"Tourism in the Antarctic Region The Dilemma of Development and Environment Protection"

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Summary

More and more often the Antarctic constitutes the goal of exotic travel. The tourists are attracted here by the entirely different natural conditions, by incredible landscapes and natural phenomena. Yet the reception potential relating to the tourist movement in the Antarctic is limited. In an attempt to preserve the local ecosystem, the Antarctic Treaty System which assumes that the region will focus on the needs of science and tourism, was introduced. The International Association of Antarctic Tour Operators (IAATO), which drafted the principles of the organization of tourism in this region, is responsible for the coordination of the tourist economy here. Towards the end of the first decade of the XXI c., the number of tourists in the Antarctic region has exceeded 40 thousand, which seems a maximum figure (the boom phase in the Butler cycle) whereas a further growth of tourism exploration should be restricted, as regards sheer numbers and induced to introduce less harmful tourist behavior from the point of view of environment protection.

Key words: *Antarctica, exploration, tourism, Butler cycle, development boundaries.*

Introduction

The goal of the present paper is to analyze the forms and volume of the tourist movement as well as to define the directions and priorities of its development. The paper is based on an analysis of the views and opinions contained in literature, on statistical data published by IAATO (International Association of Antarctic Tour Operators) as well as by the international tourist organizations and on my own observations recorded during a cruise on board a tourist ship "Princess Star" around the Antarctic Peninsula at the turn of 2010/2011.

Antarctica – Concept and Boundary

The regions of the Arctic and the Antarctic spread out symmetrically around the earth's poles; they are both similar in respect of their climate and difficult from the point of view of tourist exploration.

The Arctic is a region situated in the northern hemisphere which stretches from the North Pole, and comprises the Arctic Ocean together with its islands as well as the northern parts of Northern America, Europe and Asia. In most cases, it is the Northern Subarctic Circle that is regarded as the boundary of the Arctic, that is the 66°33'N parallel. The surface area of the Arctic delineated by this boundary measures 21 million sq.km. The name Arctic is derived from the Greek word *arktos* meaning bear. This is confirmed by the geographical situation of the Arctic under the constellation of Great Bear.

Symmetrically, on the opposite side of the earth, that is in the *"anti"* position with relation to the Arctic, one finds a region which was named Anti-Arctic, that is Antarctic. This name defines an area situated in the southern hemisphere which incorporates the Antarctic continent (the Antarctic) as well as the Southern Ocean that surrounds it, together with its islands. It is traditionally assumed that the boundary line of the marine part of Antarctica is marked out by the so called *Antarctic Convergence.* The marine part of Antarctica is characterized by a cold, maritime climate which differentiates it from the climate of the continent of Antarctica. For although the climate is warmer here, yet one also observes higher rainfall and greater cloudiness. The marine Antarctica is chiefly made up of the western coast of the Antarctic Peninsula (north of the 70th parallel) together with the adjacent islands (Southern Shetlands, Southern George Island etc.).

Antarctica has no land connection with other continents; the continent which lies closest to it is Southern America (nearly 950km away). At its widest point the mainland measures 5700km; the average distance from the sea is 443km. Most of the surface area of Antarctica lies within the Subarctic Circle; the northernmost land extremity extends to the cape of Prime Head on the Antarctic Peninsula. The external slopes of the Transantarctic Mountains (extending from the Weddell Sea to the Ross Sea) divide the continent into Eastern Antarctica – which is bigger (by about 10 million sq.km), more compact and situated almost entirely in the eastern hemisphere, and Western Antarctica – which is smaller and more dismembered; the latter part includes the Antarctic Peninsula.

The surface area of Antarctica amounts to nearly 14 million sq. km in the summer and it extends to as much as 21 million sq. km in the winter, when the surface of the ice expands. As much as 98% of the surface area of the Antarctic continent is covered with ice, whose total volume approximates around 30 million sq. km; this constitutes almost 75% of the world fresh

water resources. Antarctica is the most elevated continent; its average height is 2194 m above the sea-level (higher than Asia with the Himalayas). It is also the driest, the coldest and the most windy continent. Many travellers who are enchanted by its natural austerity are of the opinion that it is the most beautiful continent on earth.

The mean thickness of the ice amounts to 1829 m, whereas the maximum thickness is 4776 m. The immense pressure of such a great mass of ice pushed the land under it, on average 600 m under the surface of the sea. The highest point of the ice cap is the Dome Argus in Eastern Antarctica, south of the Amery Ice Shelf (80°49'S; 76°31'E) situated at the height of 4091 m above sea-level. The highest summit of Antarctica is Mount Vinson – 4897 m above sea-level (in the Sentinel Mountain Range, belonging to the Ellsworth Mountains). The Southern Pole is situated on the surface of the land ice dome at the height of 2835 m above sea-level.

One finds here the Lambert Glacier which is world's longest valley glacier; it was localized in the Valley of the International Geophysical Year, on the American Plateau (it measures 400 km in length and up to 200 m in width). The small areas of Antarctica that are not covered with ice are known as oases; one finds here lakes and small streams which thaw in the summer. To the lowland oases, there belong, among others: Bunger (925 sq. km), Grearson, and Vestfold oases; to the mountain oases, also known as dry valleys, there belong, among others: Wright, Taylor's and Victoria oases.

Antarctic Treaty

Antarctica is the only uninhabited mainland; its political and legal status was regulated by an international agreement known as the Antarctic Treaty[1]. According to the provisions contained in the Treaty, Antarctica should be used exclusively for peaceful purposes, mainly for conducting scientific and academic research and for limited tourist exploration. The scientific research should be the effect of cooperation and its results should be accessible to everyone. The surface area which the *Antarctic Treaty* extends to covers 52.5 million sq. km. Initially the treaty was to remain valid for 30 years, i.e. until 1991, yet on the strength of the *Protocol on Environmental Protection to the Antarctic Treaty* (the so called Madrid Protocol), its validity was extended to the next 50 years[2]. Poland had accessed the Antarctic Treaty in 1977 and it takes active part in the activity of the organizations which manage and administer the Antarctic. It carries the status of a consultative state and it has not made any territorial claims to any areas of the Antarctic; it has accepted the set of principles concerning environmental protection which is extended annually by EPC (Environment Protection Committee).

The International Association of Antarctic Tour Operators (IAATO) deals with the coordination of the tourist movement on the territory of Antarctica; it defines and determines the principles of safety of the tourist movement as well as the principles of environmental protection. The norms of tourist behavior have been defined in great detail, including issues such as safe distances from individual animal species and limitations whose aim is to decrease the negative impact of tourism on Antarctic nature. The Antarctic Treaty accepted these principles as recommendations for the scientists who stay and conduct their research in Antarctica.

Antarctica as a Region of Exotic Tourism

Compared to the other ecosystems on our globe, the Antarctic is characterized by a great variety of landscapes, climatic conditions as well as a multitude of organisms and phenomena that can be encountered there. This variety constitutes a great exotic attraction for tourists and in the case of Antarctica it is one of the main motifs which makes travellers from all over the world wish to come here (Szeligowicz, 2006). The ocean which surrounds Antarctica – the so called Icy Southern Ocean – has an almost constant temperature which oscillates only between around -2°C and a few degrees plus, whereas its northern boundary is made up of the ocean waters with a temperature which increases gradually as one moves towards the north. At the same time, this boundary constitutes a barrier for many species of sea organisms. This boundary – the so called sphere of Antarctic convergence – can also be experienced by people who travel across it on board of ships- due to changes in the temperature of the surrounding air. This belt of cold waters plays a role which is similar to that of a water "thermostat" which appeared around 20 million years ago around Antarctica, allowing it to cool down and freeze (Szeligowicz, 2006). We owe the emergence of this "thermostat" to the ocean currents which flowed around the Antarctic and were referred to as a "Western Wind Drifts". One observes a great contrast between the richness of life in the waters of the Icy Southern Ocean and the desert-like, desolate interior of the Antarctic Continent. Due to a complete lack of living organisms, during the windless periods of polar nights, one can witness complete silence here. In the case of the Icy Southern Ocean, it is the lifting of the deeper layers of water containing nutrients towards the surface, combined with good oxygenation of these waters that contribute to their biological richness (Szeligowicz 2006).

Among the tourist attractions of Antarctica one finds, among others, the possibility of watching northern lights. Another attraction are icebergs which are a typical feature of marine Antarctica. The latter may have gigantic dimensions and not infrequently reach a few hundred meters in diameter and a few dozen meters in height in the part above the surface of the water; these are usually characterized by simple, table-like shapes. One also comes across much taller, though smaller icebergs which have horizontal dimensions, and are characterized by unique, fantastic shapes (Rakusa-Suczczyński, Kwarecki, 1987). Apart from that, the ice that one comes across here may be different in color; it may be white, light blue, blue, pink, green or brown (McGonigal, Woodworth, 2005), depending on the type of seaweeds that can be noticed with the naked eye as well as the kind of microorganisms that occur in the ice.

[1] Also referred to as an Antarctic Pact or Treaty; it was signed in December 1959 and it came into force in June 1961; the Treaty was signed by 12 states which conducted research on Antarctica during the III International Geophysical Year (1957–58).

[2] Protocol on Environmental Protection to the Antarctic Treaty of 1991.

Another spectacular phenomenon of the Antarctic which constitutes an important attraction for tourists are active volcanoes and thermal waters. The best known is the Erebus volcano and the Deception Island which constitutes the summit of an extinct volcano; inside its caldera, one finds a natural port and thermal water geysers. The abandoned base in Port Lockroy has been transformed into a museum with a post office and a souvenir shop; around 7 thousand people visit this place each year.

Development of Tourist Exploration

Antarctica was discovered in 1826 by a scientific expedition organized by Bellingshausen; later on, the exploration of this continent was conducted, among others, by Bransfield, Weddel, Wilkes and Ross. A lot of new information which contributed to the exploration of this continent was brought in by the whalers who were hunting for seals and whales here. The Southern Pole was discovered for the first time on the 14 December 1911 by a Norwegian explorer Roald Amundsen, following a dramatic race with the British team under the leadership of R.F. Scott.

The first tourist visits date back to the second half of the 50's of the 20th c. In December 1956, Chilean plane with 66 passengers on board flew over this continent for the first time, whereas in October 1957 the airline association Pan American Airways organized the first tourist flight to Antarctica which was combined with a landing. As time passed, tourist trips to this region of the earth became a more and more common offer of tourist agencies (especially in the United States, Canada, Great Britain, Germany, Italy, Spain, Chile, Australia and New Zealand); this was to a large extent the consequence of setting up new research stations in Antarctica which were also used as bases for tourists.

Towards the end of the 60's of the 20th c. Antarctica began to be explored from the ocean; the first 200 tourists arrived here on board of one of the Argentinian ships already in 1958 (Davies, 1999). Whereas beginning with the 70's, one may already speak about a mass character of this phenomenon. The majority of tourists come here on board of ships setting out from Ushuaia in Argentina, or else from Punta Arenas in Chile. Among the ports from which Antarctic voyages set out, one also finds Port Stanley in the Falklands, and in the case of big cruise ships, also Puerto Madryn, Buenos Aires in Argentina. To eastern Antarctica one may also set out from the ports of New Zealand (Christchurch) or Australia. Both the number of ships and passengers increased – initially from 2 ships carrying around 3000 people annually in the mid-1980's, to around 40 ships carrying the total number of 24.000 passengers in the 2005–2006 season.

As was already mentioned, the first scenic flights over Antarctica were initiated towards the end of the fifties. In the years 1977–1980, e.g. the commercial air lines from New Zealand and Australia organized 44 flights for 11 thousand passengers who were yearning to see Antarctica (Spenneman 2007). At the present moment, flights over Antarctica are offered by Quanta and Air Zealand Airlines (10 thousand passengers annually).

The last few years and further progress in air transport technology have brought about rapid development of tourism, not only by luxury ships to the inshore waters, but also inside the continent. The discovery of a natural belt of smooth ice which is free of snow, at the foot of the Patriot Hills, made it possible for big transport planes with tourists to land. Here in the tent camp, tourist companies organize flights by small aircraft to the pole or else to the breeding grounds of penguins along the coast. It is here that one also finds a base for teams as well as individual polar explorers setting out on the conquest of the virgin mountains of Antarctica, and wishing to reach the pole on foot, or else overcome the last great hurdle: to walk across the continent single-handedly.

In the last dozen or so years, new forms of active tourism have emerged in the Antarctic region. Alpinism is developing, mainly in the Ellsworth Mountains, where the chief goal of climbers is the highest summit of Antarctica – Vinson. Conquering it is necessary in order to gain the "Crown of the Earth". More and more often, summer bases are set up periodically to cater for the tourists. The most well-known tourist base is Patriot Hills in the Ellsworth Mountains which caters for qualified tourists and alpinists. Another popular form of exploration are land attempts to reach the southern pole or else traversing Antarctica through the pole. In the years 1979–98, the pole was reached 10 times in this way, whereas traversing Antarctica was performed 6 times. Among the most spectacular achievements are single-handed, unaided passages, without outside support.

Antarctica is often referred to as the "continent of science and tourism" (House J. 2000). It was prognosticated that until the year 2010 the number of tourists in a single season in Antarctica will increase to 20 thousand (Dowling 2003). Relying on the estimates released by the IAATO (Fig. 1), one may observe that in the year 2008 the number of tourists there attained the value of 40.000, that is twice bigger then prognosticated. The consequences of the increased tourist movement to the area begin to be noticed on many planes, and particularly in the sphere of changes in the natural environment caused by this movement (Davies, 1999).

According to the principles drawn up by the International Association of Antarctic Tour Operators (IAATO), the number of people staying at any one time on the mainland should not exceed 100; the purpose of this principle is to eliminate the phenomenon of unintentional scaring of wild animals. Yet one should emphasize here that it is precisely the tourists who came to the Antarctic stations in the 80's that were the first to force the owners of the stations to tidy up the terrain around them. Apart from this type of social control, the tourists also constitute a more and more numerous group of Antarctica ambassadors who propagate the idea of its protection the world over.

The best conditions for the development of tourism, from the point of view of climatic and logistic considerations, is the Antarctic Peninsula. It is here that the biggest number of research stations came into existence in any case. The tourist services on this most frequently visited Henryk Arctowski Polish Antarctic Station[3], were organized in a very efficient manner. The first

[3] Henryk Arctowski (1871–1958), a participant of the first scientific expedition to Antarctica on board of the „Belgica" ship (1897–1899) became the station's patron.

tourists came here in the 80's. At present, the station is the most frequently visited place in Antarctica; more than 20% of all visitors to Antarctica visit the station. In the years 1991–97, the station was visited by 12.884 tourists (Ciaputa, Salwicka 1997). At present the Polish station is visited by around 3000 people annually.

The Henryk Arctowski Station has the best climatic conditions in the whole of Antarctica which no doubt tends to favor tourism; the station is situated in Admiralty Bay on King George Island, in a navigationally convenient place; it also possesses a helicopter airfield. In the immediate neighborhood of the station there are colonies of Adela penguins and white-brow penguins as well as lairs of sea elephants, sea lions and Weddell seals. Numerous tourist visits at this station are not only the result of the natural conditions in the area, but also of an open and friendly attitude of the station employees towards tourists (Szeligowicz 2006). In the vicinity of the Polish station, one can also find the grave of Włodzimierz Puchalski, a naturalist and photographer; the grave has been entered on the list of Antarctica's Historic Sites and Monuments.

The Henryk Arctowski Polish Antarctic Station was founded in 1977 and it belongs to one of the most heavily burdened stations as regards the tourist movement. It is enough to say that in the course of the six consecutive seasons of Antarctic summer, beginning with the season of 1991/1992, the station had been visited by nearly 13 thousand tourists representing 25 different nationalities, and on average 2 vessels a week with 30–300 people on board came to the station in this period; this constituted 1/5 of all the tourists visiting Antarctica (Ciaputa, Salwicka, 1997). I have even come across an opinion that the Henryk Arctowski Station is already more like a tourist agency than a research station (Donachie 1994).

According to the estimates of the British Antarctic Survey, at the beginning of the 90's the number of tourists in Antarctica had reached the level of 9–10 thousand annually, whereas in the season of 2007/2008 it already reached 46 thousand[4]. IAATO states that right now over 100 tour operators have Antarctica in their offer, i.e. 7 times more than 16 years ago.

It is the American citizens who most often select Antarctica as the goal of their travels (over 1/3 of all tourists). In the majority of cases, they take part in cruises on board of tourist vessels which are organized by North American cruise lines. A significant percentage of visitors to Antarctica come from Great Britain (15%) and Germany (10%). Countries such Australia, Japan, Holland and Switzerland are also in the lead as regards travel to Antarctica.

Table 1 presents the most typical tourist and recreational activities of the visitors to Antarctica during the 2007/2008 season. In most cases, these activities involved disembarking – descending onto mainland from small vessels (35%) or landscape watching from board of big cruise vessels (37%). This latter form of activity is less invasive as regards the natural environment, as long as vessel crews observes the ecological Antarctic procedures. Only 5% of visitors declare visiting research stations as the goal of their travel to Antarctica. This activity precedes canoeing (3.7%), strolling on the ice (2.7%) and scuba diving (1.2%). The remaining extreme forms of activity, such as camping, helicopter flights or flights on board of small planes, skiing and climbing are engaged in by less than 1% of visitors.

Directions and Boundaries of Further Development

Polar ecosystems are among those which are particularly sensitive to all kinds of external interferences, including disturbances caused by the expansion of tourism (Tefler 1997). Dangers associated with mass tourism are usually due to frequent tourist visits to areas which though small in size, have nevertheless a considerable biological significance.

Tourism may also be the cause of environmental pollution (sewage produced by man as well as oil associated with transport (Rakusa-Suszczewski, 1999) which may lead to greater changes in the organisms of the local species than in the organisms of species living in a moderate climate, as many polar organisms grow more slowly (often reaching gigantic dimensions); in this way, these organisms are subjected to the adverse influences of this pollution for a longer period (Szeligowicz 2006).

Final Conclusions

Moreover the polar regions, that is the Arctic and the Antarctic, create good conditions for organizing the ever more popular forms of trekking and extreme sports which allow people to break away from the everyday routine so as to face the extremely difficult conditions and reach places no one, or nearly no one has reached before and experience such profound sensations as hunger, pain, risk, fear, euphoria, exaltation, or being the "pioneer", someone extraordinary, someone who is separated from the "normal", ordinary world (Gyimóthy, Mykletun, 2004). Therefore the polar regions constitute a challenge for those wishing to organize the so called *adventure tourism.* It is only Antarctica which has really and truly remained the last wild region on our planet that attracts more and more people wishing to set out on their *voyage of discovery.*

It seems that appropriate control, maybe not only at the "Arctowski" station, but on the entire Antarctic, is able to ensure harmonious coexistence of tourists, scientists and nature as the latter, particularly in Antarctica should be regarded as the highest good.

Antarctica is the world training ground for implementing the principles of so called sustainable tourism[5]. The volume of the tourist movement which has been growing here steadily since the 70's of the last century, has reached the limits of its capability. By applying Butler's model of the cycle of tourist develop-

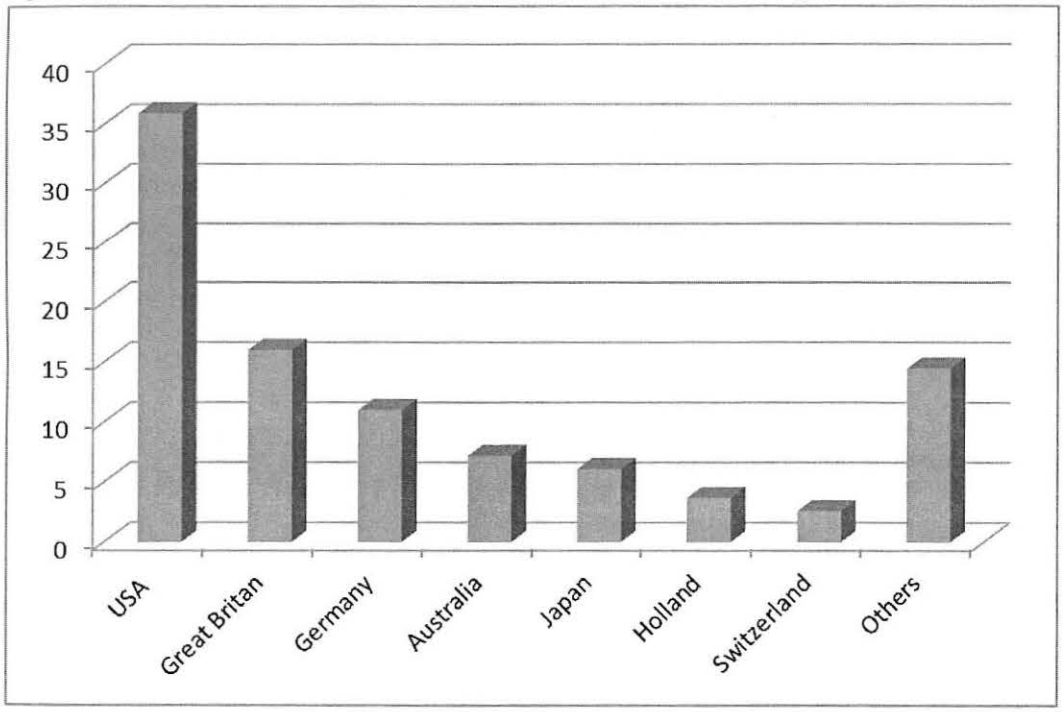
[4] http://www.antarctica.ac.uk/about antarctica/tourism/index.php.

[5] R.W. Butler (1993) defines sustainable tourism as „tourism which is developed and maintained within a given area (community, environment) in such a way and on such a scale that it remains profitable within an unspecified time-span and does not cause changes in the natural environment in which it exists, to an extent that would make successful growth and well-being of other undertakings and processes in the area impossible".

ment (TALC)[6], we can recognize the period from the year 1958 (the first landing of a group of tourists) to the beginning of the nineties of the previous century, as the phase of exploration. The nineties bring an already greater volume of tourists – from a few to 10 thousand visitors. This constitutes the introduction phase, during which the legal and organizational foundations of Antarctic tourism are born. The first decade of the XXI c. marks a continuous increase trend; the volume of the tourist movement is almost 4 times bigger at present than at the beginning of the century. This represents a typical increase phase in accordance with Butler's cycle. After wards, we may encounter the phase of consolidation and flourishing of tourist activity, that is the boom period. Taking into consideration all the formal limitations of the tourist movement as well as the logistical barriers, we may prognosticate that the figure of 50 thousand tourists in the season is the upper reception limit of the tourist movement in the area.

Weizenegger's hypothesis (2006) which assumes that within protected areas such as e.g. national parks, one may apply restrictive measures, such as for instance high taxes imposed on those who exceed the capacity of the protected area, seems to find its full confirmation with relation to Antarctica. In such a situation, the development of this tourist area would be limited to the first three phases of Butler's cycle, and then it would assume the shape of a forced phase of boom, though at the level of the final stages of the growth phase. The absence of the local community on Antarctica as well as the lack of IAATO activity aiming at limiting the volume of the tourist movement, create a chance for the implementation of precisely such a model of further development of tourism on Antarctica. One may only hope that due to adequate control and supervision of tourist exploration, in accordance with the principles of sustained tourism, further growth will not destroy the unique ecosystem of Antarctica and that Antarctica will remain the goal of exotic tourist exploration.

Figure 1. Structure of tourist movement according to nationality in the Antarctic region during the summer of 2007/2008.



Source: IAATO data, (http://iaato.org/tourism_stats.html)

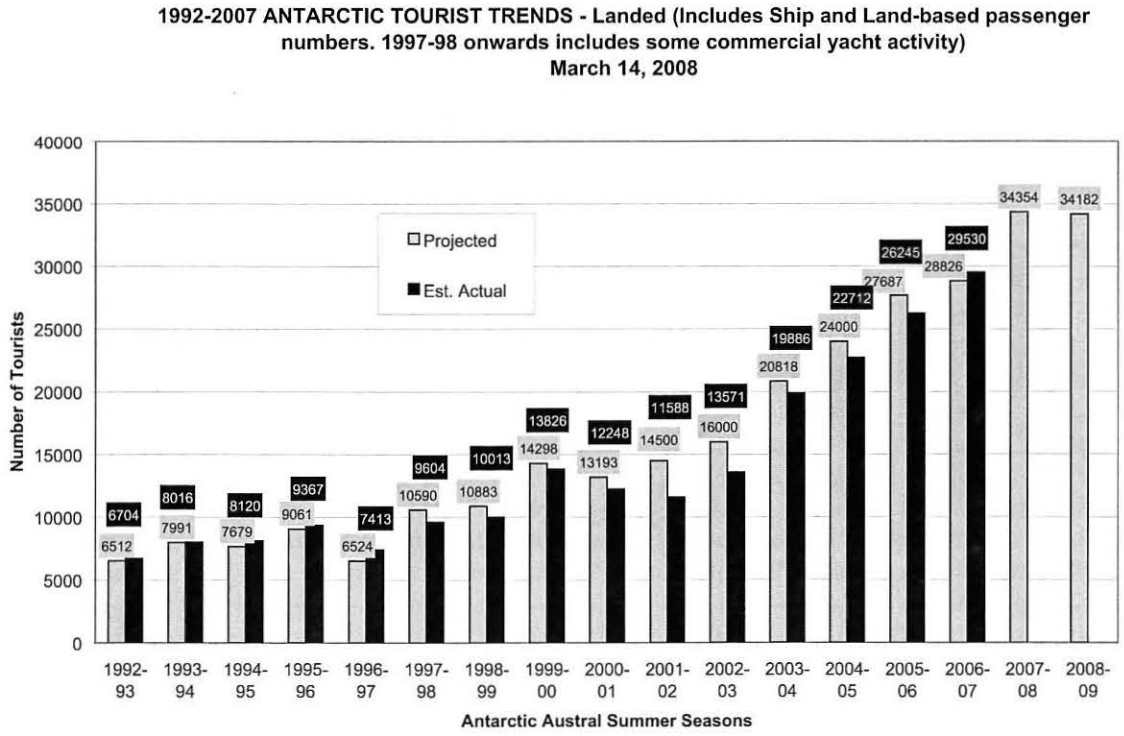
[6] TALC (Tourist Area Life Cycle) – a theory published by R.W. Butler in 1980 in the journal *Canadian Geographer,* entitled: *The Concept of a Tourist Area and Cycle of Evolution: Implications for Management of Resources.* In it the author describes a theoretical model of evolution of a tourist area, relying on six phases of its development (*exploration, introduction, growth, consolidation, boom and decline* or *revival*) which consequently take on a cyclical character. The above model was based chiefly on the symptomatic variable in the shape of the number of visitors to a tourist area under investigation in a given year.

Tab. 1. Activities of tourists visiting Antarctica in the summer of 2007/2008 r.

Type of activity	Number of persons	%
Disembarkation from small vessels (descending on land)	218,856	35.5
Cruises on board of big vessels (over 500 passengers)	231,823	37,6
Cruises on board of small vessels	76,335	12.4
Visiting research stations	29,208	4,7
Canoeing	23,117	3,7
Strolling on ice	16,541	2,7
Scuba diving	7,159	1,2
Scientific research	2,994	0.5
Camping	1,823	0.3
Helicopter flights	1,778	0.3
Anchoring nearby mainland	1,708	0.3
Skiing	1,343	0.2
Landing on glaciers	1,024	0.2
Submarine cruises	925	0.1
Climbing	911	0.1
Flights in small aircraft	554	0.1
Snowboarding	111	0.02
Others	958	0.2
ALTOGETHER	619,007	100.0

Source: IAATO data (http://iaato.org/tourism_stats.html)

Figure 2.



Source: IAATO data, (http://iaato.org/tourism_stats.html)

Figure 3. Phases of the Butler cycle with regard to protected areas

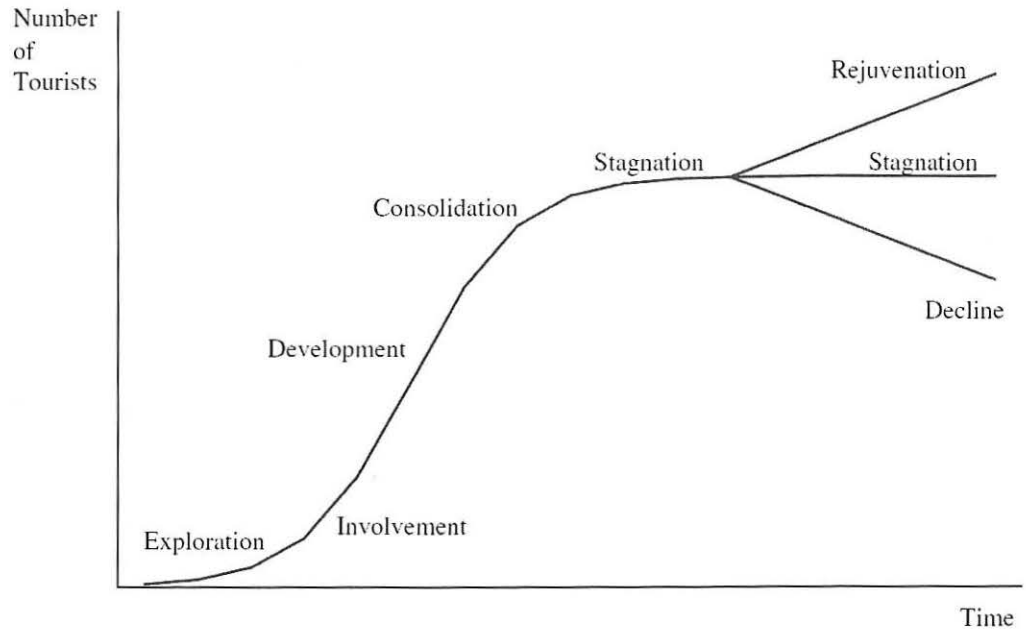


Figure 1. S-shaped Lifecycle Graph

Source: Butler (1980)

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