

# **ASSESSMENT OF THE ENVIRONMENTAL IMPACT OF COMMERCIAL TOURISM ON ANTARCTIC ECOSYSTEMS**

## **RESEARCH TEAM**

### **Principal researchers:**

Javier Benayas del Álamo (ecology dept., UAM)  
Martí Boada Juncá (geography dept., UAB)

### **Research team:**

Pablo Tejado Sanz (biology faculty, IEU)  
María Muñoz Santos (ecology dept., UAM)  
Luís Rodríguez Pertierra (ecology dept., UAM)  
Ana Justel Eusebio (mathematics dept., UAM)

### **Assistants:**

Jordi Oliver-Sola (environmental science and technology institute, UAB)  
Ramón Farreny (environmental science and technology institute, UAB)  
Xavier Gabarrel (chemical engineering dept., UAB)  
Joan Rieradevall (chemical engineering dept., UAB)



## **OBJECT OF THE STUDY**

The goal of this research is to determine whether the presence of tourism has a negative impact on Antarctic ecosystems. The aim is to establish whether the tourist activities currently carried on in Antarctica are compatible with the proper conservation of its natural assets.

The **initial hypothesis** is that the self-regulation carried out by the companies in the industry to date has made it possible to preserve the ecosystems properly because numbers of tourists have not been excessive. However, the rise in the number of visitors to Antarctica in recent years has raised serious doubts among the scientific community about the capacity of the fragile Antarctic ecosystems to withstand this increase in tourist demand.

This study coincides with the **3<sup>rd</sup> International Polar Year**, which ran from March 2007 to March 2009. This is a triple commemoration which represents a major scientific programme focusing on the Arctic and Antarctic: the 150<sup>th</sup> anniversary of the 1<sup>st</sup> International Polar Year, the 75<sup>th</sup> anniversary of the 2<sup>nd</sup> International Polar Year and finally the 50<sup>th</sup> anniversary of the International Geophysical Year, which marked the beginning of the scientific stage in Antarctic exploration and served as a forum for the international community to come together to start drawing up the Antarctic Treaty. This document, signed in Washington in 1959, is of enormous importance as it assures the protection of Antarctica, setting the whole continent aside for scientific research for peaceful purposes. On the occasion of this event the most ambitious campaign in the history of Spanish Antarctic research has been run, with over 145 researchers working in the Antarctic, including three of the members of the research team involved in this study.

## **METHODOLOGY**

To assess the consequences of commercial Antarctic tourism for the terrestrial ecosystems of Antarctica, a **participative design** was chosen. This means the researchers took on the role of tourists in order to assess an Antarctic expedition on a cruise ship on a typical visit to Antarctica lasting nine days. Although they collected data throughout the trip, the team members did not identify themselves and remained anonymous at all times as if they were ordinary tourists on the expedition.

During the trip, lasting from 8<sup>th</sup> to 16<sup>th</sup> February 2008, **10 sites** were visited, of which 6 were in the "Top 10" most visited places in Antarctica according to statistics for the 2006-07 season produced by IAATO (the International Association of Antarctica Tour Operators). The sites are listed below together with the number of visitors during the 2006-07 season and their place in the ranking of landings\*:

- Whalers Bay (16,774 visitors, 1)
- Neko Bay (14,646 visitors, 3)
- Half Moon Island (14,438 visitors, 4)
- Cuverville Island (13,105 visitors, 5)
- Petermann Island (12,571 visitors, 6)
- Barrientos Island (7,123 visitors, 10)
- Waterboat Pt. - González Videla Station (5,929 visitors, 11)
- Pendulum Cove (4,751 visitors, 14)
- Danco Island (3,935 visitors, 16)
- Yankee Bay, Greenwich Island (3,562 visitors, 19)

\*: There was also a visit to Lemaire Channel, better known as the '*Fuji Channel*' or '*Kodak Gap*' because of its picturesque scenery, but this was not included in the above list because it was a visit on which the passengers did not disembark.

For each of the sites visited a document was prepared with the following information:

- **Location.** In this section both the geographical position of the place and historical notes of interest were given.
- **Human settlements.** If any, something which is not very usual in Antarctica.
- **Geology.** Only geological features of particular interest were noted.
- **Biodiversity in the area.** The species present were indicated, along with the approximate size of fauna colonies and any salient features.
- **Degree of protection.** Stating whether it is a protected area: Antarctic Special Protected Areas (ASPAs), or Sites of Special Scientific Interest (SSSI).
- **Tourist presence.** This showed the trend over recent years in visitor numbers to the spot, the most important attractions in the area and their position in the ranking of visitors in the 2006-07 season.
- **Visit management.** The role of the interpreter-guides was assessed: handling of the group of visitors, knowledge and the explanations provided, quality of the job they did, etc.
- **Impact.** All damage to the environment which might be due to the presence of tourists was recorded: rubbish, disturbance of animals, trampling of mosses and lichens, souvenir collecting, edaphic erosion, noise pollution, etc.
- **Observations.** Relevant final notes in addition to the above information, in some cases including topics of interest for managing the Antarctic tourist industry or the personal impressions of the researchers. This also included some comments made by the tourists during the landing.

The visit was aboard the cruise ship **Antarctic Dream**, which can carry 78 passengers, making it somewhat smaller than average for this type of vessel. It is one of only two ships which run these tours with guides working mainly in Spanish (the other is the *Ushuaia*), for which reason the passenger profile differs from the usual one for Antarctic tourists.

The research was completed with appropriate **desk work**. The first piece of work reviewed the history, operation, regulation, basic figures and environmental consequences of commercial Antarctic tourism on the basis of an extensive review of the bibliography, providing a starting point and a theoretical context for the study. The second dealt with the

analysis of the environmental impact in the sector with regard to its environmental and energy metabolism, assessing for this purpose the energy flows consumed during the transport stages to Ushuaia (by air) and from this port to the Antarctic continent for the tour (by cruise ship). The methodology used was based on Life Cycle Analysis (LCA), which is an environmental assessment procedure which measures the environmental load associated with a product, process or activity, taking into account all the stages in its life cycle, always in accordance with ISO (International Standards Organisation) standards.

## **BRIEF SUMMARY OF THE RESEARCH**

While an assessment of a single cruise severely limits the possibilities of obtaining results which can be generalised to the rest of the sector, the activity made it possible to identify a series of interesting trends. This was because during the fieldwork interviews were conducted with different stakeholders connected with Antarctic tourism. At these meetings with representatives of the **Antarctic tourist industry** a small but steady growth in the number of tourists carried by the smaller vessels for up to 100 passengers was detected, while the largest increase was accounted for by cruise ships for more than 500 passengers, which often include Antarctica as part of a transoceanic voyage with other international stop-off points. Fortunately, this type of vessel spends less days in Antarctic waters as the large number of passengers means landings are not possible because too many Zodiac trips would be needed to land all the passengers. While this product is attractive enough for most passengers as it involves ships with all the comforts which can make faster voyages, tourists with more nature-oriented or educational motivations tend to opt for smaller cruise ships which provide a first-hand experience of what Antarctica is like. Another of the problems detected is the increase in the number of private yachts and sailing vessels which travel to Antarctica on their own account with no supervision of any kind. While their relative contribution is small, their ability to moor practically anywhere could lead to significant impacts on sites which are highly sensitive to human presence, especially in the case of small coastal colonies or highly vulnerable species such as the imperial or blue-eyed shags (*Phalacrocorax bransfieldensis*). Another issue which may become a problem in the next few years is that of tourist cruises which are not part of IAATO and are therefore under no obligation to meet the environmental recommendations laid down for the tourist industry by the Antarctic Treaty. Finally, concerning the global environmental impact of CO<sub>2</sub> emissions, it should be pointed out that every Antarctic tourist generates approximately 4.4 tonnes of carbon dioxide, and in energy terms uses five times the average annual electrical power consumption of a European three-person household. Sea transport (on a cruise ship) makes up 56% of the total emissions, while air transport (the flight to Ushuaia) accounts for the remaining 44%.

With regard to the experience on the **Antarctic Dream**, it should be stated that this tourist product has been successfully marketed for years, representing an excellent way of gaining first-hand experience of what the Antarctic is like. While other cruises exist which include more adventurous activities such as kayak trips, spending a night on the continent in a tent and so on, the tourist package on this cruise was the closest to a standard experience of the Antarctic tourist industry. As is usual, landings are concentrated at particular points which are characterised by a high degree of biodiversity and good accessibility by sea. The problem arises when human pressure causes irreversible impacts on the places visited. This is the case with Barrientos Island, the only Antarctic site where similar levels of edaphic degradation have been observed to other natural areas around the world which are subjected to high levels of use. This tendency for all the Antarctic tour operators to use the same places has generated some massification issues in certain locations, which affects the level of satisfaction of their customers. To avoid this, the captains of the vessels have started to seek out new sites for landings, so that every year the tourist companies take their passengers to new places which no other cruise has visited before. This enables them to reduce the concentration of the pressure and impacts in a few spots, but on the other hand it creates a high degree of dispersion among the places visited. This strategy may affect the trends observed in recent years among several species of Antarctic fauna, the populations of which have grown. For example, on expeditions in recent years it is much easier to see whales and in larger numbers than in previous decades, indicating that conservation policies in recent years may be starting to bear fruit. These positive trends must not be affected by the tourist industry, which depends to a large extent precisely on the good health of Antarctic ecosystems.

Concerning the profile of the **passengers on the Antarctic Dream**, the low degree of motivation displayed by the vast majority was striking. This was noted by both the researchers and the guides on the expedition. Many appeared to be tired of seeing penguins after their first landing, when there were still five days left of activities on land. Quite a few passengers did not land when the weather was not favourable, or else did not use up all of the three hours the visit lasted. It is also worth pointing out that when passengers on the cruise were asked why they were on the trip many of them gave as their main reason setting foot on the only continent they had never been to before, far from the search for a unique experience on a legendary, remote continent with an air of adventure and on which the human presence has been sparse and limited. In general, it was noted that many of the users of the Antarctic tourist product were from social groups with high purchasing power and mostly of advanced age. Most of this group has no special sensitivity or great motivation to enjoy the considerable natural heritage of the frozen continent. This is a public which demands a trip with certain comforts and which is highly demanding with the food and service they are given, but which may not appreciate the quantity and quality of the information a good guide can give them. In this respect it should be pointed out that some of the passengers complained that there was no casino or entertainment programme aboard the cruise ship. In the opinion of our research team, all tourist activity in Antarctica should prioritise raising awareness and involving tourists in the importance of conserving and protecting the continent's environmental heritage. This makes it essential that tourist products aimed at a more general public with little environmental motivation have good guides and activities which enable them to achieve these goals.

In this respect, it should be mentioned that the **handling of guided visits** on the Antarctic Dream was perhaps one of the weakest aspects, as the recommendations of the Antarctic Treaty and IAATO were not fully met. These institutions advise that vessels have a specialist guide for every 15-20 tourists. In our case, the ship should have had at least 3-4 guides for the 69 tourists on the expedition, at a ratio of one per 20 passengers. In fact only two people performed this function on all the landings, with the ship's receptionist and one of the people responsible for the zodiacs doubling up as guides on occasions to comply with the rules. Nor did the professional profile of the two guides accompanying the group seem to be entirely suitable. In both cases they were recent graduates who, although they were highly motivated and had a good knowledge of Antarctica, lacked solid experience in communication skills and strategies for handling groups of visitors. Their youth and, on occasions, their shyness meant that the tourists systematically disobeyed their instructions and consistently behaved in ways which ignored the established rules, for example going too close to take photos of specimens of penguins and other species. A group of adults with little motivation in conservation terms calls for highly experienced guides to stop them breaking the codes of behaviour laid down by the IAATO itself on the basis of the recommendations in the Antarctic Treaty. With regard to the themed talks given concerning different aspects of nature in Antarctica, the audiences were small (a maximum of 32 people, with an average of 17.5 people attending the six sessions given). Perhaps an excessively biological focus and limited presentation skills lay behind this limited success with the passengers.

## **CONCLUSIONS**

There is considerable international concern over the environmental impact tourism may have on ecosystems which have been in their natural state for centuries without the large-scale presence of human beings. Tourism is without a doubt the activity which is bringing the largest numbers of people to this continent, and it is therefore to be expected that it is identified as a potential cause of irreversible changes to the environment. However, the greatest impact of this industry so far seems to be the environmental cost of the journey in terms of direct and indirect CO<sub>2</sub> emissions rather than the physical and/or ecological degradation of the places visited by the tourists. This might change if there is either a catastrophic accident involving one of the tourist cruise ships which visit the area (as in fact happened in 2007 when the MS Explorer sank in the Antarctic Ocean) or an uncontrolled increase in the numbers of Antarctic tourists.

While the system of self-regulation implemented by the tourist industry in Antarctica through IAATO has proved to be relatively effective up to now, it is very possible that it is not solid enough to take on the new challenges faced by this industry. The extreme conditions of the place, the increase in the number of visitors and ships travelling to the area, plus the diversification of the activities in which they engage, are going to put the sustainability of the

current model to the test. For these reasons it is more necessary than ever to implement systems for supervision and monitoring of both the impacts generated and compliance with the measures agreed upon. In this respect our team proposes three specific steps:

**a) Training and accreditation of guides:** the staff responsible for running visits by tourists to Antarctica represent an important management tool as they are the first line of defence against the generation of impacts by visitors. It is therefore essential to have a system of accreditation for guides to ensure they are properly trained.

**b) Independent inspection:** a combination of self-regulatory mechanisms operated by the tourist industry and the presence of independent observers could guarantee compliance with the rules which already exist.

**c) Tourist monitoring vessels:** implementation of a system of direct monitoring with inspections of the operations of tourist cruises in the most sensitive locations and the most-visited places could complement the above proposal. Other related functions of these vessels might include the monitoring of other provisions of the Antarctic Treaty such as those regarding illegal fishing, or logistical support for rescue operations.

To finance these measures we would propose a tax per visitor be levied to preserve the resources of the most pristine environment on the planet. It has been estimated that a tax of ten US dollars per visitor would be sufficient to implement the first two measures, while the third would require a larger investment (\$100 per tourist). For a system of this type to be viable and effective, an international institution of recognised standing and wide experience of managing international projects would be essential, to take on the transnational powers necessary to set up a legal framework recognised by states. This means beginning a debate in depth between the institutions involved (the Antarctic Treaty itself, IAATO and the UN, among others) concerning the different options. Two options which might be valid are the UNEP and the IUCN. In any case, this debate and the resulting decision would have to fit into the framework of the Antarctic Treaty.