some get entangled in nets and die. However, due to the voluntary agreement not to fish in the close vicinities of the islands and the increased awareness of the local fishermen, this threat is lower than some years ago, especially compared to other threats particularly for the Humboldt Penguin, such as industrial fishing and ENSO occurrences (Birdlife International, 2007a).

On the other hand, for the local population, the loco fishing was, and partly still is, one of the main income sources. Many of the fishermen originating from other regions of Chile came in pursuit of better fishing grounds and for work in the associations, the so-called '*Sindicatos*', with designated management and exploitation areas [MEAS] for loco (Leiva et al., 2002; Personal communication, Interviewees 1/2/6/10/11/15/18).

During the last years, the numbers of loco declined along the coast and in order to establish effective management strategies, the fishermen in Puñihuil organized themselves into two associations with about

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<sup>27</sup> In the case of Puñihuil, several people wait at the entrance road and try to tout arriving tourists for either the Ecoturismo or the free rider's boat-tours! This leads to an overall negative perception of the tourists and also contributes partly to conflict among the competition.

100 members in total. The poaching and stealing of loco from other MEAS are common ventures in the region, signifying the value of this resource. As a consequence, the whole issue of loco fisheries is extremely conflict-ridden, with 'Mafia-like' structures and even homicides being associated with it (Personal communication, Interviewees 1/2/5/6/15).<sup>28</sup> For the loco-season of 2008, the National Fishing Service [SERNAPESCA] allocated a total allowable catch [TAC] of 311,299 locos for one of the two fishermen associations stationed in Puñihuil (Personal communication, Interviewee 6). To give a short glimpse at the magnitude, the TAC of loco for just one of the two associations for 2008 has an estimated valued of around €400,000 (prices vary from €1 to €1.5 per unit) and earnings outside the season are probably considerable.<sup>29</sup>

#### 4.4.2 Tourism

In 2006, the four local boat tour operators, two of them with their associated restaurants, and the small hotel started to co-operate in an association, referred to as Ecoturismo Puñihuil [*Comité de turismo y adelanto social ecoturismo de Piñihuil*] (Ecoturismo, 2006).<sup>30</sup> This idea was initiated by the Chilean NGO CCC, which works closely with coastal communities for the protection of the marine ecosystem and ecotourism as an alternative use to other forms of exploitation (Personal communication, Interviewees 2/8).<sup>31</sup> The CCC helped to build up the association and supported the members with training and capacity building. However, just some months later, one of the five members [referred to as 'Free rider'] dropped out due to disputes about him using an additional tour-boat. This constituted a setback for the local development and management efforts. As a consequence, price competition increased again, yet again marketers are touting tourists, and also other factors which the creation of the association was supposed to delimit came up once more, such as an increased number of boat tours due to the decreased co-operation and the uncoordinated departure of boats where not all available seats were occupied by visitors (Personal communication, Interviewees 2/3/10/11/17).

Table 3 reveals the tour price and income differences and it shows the economic results which differentiate the Ecoturismo Puñihuil association and the free rider. Due to the increased cooperation among the three boats of Ecoturismo, the number of passengers per tour increased from 7.95 in 2007 (Muñoz et al., 2007) to 11 in 2008. The result is a lower number of unnecessary tours and thus a decrease in disturbance of the animals. Furthermore, it has economic implications as it decreases costs and increases revenues per tour. In addition, Ecoturismo was able to keep prices higher than under a free market competition situation, thus also increasing the revenues per tour. For the free-rider, the situation is somewhat different: the competition with Ecoturismo led him to a decrease in prices per passenger in order to gain market share. Hence, some of the tourism companies transporting visitors from Ancud to the beach prefer to work with him, as they are

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<sup>28</sup> To obtain reliable information from first hand is very difficult and thus the information represented is based on second hand personal communication and conversations

<sup>29</sup> For further information on this topic see: Leiva et al., 2002

<sup>30</sup> For further information about the member of the association see [www.pinguineraschiloe.cl](http://www.pinguineraschiloe.cl)

<sup>31</sup> For further information on the Centro de Conservación Cetácea: [www.ccc-chile.org](http://www.ccc-chile.org)

charged lower prices per person and can thus increase their own revenues (Personal communication, Interviewees 12/13/14). Although he has a share of 18 percent of the passenger market (per boat), compared to 22 percent for Ecoturismo, the revenues are much lower due to the lower prices charged and the lower average number of passengers per tour with equal operation costs.

For the conservation efforts and local revenues, the association and cooperation of Ecoturismo definitely has a more positive impact with a stronger market position than operating independently under higher competition and price pressures.

**Table 3 – Economic indicators of Ecoturismo and the Free rider**

| <b>Economic Indicators</b>                          | <b>Ecoturismo (3 boats)</b>      | <b>Free rider (2 boats)</b>     |
|---|----------------------------------|---------------------------------|
| Average number of passengers per tour               | <b>10.50</b> ( $\sigma = 2.72$ ) | <b>8.01</b> ( $\sigma = 2.17$ ) |
| Average number of boat tours per day                | 22.94 ( $\sigma = 7.36$ )        | 16.88 ( $\sigma = 5.54$ )       |
| Average number of tours per boat/day                | 7.65 ( $\sigma = 2.46$ )         | 8.43 ( $\sigma = 2.77$ )        |
| Share of local tourist market (Passengers)          | 65 %                             | 35 %                            |
| Share of local tourist market (Revenues)            | 72 %                             | 28 %                            |
| Share of local tourist market per boat (Passengers) | 22 %                             | 18 %                            |
| Share of local tourist market per boat (Revenues)   | 24 %                             | 14 %                            |
| Average price per passenger charged                 | €5.00                            | €3.50                           |
| Estimated income per tour                           | €55.23                           | €29.48                          |

Note: The relatively high standard deviation is explained in Appendix 4; Eventual discrepancies of sums are due to rounding

Concerning the personal welfare, it was generally agreed by most interviewees who work in tourism, either directly on the boats or for the tourist companies in Ancud, that their life situation has improved and income has become more stable and secure. The tourism activities offered them new opportunities and gave them new knowledge and exciting experiences that they would not have had as fishermen or in their former jobs (Personal communication, Interviewees 9/10/11/12/14/15).

#### **4.5 Local conflicts**

With the start of the conservation efforts initiated by the Fundación Otway in 1997, several conflicts arose in Puñihuil. At first, many local fishermen were afraid that the FO would interfere with their only partly legal loco fishing activities, resulting of a presence of official authorities, especially the marine guards and the police (Personal communication, Interviewee 1).

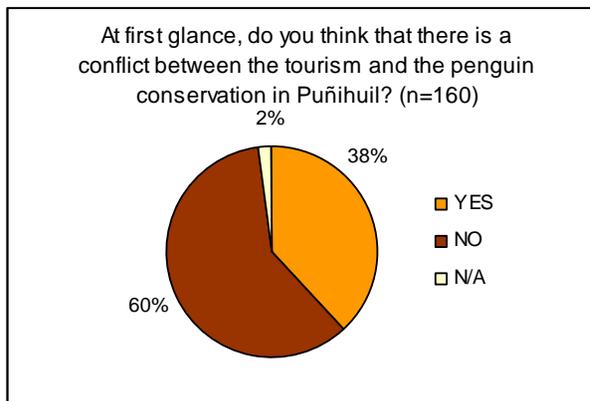
As stated earlier, the FO worked together with local fishermen in the first years and when they started to use their own boats later, only local fishermen were employed as captains. Although this work generated less income than loco fishing, they claimed it was a more exciting and honest work (Personal communication, Interviewees 1/10/11). However, in the following years, the number of tourists increased and some fishermen started to offer their tours with their own boats, leading to a situation on the beach characterized by high levels of competition and creating distrust. Eventually the FO decided to stop its own tours in 2007 and is currently searching for a successor for the continuation of the conservation project in Puñihuil (Personal communication, Interviewee 1).

Another aspect is the attractiveness of tourism and its employment opportunities to people from areas outside of Duatao or Chiloé, which might cause other conflicts to emerge if more people settle in Puñihuil, alongside with higher environmental impacts associated with it (Butler, 1974).

#### 4.6 Tourist questionnaire

In order to obtain data about the awareness and attitudes of the visitors who come to Puñihuil a tourist survey was prepared.<sup>32</sup> In total, 160 surveys were filled out and evaluated. The majority of respondents originated from Chile (69), followed by Germany (28), France (13) and the US (10).<sup>33</sup> For the purpose of simplicity I divided the nationalities of tourists into three general regions of origin: Latin America (79 respondents), Europe (61) and North America /Australia/New Zealand (20).

**Graph 3 – Conflict between tourism and penguin conservation**



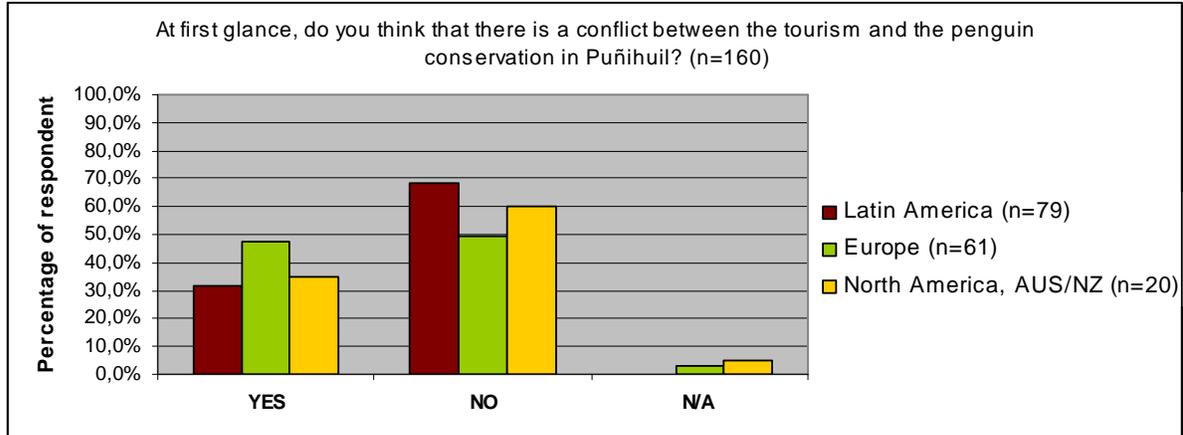
One of the first questions in the survey asked about the awareness of tourists concerning the topic of conflicts between tourism and penguin conservation (see Graph 3). The result shows that the majority of respondents (60 percent) do not think that there is a conflict between tourism and the penguin conservation in the context of Puñihuil. However, one has to note that, to the average visitor such conflicts and problems are not

apparent at first sight. Analyzing the data, it was also observed that there was a correlation between a tourist's origin and the answer given, indicating that European visitors are more aware of possible conflicts (nearly 50 percent) compared to visitors from Latin or North America (see Graph 4). However, it is important to note that this can also be attributed to the fact that European tourists coming to Puñihuil have a different motivation for their travels and are generally more nature-oriented than Chileans, who come with their families for a short visit.

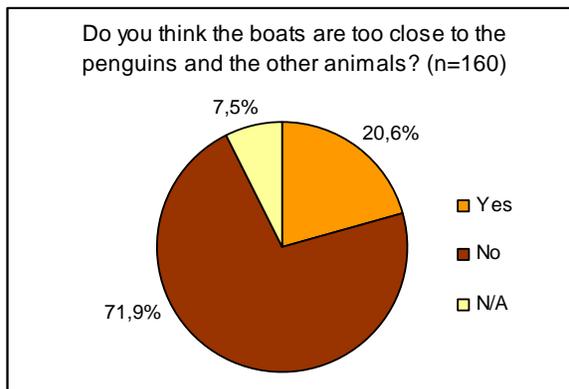
<sup>32</sup> A questionnaire example is attached in Appendix 5

<sup>33</sup> For a detailed information about tourists origin see Appendix 7

**Graph 4 – Conflict of tourism and conservation, answer according to tourist origin**



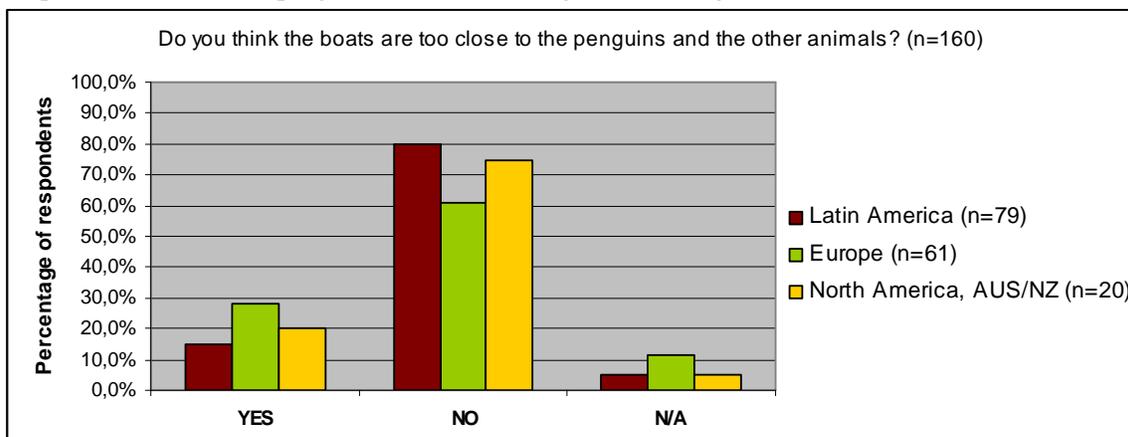
**Graph 5 – Distance to the penguins**



Another question asked the respondents if they had the impression that the boats were too close to the penguins and the other animals on the islands of Puñihuil (see Graph 5). The great majority (75 percent) believed that the boats were not too close to the penguins, but one has to note that 'too close' is subjective and depends on the respondent's individual impression, the same holds valid for the other questions in the survey too. In order to obtain

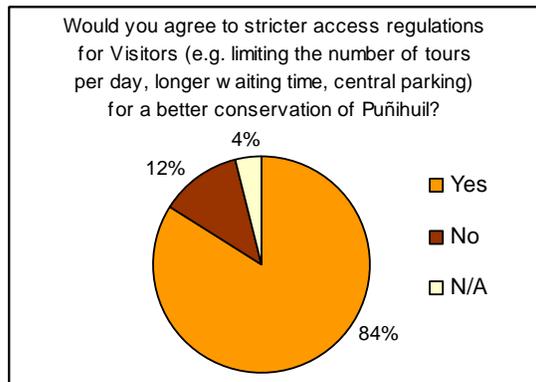
valuable answers, the survey was usually conducted after the tourist went on a tour. However, in some cases the respondent filled out a survey before and thus the answer was counted as 'N/A' (No Answer). This question also revealed a discrepancy in origin of the tourist and answer given. Again, it can be observed that tourists from Europe have more awareness about the distance between boats and animals, although the share is still comparatively small (see Graph 6).

**Graph 6 – Distance to the penguins, answer according to tourist origin**

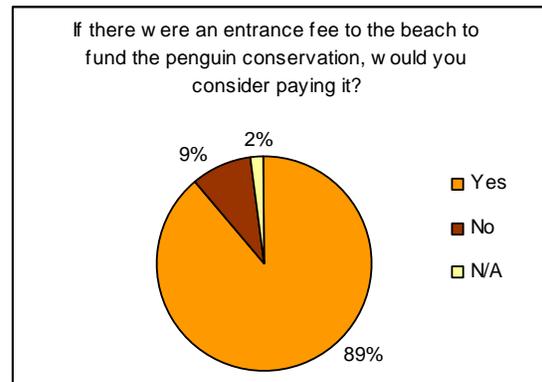


Additionally, the survey also explored to what extent the respondents would be willing to accept more restricted access regulations to the beach (see Graph 7), including a limitation of visitors and tours per day as well as central parking. Moreover, a contingent valuation question was asked to acquire information whether visitors would also exhibit willingness to pay [WTP] an entrance fee in order to obtain funding for a better conservation work in Puñihuil (see Graph 8).

**Graph 7 – Access regulation**



**Graph 8 – Entrance fee**



Those two types of questions are especially useful in order to find out what management tools can be implemented and would be accepted by visitors, resulting in improved planning of tourism and a more effective conservation, as well as to calculate financial impacts and to establish a new source of income aimed to fund conservation efforts (Pearce, 2007; Eagles et al., 2002). The results obtained are rather favorable and although twelve percent of the respondents answered negatively concerning stricter regulations, a majority (84 percent) supported those measures, provided they benefit the conservation efforts in Puñihuil and tourists are informed beforehand.

Furthermore, 89 percent of the respondents were also in favor of paying an entrance fee to the beach, given its purpose of conservation. Nevertheless, there were also skeptical voices about this approach:

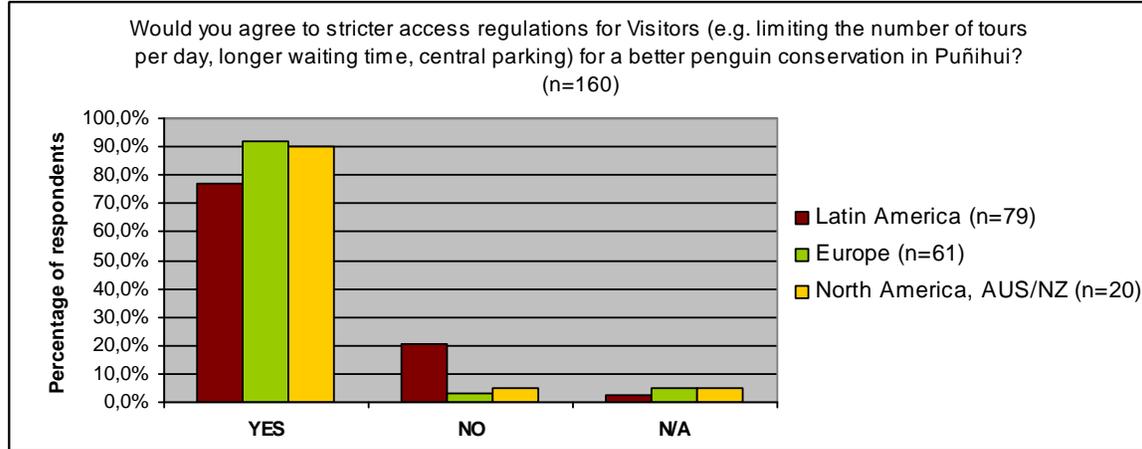
**The beaches are free** (A 24-year old Chilean tourist who was asked if she would pay an entrance fee to the beach)

A different question was asked about the amount visitors would be willing to pay. This question was added to the survey in a later stage and consequently only 48 respondents answered, compared to 160 for the questionnaire as a whole. Nevertheless, it revealed that approximately €2.5 represents the average amount that people would be willing to spend.<sup>34</sup>

**I would be happy to pay if I knew that the money was actually going toward their conservation** (A 32-year old US tourist who was asked if she would pay an entrance fee to the beach)

<sup>34</sup> For calculation please see Appendix 7

**Graph 9 – Access regulations, answer according to tourist origin**



When compared by regions of origin, the results do not vary considerably. However, the willingness to accept stricter access regulations is greater among tourists from Europe and North America/Australia/New Zealand (see Graph 9). Concerning the willingness to pay an entrance fee to the beach, the tourists' origin is not important to the answer given and the majority would accept an entrance fee.<sup>35</sup>

#### 4.7 Trends in tourism development

In the past years, the share of domestic tourists coming to Puñihuil increased significantly so that at present, Chileans represent the largest group of tourists, especially during the national holiday period in January and February. This has implications for the tourism quality and the price levels, as interviewees told me from their experience that Chileans are in general more inclined to base their choice on price rather than better service, which increases the price competition. (Personal communication, Interviewees 2/12/13/14)

Furthermore, during my stay in Puñihuil, I noticed that increasingly visitors arrive and are interested to go on whale-watching tours, which are not yet officially offered by any tour operator in the area.<sup>36</sup> Although there is currently no authorized whale-watching tour operating and no serious marketing in place, the power of mouth to mouth communication and the media play an important role. This attention was set off by scientists which discovered in 2003 that Chiloé and the Corcovado region represent the most important feeding and nursing ground for blue whales in the southern hemisphere (Hucke-Gaete et al., 2003). However, the recent development of a whale-watching 'hype' in Chiloé has to be approached with caution and under a range of limitations, so as not to also negatively affect the whales.

Problems for the penguin conservation in Puñihuil lie in the potentially higher impact whales could have on tourism and its development. The lure of money that can be gained with whale-watching might override the penguin conservation efforts and possible funds could be redirected. Negative effects for

<sup>35</sup> For further information and a graph about visitor origin and the willingness to pay and entrance fee see Appendix 7

<sup>36</sup> The local boat-tour operators do sometimes go on whale-watching tours during January and February if there is a group asking for it, but currently they do not have an official permit and license for it. The CCC is doing research about the feasibility of whale-watching tourism in Puñihuil.

Puñihuil could include an even bigger growth of tourism numbers, more infrastructure, traffic and pollution. Concerns and fears about whale-watching development and new large-scale operators coming to Puñihuil were expressed by a number of interviewees (Personal communication, Interviewees 1/3/7/11/17).

#### 4.8 The role of the government

**When the government intervenes there are always more problems than when the locals exploit the place. I think they know better their traditions and can better respect them** (A 53-year old Argentinean tourist who was asked if he would support stricter regulations in Puñihuil)

The field research also revealed that different government agencies share responsibilities for the conservation of biodiversity and the tourism development in Puñihuil. Table 4 represents each agency (national and regional) and shortly states its respective responsibilities and competencies.

**Table 4 – Government agencies with responsibilities for Puñihuil**

| Responsibility          | Agency   | Current responsibility and competency towards Puñihuil   |
|-------------------------|--|--|
| Fisheries               | SERNAPESCA   | Fisheries, control and enforcement of TAC  |
| Tourism                 | SERNATUR   | Monitoring tourism arrival and marketing   |
| Beach and Marine waters | Harbour Master Ancud                               | Beach and surveillance of boat security measures and safety of passengers, fishermen operating licenses* |
| Environmental issues    | CONAMA   | Coordination of different agencies in environmental questions and impacts, but not in Puñihuil           |
| Natural Monument        | Ministry of Agriculture in representation of CONAF | Surveillance and enforcement of protection status of Islands (does not include the water/sea)            |
| Land use and Population | Municipality of Ancud                              | Land use planning at the beach and access roads to Puñihuil, Traffic at beach, Tourism marketing,        |

\* Circular Marítima, 2006

The islands of Puñihuil belong to the National Protected Area System which is administered by CONAF (CONAF, 2006). As a consequence, CONAF should, by law, have a park ranger in Puñihuil, but up to this point it does not and claims that the local community and the FO effectively invigilate the islands from access by unauthorized persons (Personal communication, Interviewees 1/4).

In September 2007, an advisory council initiated by CONAF for the conservation and development of the natural monument of Puñihuil was formed (SERNATUR, 2007b).<sup>37</sup> It comprises the following members and their respective representatives: The Municipality of Ancud (mayor); SERNATUR (regional director); the Fundación Otway (president); Ecoturismo Puñihuil; Fishermen Association 'Viento Fuerte' Puñihuil (president); Harbour Master Ancud; SERNAPESCA (regional director); Nativa Viajes (a regional tourism company); the Centro de Conservación Cetácea (director) and CONAF (regional director). The goal of this advisory council is to provide guidance and management for the sustainable development of and to unite the different actors having a stake in Puñihuil. However, it remains questionable to what extent the advisory council takes action or has just a representative and symbolic function.

<sup>37</sup> Reglamento de Funcionamiento del Consejo Consultivo para la Conservación y Desarrollo del Monumento Natural Islotes de Puñihuil

Interestingly, the environmental agency CONAMA as such is not part of the council, but the agency is well aware of the problems in Puñihuil. As of now it has no legal authority due to the currently relatively small scale of the tourism development which does not reach the official limit where CONAMA can take action and conduct an environmental impact assessment before any further developments take place (Personal communication, Interviewee 5).

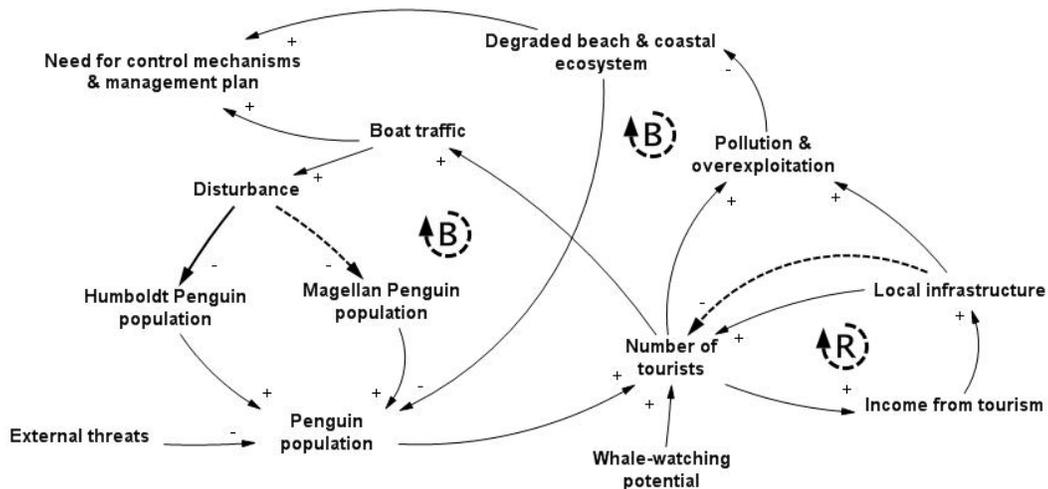
Subsequently, the variety of government authorities often leads to a ceding and passing on of responsibilities and a lack of coordination between those authorities, revealed in other cases such as the recent aquaculture development and marine conservation in Chile (Fernández & Castilla, 2005; Barton, 2006). This finding is also applicable to Puñihuil and was substantiated by several interviewees (Personal communication, Interviewees 1/2/4/5/6). Pearce (2007) argued that weak governance often shows up as poor management and neglect, in many cases even corruption, although corruption in Chile is low compared to most Latin-American countries.<sup>38</sup> The fisheries agency SERNAPESCA, being responsible for the management of the fisheries and the marine wildlife, has currently no authority to restrict the number of tours and to set a minimal distance restriction between boats and the islands. Only the lifting of status to a marine reserve would give it the ability to control and enforce stricter regulations in Puñihuil (Personal communication, Interviewee 6, 2008).

However, the actual significance of Puñihuil as a tourist attraction is probably still not fully acknowledged by the local authorities as there seems to be a general deficiency of valid statistic, information and the lack of taking on responsibility is apparent.

#### 4.9 The current situation in Puñihuil

Subsequent to the material obtained in this chapter, the situation became more complex. The interactions are shown in the third Causal Loop Diagram in Figure 5. The dashed lines indicate a weaker connection.

**Figure 5 – CLD 3: The current situation**



<sup>38</sup> The Transparency International Corruption perception index ranks Chile 22<sup>nd</sup> out of 179 countries surveyed, indicating that Chile has a relatively low degree of public sector corruption (Transparency International, 2008)

After the islands got their protection status, the dynamics of the system changed and tourism started to play an increasingly important role in Puñihuil. In CLD 3, a simplified relationship between ecosystem degradation and tourism is represented, which leaves out the fisheries (see CLD 2, Section 3.6). Other external threats to the Puñihuil penguin population are represented as an outside factor having a negative impact.

It is to observe that a lack of control mechanisms and the non-existence of a management plan currently represent one of the main challenges to prevent the possibly deteriorating effects of the tourism development, not only for the penguin population, but also on the whole beach and coastal ecosystem of Puñihuil. The potential for whale-watching is likely to lead to a further increase in the number of tourists, and it has the power to outweigh the attractiveness released by the penguins and to additionally increase disturbance levels. The local infrastructure development, dependent on the derived income can lead to an increase of the number of tourists, finding a greater range of options (accommodation, restaurants etc.), which is, thus, the predominant link. Yet, some tourists might avoid a place with more tourism activity, which leads to lower tourist numbers.

The transferability of this study to other locations and cases is determined by the interactions of tourism and ecosystem effects, such as pollution and animal population impacts. Instead of having penguins as the focal species in the system, other species can be thought of as substitutes for other places respectively. Whenever a certain area faces pressures from anthropogenic actions, protection statuses serve as an immediate solution, but in the long run, the impacts of new use-forms have to be analyzed carefully in order to avoid a shifting of the threats to the species at question. However, as every case and location has a specific set of characteristics, those should be considered and taken into consideration carefully.

## **5 Analysis**

The results represented in Chapter 4 reveal the complex interrelations between the penguin conservation and the local community development in Puñihuil. It has been shown that the increase in the number of visitors to the beach of Puñihuil every season has had clear advantages for the local economy with increased revenues and development opportunities, but it is a two sided-coin with positive and negative effects for the ecosystem (primarily negative), the community (primarily positive, but also negative) and the local and regional economic development. This following section will illustrate and analyze the economic, environmental and social benefits and costs of the tourism development.

### **5.1 Economic impacts of conservation and tourism**

**People profit but do not preserve** (A 53-year old Chilean tourists who was asked if he thinks there is a conflict between tourism and the penguin conservation in Puñihuil)

Similar to any economic endeavor, tourism produces benefits and costs whose effects interact in complex ways (Eagles et al., 2002). In Table 5 some effects are shortly represented.

**Table 5 – Economic impacts of tourism applied to Puñihuil**

| Benefits  | Costs  |
|---|--|
| <ul style="list-style-type: none"> <li>- More jobs for local residents</li> <li>- Increased income of locals</li> <li>- Improved living standards</li> <li>- New skills for locals</li> <li>- Generates local tax revenues</li> <li>- Stimulation of other economic sectors (e.g. transport, retail, tourism related services)</li> <li>- Funding the development of infrastructure and services</li> </ul> | <ul style="list-style-type: none"> <li>- Foreign Ownership and raising property values in the region</li> <li>- Leakage of tourism expenditures from Puñihuil to Ancud and other regions</li> <li>- Reduced welfare of fishermen due to restricted access to fishing grounds around islands</li> <li>- Direct costs of construction of buildings and facilities</li> </ul> |

Source: Based on and adapted from Butler, 1974; Ceballos-Lascuráin, 1996; Eagles et al., 2002; Tapper, 2006

Yet, the economic value of the penguin colonies for Puñihuil is big and as stated in Section 4.3, it is estimated to be around €157,500 in direct revenues from the boat operations for the whole season of 2007/2008. Including additional expenditures for food and drinks, overnight stays and handicrafts, the revenues are far higher. Thus, the economic impact for this small area, primarily characterized by fishing and farming, is immense and as stated by local interviewees, significantly increased their livelihood and income became more stable and not dependent on fish catches and market prices.

However, especially in tourism, a significant part of the revenues often leaks away from the area suffering a disproportional environmental impact, to regions where the main tourism infrastructure is provided (Eagles et al., 2002). This is also true for Puñihuil, as Ancud is the main tourist centre for northern Chiloé and nearly all tourists reside there.

Nevertheless, the heavy dependency on tourism increases the vulnerability to external factors which are beyond any local control, such as natural disasters, currency fluctuations, competitive nature of markets and increased competition from other places with high tourist appeal in the region. This is true especially for Chiloé where tourism is expanding and new places are sought after for tourism development (Personal communication, Interviewees 7/16). In addition, the risk of whale-watching as a new tourist activity demanding high initial investments for equipment and boats, might lead to financially stronger competition from big companies, posing a risk to the small scale operators who do not have the sufficient financial or political stakes to compete.

However, local empowerment represents one of the major benefits for the members of Ecoturismo Puñihuil. Not only is there a better economic situation, as revealed in Section 4.4.2, than that of the free-rider, but the joint effort did also lead to upgraded service quality with new and safer boats, partly funded by the government's development agency, and improved environmental standards such as more environmentally friendly motors with less noise disturbance and lower emissions (Personal communication, Interviewees 2/8). Moreover, Ecoturismo Puñihuil tried to implement the recommendations given in the tourism carrying capacity study conducted in the year 2007. There, the carrying capacity of Puñihuil in terms of local infrastructure and of the ecological consequences was analyzed (Muñoz et al., 2007). The

report came to the conclusion that a number of changes would have to be implemented if the tourism activity and the conservation of the islands will continue as an important source of income, under various aspects. First of all, a limitation of tours would have to occur, in order not to put too much pressure and stress on the ecosystem and its inhabitants. As a recommendation, it was stated that no more than 30 tours each day would have to take place, together with a fixed route around the islands and a minimal time between each tour (Muñoz et al., 2007). However, overwhelmed by the amount of tourists and the competition from the free rider, the recommendations were only partially followed.

As a result, it can be stated that instead of having an open market situation with free access to the use of the resource (i.e. access to drive boats around the islands), this example shows that cooperation and in the longer run a limitation of access, restricted to a relatively small number of cooperating local businesses only, can have overall more positive effects for conservation (see Section 4.4.2). Still, governmental responsibilities cannot be denied and it was acknowledged by the interviewees that without support and control from authorities they cannot put into place restrictions themselves (Personal communication, Interviewees 1/3/10/15).

Another serious problem is the lack of funds assigned for conservation issues. Most revenue sources for protected area management in developing countries come from administrative agencies or are funded by entrance fees (Lindberg and Enriquez, 1994; in Eagles et al., 2002). As there is a clear absence of government authority in Puñihuil and no funding from their side, the feasibilities of visitor entrance fees to raise funds could be considered as an option for the future (see Section 4.6). Apart from the financial effects, delimitation of visitor numbers could also be a consequence. However, the questions remain: Who should be in charge of collecting and enforcing entrance fees; who should administrate them accordingly and who should delimitate the visitor numbers? A more feasible option could include an additional charge on the price of tour operators and central parking with fees, which are then used for conservation purposes. But here as well problems of enforcement and administration will be encountered. Without a management agency, such as CONAF, any fundraising measure is difficult to implement. Ironically, CONAF stated that the reason why it is not present at Puñihuil is the lack of funding required to build a park warden house and to pay staff (Personal communication, Interviewee 4). But even if there were money, there is currently no organization which could implement and enforce stricter conservation regulations.

So far, apart from the small hotel, which was funded by an Argentinean businessman and is run by a local former fisherman of Puñihuil (Personal communication, Interviewee 9), there has not been any other form of foreign investment. However, when it is realized that the area offers a great and easy business opportunity due to its outstanding landscape, its fascinating biodiversity and the premise of whale-watching operations in the future, this might change, leading to consequences beyond the control of the local community and undermining the so far reached positive development in community empowerment and economic development.

## 5.2 Environmental impacts of conservation and tourism

From an ecological perspective, having Ancud as the main tourist centre providing the necessary infrastructure is certainly positive, because it reduces the time people stay at Puñihuil beach and the negative impacts associated with it. During late evenings, early mornings and on days with bad weather, the beach is basically void of people and a magnificent spot.

However, one of the most serious problems for Puñihuil is crowding during high season, where the mere presence of tourists and the numerous boat tours (see Section 4.3) per day leave a serious impact (Ceballos-Lascuráin, 1996; Eagles et al., 2002). With the prospect of whale-watching, the number of people is very likely to increase further, leading to more investments and infrastructure being built in the vicinities of the beach. Furthermore, the upgrading of the access road will simplify car access to the beach, rendering Puñihuil as an even more attractive and easy-to-reach weekend destination for the population of Ancud and Puerto Montt probably resulting in overcrowding with negative effects.

**Table 6 – Environmental impacts of tourism applied to Puñihuil**

| Positive  | Negative   |
|---|--|
| <ul style="list-style-type: none"> <li>- Increased education and awareness towards conservation risks of penguins, especially the Humboldt Penguin*</li> <li>- Improved protection status of Puñihuil Islands (Natural Monument) and access ban</li> <li>- More local efforts to keep beach clean and free of litter</li> <li>- Funds for conservation efforts ±</li> <li>- Increased Magellan Penguin population</li> <li>- No proven decrease of Humboldt Penguin population</li> </ul> | <ul style="list-style-type: none"> <li>- Crowding of people during peak times</li> <li>- Human waste problems</li> <li>- Behavioural effects of wildlife disturbance</li> <li>- Habituation of wildlife to disturbance (Magellan Penguin)</li> <li>- Possible physiological effects of disturbance on Humboldt Penguins ±</li> <li>- Overdevelopment of beach (construction of more accommodation etc.)</li> <li>- Emissions and air pollution from boats and cars</li> <li>- Visual and noise impacts from motorised machines (cars, boats, motorbikes)</li> <li>- Soil compaction of sand beach</li> <li>- Higher risks of direct threat to animals from boat propeller cuts</li> <li>- No proven increase in Humboldt Penguin Population</li> </ul> |

\*However, the educational aspect is not given as there is a lack of tourist information and education, see Appendix 7 for tourist questionnaire result about information satisfaction

± These effects have not been addressed in Puñihuil, but have been shown at other locations in Chile (Ellenberg et al., 2006) ± With the end of the work of the Otway Foundation, it remains unsure if there will be a continuation of the current conservation efforts (tourist education and information) and any more fund for conservation work

Source: Based on and adapted from Butler, 1974; Ceballos-Lascuráin, 1996; Eagles et al., 2002; Tapper 2006

To fully understand the ecological complexities and to investigate the thresholds of the ecosystem, more research is required, but gaps are closed every year and the CCC actively seeks to provide scientific data and information. However, action should not be delayed until the penguin numbers actually drop, but should be taken immediately to chiefly protect the penguin colonies, following the philosophy of the precautionary principle (deFur & Kaszuba, 2001). Yet, the aforementioned constraints of mainly economic thinking from the local stakeholders and the lack of government control and management do not facilitate this step.

It remains to be studied where the critical thresholds are and how much disturbance the animals will bear before their population decreases and they disappear, because only scientifically backed-up data is likely to have an effect of being heard and enforced. Right now it seems that a successful combination of biodiversity protection with tourism and recreation (IUCN, 1994) does not take place at the beach and tourism is overwhelmingly present and appears to have become the main objective in Puñihuil. The clear lack of a management framework and strategy affects the ongoing irresponsible manner in which tourism is conducted. There is a difficult challenge, and trade-offs between tourism development and the biodiversity protection for the wellbeing of the local community have to be made (Eagles et al. 2002). It seems that only the establishment of a marine protection area can lead to stricter regulations for the tourism activities, enforced by the fisheries ministry SERNAPESCA (Personal communication, Interviewees 1/3/6).

Going back to the finding of the Puñihuil penguin population (see Section 4.1), the protection of the islands has had clear positive effects on the Magellan Penguin, but the Humboldt Penguin population did not increase, but at the same time it did not decrease. To what extent this can be called a success is questionable, but if the current trend of high visitation and disturbance continues, the decreasing presence of Humboldt Penguins will be the indicator for change and an overuse of the ecosystem, as they react sensitively to disturbance and stress (Ellenberg et al., 2006; Walker et al., 2006).

The high numbers of boat-tours from 4 to 7 pm when the adults return to feed their chicks (see Section 4.3, Graph 2) add to the overall negative impacts. Boats often block the returning adults from entering the islands where the chicks wait to be fed. This has implications for the chicks, as it prolongs the time they have to wait for their food and it likely leads to an increased stress level in the parental animals (Personal communication, Interviewee 3). Another important issue on that matter is that moulting takes place in February and March and during this time the penguins cannot swim out to hunt, as their feathers are not providing the necessary water resistance and insulation (Simeone, 2005). During the several weeks moulting period the animals have to save as much energy as possible to survive and every additional attempt to escape threats, such as approaching boats, has severe impacts, which is even worse when the birds try to get into the water in order to escape boats approaching too close (Personal communication, Interviewee 3, 2008). This conduct might seem funny and cute for tourists but it represents a severe threat for the moulting penguins as it is an unnecessary loss of energy and additional stress.

Nevertheless, as indicated before, for the tourism activities it makes no difference what penguin species is present, as long as there are penguins. The two species are physically very similar, but one is threatened by extinction and the other one not, and the problem that the threatened Humboldt Penguin reacts very heavy to disturbance, adds to the difficulties of combining tourist and conservation in Puñihuil.

The potential disappearance of the Humboldt Penguin, might lead Puñihuil to lose the main characterization of its declaration as a Natural Monument, while it also puts a bad light on the governmental authorities, as Chile has signed the convention on biodiversity for the protection of migratory species, which includes the Humboldt Penguin (UNEP-WCMC, 2003; CMS, 2005). Moreover, it has been found that ENSO occurrences result in a migration of Humboldt Penguins southward, following their main prey.

Thus, in times of climate change and increasing occurrence of ENSO phenomena, protecting their most southern habitat and breeding sites is of utmost importance regarding their future survival (Wallace et al., 1999; UNEP-WCMC, 2003; Herling et al., 2005). Chile, having signed according treaties for the protection of this species should not neglect its responsibility, and only putting the breeding island habitat under protection on paper is not sufficient and measures should be taken to also protect marine waters and foraging regions.

### 5.3 Social impacts of conservation and tourism

Apart from the economic and environmental impacts of tourism, social impacts represent another effect with positive and negative sides (Eagles et al., 2002). In Table 7 the most prevalent impacts for Puñihuil are represented.

**Table 7 – Social impacts of tourism applied to Puñihuil**

| Positive   | Negative  |
|--|---|
| <ul style="list-style-type: none"> <li>- Increased awareness about and responsibility for local environment</li> <li>- Better knowledge about conservation and sustainability</li> <li>- Higher degree of openness to other countries and cultures</li> <li>- Education and empowerment</li> <li>- Tourism as driver for preservation of heritage</li> </ul> | <ul style="list-style-type: none"> <li>- Unheard voices of the marginalized local community (farmers/fishermen)</li> <li>- Risk of conflicts between and tourism businesses and fishermen/farmers</li> <li>- Loss of traditional heritage and culture</li> <li>- Seasonality of tourism and associated low employment during off-season</li> <li>- Lifestyle changes and higher living costs</li> <li>- Lower quality of life for locals due to crowding</li> </ul> |

Source: Based on and adapted from Butler, 1974; Ceballos-Lascuráin 1996; Eagles et al., 2002

The empowerment achieved and the shift in thinking and awareness of the local community in Puñihuil are remarkable and many discussions during my field stay were centered on protection, conservation and sustainability. However, even though the problems and challenges are widely recognized, they are only poorly changed and solutions or improvements slowly implemented. Again, the reasons are lack of government action and the situation of open market competition. Therefore the need for capacity building and stakeholder cooperation is of utmost importance if the situation in Puñihuil is going to change towards a more sustainable development. As a consequence, the continuous presence of NGOs which is involved in protection of biodiversity and also providing for guidance and support in sustainable development is necessary (Wood, 2002). In Puñihuil, the FO assumed the protection and conservation work together with tourist information and education, while the CCC is a partner and support for the local community development with the clear aim to combine high quality tourism with low impact on the ecosystem (Personal communication, Interviewee 8).

To what extent the current situation will change due to the resignation of the FO from Puñihuil remains unknown, but it is certain that the educational and informational aspects will be further neglected and tourists will experience an even lower level of information than before.<sup>39</sup> However, the local

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<sup>39</sup> The level of information about the ecosystem and its threats is very low and the FO was the main provider of information up to now, see Appendix 7

community also seems to be overall happy with the tourism development, although there are negative effects, and it can be observed that the pride of showing foreigners the beauty of the nature and the splendor of culture is erasing the historic notion of Chiloé being the 'forgotten island'.

## 6 Discussion

### 6.1 Valuing biodiversity?

**If locals make money from penguins they will value them more.** (A 69-year old British tourist on the question whether he thinks there is a conflict between tourism and the penguin conservation in Puñihuil)

The valuation of biodiversity in monetary terms under the neo-classical economic paradigm is an easy way to convince people of either foregoing or undertaking certain activities. As long as conservation can be transmitted to be an economically rational activity, people will most probably understand and value it accordingly, especially in marginalized regions where conservation is a luxury, as it was and partly still is in Chiloé. The problem starts when the economic rationale takes over and jeopardizes the conservation efforts, thus undermining its own existence, as is the case for Puñihuil. Hence, it is argued that market forces should not be left to drive and eventually decide the outcome of conservation projects. Otherwise, we would acknowledge that biodiversity that cannot continue to exist in the marketplace does not merit being conserved (Chan et al., 2007).

Besides, there are also moral implications of valuing biodiversity. Certainly, the disappearance of the Humboldt Penguin from Puñihuil will not seriously impinge on the tourism activity, as long as there are Magellan Penguins. Although other animals will fill its niche, its disappearance will affect the ecosystem to an unknown extent. Furthermore, we do not know the totality nor do we understand the whole complexity of the ecosystem function or its critical thresholds (Farber et al., 2002). This should be reason enough to take action for a more stringent protection of species, on a global scale.

Additionally and more importantly in the context of sustainability as defined by the World Commission on Environment and Development [WCED] is the intergenerational equity as it represents an inherent component of the notion of sustainability (WCED, 1987). There cannot be a monetary valuation to biodiversity if we do take into consideration future generations and their share of experiencing and living in a world such as ours, still rich in a diversity of species. Since it is impossible to communicate with future generations, we should not value biodiversity only in current monetary terms and this advises us to consider conservation not only as a constraint on economic activities. (Hampicke, 1999)

Although the penguin colony generates at least €157,500 of revenues per season, not including any additional spending of the tourists, it would be wrong to think of this amount as being the value of the Puñihuil penguin colony<sup>40</sup> (Section 4.3). There is also the scientific value of Puñihuil which is beyond any

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<sup>40</sup> The real value, only economically speaking, could be calculated by discounting the yearly revenues, but due the above mentioned reasons, this was not done in the thesis

substitution, as there is no other place having the same biological features of a mixed penguin colony (Simeone & Schlatter, 1998).

The key argument here is the intrinsic value of nature, beyond any economic measures of valuation and reclaiming that something which cannot be substituted - and the Humboldt Penguin or any other species cannot be substituted - consequently has no price and thus should not be measured under monetary terms (Hampicke, 1999). The aesthetic value of biodiversity is often another reason put forward by conservationists. However, as human beings we are habitually doomed to classify species and it is argued that conservation too often focuses on charismatic and cute species while others get too little attention. This development involves risks, as the charismatic species often depend on the less charismatic ones for their own survival (Stokes, 2007).

We as human beings have the power to extinguish species from the face of the planet (Sen, 2004). But with power comes responsibility and it should be within our sense of value to protect biodiversity, even more so when we are aware of its threat and know about preventive actions.

## **6.2 Stakeholder responsibility**

It has been widely acknowledged that the challenge of protected areas management, especially that of dealing with the pressures of recreation and tourism, will only be met effectively through building partnerships between all the interested parties (Ceballos-Lascuráin, 1996; Eagles et al, 2002). Thus, also in local community development project planning, the explicit inclusion of those who have a stake in projects scenario has become a prevailing attitude (Bell and Morse, 1999). The crucial conception of today's sustainable development should aim at 'biodiversity for development', with poverty reduction and conservation as mutually reinforcing (Brown, 2004). It was seen from this research, that conservation benefited the local community with a new economic opportunity.

From another perspective, a stronger commitment to the responsibilities of citizenship, along with enforced institutional regulations and the provision of financial incentives, may help to enhance environmental care (Sen, 2006). To an extent this responsibility has been taken on by the local tourism operators in Puñihuil, who moved from being purely opportunistic towards higher conscientiousness. The trend shows that there is an increasing awareness about the current problems associated with tourism and there is the willingness to solve those (see Section 4.4). Ironically, the institutional and economic constraints impede local auto-regulation and contribute to a situation often described as the tragedy of the commons, where open access to a natural resource undermines its very existence (Hardin, 1968). This, in turn, harms the economic as well as environmental long-term survival of the local community which is after all becoming dependent on tourism to a greater extent. However, local empowerment and the strengthening of its responsibilities have to continue and it might at one point substitute for the lack of governmental regulations, balancing economic, environmental and social aspects.

In the case of Puñihuil it is currently once more clear that the actual interface between tourism and conservation is of coexistence but it moves towards conflict and contradiction due to a lack of management, the explosive growth of tourism and its expansion without sufficient planning, observed in many other cases as well (Ceballos-Lascuráin, 1996). Still, the problem is not the individual tourist, but the total number which by their mere presence overuse the resources, in this case putting stress on the penguins. Presence and its consequential pollution are thus the main problem for the Humboldt Penguin which reacts accordingly to disturbance (Ellenberg et al., 2006).

Many studies about ecotourism have reached the conclusion that in general, tourists who are most interested in visiting protected areas, such as ecotourists, tend to be more highly educated than tourists in general (Wight, 2001; in Eagles et al., 2002). However, personal observation and many discussions with tourists visiting Puñihuil do not substantiate this proposition in this particular setting. One such reason might be the very nature of the species being the main driver for the tourism: the penguins. Most people see them as very cute and adorable creatures and seeing them in real, taking pictures and being able to show relatives and friends about this experience is the main goal. For the majority of tourists, learning more about the ecosystem and the threats is clearly not the main objective of the visit. Although clear data and evidence is missing, my personal observations working with tourists for two months do back up that assertion. Tourists, being stakeholders themselves, have to take on responsibility for their actions and their consequences.

Generally, observation is perceived as having a low impact for biodiversity and tourism is claimed to be a non-consumptive use of nature (Costanza, 1997). But in the case of Puñihuil, as it is at present, it can be claimed that tourism and observation represent an indirect form of consumption of the ecosystem, leaving it deteriorated and degraded for future generations. Consequently, as of now, it can be claimed that tourism in Puñihuil represents a consumptive use of biodiversity contributing directly to the degradation of the beach ecosystem and indirectly to the island ecosystem deterioration resulting in the eventual disappearance of species, foremost the Humboldt Penguin.

However, counting only on the local population to implement conservation measures will probably take too much time, time which might not be there for the Humboldt Penguin, especially with the current lack of understanding and scientific research about ecosystem thresholds (Personal communication, Interviewee 5). To what extent the government is actually to blame, in a country with one of the largest coastlines in the world (see Section 3.2), remains. There are a numerous places in Chile who require special attention and environmental protection, but the lack of resources combined with unclear and overlapping competencies (see Section 4.8) does not ameliorate the current situation.

Yet, everyone having a stake in Puñihuil has to realize that the decline in environmental health can seriously compromise the growth possibilities of tourism itself and the local actors should try everything to avoid this from happening as it ultimately jeopardizes their own future (Fossati & Panella, 2000).

### 6.3 SWOT analysis of factors applied to Puñihuil

The Strength, Weaknesses, Opportunities and Threats [SWOT] analysis in Figure 6 summarizes internal factors which can strengthen or weaken the objective of reaching a more sustainable use<sup>41</sup> of the local biodiversity as well as external factors which represent opportunities and threats to this objective.

**Figure 6 – SWOT analysis**

|  | Helpful factors for achieving a more sustainable use of biodiversity in Puñihuil   | Harmful factors for achieving a more sustainable use of biodiversity in Puñihuil   |
|--|--|--|
| <b>Internal factors (Puñihuil)</b>             | <b>STRENGTH</b>  | <b>WEAKNESSES</b>  |
|  | <ul style="list-style-type: none"> <li>- Ecoturismo Puñihuil cooperation among the local boat tour operators</li> <li>- CCC capacity building and education for ecotourism of local community</li> <li>- Increased stakeholder participation</li> <li>- Income gained from tourism</li> <li>- Deeper understanding about necessity to protect ecosystem and biodiversity</li> <li>- Government financial assistance to sound development</li> <li>- Positive impacts of tourism to the economy ∓</li> <li>- Positive impacts of tourism to the environment *</li> <li>- Positive impacts of tourism to the local community ±</li> <li>- General acceptance of tourists for stricter management and regulations and Willingness to Pay</li> </ul> | <ul style="list-style-type: none"> <li>- Free rider action and business competition</li> <li>- New / increasing conflicts among stakeholders (business to business, fishermen to business)</li> <li>- Short-term monetary/economic thinking vs. long-term planning and conservation efforts</li> <li>- Low willingness to change old behaviors or to adapt to new situation</li> <li>- Negative impacts of tourism to local economy ∓</li> <li>- Negative impacts of tourism to the environment *</li> <li>- Negative impacts of tourism to local community ±</li> <li>- Large scale business operations developing tourism projects</li> <li>- Uncontrollable increase in visitor numbers</li> <li>- Lack of cooperation with travel agencies, resulting in uncontrolled arrivals of large tourist numbers and constraints to planning</li> </ul> |
| <b>External factors (Chiloé, Chile, World)</b> | <b>OPPORTUNITIES</b>   | <b>THREATS</b>   |
|  | <ul style="list-style-type: none"> <li>- Global growth in nature-based tourism (e.g. ecotourism)</li> <li>- Increased national conservation efforts and governments financial support and assistance for ecotourism certification</li> <li>- Ecotourism certification applicable for Puñihuil, resulting positive effects on procedures, standards and better tourism marketing in long run</li> </ul>   | <ul style="list-style-type: none"> <li>- Loss of tourism attractiveness due to ecosystem degradation</li> <li>- Increased competition with other touristic places in the region</li> <li>- Unforeseen events putting penguin population at risk (e.g. massive marine pollution, disease, effects of climate change, continuous overfishing of anchovies and other prey)</li> <li>- Unfavourable media coverage due to stepping back of the Fundación Otway, resulting in lower tourism attractiveness</li> <li>- Continuous lack of government control and actions towards more regulations</li> </ul>   |

Note: For the positive/negative effects of tourism on the economy ∓ see Section 5.1; environment \* see Section 5.2.; community ± see Section 5.3.

Already in 1980, research confirmed that tourism generally follows a cycle, showing that it is dynamic and changes over time, brought by factors such as change in preferences, gradual deterioration and the change of the original natural and cultural attractions responsible for the initial popularity (Butler, 1980). To continue this argument, the development in Puñihuil, with drastic visitor increases so far, might have

<sup>41</sup> The term sustainable use in this case refers primarily to the preservation of cultural services, such as the aesthetic and recreational services and the scientific enrichment (see CBD, 2005), derived from the Puñihuil penguin colony.

reached a point of consolidation ultimately followed by stagnation. This phase is characterized by a peak in visitor numbers as the environmental, economic and social problems will become more prevalent. Puñihuil as of now can be said to stand within the consolidation phase, applying the tourism cycle theory (Butler, 1980). Thus, it has become clear that the number of visitors must be restricted in order to not exceed the carrying capacity of the ecosystem and its biodiversity (Muñoz et al., 2007).

As a result, the most prevalent challenge in Puñihuil remains the establishment of a working visitor management, balancing economic interests of the local and regional stakeholders and the conservational aspects in a way that Puñihuil does not lose its attractiveness to tourists in the long run. Nonetheless, given the diversity of interests and the conflicts, this venture will require a set of long-term strategies, direct stakeholder involvement and planning. Due to the lack of government intervention, the recent development pointed into the direction of auto/self regulation of the local boat operators in order to achieve a better conservation effort, a step that is certainly positive but due to the difficulty of combining each other's interests and the prevalent selfishness, the final outcome of the co-operational efforts remain still unsure in the years to come. The provided statistics and data aimed at showing that co-operation has positive effects and giving up self-decision making in one's own operational activities is more than off-set by the positive economic effects (see Section 4.4.2).

The denomination of the concept of ecotourism applied in Puñihuil with the Ecoturismo cooperation has to be certified, because it is misleading as it lacks any connection with the actual definition of ecotourism and the absence of clear standards. More so, the name describes the ultimate goal where to get to in the future, but as of today it represents a mere marketing tool without any implemented or backed up standards behind it. Tourists are often misled by the name and think they are part of an ecotourism activity, but in reality they are not and unknowingly they contribute to the deterioration of the ecosystem and the disappearance of the islands biodiversity. Nevertheless, it has to be acknowledged that even the often praised concept of ecotourism as a hope of conservationism to produce economic benefits that encourage conservation, generated evidence to be ecologically unsustainable, more so if ecotourists travel long distances, contributing to increasing greenhouse gas emission levels (Gössling, 2002; Ellenberg, 2006).

However, the continuous efforts by the Cetacean Conservation Center to combine community development aspects with ecological consideration and the exploration of the feasibility of whale-watching and penguin tourism in Puñihuil might serve as a valuable framework for any future operation and decision, provided that the current constraints can be overcome (CCC, 2008).

The outcome of the tourist questionnaire and the favorable result of the WTP study (see Section 4.6) should provide the local tourism businesses and the tour operators with enough convincing evidence that stricter regulations and even the imposing of an entrance fee does not negatively impact the arrival of visitors and might even contribute to the long-term functioning of tourism in Puñihuil. However, concerning the willingness to pay, the tendency of people to be willing to pay and to actually pay the amount is different and one has to account for it (Pearce, 2007).

State intervention often seems to be necessary in order to control the various negative externalities caused by tourism and its related activities, especially the environmental consequences so that efficient economic systems are established which favors the collective welfare (Fossati & Panella, 2000). Therefore, the government and local stakeholders are urged to take direct action in order to prevent further damaging activities to the environment and the species which were meant to be protected by the tourism activities.

I have seen with my own eyes how everyone talks about protection and conservation, but no one actually does take the necessary steps. The tragedy of the commons also applies in that case and the absence of a management plan and the government implementing it further worsens the situation (Hardin, 1968). The current trend in Puñihuil and its associated aspects represent a weak sustainability approach, where the economic sustainability is emphasized and the financial values are key elements, as opposed to strong sustainability where the focus is primarily on the environment (Bell and Morse, 1999; Hediger, 1999). This trend needs to be reversed and, with regards to strong sustainability, the environmental considerations should constrain economical decisions, for the long-term benefit of both sides and to acknowledge that:

Biological diversity is important for life on Earth and is one of the pillars of sustainable development. Our continued deriving of benefits from biodiversity, both now and for future generations will depend upon how we use it and how our activities impact upon ecosystem functioning and goods and services. (Zedan, 2004; in CBD, 2004:1).

#### **6.4 Recommendations**

The problems of the world are increasingly interconnected and one-size fits all solutions are rarely applicable (Chan et al., 2006). The same is true for conservation, which requires locally and regionally tailored approaches. Conflicts between conservation and human welfare and the shutting out of local stakeholders has to be avoided to a maximum, as they might ultimately determine the fate of the landscape and the outcome of the conservation effort - in the case of Puñihuil the fishermen in combination with the tour operators. Consequently, cohesion and cooperation between the stakeholder groups is vital.

Thus, it is recommended to continue efforts to implement a community-based ecotourism in Puñihuil with all local stakeholders involved. This means that the community must acquire substantial control and involvement in the ecotourism project and the majority of the benefits remain in the community where a group initiative manages an enterprise conjointly (Wood, 2002). The applicability for Puñihuil is shown with the Ecoturismo cooperation, although it remains to re-include the free rider in order to make it work. Furthermore, the continuing free access to beach for new entrepreneurs and companies seeking quick and fast return on investments without acknowledging local aspects, let alone a long-term sustainability perspective, has to be restricted.

Moreover, the cooperation should aim at an internationally approved certification for ecotourism in order to improve marketing efforts and to also provide tourists with a true ecotourism experience. Therefore it is of utmost importance that Ecoturismo establishes standards for the responsible conduction of its tours

and the further tourism activities in correspondence to the already presented recommendations (Muñoz et al., 2007; CCC, 2008).

Local decision makers should be urged to shun accessibility improvements and the upgrading of the street, because this would result in increased visitation with the mentioned negative impacts for the environment and thus lead to a deterioration of the attractiveness in the long run. These factors undermine the initial development objective and do not provide long-term revenue generation for the local community or the region (Butler, 1980).

Furthermore, a tourism monitoring program should be established and implemented in close collaboration with the community, researchers and tourism operators in order to provide an updated visitor database, to measure visitor impacts and to monitor service quality (Eagles et al., 2002).

Finally, the limitation of boat-tours per day should be enforced as recommended in the tourism capacity study (Muñoz et al., 2007) and during times when adults return from their foraging grounds to feed their chicks (Section 4.3, Graph 2), boat-tours should keep greater distance to the islands or better even avoid sensitive spots where returning penguins enter the islands. Another option could be the use of scopes from different points at the beach, to compensate for the lower number of tours and to still let people observe the penguins, without disturbing them.

## **6.5 Is biodiversity conservation in Puñihuil possible?**

To summarize and answer the question which courses throughout this thesis - if the conservation of biodiversity in Puñihuil is possible - the answer is that given the current circumstances and the difficulties to overcome the constraints, it is not possible as of now. Since it is unknown where the ecological thresholds are and Puñihuil, like any other ecosystem, constitutes a fragile and complex interconnection of ecological elements, I share the opinion of my interviewees (Interviewees 1/3/5) that a continuing deterioration of the coastal ecosystem will occur, with a decline in penguin numbers already observed this year but not scientifically proven and followed up, and the disappearance of the Humboldt Penguin.

The unforeseen consequences of tourism provoked by the penguin conservation and the island protection in Puñihuil are today similar to any other form of exploitation resulting in ecosystem degradation. Tourism as it is practiced now, far away from any ecotourism concept is just a more subtle way of making use of nature and leading to its destruction in the long run. For the future of Puñihuil, it all depends on how both conservation and development can be re-combined and under which regulations and with whose control it is achieved and done. The establishment of a marine reserve would allow for stricter regulations to take place (Personal communication, Interviewees 3/8/6) and the existing plans of establishing a marine reserve should be implemented.

Coming back to Puñihuil, it can certainly be argued that the approach taken by the Fundación Otway was partly inexperienced and naïve, but the FO should also be given credit for the bold mission of starting a conservation project like this from scratch. Unfortunately, the absence of stringent government control and

regulation and the particular conditions in Puñihuil stirred up the situation where market economic thoughts of opportunistic local entrepreneurs overruled conservational concerns. However, it should not be neglected that the penguin conservation initially was a success and did partly represent a win-win situation for biodiversity protection and for community development. This is so, because no one actually knows what would have happened to the local penguin population and the beach if the development before 1997 had continued (See Section 3.6). Maybe there would have been no more penguins after all as they would have gotten entangled and drowned in the fishing nets, being taken for baits and suffered even higher consequences of their island ecosystem destruction with a complete deterioration of breeding sites.

As a general comment it can be said that, as there is a natural tendency for people to want to experience protected areas, it might sometimes be better not to lift the status of an area. Especially so, when human interference is low, as to not lure people to that place which would eventually be followed by exploitation in the form of tourism (Eagles et al., 2002). However, for many places and ecosystems which are experiencing pressure from human interactions, official protection statues are the only form safeguarding (Gössling, 1999).

## **7 Further Research**

The islands have an intrinsic value for marine biologists and ecologists, and furthermore, it has become clear that Puñihuil also represents an ideal study place for social sciences and development studies. The effects of climate change on the local ecosystem represent just one of the many research studies which can be conducted in Puñihuil, especially with regards to the consequences on the penguin population. Furthermore, the tourist themselves still represent a field of research for social scientists and economists. Concrete studies should be undertaken in Puñihuil, for the sake of closing the gaps of information, including among others the ecosystem thresholds, penguin behavior and the related risks from artisanal fishing.

## **8 Conclusion**

The complexities of biodiversity conservation and development have been shown here and although the constraints and hurdles are big, there is no other choice than to overcome them for the sake of rescuing species from extinction, on a global scale. Surely, conservation does attract exploitation, but it consequently can lead to empowerment of once economically and socially marginalized local communities.

The efforts started by the Fundación Otway in 1997 were without a doubt necessary and brave, even though the drawbacks are now becoming obvious, but at this time the number of tourists and the impacts the conservation project would attract had been unforeseen. For the local community and for the conservationists involved, the process of learning is connected with experiencing, but it should not be waited until there is a point of no return reached and Puñihuil has irreversibly lost its unique biodiversity, foremost the common presence of Humboldt and Magellan Penguins.

True ecotourism with high environmental and social standards has the possibility to combine the conservation of biodiversity and local development, but it is not yet happening in Puñihuil. The key word should be biodiversity conservation for development and Puñihuil has shown how conservation of biodiversity can enhance local wellbeing and development. Now it is time to give back and add the notion of development for biodiversity conservation in order to establish a mutually beneficial relationship where the local population benefits from the penguins and the penguins benefit from the tourism through higher protection. One thing has become clear: the penguins in Puñihuil do not need the human's presence, but now the local population needs the presence of the penguins.

If the trend continues and an increasing number of tourists arrive each year with consequential negative effects on the ecosystems and the wildlife on the islands, then the attractiveness of Puñihuil as a tourism destination will suffer with respective effects on the tourism business in the region. Tourism has the potential to bring about great benefits but also great costs and risks for conservation and protected areas. It remains to enhance and build on the benefits and to minimize the costs and risks. It doesn't mean that people should not travel anymore or experience the places on Earth, blessed with magnificence and beauty, as their spending represents an important part for the protection of those places. But, everyone of us, being a tourist as some point, has to be aware of the consequences each visit to natural areas brings about and we have to take on the responsibility for our actions, which sometimes can also include not to travel or not to experience a place in real, in order to contribute to the future existence of it.

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## 10 Appendix

### Appendix 1: Interviewee basic information

Interviewee 1: Horst George, President of Fundación Otway Chile. Interviewed on 31<sup>st</sup> of January 2008.

Interviewee 2: Katja Siemund, Member of Ecoturismo Puñihuil. Interviewed on 14<sup>th</sup> of February 2008.

Interviewee 3: Maria José Oetiker Hidalgo, Veterinarian and Researcher for the CCC. Interviewed on 13<sup>th</sup> of February 2008.

Interviewee 4: Hernán R. Rivera Meléndez, Regional Natural Heritage Director, CONAF Chiloé. Interviewed on 5<sup>th</sup> of February 2008.

Interviewee 5: Alfredo Wendt Scheblein, Marine biologist, CONAMA. Interviewed on 7<sup>th</sup> of March 2008.

Interviewee 6: Cesar Sepulveda. SERNAPESCA. Interviewed on 20<sup>th</sup> of February 2008.

Interviewee 7: José Mancilla Contreras, Regional director of SERNATUR. Interviewed on 26<sup>th</sup> of February 2008.

Interviewee 8: Elsa Cabrera, Director of the Centro de Conservación Cetácea [CCC]. Interviewed on 28<sup>th</sup> of February 2008.

Interviewee 9: Miguel Altamirano. Hotellier Penguinland and former fisherman. Native to Puñihuil. Interviewed on 14<sup>th</sup> of February 2008.

Interviewee 10: Pedro Barria Bargas, Member of Ecoturismo Puñihuil and fisherman. Native to Puñihuil. Interviewed on 18<sup>th</sup> of February 2008.

Interviewee 11: Francisco Altamirano, Member of Ecoturismo Puñihuil and fisherman. Native to Puñihuil. Interviewed on 26<sup>th</sup> of February 2008.

Interviewee 12: Manuel Rigoberto Paredes. Akiturismo, Tour operator in Ancud. Interviewed on 3<sup>rd</sup> of March 2008.

Interviewee 13: Carlos Maldonado Nenén, Akiturismo and Chiloétours, Tour Operator in Ancud. Interviewed on 18<sup>th</sup> of February 2008.

Interviewee 14: José Díaz Trojillo, Penguin Explorer, Tour operator in Ancud. Interviewed on 21<sup>st</sup> of February 2008.

Interviewee 15: Jorge Reinaldo Barria Altamirano. Employee of the Fundación Otway and former fisherman. Native to Puñihuil. Interviewed on 22<sup>nd</sup> of February 2008.

Interviewee 16: Maria Paz Díaz Villalobos, Tourist information office Ancud. Interviewed on 20<sup>th</sup> of February 2008.

Interviewee 17: Cristobal Alejandro Arjel Vargas. Student of tourism studies. Interviewed on 27<sup>th</sup> of February 2008.

Interviewee 18: Doris Nuñez Aguila. Asistente Social municipality of Ancud. Interviewed on 3<sup>rd</sup> of March 2008.

**Appendix 2: Set of questions asked to the interviewees during the semi-structured interviews.**

**Respondents (Interviewees 2/9/10/11/12/13/14/15/17)**

1. Since when do you live in Puñihuil?
2. What was your profession in the past?
3. What is your profession now?
4. What do you do during the winter, when there are no tourists coming to Puñihuil?
5. What was the situation of the island and beach ecosystem before the conservation project started?
6. Why do you think come tourists to Puñihuil?
7. How was the tourism development over the years, and how did the number of tourists develop?
8. Where there always penguins on the islands?
9. How did the penguin population develop?
10. Has your economic and social situation overall improved, e.g. do you earn more money now and do you think that your life is better/easier now?
11. Do you think that conservation and tourism have been good for the beach?
12. Is there a management plan for Puñihuil?
13. Are there any conflicts and problems at the beach (e.g. between the fishermen and the tourism activities)?
14. How many people work in tourism at the beach?
15. What do you think about the possibility of whale-watching tourism?

**Informants (Interviewees 1/3/4/5/6/7/8/16/18)**

1. What are the possibilities for control and regulations in Puñihuil and to what extent can your agency/authority/organization control and enforce?
  2. Is there a management plan for Puñihuil?
  3. Does your agency/authority/organization provide funds or subsidies for the conservation work in Puñihuil?
  4. To what extent are the fishermen important in for the successful penguin conservation?
  5. Do you think there are conflicts in Puñihuil (e.g. between the fishermen and the tourism activities)?
  6. Do you think that the tourism development was good for the local population?
  7. Do you think this development was also good from a conservational point of view?
  8. What does the tourism do which benefits the conservation?
  9. What is your opinion about the possibility of whale-watching tourism in the future?
-

### Appendix 3: Tourist survey

**Dear Visitor, for the conduction of a Master Thesis about *Conservation and Economic Development through Tourism – A Case Study of Puñihuil*, you are kindly ask to fill out this questionnaire as objective and truthfully as possible. Thank you very much.**

1. At first glance, do you think that there is a conflict between the Tourism and the Penguin Conservation in Puñihuil?  
 Yes  No  
Please comment \_\_\_\_\_
  2. Do you think Puñihuil is well organized?  
 Yes  No
  3. Did you already go on a boat-tour in Puñihuil or do you plan to go?  
 Yes  No
  - 3.1. If yes, do you think the boats are too close to the Penguins and the other animals?  
 Yes  No
  - 3.2. Was there sufficient information about the ecosystem and the threats during the tour?  
 Yes  No
  - 3.3. If no, what kind of information would you wish to have? \_\_\_\_\_
  4. If there were an entrance fee to the beach to fund the penguin conservation, would you consider paying it?  
 Yes  No
- How much would you be willing to spend?
- Up to 1000 Pesos
  - 1000 – 2000 Pesos
  - 2000 – 3000 Pesos
  - More than 3000 Pesos
- Please comment \_\_\_\_\_
5. Are you satisfied with the local infrastructure (e.g. Restaurants, Accommodation)  
 Yes  No  
Please comment \_\_\_\_\_
  - 5.1. If no, what do you think should be improved? \_\_\_\_\_
  6. If there were more accommodation, would you stay overnight and if yes, how many nights?  
 Yes \_\_\_\_\_  No
  7. How much would you spend approximately for accommodation (standard two bed room in a hotel)?  
 Up to 5000 Pesos  
 5000 – 7000 Pesos  
 7000 – 9000 Pesos  
 More than 9000 Pesos
  8. Would you agree to stricter access regulations for Visitors (e.g. limiting the number of tours per day, longer waiting time, central parking) for a better conservation of Puñihuil?  
 Yes  No  
Please comment \_\_\_\_\_
  9. How old are you? \_\_\_\_\_
  10. What is your Nationality? \_\_\_\_\_
-

**Appendix 4: Statistics about visitors to the Puñihuil Islands during January 11<sup>th</sup> until February 25<sup>th</sup> 2008 (n = 16 days)**

| Association                           | Ecoturismo Puñihuil |               |               | Free Rider    |               | Result         |
|---------------------------------------|---------------------|---------------|---------------|---------------|---------------|----------------|
|                                       | Boat 1              | Boat 2        | Boat 3        | Boat 4        | Boat 5        |                |
| <b>Passengers transported per day</b> |                     |               |               |               |               |                |
| 2008-01-11                            | 47                  | 49            | 86            | 54            | 36            | <b>272</b>     |
| 2008-01-12                            | 34                  | 0             | 16            | 69            | 73            | <b>192</b>     |
| 2008-01-13                            | 74                  | 53            | 120           | 31            | 41            | <b>319</b>     |
| 2008-01-15                            | 64                  | 54            | 71            | 60            | 68            | <b>317</b>     |
| 2008-01-16                            | 76                  | 61            | 95            | 68            | 87            | <b>387</b>     |
| 2008-01-17                            | 44                  | 79            | 74            | 52            | 63            | <b>312</b>     |
| 2008-01-19                            | 68                  | 87            | 115           | 71            | 62            | <b>403</b>     |
| 2008-01-20                            | 34                  | 91            | 72            | 53            | 61            | <b>311</b>     |
| 2008-01-23                            | 98                  | 117           | 167           | 83            | 77            | <b>542</b>     |
| 2008-02-06                            | 111                 | 85            | 123           | 94            | 90            | <b>503</b>     |
| 2008-02-17                            | 95                  | 89            | 116           | 95            | 116           | <b>511</b>     |
| 2008-02-18                            | 113                 | 143           | 174           | 110           | 87            | <b>627</b>     |
| 2008-02-19                            | 126                 | 117           | 188           | 98            | 94            | <b>623</b>     |
| 2008-02-21                            | 61                  | 81            | 109           | 71            | 92            | <b>414</b>     |
| 2008-01-23                            | 77                  | 78            | 72            | 100           | 0             | <b>327</b>     |
| 2008-02-25                            | 55                  | 32            | 63            | 43            | 30            | <b>223</b>     |
| <b>Results</b>                        | <b>1177</b>         | <b>1216</b>   | <b>1661</b>   | <b>1152</b>   | <b>1077</b>   | <b>6283</b>    |
| <b>Percentage</b>                     | <b>18,73%</b>       | <b>19,35%</b> | <b>26,44%</b> | <b>18,34%</b> | <b>17,14%</b> | <b>100,00%</b> |

| Association                    | Ecoturismo Puñihuil |               |               | Free Rider    |               | Result         |
|--------------------------------|---------------------|---------------|---------------|---------------|---------------|----------------|
|                                | Boat 1              | Boat 2        | Boat 3        | Boat 4        | Boat 5        |                |
| <b>Number of Tours per day</b> |                     |               |               |               |               |                |
| 2008-01-11                     | 5                   | 6             | 9             | 9             | 5             | <b>34</b>      |
| 2008-01-12                     | 5                   | 0             | 2             | 11            | 9             | <b>27</b>      |
| 2008-01-13                     | 9                   | 6             | 10            | 5             | 5             | <b>35</b>      |
| 2008-01-15                     | 8                   | 5             | 6             | 10            | 7             | <b>36</b>      |
| 2008-01-16                     | 9                   | 6             | 9             | 10            | 9             | <b>43</b>      |
| 2008-01-17                     | 6                   | 7             | 8             | 9             | 6             | <b>36</b>      |
| 2008-01-19                     | 6                   | 8             | 8             | 10            | 7             | <b>39</b>      |
| 2008-01-20                     | 4                   | 7             | 7             | 7             | 7             | <b>32</b>      |
| 2008-01-23                     | 11                  | 10            | 11            | 11            | 8             | <b>51</b>      |
| 2008-02-06                     | 9                   | 6             | 11            | 9             | 9             | <b>44</b>      |
| 2008-02-17                     | 9                   | 9             | 10            | 13            | 12            | <b>53</b>      |
| 2008-02-18                     | 9                   | 10            | 11            | 12            | 9             | <b>51</b>      |
| 2008-02-19                     | 9                   | 9             | 13            | 10            | 8             | <b>49</b>      |
| 2008-02-21                     | 7                   | 7             | 9             | 10            | 9             | <b>42</b>      |
| 2008-02-23                     | 8                   | 9             | 7             | 13            | 0             | <b>37</b>      |
| 2008-02-25                     | 7                   | 4             | 6             | 7             | 4             | <b>28</b>      |
| <b>Results</b>                 | <b>121</b>          | <b>109</b>    | <b>137</b>    | <b>156</b>    | <b>114</b>    | <b>637</b>     |
| <b>Percentage</b>              | <b>19,00%</b>       | <b>17,11%</b> | <b>21,51%</b> | <b>24,49%</b> | <b>17,90%</b> | <b>100,00%</b> |

| Association                                      | Ecoturismo Puñihuil |               |               | Free Rider    |               | Result         |
|--|---------------------|---------------|---------------|---------------|---------------|----------------|
|  | Boat 1              | Boat 2        | Boat 3        | Boat 4        | Boat 5        |                |
| <b>Number of people per hour for all 16 days</b> |                     |               |               |               |               |                |
| 9:00-10:00                                       | 2                   | 0             | 5             | 6             | 0             | 13             |
| 10:00-11:00                                      | 50                  | 2             | 3             | 60            | 13            | 128            |
| 11:00-12:00                                      | 86                  | 102           | 118           | 91            | 36            | 433            |
| 12:00-13:00                                      | 146                 | 183           | 191           | 103           | 100           | 723            |
| 13:00-14:00                                      | 168                 | 149           | 230           | 161           | 156           | 864            |
| 14:00-15:00                                      | 109                 | 127           | 143           | 114           | 113           | 606            |
| 15:00-16:00                                      | 130                 | 88            | 182           | 90            | 154           | 644            |
| 16:00-17:00                                      | 216                 | 235           | 242           | 177           | 175           | 1045           |
| 17:00-18:00                                      | 115                 | 160           | 266           | 138           | 176           | 855            |
| 18:00-19:00                                      | 114                 | 126           | 193           | 154           | 120           | 707            |
| 19:00-20:00                                      | 41                  | 44            | 88            | 58            | 34            | 265            |
| <b>Result</b>                                    | <b>1177</b>         | <b>1216</b>   | <b>1661</b>   | <b>1152</b>   | <b>1077</b>   | <b>6283</b>    |
| <b>Percentage</b>                                | <b>18,73%</b>       | <b>19,35%</b> | <b>26,44%</b> | <b>18,34%</b> | <b>17,14%</b> | <b>100,00%</b> |

| Association                                     | Ecoturismo Puñihuil |               |               | Free Rider    |               | Result         |
|---|---------------------|---------------|---------------|---------------|---------------|----------------|
|   | Boat 1              | Boat 2        | Boat 3        | Boat 4        | Boat 5        |                |
| <b>Number of tours per hour for all 16 days</b> |                     |               |               |               |               |                |
| 9:00-10:00                                      | 1                   | 0             | 1             | 2             | 0             | 4              |
| 10:00-11:00                                     | 9                   | 1             | 1             | 9             | 2             | 22             |
| 11:00-12:00                                     | 9                   | 12            | 13            | 15            | 6             | 55             |
| 12:00-13:00                                     | 13                  | 16            | 15            | 15            | 11            | 70             |
| 13:00-14:00                                     | 15                  | 13            | 19            | 20            | 15            | 82             |
| 14:00-15:00                                     | 11                  | 12            | 13            | 15            | 13            | 64             |
| 15:00-16:00                                     | 13                  | 7             | 15            | 15            | 15            | 65             |
| 16:00-17:00                                     | 19                  | 19            | 17            | 22            | 18            | 95             |
| 17:00-18:00                                     | 10                  | 12            | 18            | 17            | 18            | 75             |
| 18:00-19:00                                     | 13                  | 12            | 16            | 18            | 13            | 72             |
| 19:00-20:00                                     | 8                   | 5             | 9             | 8             | 3             | 33             |
| <b>Result</b>                                   | <b>121</b>          | <b>109</b>    | <b>137</b>    | <b>156</b>    | <b>114</b>    | <b>637</b>     |
| <b>Percentage</b>                               | <b>19.00%</b>       | <b>17.11%</b> | <b>21.51%</b> | <b>24.49%</b> | <b>17.90%</b> | <b>100.00%</b> |

The high standard deviations are explained due to the relatively high statistical dispersion of the data. This in turn can be attributed to the sampling method I used, which was random and thus also included days with bad weather where tourist numbers were low. Also weekends with generally higher tourist numbers compared to normal weekdays, are responsible for the range of numbers and thus the relatively great distance from the mean. It has to be noticed that all standard deviations are calculated from the respective averages.

### Appendix 5: Visitor numbers from the National Forestry Corporation CONAF

| REGIÓN   | 1987    | 1988    | 1989    | 1990    | 1991    | 1992    | 1993    | 1994    | 1995    | 1996    | 1997    |
|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| I        | 4,972   | 4,682   | 5,222   | 6,541   | 5,753   | 10,404  | 16,683  | 31,294  | 36,010  | 38,158  | 43,685  |
| II       | 192     |         | 2,174   | 4,532   | 11,429  | 24,649  | 41,420  | 42,011  | 36,194  | 153,015 | 169,573 |
| III      | 4,519   | 6,182   | 6,166   | 5,332   | 5,687   | 7,137   | 2,993   | 5,047   | 7,864   | 13,143  | 15,348  |
| IV       | 9,732   | 5,262   | 7,202   | 8,751   | 11,051  | 12,119  | 11,453  | 14,515  | 14,722  | 17,914  | 15,931  |
| V        | 109,862 | 36,790  | 122,465 | 143,842 | 137,117 | 142,058 | 140,152 | 118,443 | 83,151  | 36,422  | 37,312  |
| RM       | 43,155  | 1,895   | 40,123  | 66,093  | 69,849  | 65,913  | 62,551  | 60,938  | 65,371  | 69,449  | 48,664  |
| VI       | 4,942   |         | 6,234   | 7,026   | 5,388   | 6,197   | 7,360   | 7,208   | 6,393   | 4,601   | 4,847   |
| VII      | 37,739  |         | 76,723  | 70,139  | 66,377  | 73,485  | 79,230  | 97,660  | 101,290 | 90,300  | 71,841  |
| VIII     | 28,766  | 31,976  | 45,896  | 36,571  | 50,060  | 41,224  | 22,015  | 33,967  | 29,086  | 26,056  | 31,512  |
| IX       | 161,917 | 44,055  | 213,163 | 182,301 | 175,211 | 143,566 | 134,965 | 159,950 | 151,979 | 129,767 | 125,223 |
| X        | 118,936 | 119,445 | 136,383 | 130,982 | 139,647 | 184,320 | 241,357 | 244,594 | 272,176 | 223,643 | 258,480 |
| XI       | 22,681  | 11,090  | 23,284  | 16,642  | 18,517  | 11,989  | 17,165  | 15,647  | 16,496  | 13,085  | 12,168  |
| XII      | 43,267  | 15,099  | 51,808  | 53,318  | 56,127  | 59,010  | 62,941  | 73,608  | 80,445  | 91,422  | 106,926 |
| I.PASCUA | -       | -       | -       | -       | -       | -       | -       | -       | 7,760   | 8,401   | 11,520  |
| TOTAL    | 590,680 | 276,476 | 736,843 | 732,070 | 752,213 | 782,071 | 840,285 | 911,988 | 908,937 | 915,376 | 953,030 |

| REGIÓN   | 1998    | 1999    | 2000      | 2001      | 2002      | 2003      | 2004      | 2005      | 2006      | 2007      |
|----------|---------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| I        | 25,065  | 25,618  | 24,769    | 25,649    | 23,732    | 21,144    | 22,824    | 24,748    | 25,572    | 30,847    |
| II       | 136,391 | 85,451  | 23,070    | 16,249    | 33,398    | 55,867    | 123,959   | 136,009   | 133,738   | 146,262   |
| III      | 13,385  | 17,211  | 15,790    | 11,663    | 14,855    | 10,106    | 17,021    | 14,239    | 11,708    | 14,735    |
| IV       | 15,119  | 16,022  | 17,312    | 31,433    | 26,955    | 29,321    | 30,200    | 34,459    | 33,917    | 42,416    |
| V        | 81,377  | 106,993 | 74,780    | 79,813    | 69,782    | 92,896    | 78,670    | 75,721    | 92,573    | 94,318    |
| RM       | 63,827  | 59,309  | 66,525    | 50,544    | 50,640    | 70,463    | 63,454    | 73,711    | 87,708    | 73,923    |
| VI       | 5,704   | 4,454   | 4,283     | 3,200     | 4,283     | 6,835     | 9,108     | 8,000     | 7,435     | 9,290     |
| VII      | 46,678  | 40,134  | 44,191    | 51,199    | 44,191    | 50,970    | 50,300    | 49,332    | 50,234    | 65,778    |
| VIII     | 12,990  | 13,863  | 11,943    | 8,058     | 11,943    | 15,146    | 20,739    | 16,215    | 18,109    | 29,737    |
| IX       | 126,331 | 119,649 | 101,091   | 93,740    | 101,091   | 121,430   | 178,093   | 174,151   | 75,693    | 130,503   |
| X        | 266,503 | 285,814 | 477,524   | 529,555   | 477,524   | 507,893   | 546,803   | 581,351   | 654,223   | 717,724   |
| XI       | 14,508  | 19,881  | 21,797    | 17,439    | 21,797    | 20,116    | 23,250    | 24,090    | 22,199    | 27,175    |
| XII      | 109,513 | 105,778 | 123,717   | 133,021   | 123,717   | 166,230   | 191,271   | 203,009   | 218,595   | 248,753   |
| I.PASCUA | 13,338  | 14,005  | 15,210    | 12,116    | 15,210    | 18,990    | 22,384    | 27,394    | 30,351    | 36,412    |
| TOTAL    | 930,729 | 914,182 | 1,022,002 | 1,063,679 | 1,024,213 | 1,187,407 | 1,378,076 | 1,442,429 | 1,462,055 | 1,667,873 |

- Interestingly, one can see that the 10<sup>th</sup> region has had a growing tourism arrivals to protected areas and has highest visitor numbers compared to all other regions
- For the 10<sup>th</sup> region this represents a visitor increase of 600% within 20 years, from 1987 to 2007.
- The share of tourists received by the 10<sup>th</sup> region compared to the national level was 20% in 1987 and increased to 43% in 2007. Thus, tourism to protected areas represents an important factor of the regional economy. The situation for Chileo is somewhat different, as tourism on the island just started recently to develop and the infrastructure is not as developed and qualitative as on the main land and compared to the mainland, the areas which are protected under CONAF are only two, which alters the statistics. However, the numbers well reflect the importance of tourism to those areas and also the respective share of income generated through protected areas.

**Calculation:**

- $717,724 / 118,936 * 100 = 603.45\%$
- $118,936 / 590,680 * 100 = 20.14\%$
- $717,724 / 1,667,873 * 100 = 43.03\%$

Source: CONAF Homepage

[http://www.conaf.cl/?page=home/contents&seccion\\_id=8b88e25cd263aab2e31dcfb73c3daba3&unidad=0&](http://www.conaf.cl/?page=home/contents&seccion_id=8b88e25cd263aab2e31dcfb73c3daba3&unidad=0&)  
[accessed 14/04/2008]

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**Appendix 6: Selected tourist comments concerning conflict between tourism and conservation (6a) entrance fee to the beach (6b) and stricter regulations (6c):**

**6a**

- YES "People profit but do not preserve" (53, Chilean)
- YES "A lot of pressure on the colonies" (24, Chilean)
- YES "The tours disturb the tranquillity of the birds" (34, Chilean)
- YES "Too much tourism will endanger the birds" (40, US)
- YES "The boats probably disturb the birdlife" (24, Australia)
- YES "Boats get too close and disturb the penguins" (60, Canada)
- YES "It seemed that many visitors would disturb the wildlife" (22, USA)
- YES "The main beach is not protected" (31, Spanish)
- YES "Too many people" (35, French)
- YES "Too many cars on the beach" (38, German)
- NO "The tourist visits don't seem to have a very heavy impact" (24, USA)
- NO "Boat captains work with caution" (40, German)
- NO "The Penguins are reproducing; we don't suppose there is a problem" (32, Spanish)
- NO "If locals make money from penguins they will value them more" (69, British)
- NO "Not now but it might be in the future" (47, Spanish)
- NO "Everything is in harmony" (30, German)
- NO "I think it is a good way to make tourism without harming flora and fauna" (17, Chilean)
- NO "Only observation" (Chilean, 35)
- NO "I can not see any intervention from the tourist on the boats" (48, Chilean)
- NO "The penguin habitat is not altered" (45, Chilean)

**6b**

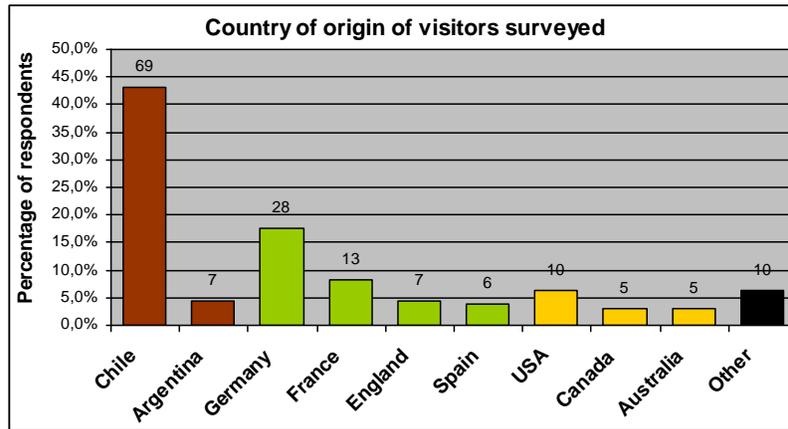
- YES "Something small could be justified as people have already paid for tours" (32, Australian)
- YES "I would be happy to pay if I knew that the money was actually going toward their conservation" (32, USA)
- YES "In order to contribute to protection and conservation measures" (30, German)
- YES "Include it in the tour price" (22, Sweden)
- NO "The beaches are free" (24, Chilean)

**6c**

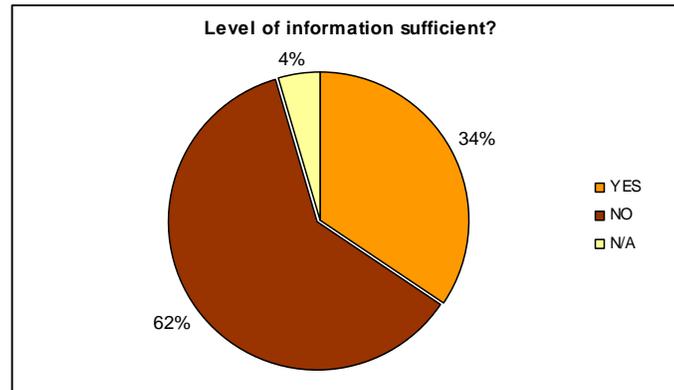
- YES "The government should control at all times to ensure the safety of the penguins and the security of the visitors" (40, US)
- YES "Whatever is needed to protect the species and environment" (57, USA)
- YES "Look at what is happening in the Galapagos Islands and beware" (61, Canada)
- YES "The ecosystem is a totality, not only the islands" (31, Spanish)
- YES "I wouldn't have any problems with a waiting time. If the amounts of tours are restricted I think it would be a good idea to have more communication so that people are informed and able to plan their visit" (33, German)

- YES "I think if it's there, tourists just accept it and get used to it. In Italy, to see some paintings you have to wait for hours for even 5 minutes to see them. People accept this" (34, British)
  - NO "When the government intervenes there are always problems than when the locals exploit the place. I think they know better their traditions and can better respect them" (53, Argentinean)
- 

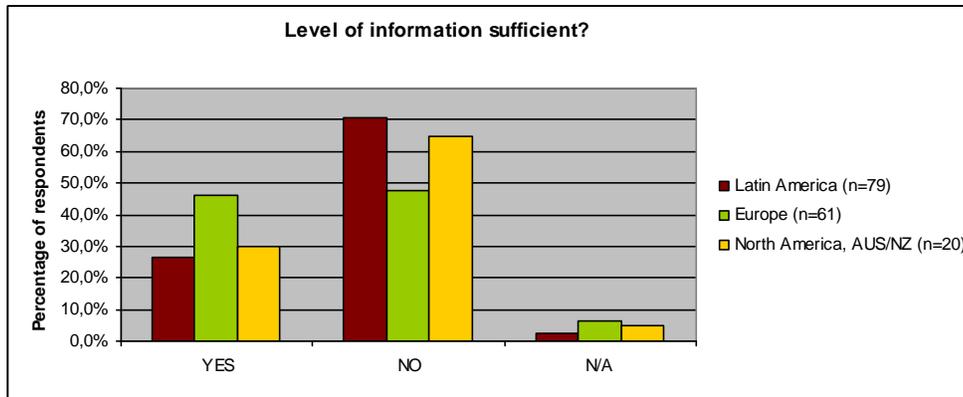
### Appendix 7: Further information from the tourist questionnaires



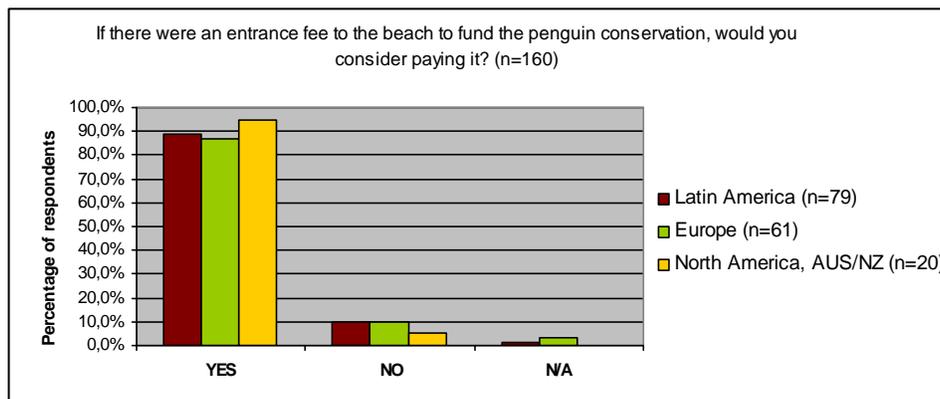
Currently, the level of information is fairly low and during the boat-tours, all except one tour operator give basic information only in Spanish. In general, ecosystem threats are neglected. For tourism and especially ecotourism, providing information is essential to raise more awareness among tourists.



It is interesting to observe, that especially tourists from Latin America were in general not satisfied with the level of information given. However, this has its root in the language barrier, as foreign tourists often think there was enough information, but they simply did not understand. However, they answered with YES, which ultimately changes the result and thus, this question was not included in the main thesis.



The difference between tourist's origin and the willingness to pay an entrance fee to the beach is very low.



**Willingness to pay:** If there were an entrance fee to the beach to fund the penguin conservation, how much would you be willing to pay?

| Value range:           | up to 1000\$ | 1000-2000\$ | 2000-3000\$ | >3000\$ ☒ | N/A |
|------------------------|--------------|-------------|-------------|-----------|-----|
| Number of respondents: | 14           | 17          | 10          | 7         | 3   |

☒ As this is an open value, the base for calculation is 3500\$

Total respondents:  $14+17+10+7 = 48$

Calculation:  $(500*14+1500*17+2500*10+3500*7)/48 = 1708.33\$$

$1708.33/700 = 2.44€$

**Appendix 8: Detailed information about Puñihuil penguin population development**

|   | <b>1997</b>     | <b>2004</b>     | <b>Change in %<br/>from 1997 to<br/>2004</b> |
|---|-----------------|-----------------|--|
| <b>Change in nest numbers and occupation</b>  |                 |                 |  |
| <b>Number of nests Small Island</b>           | <b>285</b>      | <b>366</b>      | <b>28%</b>                                   |
| Number of active nests (Small Island)         | 131 (46%)       | 198 (54%)       | 51%  |
| Number of nests occupied by Magellan Penguins | 104 (79%)       | 151 (76%)       | 45%  |
| Number of nests occupied by Humboldt Penguins | <b>27 (21%)</b> | <b>30 (15%)</b> | <b>11%</b>                                   |
| Percentage of nests collapsed (Small island)  | 80 (28%)        | 11 (3%)         | <b>- 86%</b>                                 |
| <b>Number of nests Big Island</b>             | <b>529</b>      | <b>841</b>      | <b>59%</b>                                   |
| Number of active nests (Big Island)           | 235 (44%)       | 369 (44%)       | 57%  |
| Number of nests occupied by Magellan Penguins | 186 (79%)       | 307 (83%)       | 65%  |
| Number of nests occupied by Humboldt Penguins | <b>49 (21%)</b> | <b>46 (13%)</b> | <b>- 6%</b>                                  |
| Percentage of nests collapsed (Big island)    | 53 (10%)        | 34 (4%)         | <b>- 36%</b>                                 |
| <b>Number of nests in total</b>               | <b>814</b>      | <b>1207</b>     | <b>48%</b>                                   |

Source: Based on and adapted from Simeone & Schlatter, 1998; Simeone, 2005