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Section 1: Introduction

Tourism in Antarctica has increased steadily over the last two decades and established itself as a legitimate Antarctic activity. Tour operations in the Antarctic are predominantly ship based but other market segments have developed as well, including land-based tourism using aircraft. The development of permanent land-based infrastructures and facilities for the accommodation of tourists in Antarctica has concerned academics for decades. Permanent tourist facilities are believed to start a completely new chapter in Antarctic tourism, especially in combination with an air link (Lovering & Prescott 1979: 99). Hotels, casinos, theme parks and other forms of permanent land based tourism facilities often portray in the media as a nightmare glooming at the horizon of near future in Antarctica (Mercopress 2004, Guardian 2006). However, apart from tourist accommodation at selected scientific stations and a number of tented camps, no permanent, purpose built tourist facilities have been established over the past half-century.

Recently the issue of permanent land based tourism has caught the attention of policy makers within the Antarctic Treaty System. At the Antarctic Treaty Meeting of Experts (ATME) on tourism and non-governmental activities in Tromso in 2004 New Zealand proposed a prohibition of permanent land based tourism facilities, because it launches questions on user rights, property rights and legal jurisdiction (Bastmeijer & Roura 2004: 780). During the last Antarctic Treaty Consultancy Meeting in Stockholm, June 2005, land based tourism was on top of the list of issues to be discussed during the tourism-working group. Countries such as New Zealand, Australia and Germany tabled working papers and argued for a precautionary approach and the adoption of a prohibiting measure against the establishment of land-based tourism in Antarctica. Other Consultative Parties did not share their views and no consensus could be reached at this point (ASOC 2005b).

In the light of this current policy, discussion it is useful to get an overview of the historical and current interests in land based tourism and analyse the probability and feasibility of such developments. After all, no purpose built land based facilities have been developed for tourists so maybe building such facilities is simply not feasible. However, maybe there are currently less obstacles for developing permanent land based facilities than in the past and are we on the verge of a new development. In short, what are the opportunities and constraints for developing land based tourism facilities in Antarctica, how do these different factors interact and what are the implications for the future of Antarctic tourism and policymaking.

So far, the discussion on permanent tourism facilities in Antarctica has remained a largely legal and jurisdictional issue. In this paper, however, I will analyse the actual land based tourism developments in Antarctica alongside a number of historical plans and proposals for such developments and discuss a whole range of other relating factors. I have to note that the greatest limitation of this project is the availability of research material. This is mainly because we are dealing with a development in Antarctic tourism that has largely not been actualised. Second, historically many of the land based tourism activities have been taking place in the Antarctic Peninsula, especially around Chilean and Argentinean stations. Since much information about these operations is not available in English, the language barrier and being in New Zealand posed a second limitation. To overcome some of these problems contacts were made with experts in the field for consultation.

In the following section, I will provide a historical overview of land based tourism in Antarctica and present the actual developments as well as some of the proposed plans that were found in this project. Afterwards, I will discuss the various opportunities and constraints experienced by these actual and proposed land based tourism projects. In the last section of this paper I will draw the conclusions from the previous sections and discuss some of its implications.

Section 2: Land based tourism in Antarctica: context and cases

Tourism in Antarctica

Tourism in Antarctica started as early as 50 years ago. In 1956 a Chilean airline flew 66 passengers non-stop over the South Shetland Islands, and in 1957 a Pan American Airways stratocruiser flew from Christchurch to McMurdo Sound, being the first commercial flight to land in Antarctica. Ship based tourism became a regular pattern when Lars Erik Lindblad started his tourist voyages in the mid-1960s (Stonehouse 1994, Hall & Wouters 1995). Tourism has continued to develop itself, slowly during the first two decades and more rapidly from 1990 onwards (see Figure 1). The total number of tourists partaking in Antarctic travel itineraries has exceeded 30,000 in the 2004/05 season and is projected to grow in the future.

Since 1991 the Antarctic tourism industry has self-organized in the International Association of Antarctic Tour Operators (IAATO), imposing a wide range of operational and environmental procedures on its members.

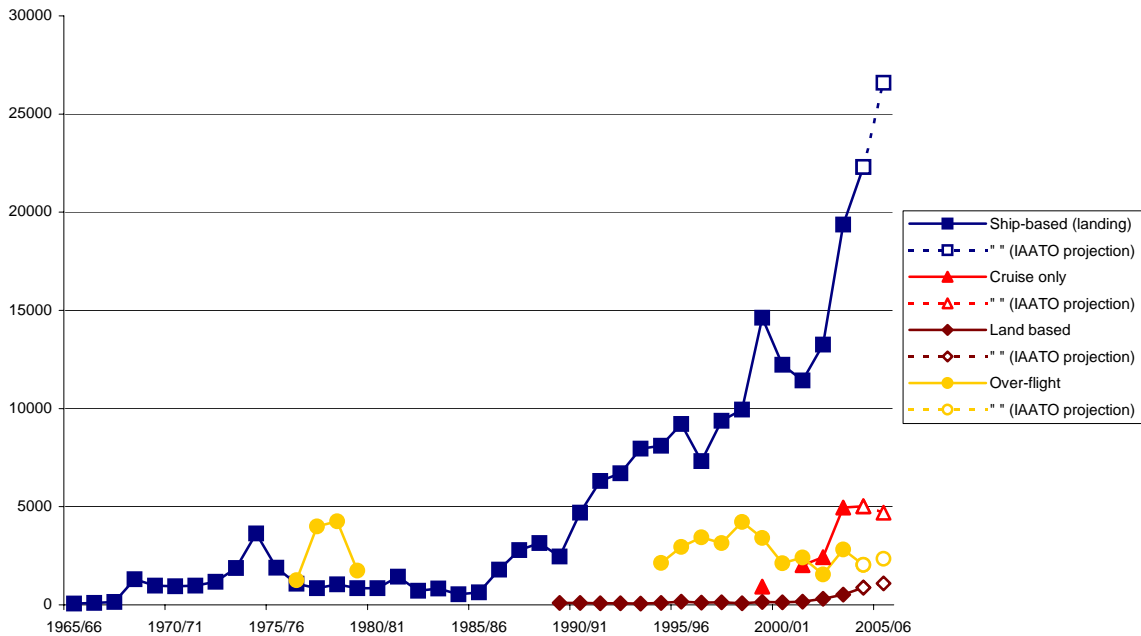


Figure 1: Tourist numbers visiting Antarctica 1965-2005.

Sources: Enzenbacher (1992), Headland (1994), Headland (2005), IAATO (2005).

As Figure 1 shows, ship based tourism with landing is the most dominant type of tourism in Antarctica. The classic Antarctic expedition cruises in the ‘Lindblad-style’, involving small to medium sized ships, rubber boat landings and educational programmes are now complemented with large cruise liners, fly-cruise operations, as well as adventurous activities such as helicopter excursions, kayaking, scuba diving, mountain climbing, and cross-country skiing (Stonehouse & Crosbie 1995, Bastmeijer & Roura 2004: 765). More and more of these additional activities are venturing into the Antarctic interior. Most tour operations concentrate in the Antarctic Peninsula area, because of geographical proximity and lack of sea ice (see figure 2). Most of the red dots in figure 2 represent ship-based landings¹.

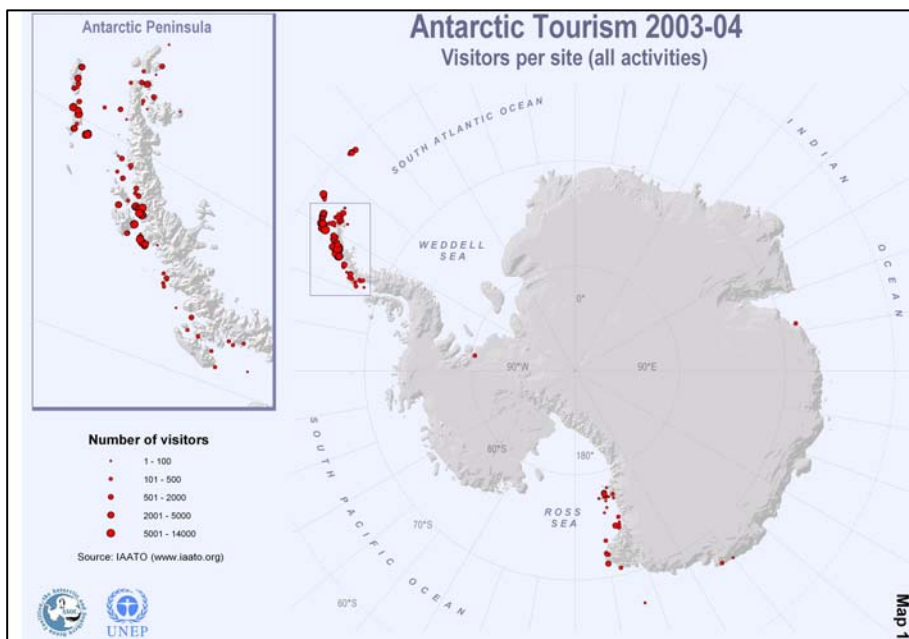


Figure 2: Spatial distribution of Antarctic tourism activities. Source: ASOC (2005)

Land based tourism in Antarctica

Before I start with the main part of this paper, it is important to make clear what is meant with the term “permanent land based tourism facility and infrastructure” in the Antarctic context. As we saw in figure 1, Antarctic tourism can be categorised into a number of specific industry sectors according to the mode of transport that is used (ship or aircraft); the basis from which activities are operated (ship or land); and whether or not tourists make short visits on the Antarctic islands and continent (the non-landing itineraries are referred to as over-flights and cruise-only). Tourist itineraries operated from ships are generally referred to as “ship based tourism” and itineraries operated from land and serviced by aircraft are termed “land based

¹ Some of the red dots refer to land based tourism including the red dot at the foot of the Antarctic Peninsula representing the Patriot Hills camp of ANI/ALE.

tourism”. These categories are recognised as such by IAATO. There are currently two IAATO member companies categorised as land based operators, both do not make use of purpose built, permanent land based facilities, but use tented camps and existing facilities at research stations. A number of national programmes have been known and/or are known for accommodating tourists at their stations, with or without a lift on a supply vessel or aircraft for subsidising their Antarctic science programmes. Some national programmes also lease out parts of their research stations to private companies, such as tour operators. In the following overview of both proposed and actual land based tourism activities we will see examples of all of these types of land-based tourism.

Early proposals and developments of land based tourism

Lindblad’s plan for Cape Hallett

In 1974, the Antarctic ship-based tourism pioneer Lars-Erik Lindblad held an informal meeting in which he outlined his plans for Cape Hallett station in the Ross Sea region. After having visited this recently abandoned station in one of his cruises, Lindblad developed the idea of making tourism operations more efficient by flying tourists to the Cape Hallett station and operating the cruise itineraries from there. This way it could be possible to take his ship the Lindblad Explorer into the Ross Sea at the beginning of the season, while in the meantime a planeload of passengers would be flown from Christchurch to Cape Hallett station, accommodated and catered by a small permanent staff. Once the tour of the Ross Sea and Ross Island had been completed the ship-based passengers would be flown back to Christchurch and those recently arrived would join the ship. This process would be repeatedly operated during the summer month and could save on time consuming shipping time between the gateway ports and Antarctica. According to Baden Norris, a guide on the Lindblad Explorer at the time, the proposal was one of many “*floating ideas*” that Lars Erik Lindblad had. The plan was never actualised but does illustrate early commercial interests into land-based facilities (Norris, B. 2006 – personal communication).

Hotel Estrella Polar

In 1982 an international conference was held at the Chilean station Teniente Rodolfo Marsh on King George Island (see figure 3 and 4) and the delegates were housed in specially constructed accommodation blocks (Headland 1994: 277). The surplus of capacity was used in the following years for accommodating tourists in “*the only guest-house*” arriving by

chartered aircraft (SERNATUR 198-: 1)². The blocks became known as “*Hotel Estrella Polar*” (Polar Star Hotel), a facility with a capacity of 80 beds (Headland 1994: 277). Several companies subcontracted transport and accommodation from the Chilean air force and operated both summer and winter tourist visits, providing a valuable source of outside revenue (White 1994). In the 1992-93 the tourist visits ended when the Chileans declined to carry tourists on official flights.

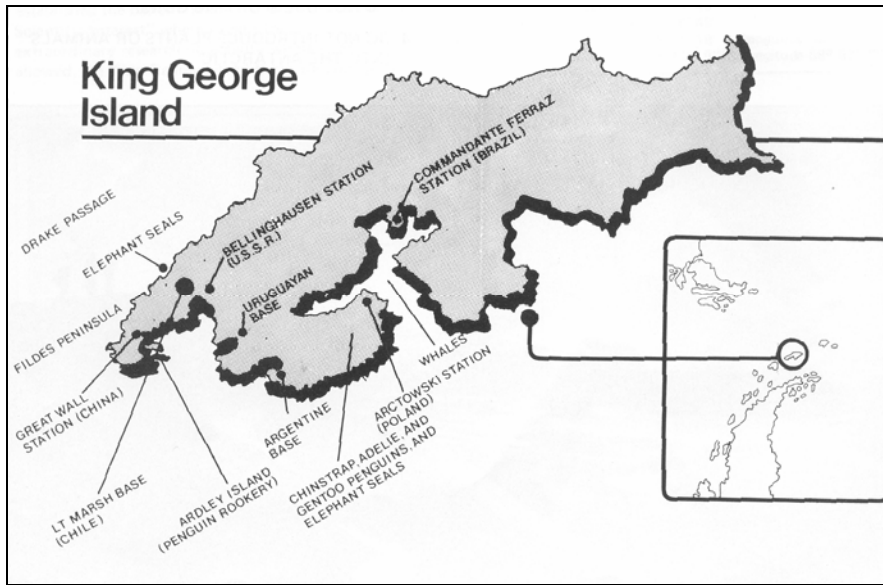


Figure 3: King George Island with some of the main research stations, including L.T. Marsh Base (Chile), Bellinghousen Station (nowadays Russia), and Artigas Station (Uruguay).

Source: SERNATUR, (198-).

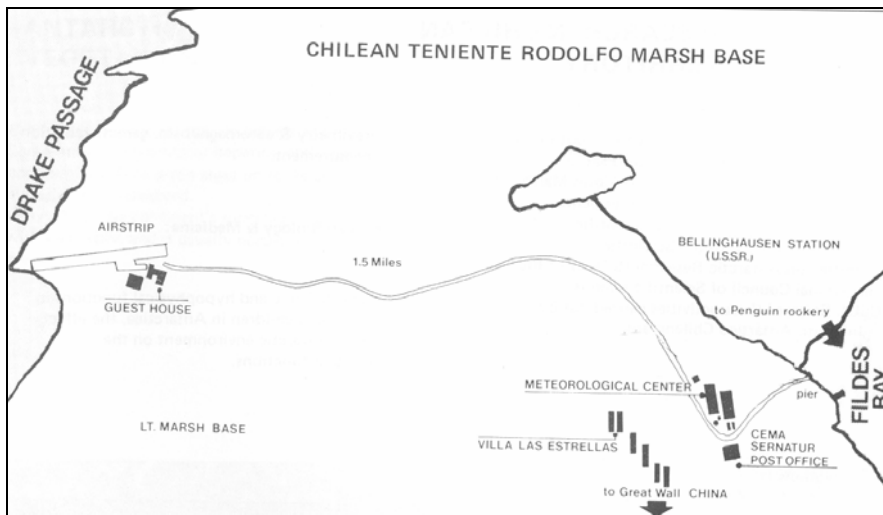


Figure 4: L.T. Marsh Base, including airstrip, guesthouse and Villa las Estrellas.

Source: SERNATUR (198-).

² The exact year of this publication is not known.

According to Headland (1994: 277) the Argentineans offered a similar service for a few years during the mid-1980s, using facilities at Vicecomodoro Marambio station at Seymour Island. White (1994: 266) reports that in 1991 Argentina received a request from Holiday Inn to build a hotel at Esperanza station. This proposal has remained with rumours.

Adventure Network International

In the mid-1980s, a group of Canadian adventurers organized their own air-supported expedition to Antarctica and lay the foundation of what was to become Adventure Network International (ANI). From Punta Arenas and Capetown ANI has serviced several tented camps and landing strips in Antarctica using a range of chartered and privately owned aircraft (Kershaw 1998). ANI provides the logistics and back up service to private expeditioners, such as mountaineers and cross country skiers (see figure 5: private expeditions and mountaineering). In addition, less demanding tourists are flown to the South Pole and an emperor penguin colony (see: other passengers). In recent years, ANI has introduced a number of guided adventure itineraries that are clearly growing (see: adventure tourism). Contrary to the general belief, average growth rates are not high, as Figure 5 shows. Nevertheless, the trend has been upwards over the last few years, interrupted only by a dip in 2003/2004 when operations were limited as ANI was taken over by ALE. ANI/ALE has been operating in Antarctica for seventeen consecutive seasons.

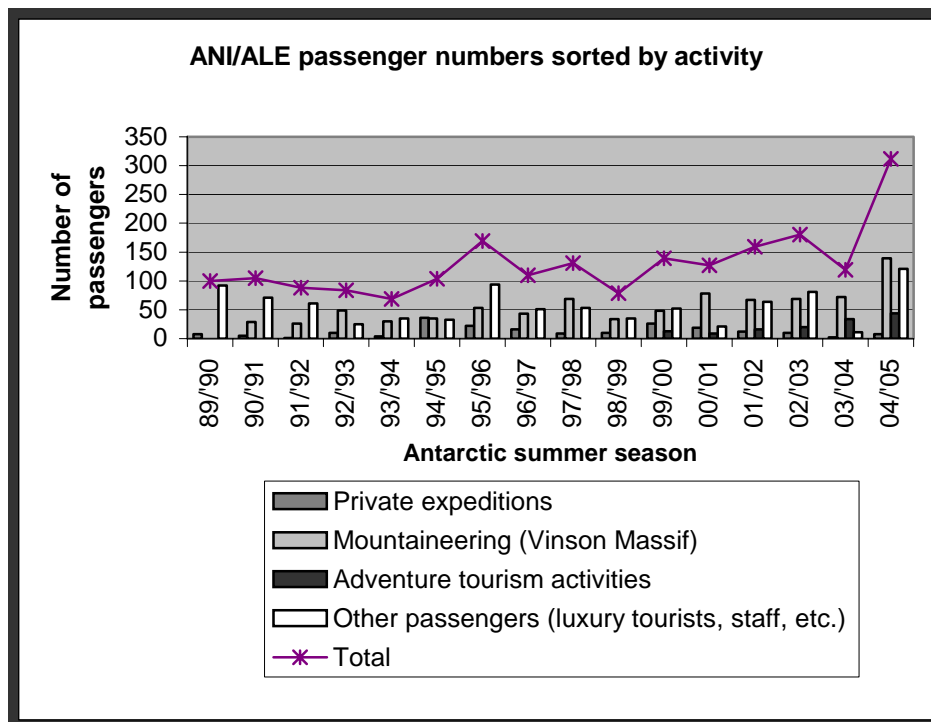


Figure 5: Numbers of ANI passengers per austral season, 1989/1990 to 2004/2005. Sources: Swithinbank, C. (1989-2000), IAATO (1997-2005)

Project Oasis

In the late 1980s, Helmut Rohde and Partners, an Australian architect firm prepared an ambitious proposal for Project Oasis in the Vestfold Hills near Davis station. The project included an airstrip, accommodation facilities, research facilities, education facilities, a hospital and search and rescue facilities (see figure 6 for visual representation of the facility). The project reacted on the poor environmental and operational performances of nationally operated research stations at the time. The basic argument made is that many National Antarctic Programmes relied on experience and technology from the Arctic, failing to recognise many of the differences between Antarctic and Arctic conditions. The proposal never eventuated, but the technological and operational research undertaken provides a valuable source of information for the viability and feasibility of Antarctic land based tourism development (Rohde 1990). The proposal of Rohde and Partners is unique in the sense that, to my knowledge, no private company has ever developed a plan for establishing a purpose built land based facility and operation as comprehensive as Project Oasis with the intention of actual realisation.

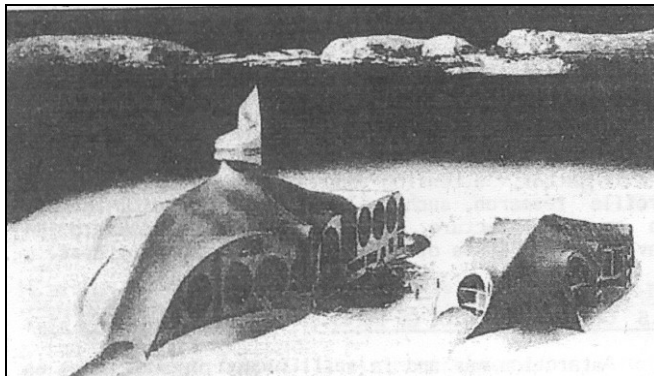


Figure 6: Visual representation of the Project Oasis facility.

Source: Rohde (1990: 34)

New Zealand Tourism Board feasibility study for land based facilities in the Ross Sea region

In 1997, the New Zealand Tourism Board was commissioned by the Officials' Antarctic Committee to provide a report on tourism opportunities in the Ross Sea region. Besides the expansion of already existing forms of tourism the feasibility is assessed of a number of options for land based tour operations, including providing tourist accommodation at Scott Base, transferring airborne tourists to ships (fly-cruise operations) and setting up a land based facility specifically for tourists (Abbott 1997). Although these "options" were never further developed the report provides interesting insights in some of the opportunities and limiting factors that are involved in land based tourism in Antarctica.

Recent proposals and developments of land based tourism

Antarctica-Soyuz

In 1999 Chile has received an Initial Environmental Evaluation (IEE) from the Russian-Chilean company Antex Polus for land based tourism activities on King George Island, starting in the 2000-01 season. In this proposal tourists are flown to the Teniente Rodolfo Marsh airstrip in Antonov-74 aircraft and accommodated at the Russian Bellinghausen station. At Bellinghausen part of the station is refurbished into a tourist hostel in the months before the first arrivals. Table 1 below provides the details on the redecorating of the tourist hostel at Bellinghausen, as presented in the IEE.

Month/year	Activity
Dec. '99-Jan. '00	Transport of material to Antarctica by sea
Jan.-March '00	Refurbishment of the hostel at Bellinghausen
March '00	End of work/environmental evaluation of refurbishment
Sept. '00	Details on Antarctic operations
Oct. '00-March '01	First season of Antarctic tourism operation

Table 1: Proposed schedule of preparations for Antarctica-Soyuz project.

Source: Chanceaulme (1999)

Tourists are taken in groups of twenty, and the journeys take six days, with four full Antarctic days. Table 2 below shows the plan for the first season (2000-01). Antex Polus proposes 33 journeys for the 2000/01 season and 34 journeys for the following years up to the 2004-05 season.

Month	No. of journeys	No. of passengers	No. of flights
October	5	100	10
November	5	100	10
December	6	120	12
January	6	120	12
February	6	120	12
March	5	100	10
Total	33	660	66

Table 2: Proposed operation scheme for the Antarctica-Soyuz project.

Source: Chanceaulme (1999).

On the same website the results of the assessment carried out by the Chilean Environmental Agency is posted. They approve of the proposal, stating that no environmental impacts are made (CONAMA 1999). It is however not clear whether the proposed activities are actually taking place. According to the presented scheme the project was projected to run until the 2004-05 season. No new proposal has been presented on the website of the Chilean Environmental Assessment Agency. Consultation with a scientist well aware of the tourist activities on KGI has made me to conclude that the Antarctica-Soyuz project has never actualised (Peter, H-U. 2006 personal communication).

Dronning Maud Land - ALCI

Recently, Antarctic Logistics Centre International (ALCI) started operating the air link between Cape Town and Dronning Maud Land (DML). Although initially intended as a transport link for national programmes operating in the DML area, several reports show that paying passengers have been taken on board. Moreover, several proposals exist for mountaineering expeditions (ANAN Archive 2001: 83/01, 61/01). In many of these proposals tented camps are used as the means of accommodation. ALCI seems to have followed the model set out by ANI but has so far not provided any information on the exact passenger numbers that have been carried to and from the Antarctic, their operational procedures and environmental management (IAATO 2003a).

Villa las Estrellas

The Chilean airline Aerovias DAP has operated commercial flights for a number of years between Punta Arenas and King George Island. Some reports state that the scope of their programmes (days trips) have recently been increased including over-night options at the Villa las Estrellas, part of the Chilean Presidente Aduardo Frei station (ANAN Archive 2000: 17/03). In conjunction with affiliating companies further options include extended stays involving yachts or via ski-equipped aircraft. It is even stated, “(...) *the cost of a night's stay at Frei is put at \$US200 per person*” (ANAN Archive 2000: 17/03). It is not known how many tourists have been involved in this operation.

Visitor programme to Artigas station Uruguay

In the 2004/05 season the Uruguayan national programme has reported to have taken a selected number of paying passengers on their operational flights to Artigas station on King George Island (IAATO 2005a) (Uruguay 2005). In this case, the operator of the activity is not commercial but governmental.

“This planned program in support of the National Antarctic Scientific Program is based on selectively on the possibility, for a restricted number of visitors (maximum 20 people), of travelling according to the free places available in Uruguayan scientific expeditions” (Uruguay 2005).

Uruguay has stated that taking visitors can contribute to the Uruguay Antarctic Programme by assisting in logistics and field activities and provide financial support. Further, visitors are treated as any other expeditioner in the Uruguay programme and follow the same requirements. The Artigas visitor programme is known to have continued in the 2005/06 season (Peter, H-U. 2006 –personal communication).

Date	No. of visitors
19-20 Dec. 2004	8
18-24 Jan. 2005	16
10-16 March 2005	19
Total	43

Table 3: Visitor numbers to Artigas station in 2004/05.

Source: Uruguay (2005).

Recent developments in ship based tourism

In Antarctic ship based operations there are a number of developments that relate to the possible development of land based tourism. First, staying overnight in tents has been an option for almost a decade for ship based tourists. Camping is included as an additional activity in Antarctic ship based itineraries to provide a more hands-on experience for the tourists (IAATO 2003b). According to Hansom & Gordon (1998: 258) the ship based tour operator Marine Expeditions has proposed developing a tourist camp on King George Island but they did not proceed.

Second, in recent years a Chilean tour company has introduced fly-cruise operations in cooperation with Aerovias DAP. Tourists are flown to KGI in the South Shetland Islands and board the tourist ship. This way the long and discomfoting ship journey can be avoided and more passengers can be squeezed into the tourist season. So far, only one company is operating in this way and tourist numbers have remained low. However, we have to bear in mind that in a way fly-cruise operation provides the same efficiency like land-based facilities in combination with an air connection. Similarly, some authors have considered fly–sail operations very likely to drive the need for land-based facilities, for reasons of safety, self-sufficiency and comfort.

Section 3: Opportunities and constraints: an analysis

Introduction

In the following section, I will present an analysis of the opportunities and constraints of land based tourism in Antarctica. This section is structured around the following factor areas that were identified during the analysis of the cases presented in the previous section:

- Accommodation and facilities
- Technology
- Access and transport
- Developmental and operational costs
- Market demands
- Environmental conditions and impacts
- Human risks
- Legal obstacles and political climate
- Civil society resistance

These factor areas are discussed as separate headings, but we have to bear in mind that these factors are all interlinked and act jointly. Many of these factors return in the presentation of other factors or discussed in conjunction. In fact, the feasibility of land-based tourism (of any activity in the Antarctic) is made up of a complex web of factors and the way these factors are tackled by the operator (or other stakeholders) determines the success or failure of the proposed activity.

Accommodation and facilities

In the previous section, we have seen that in terms of accommodation and facilities currently commercial and national operators make use of existing facilities of national programmes and tented camps. Permanent purpose built land based facilities as proposed in Project Oasis are presently not available. The closest to this type of accommodation was provided by the hostel operated at the Chilean Teniente Rodolfo Marsh station on KGI between 1982 and 1992.

Facilities of national programmes, such as scientific stations have and are being used by non-governmental parties in Antarctica. In the previous we have seen a few examples of

proposals and operations with a more permanent and persistent nature, such as Lindblad at Cape Hallett, Hotel Polar Estrella and Antarctica Soyuz at Bellinghousen station on KGI. We have to bear in mind that incidental uses of facilities at research stations by non-governmental one-off expeditions have occurred frequently throughout the history of Antarctic tourism, with or without the consent of the national operator. In the aftermath of the cold war and receding geopolitical tensions in the Antarctic Peninsula, more and more stations are abandoned, dismantled, or could become available for commercial uses.

Existing facilities of national operators offer a number of advantages over purpose built tourism facilities; they provide a cheap and effective way of accommodating tourists in Antarctica. Often the basic structures of the buildings are already in place and only need some refurbishment (Chanceaulme 1999). The buildings are already part of the intricate network of a research station, providing access, back up, activities and amenities important for the tourist experience, such as postal services, communication, bars, entertainment, etc. The area of the existing station is already environmentally affected so there is less of a moral issue when it comes to the impacts on the physical environment and the intrinsic values of the Antarctic wilderness. In other words, utilising existing facilities of national operators provide commercial operators with a full package deal of factors that would otherwise cost a fortune and a lot of effort to secure. Organising all these factors independently would drive the price up of the itinerary and that would make the operation less feasible.

In the feasibility study for land based tourism in the Ross Sea region, the New Zealand Tourist Board is inclined to look at smaller scale options, such as the semi-permanent accommodation of the Cape Roberts drilling project using shipping containers. It is proposed that in terms of accommodation an incremental approach can be taken, starting with semi-permanent facilities, such as tented camps or containers, and possibly leading to a more permanent facility when there is a proven need (Abbott 1997: 46-47). The report also suggested that the beds available at Scott Base, as a result of under capacity could be rented to tourists. Lou Sanson of Antarctica New Zealand has assured that under the current New Zealand policy this would definitively not happen (Sanson, L. 2006 –personal communication).

In order to make use of existing facilities in Antarctica lease out contract has to be secured with a national operator. In the case of Lindblad's interest in Cape Hallett the Department of Scientific and Industrial Research (DSIR) in New Zealand was not interested in leasing out the base site. This factor practically ended Lindblad's aspirations in the Ross Sea region (Norris, B. 2006 –personal communication).

The land based operations of ANI/ALE and others are based on tented accommodation and do not rely on facilities owned by other parties. These tented camps are removed every season and are erected on the icecap; minimising impacts and laying no additional claim on the limited availability of ice-free land. Together with effective risk management and the highest levels of environmental awareness and management observed in Antarctica, these factors contribute to a solid, self-sufficient basis necessary for sustained land based tourism. I have to note that although the camp is collapsed every season a large part of the equipment, including tents, radios, food and an airplane; remain at Patriot Hills stored in a snow cave (Kershaw 1998: 80).

The above discussion already highlights some of the reasons why purpose built land based tourism facilities were never developed in Antarctica. Tour operators would have to organise a whole range of services and amenities, at enormous developmental and operational costs, taking enormous human risks, and affecting pristine parts of Antarctica. It is not for nothing that Project Oasis came up with a plan for a tourist facility in conjunction with a science facility (Rohde 1990). This way developmental and operational cost could be shared, resources could be pooled, and tourists and scientists could mutually benefit from one another. However, the Australian authorities of that time were not in favour of supporting further commercial development *until “a detailed conservation strategy is developed for the Australian Antarctic Territory”* (HRSCERA 1989: xi).

Technology

Technological aspects apply to all of the above mentioned aspects of human presence in Antarctica, such as accommodation, transport, food provision, human safety, environmental sensitivity, communication, etc. The technology of establishing permanent land based tourism in Antarctica is primarily discussed in the Project Oasis proposal. Most of the other proposals focus on the usage of existing facilities and therefore do not provide many technological constraints, other than refurbishment. Technology used in operating tented camps is often derived from early national expeditions and experience elsewhere in high-latitude and high-altitude environments. Polar technology for land based facilities in a remote and extreme environment like Antarctica is often developed in a “learning-by-doing” approach.

Project Oasis is above all an architectural project that presented a number of innovative ideas for land-based facilities in Antarctica. The justification of their proposal was sought in the poor environmental performance of many of the operated science station at the time.

According to Helmut Rohde this was mainly due to the lack of developing technology for the specific Antarctic conditions and a result of copying existing technology from the Arctic and elsewhere. Project Oasis on the other hand provided state-of-the-art technology that was tailor-made for Antarctic conditions and operations (Rohde 1990). Some of the innovations include:

- Internalising all vehicle, service, fuel storages and movement corridors
- Consolidating the capacity of seven research stations into one to reduce the effects of multiple stations and achieve economies of scale
- Using welded, single-piece, stressed skin steel building materials
- Constructing most of the building in a ship-yard off-site, towing it to Antarctica, sliding it across the ice and fixing it into position
- Minimising wind and snow-drift problems through the shape of the building
- Paying more attention to building aesthetics and psychological needs of long-stay personnel (Rohde 1990).

Access

Creating access to Antarctic is probably the most important factor for the establishment of land based tourism facilities. It is not for nothing that many of the academic papers highlighting the potential of land-based tourism contained supplementary remarks, like: *“unless air access is facilitated”* (Hansom & Gorden 1998: 258). In fact, it is fair to say that it is useless to establish a land based tourism facility without having an air link to service it. When using a ship the comparative advantage of travel time is lost, and passengers are already accommodated quite comfortable in the ship making the establishment of land-based facility redundant. I have to note that adventure tourists are known to venture inland after being dropped in the Antarctic by ship but for these “one-off” cases tents are probably the best means of accommodation.

For a land based tourism operation to be financially affordable it is important to establish a long term and reliable means of air access to return the development costs of the facility. Air access in the Antarctic can be secured in a number of ways. First, tourists can be taken on governmental flights, e.g. the operations to the Hotel Polar Estrella Artigas in the 1980s and the current visitor programme to the Uruguayan base on KGI. In the previous section we saw that the operations of Hotel Polar Estrella ended when the Chilean authorities did not want to take tourists on official flights any longer (Headland 1994: 277).

National operators can grant non-governmental air carriers landing rights on air strips maintained, e.g. the Chilean company Aerovias DAP. A number of national operators maintain airstrips in Antarctica in the Ross Sea region, Dronning Maud Land and the Antarctic Peninsula. In the near future, the Australian Antarctic Division will operate an air link between Hobart and Davis station.

Finally, non-governmental air carriers can maintain their own landing strip (if they manage to construct and maintain one) or make use of natural blue-ice runways, e.g. ANI/ALE to Patriot Hills, Mount Vinson and Blue One.

The main constraint for developing land based tourism in the Ross Sea region, identified by the New Zealand Tourism Board in their 1997 feasibility study, is the unlikelihood of the US Antarctic Programme to provide air traffic control for any of their landing strips in McMurdo Sound (Abbott 1997: 42). A recent example of the US position towards non-governmental use of their landing strips was the landing of Australian aviator Jon Johanson at Ross Island after having become the first person to fly across the South Pole in a homemade aircraft. He had no fuel left to return to New Zealand but received no assistance from both the US or the New Zealand programme. He eventually got a refill from a fuel dump that was stored at McMurdo station the previous year by another non-governmental aviator (New Zealand and United States 2004) (IAATO 2004). Landing a commercial aircraft full of tourists at McMurdo without air traffic control would be a hazardous operation.

ANI/ALE is perhaps the most successful commercial air supported land based operator in Antarctica because of its independence on national programmes for creating access. At the start of operations in the mid-1980s ANI faced much resistance from the National Science Foundation who did not want to have private companies flying aircraft around in the Antarctic (Abbott 1997: 90). Chile was told not to sell any fuel to ANI and would refuse to sell fuel to Chile if they would do so. Chile decided to support ANI, because it was interested in the potential of blue ice runways (Kershaw 1998: 80). Over the course of the years, ANI has managed to build up a self-sufficient land based operation with many working relationships based on safe and sound operations.

The self-sufficiency of ANI has been partly due to their trademark, the blue ice runway. Blue ice runways are natural windswept fields of solid ice suitable for landing wheeled aircraft (Swithinbank 1996: 147). Blue ice runways were vital in the establishment of ANI/ALE because it opened up the Antarctic interior without having to construct landing strips or negotiate landing rights with national operators. Later, excellent cooperation with other

parties in the field, including national operators, have made ANI/ALE a valuable and indispensable player.

A continuing point of discussion in proposals for land based tourism is the availability of appropriate and cost efficient aircraft for flying and landing to and within the Antarctic. ANI/ALE has chartered and flown a whole range of aircraft, including recently the Cessna 185, the Twin Otter, the Hercules C130 and the Ilyushin 76. The latter two have been used for inter-continental transport. The first two are used for transport within the Antarctic continent. It should be noted that the Cessna stays “permanently” in the Antarctic, as it is packed and stored in a snow cave in Patriot Hills and dug out the next season. The other aircrafts are chartered and therefore return to their owners after the summer season (Kershaw 1998). It is argued that a limiting factor for the flight operations of Aerovias DAP to KGI, is the fact that currently they only have one Twin Otter plane in their inventory (ANAN Archive 2000: 17/03). For a more solid operation more aircraft would be needed including larger inter continental carriers, like ANI/ALE. Finally, the Project Oasis proposed inter-continental flights to Davis station using aircraft of the equivalent of a Boeing 747. After this ambitious project was turned down Helmut Rohde and Partners have been reflecting on the use of smaller and cheaper aircraft to increase the feasibility of their project (Hemmings, A. 2006 –personal communication).

Developmental and operational costs

In a conference speech on Hotels in Space organised by the American Astronautical Society, Barron Hilton, the president of Hilton Hotels Corporation at the time, states: *“A primary rule of the hotel industry is that a hotel, whether on earth, in space, or on the moon, should not be built unless there is a proven need for it. No hotel should ever be built that will cost more than it can earn”* (Hilton 1967). In other words, no hotelier is going to invest in an unfeasible project. That is perhaps one of the most apparent reasons why hotels, or other forms of land-based facilities, have not been developed in Antarctica. It also explains why most of the actual land based tourism activities so far have focused either on the cheaper options of existing facilities or tented camps.

The financial viability is made of two main components, the development costs and the operational costs. Both of these two components are very difficult to estimate, but are generally anticipated to be much higher in Antarctica than for a hotel in New Zealand. The New Zealand Tourism Board identifies the following factors:

- higher design/engineering costs;

- due to the extreme climate;
- higher construction costs due to materials and transportation;
- the need for self-sufficiency in terms of water supply, electricity, sewage, waste, and back up systems for each of these services;
- the need for staff accommodation;
- the need for in-door recreation opportunities in case of bad weather conditions;
- facilities and workshops for maintaining vehicles.

These factors drive up the development costs. The operational costs are also anticipated to be much higher as a result of transportation of foods, beverages, staff and other items; the costs of housing and catering staff (Abbott 1997: 100-106). ANI/ALE spends up to 2.5 million US\$ per year on leasing aircraft for the four month season that they operate in the Antarctic, apart from the astronomical costs of fuel. On top of that the company has never been able to get a bank or operating loan (Abbott 1997: 90).

Project Oasis on the other hand estimated that the development costs of their facility are much lower in comparison with research stations at the time, as a result of innovative technology. In table 4 below the estimated costs per square metre are given as presented in their proposal.

Current station	Project Oasis
Using pre-fabrication and on-site assembly techniques	Using the SOL system
US\$ 12-16,000/m ²	US\$2-4,000/m ²

Table 4: Estimated difference in development costs.

Source: Rohde (1990)

Market demands

The market demand for Antarctic tourism is generally considered to be large and growing. Glenys Coughlan of the New Zealand Tourism Industry Association has estimated that by 2010 the pool for Antarctic travel might be between 8.5 million and 15 million consumers (Coughlan 1998). Antarctic ship based tourism has proven to be a sustaining sector of industry with a steady consumer demand. Air supported land based tourism is a fluctuating industry with a more narrow pool of consumers (Abbott 1997). A successful land based tourism operation depends on the type of activities that can be carried out, the transport system that it is linked into, the environment it is set in and the standard of comfort. These and other factors determine whether the facility will service the winter sports, the adventure,

the luxury, the eco tourism or even the back packers market. The question is whether it will be large enough to return the enormous development and operational costs of a purpose built permanent land based tourism facility.

Environmental conditions and impacts

The extreme environmental and climatic Antarctic conditions pose a number of constraints on the developing land based tourism and make the ecosystem extremely fragile. First depending on the location, the tourism season is limited to a number of months in the Austral summer. Building a permanent facility especially for tourists that can only be operated for a limited part of the year is not a very solid basis for a healthy business. Second, the extreme and changeable weather conditions, especially the wind, make land based tourism very unreliable and not very suitable for a large scale commercial operations. Ship based tour operators can adjust the itinerary whenever the weather or sea ice does not allow them somewhere. Land based operations would have to wait with flying in or out tourists or carrying out activities until the weather would clear up. The dependency on sea ice conditions could be even more disastrous for a land-based operation. The limited availability of ice-free land and the competition between human operations and biodiversity poses another constraint for the establishment of land-based facilities and the construction of airstrips.

In the air link between Punta Arenas and King George Island the weather is known to play an important role and likely to limit developments in the coming years. The main reason for this is the limited air navigation facilities available at the L.T. Marsh airfield. Improvements in these navigation facilities could potentially have a large effect on the passenger influx. (ANAN Archive 2000: 17/03).

With the signing and ratification of the Environmental Protocol in 1991, Antarctica has been declared a natural reserve that needs to be protected. Under a later heading, I will discuss some of the legal constraints of the Environmental Protocol and additional measures. Many of the above mentioned activities and proposals stem from before the Protocol.

Nevertheless, in many of these proposals the environmental concerns already played an important role. According to Baden Norris for the successful operation of Cape Hallett an airstrip would have to be constructed nearby the station capable of taking intercontinental aircraft, including the costs of building and maintaining, and possible removal of a penguin colony from ice-free land (Norris, B. 2006 –personal communication). It was this last point that made DSIR to decide against the leasing of the station. They already faced a fierce conservation lobby after worldwide condemnation of the removal of thousands of penguins to

build the base in the first place. Work on an airstrip would result in even greater numbers of penguins being displaced, and even if built keeping them off the airstrip would create great problems (Norris, B. 2006 –personal communication).

For Project Oasis the poor environmental management of existing Antarctic stations provided the justification for proposing a new combined tourist and science facility, based on state-of-the-art environmentally sensitive technology. ANI/ALE has also made sure throughout their operational history that their environmental management record is the best found in the Antarctic. This way environmental concern or impact cannot be used to constrain their business.

Many of the land based tourism operations justify their activities by stressing the educational opportunities of taking tourists to Antarctica and enlightening them on vital global processes.

Human risks

Human risks come into every activity in Antarctica, but it is safe to state that the risks stemming from land-based tourism are different from those from a well controllable environment of a ship. Human risks depend on a whole range of factors, including the environment, the activity and the management. The key to successful tour operating in Antarctic often lies in the level of self-sufficiency that can be maintained. It is much easier to run a self-sufficient business from a ship than from a land-based facility in Antarctica where many basic services are not present. In other words, creating access to Antarctica is more than just getting there. It also involves staying there and getting back safely.

ANI/ALE imposes a whole range of stringent requirements on their clients and holds the ultimate decision whether a client is accepted or not. Private expeditions need to be:

- sufficiently insured in case of an emergency;
- have permission from the relevant national government departments;
- provide information on the quantity of food that is taken and the caloric value of each meal;
- provide information on the route taken and the equipment used (camping, communication, medical);
- provide information on the experience of team members in polar regions and with the proposed activity;
- and have back up planning in case of technical problems.

As an extra safety measure, ANI/ALE automatically dispatches an aircraft to pick up expedition teams if no communication can be established for 48 hours (IAATO 2003b).

These issues of safety provide incentives for potential developers of land based facilities to locate their hotel or facility near existing stations for possible back up in case of an emergency situation. In the case of Cape Hallett, back up, if needed, could not be assured, as Cape Hallett lies beyond helicopter range from McMurdo (Norris, B. 2006 –personal communication). Logistical constraints of getting forty to ninety people off the base if the ship broke down, which only rests on the resources of the operator did not encourage further efforts. Moreover, it is questionable whether any national operator would want to carry the burden of having to manage these numbers of tourists from a hotel nearby in case of an emergency.

Legal obstacles and political climate

The study of the legal obstacles and jurisdictional implications is a study in itself and currently outside the scope of this paper. The cases discussed in this paper did not highlight many legal obstacles with regard to land-based tourism. For many of the older cases that were actualised or proposed before the ratification of the Environmental Protocol, no international jurisdiction was in place to constrain tourism activities.

The political climate of the country where the analysed proposals or activities originated from appeared to be influential, especially in the absence of international legal obstacles. Decisions were made in cases the assistance of a national programme was sought by a commercial land based operator. Besides issues of environmental protection or human safety, Consultative Parties to the Treaty have been interested in finding out about the economic benefits of tourism in Antarctica for their country or their countries citizens. Others have been hostile to the idea of land-based tourism throughout out history. For claimant states, the issue of controlling or promoting activities in their back garden has greatly influenced the positions taken concerning tourism. The development of land-based tourism has been discussed as a strategy to support geopolitical interests (White 1994: 258).

The Australian parliamentary report advised the government against granting approval for airstrips and land-based facilities for tourists until a full conservation strategy had been developed for the Australian Antarctic Territory (HRSCERA 1989). According to Alan Hemmings (Hemmings, A. 2006 –personal communication) the refusal of Australia has to be understood in the light of its strong position in the lobby for the Environmental Protocol and

against the establishment of the minerals regime (CRAMRA) at the time. They could not afford to be supporting a new commercial activity at the same time.

In the more recent cases, activities and proposals have been subject to Initial Environmental Evaluations (IEE) but must have proven to be compliant with the principles of the Protocol and causing no more than a minor or transitory impact to the environment. Land based tourism operators currently make use of existing facilities of national programmes or tented camps. Thereby they are considered in line with the above-mentioned principle. Under the Protocol, an application for the establishment of a permanent tourism facility by a company from an ATCP would require a Comprehensive Environmental Evaluation, and appear for the Committee for Environmental Protection of the ATCM, in case the ATCP is unable to deny it before that point. So far this has not occurred (Hughes, T. 2006 –personal communication)

In the case of renting out beds at research stations or even building a shelter or a hut in a place near an airstrip or station they might not require a CEE because the site is already in use (Hughes, T. 2006 –personal communication). The proposal of Antarctica-Soyuz did not eventuate but was evaluated by the Chilean authorities. The report of the Initial Environmental Evaluation committee certified that *“the Antarctica-Soyuz project on Fildes Peninsula, King George Island (...) of the company Antex Polus Chile, has fulfilled all the applicable environmental requirements, and fulfilled all the legal obligations”* (CONAMA 1999)³.

The Environmental Protocol has been implemented in different ways and is being interpreted in different ways by different governments. It is questionable whether the same proposal would have been certified this way in, for example, New Zealand. Chile, at the Antarctic Treaty Meeting of Experts in 2004 said that: *“in its opinion the Antarctic Treaty System did not prohibit building a facility and indicated that according to Chilean legislation a public facility could be leased or made over as a concession to a tour operator”* (Norway 2004).

Measure 4 on insurance and contingency planning adopted at the 2004 ATCM in Cape Town, states that every non-governmental expedition must have search and rescue cover, contingency planning and appropriate insurance in place (ATCM 2004: 27-28). Many ATCPs, at this point, have not yet implemented this measure into their domestic legislations. It is not clear what the insurance cover for a land-based hotel or tourist infrastructure would be but I assume it would be considerable and potentially create another threshold.

³ Free translation by the author.

Further, policy makers are concerned with these forms of land-based tourism for reason other than environmental protection, for example issues of ownership rights and use-rights. Currently no legal instruments are in place to address these issues.

Civil society resistance

Besides governments, other stakeholder groups and civil society bodies are also likely to oppose land based tourism developments. Hansom & Gordon (1998: 258) state that ship based tour operator Marine Expeditions have proposed the establishment of a tourist camp on King George Island. This camp could be used for visiting local wildlife, scenic locations by foot or zodiac, attending lectures in the research stations, and participate in scientific activities for groups of up to 12 tourists. It was proposed that researchers at the camp could act both as guides and undertaking scientific research (Abbott 1997: 74). ASOC has criticised this proposal for land-based tourism because of its setting in a biological and scientifically sensitive area; its failure to justify a land based camp when most of the activities could be operated from a ship, its lack of evaluation and monitoring. Due to the resistance within SCAR and ASOC, the programme did not proceed (Abbott 1997: 74).

Overview

In table 5 an comparative overview is provided of all the discussed cases, their characteristics and the most influential factors determining the success or failure of the operation.

Case:	Year:	Location:	Accommodation type:	Scale of operation:	Influential factors:	Reference:
Proposal: Lindblad's plan for Cape Hallett	1974	Ross Sea region	Using existing facility	60 passengers facility	-No lease -Construction of runway	Norris 2006
Actual: Hotel Polar Estrella	1982-1992	King George Island	Using existing facility	80 passengers facility	-Cooperation with NAPs -Chilean airforce stops operations	Headland 1994
Actual: Adventure Network International	1985-current	Patriot Hills	Tented camps	Between 100-200 people per season	-Self-sufficiency -Cooperation with NAPs and ships -Limiting market	Kershaw 1996 Swithinbank
Proposal: Project Oasis	1989	Vestfold Hills (Davis)	Developing purpose built facility	344 tourists 16.000 people annually 70 researchers 174 staff	-No support from government -Construction of runway	HRSCERA 1989 Rohde 1990
Study: New Zealand Tourism Board	1997	Ross Sea region	Using existing facility Developing purpose built facility	Various	-Landing at McMurdo -Development and operation costs	Abbott 1997
Proposal: Antarctica-Soyuz	1999	King George Island	Using existing facilities	Groups of 20 tourists 660 tourists per season	-Cooperation with NAPs	Chanceaulme 1999 Egana 1999
Actual: Dronning Maud Land	recent	Dronning Maud Land (Novo)	Tented camps	?	-Cooperation with NAPs	IAATO 2005 ANAN
Actual: Villa las Estrellas	recent	King George Island	Using existing facility	?	-Cooperation with NAPs -Limited aircraft -Limited navigation systems	ANAN Archive 2003
Actual: Artigas Station Uruguay	2004 – current	King George Island	Using existing facility	43	-Revenue for the NAP	Uruguay 2005

Table 5: Overview of actual and proposed land based tourism in Antarctica 1974-2006

Section 4: Concluding discussion

A feasible nightmare?

In many future explorations of tourism developments in Antarctica, usually a large role is reserved for permanent land based facilities. Ann Kershaw, the former managing director of ANI, stated that if tourism was to reach the one million-visitor mark, 300 facilities the size of McMurdo have to be established for accommodation and catering (Kershaw 1998). For many, this means a nightmare.

We have seen that a whole range of opportunities and constraints influence the establishment of land-based tourism, forming complex networks. In different historical developments and proposals, different factors had a determining role in the success or failure of the operation. It remains largely uncertain how different factors will jointly manifest themselves in the future.

Therefore, establishing a permanent land based tourism facility is a daunting exercise, in terms of transport, technology, developmental and operational costs, market demands, environmental conditions and sensitivity, human risks, legal obstacles and civil society resistance. Getting access and sustaining air transport is a vital factor in the development of land-based tourism. In fact, establishing a permanent land based facility makes no sense if air access cannot be secured. We have seen that creating commercial air access is a difficult task, but opportunities are appearing at the horizon, such as new governmental air links, technological innovations, chartable aircraft, and possibly increasing demand. Restricting commercial air access could provide a means to minimise land based tourism.

Although daunting and perhaps largely unfeasible we have to bear in mind that this analysis provides a somewhat biased perspective in the sense that many of the cases under discussion did not make it, and do not make use of permanent tourism facilities, like hotels. On the other hand, land based tourism has developed. Perhaps it only takes one case to prove that permanent, purpose built land based tourism is feasible.

We have to be aware that on the short term a prohibition on permanent land based tourism will not restrict the increase in scale that Antarctic tourism is currently facing, but rather the nature of development. Basically, we have seen two reasons why commercial tour operators

explore the idea of permanent or semi-permanent land based tourism, as addressed in the cases. First, land based facilities with air access open up the Antarctic continent for tourist activities that are not possible to operate from a ship, e.g. ANI/ALE. Second, land based facilities with air access provides a fixed point from where activities can be operated more time efficiently, e.g. Aerovias DAP, Lindblad at Cape Hallett, Antex Polus Chile, etc. Because of the gigantic costs involved, the environmental footprint, IAATO bylaws, and the unviable scale in relation to potential consumer demand, companies like ANI/ALE find permanent facilities unfeasible and stick to tented camps. The latter group of operators will most likely search for alternative strategies to increase the efficiency of their operations, such as fly-cruise operations, using existing facilities, etc.

Terminology

It remains unclear what is meant with the term “permanent facility and infrastructure” in the Antarctic context. Permanent is used as the opposite of incidental or transitory in the sense that it is supposed to stay in place for a number of seasons. Tented camps are generally regarded as temporary, but as Lou Sanson states *“ANI has been operating in the Patriot Hills for 17 years and store aeroplanes and equipment during the winter. I would call that permanent. Just as permanent as some of the small bases”* (Sanson, L. 2006 –personal communication). Sanson further claims that even Scott Base is not permanent in the sense that it can be removed. ASOC suggests that, in Antarctica, the term “persistence” is perhaps more applicable to land based operations. IAATO is not likely to agree. In fact, it has recently changed its bylaws stating that its members will have no more than a minor or transitory impact on the Antarctic environment, including its land based operators (New Zealand 2005). Discussions of the definitions of terms like “permanent land based tourism” will need to be sorted out at the coming ATCMs.

It also remains unclear what the facility or the infrastructure needs to be used for. It is generally thought that with a tourist facility some sort of accommodation is meant, such as a hotel or a hostel. However, a tourist facility does not necessarily have to be an over-night accommodation. Even an emergency shelter, a gift shop, an information centre, a museum, or a coffee shop can be considered tourist facilities, as long as they have been erected for tourists. It would be interesting to see how the facility at Port Lockroy would fit into this discussion. Port Lockroy is a former British research base that is currently operated as a museum, visitor centre, and a shop. There are numerous examples of these services being provided at science stations in the Antarctica.

Legal concerns and political development

According to Trevor Hughes of the New Zealand Ministry of Foreign Affairs and Trade, the development of permanent land based tourism may pose issues of jurisdiction and ownership rights capable of eroding the heart of the Antarctic Treaty System. This concern refers to article 4 of the Antarctic Treaty where the disputes of ownership over the Antarctic between claimant and non-claimant states are settled (Hughes, T. 2005 –personal communication).

ASOC points out the same set of concerns apply to the current land based tourism practices using existing facilities and tented camps. “(...) *tourism operators may seek some kind of access or title to existing infrastructure, or the right to build infrastructure, from the claimant state in that area. One claimant state is already reported as saying that under its domestic legislation an existing facility could be leased or granted as a concession to a tour operator and ASOC is aware of an assertion that a landowner in a different claimant state has argued that there was no impediment to him building a hotel in Antarctica if he wished to do so*” (ASOC 2005a: 4). IAATO has referred to the right of its tour companies to continue to make use of particular sites within the Antarctic (Bastmeijer & Roura 2004: 780). In addition, ANI was purchased in 2003 by ALE (Antarctic Logistics and Expeditions) including its equipment in the Antarctic. On the website of ALE it is stated that “*the purchase of ANI's assets in Antarctica allows ALE to utilise the existing summer camp facilities at Patriot Hills, the centre for Antarctic flight operations*” (ALE 2006). One can easily see an issue of user right coming from this statement. Issues of ownership and user rights can potentially provide a “slippery slope” or “incremental increase” of more permanent land based tourism developments (De Poorter 2000: 23).

At this stage there is no consensus on the admissibility of permanent land based tourism in Antarctica under the Antarctic Treaty and the Environmental Protocol (Germany 2005, Australia 2005, ASOC 2005b). Some countries claim that an application for permanent land based tourism can be denied using the existing domestic legislations and do not need further guidance from an ATS Measure or Resolution. Others, including New Zealand, Germany and Australia, feel there is the vulnerability, especially when potential developers might go to court to gain their right (Hughes 2006 –personal communication).

The concerns expressed in recent papers tabled at the ATCM are valid and if ATCPs want to make sure that permanent tourism facilities will not develop in the future than they take a

proactive approach and act when no such facilities have developed. According to Trevor Hughes, *“It is still early days. It is not that millions of dollars in investment have already been made. That is why we think it is timely now to talk about these things”* (Hughes, T. 2006 – personal communication). Some Parties are using land-based tourism as a means to subsidise their science programmes in Antarctica, therefore it is unlikely that they will easily agree with a prohibiting measure. The coming ATCMs will have to prove if this divide can be bridged.

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