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Title: Self-regulation of tourism in Antarctica: exploring the conditions for success and failure

Abstract :

Tourism in Antarctica has grown rapidly over the past two decades, increasing from less than a thousand arrivals in 1985 to around thirty thousand in 2006. The increasing volume and diversity of tourism in Antarctica has gone hand in hand with increasing concerns about potential environmental impacts. Formal tourism legislation has been limited, partly as a result of the complex governance structure in Antarctica. Tourism management occurs mainly in the form of self-regulation by tour operators through the International Association of Antarctica Tour Operators (IAATO), and successfully so.

To a large extent, the success of IAATO is attributable to the high degree of organisation in the sector, brought about by considerable perceived benefits of membership. Prolongation of the success of self-regulation (and effective tourism management) requires continued positive incentives of self-organisation, but this is not self-evident. Changing circumstances may lead tour operators to believe that IAATO membership is no longer in their interest.

In this paper the main pros and cons for self-regulation in the Antarctic tourism sector will be analysed. The theory of collective action developed by Ostrom, and especially the design principles for robust management of common pool resources provide a framework for analysis. Using this framework the weak and strong points of the self-regulatory regime will be identified and the outline of a conceptual model will be presented.

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1. Introduction

Since the mid-1980s, the number of people visiting Antarctica for tourism purposes has increased steadily from a few hundred to over 30000 per year. Most of Antarctic tourism remains ship-based, but other market segments have developed as well, such as land-based tourism and Antarctic over-flights (IAATO 2005). Despite the growth and diversification of the industry, tour operators in Antarctica have managed to maintain a relatively strong record in terms of safety and environmental sensitivities. The establishment of the International Association of Antarctica Tour Operators (IAATO) in 1991 and their self-regulatory regime are believed to have played a major role in this (Spletstoeser 2000; 2004; United Kingdom 2004). To date, industry self-regulation is the dominant mode of tourism regulation in Antarctica. The Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol) does provide a regulatory framework that also applies to all human activities in the Antarctic Treaty Area, and hence to tourism, but a range of gaps, inconsistencies and weaknesses of the Antarctic Treaty System (ATS) have been identified with regard to tourism operations (Hemmings and Roura 2003; Bastmeijer and Roura 2004; Molenaar 2005). IAATO has managed to put a consistent and practical set of guidelines into place, and is widely commended for the results that have been achieved.

In view of the past and present effectiveness of self-regulation, it is tempting to embrace self-regulation as the preferred management approach for the future. However, the almost exclusive focus on self-regulation entails significant risks, however, because the future of Antarctic tourism remains highly unpredictable. Decisions and actions taken by individual entrepreneurs or Treaty Parties alongside other factors may upset the current equilibrium in IAATO and undermine the effectiveness of self-regulation. To a large degree the success of IAATO is attributable to the high degree of organization in the sector, brought about by considerable perceived benefits of membership. Prolongation of the success of self-regulation (and effective tourism management) requires continued positive incentives of self-regulation, but this is not self-evident. Changing circumstances may lead tour operators to believe that IAATO membership is no longer in their interest.

The objective of the researchers is to better understand the determinants of the stability of self-organisation and to explore the implications of different scenarios for a range of internal and external developments. Three steps are taken to reach this objective. First, the institutional settings of the Antarctic tourism self-regulatory regime will be explored using the insights from the theory of collective action theory for common pool resources. The analysis largely follows the widely acknowledged design principles for robust institutions proposed by collective action theorist Elinor Ostrom (1990; 2000; 2005). The resulting analysis and discussion of the strengths and weaknesses of the Antarctic tourism self-regulatory regime will provide the main focus of this paper. Second, the analysis will provide the basis for a conceptual model for self-regulation of Antarctic tourism. In this paper an outline of this conceptual model will be presented. Step one and two will at a later stage be used to build a quantitative agent based model in which the reaction of the self-regulatory regime and its individual actors to changing internal and external factors pertaining to Antarctic tourism can be simulated.

This paper is organised as follows. In section two, some contextual information is provided on the development, regulation and self-regulation of tourism in Antarctica.

Section three presents the theoretical framework used in the analysis of section four. In section five the main results of the analysis will be discussed. Section six outlines the conceptual model that will be developed and in section seven the main conclusions coming from this analysis are drawn.

2. Development and regulation of tourism in Antarctica

2.1 Tourism development

The last two decades have seen a rapid development of tourism in Antarctica (see Figure 1), with increasing visitor numbers, and a diversifying supply of transport modes and activities. Traditional ship-based expedition cruises (smaller ships, making landings) are now complemented with cruise-only itineraries (larger ships, just sailing by), fly-sail operations (using airlinks in conjunction with smaller vessels), land based tourism itineraries (using established airlinks), over-flights, as well as adventurous activities, including kayaking, scuba diving and mountain climbing (Stonehouse and Crosbie 1995; Bastmeijer and Roura 2004).

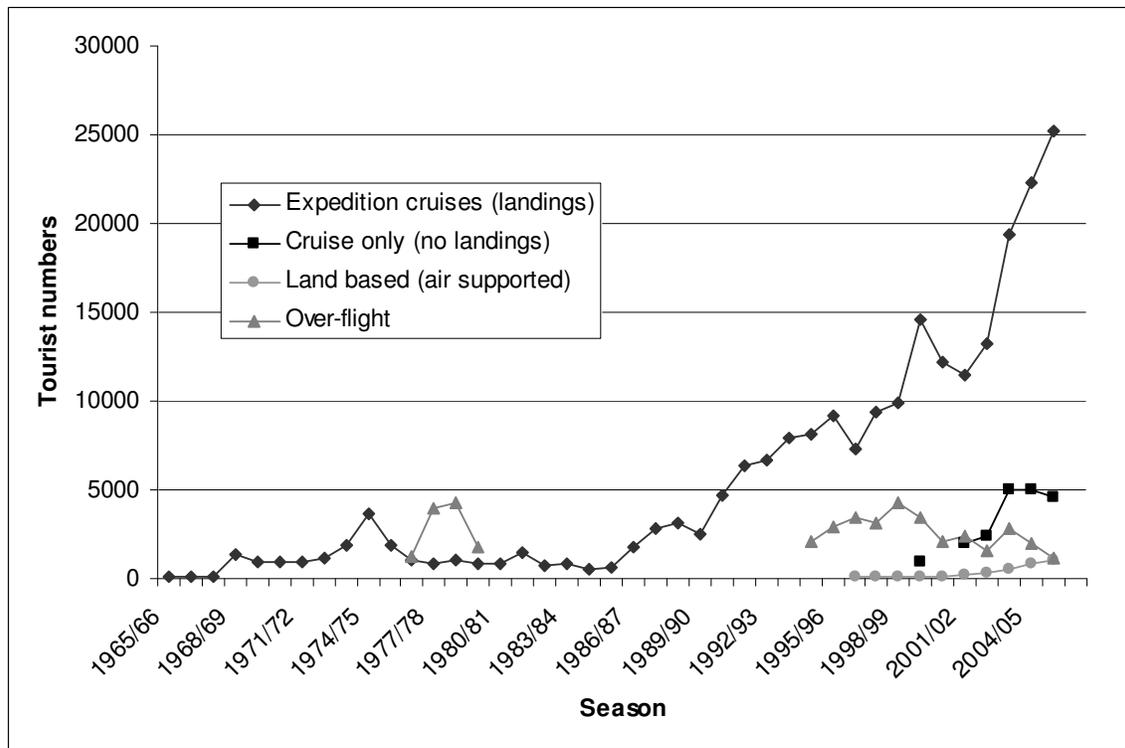


Figure 1: Tourist numbers visiting Antarctica 1965-2006 (Enzenbacher 1993; Headland 1994; 2005; IAATO 2005; 2006a)

During the 1990s, the fleet of small passenger ships (< 50 and 51-110 passenger categories) was expanded significantly with Russian vessels capable of operating in polar waters that had become redundant following the collapse of the Soviet Union (Stonehouse 1994; Cessford 1997). In more recent years, the segment of larger cruise

ship tourism records the greatest growth rates, with the numbers of small ships catering for the expedition cruise tourism stabilising.

Antarctica is a special tourist destination in many respects. To begin with, it is a remote continental landmass that is surrounded by the Southern Ocean, and therefore a long haul destination by definition (Amelung and Lamers 2006). Adding to the remoteness of the area are the treacherous weather conditions and the presence of sea-ice large parts of the year, which limit the accessibility of Antarctica for tourism. As a result, access to a region as remote as Antarctica is almost entirely controlled by professional transporters. A handful of tourists travel to Antarctica by aircraft, but the largest share of tourists visits the Antarctic Peninsula region on ship-based itineraries starting from cities in Southern Argentina and Chile. Within the Antarctic Peninsula region tourism activities are concentrated around a limited number of sites where tourists can be landed and wildlife populations and research stations can be visited. Climatic conditions limit the access to the region to approximately four to five months of the year. The spatial and temporal concentration of Antarctic tourism activities largely coincide with the activities of other users, most importantly scientific research programmes and the breeding season of wildlife species. The harsh conditions in the Antarctic region also call for extensive preparation, including the acquisition of proper insurance, permits, clothing, logistics, and experienced staff (Stonehouse 1994; Cessford 1997; Mason and Legg 1999). Any omission in planning, and any physical inability, sudden changes in weather, sea-ice conditions or icebergs can cause disaster and jeopardise the whole expedition, along with the operations of other parties in the area.

2.2 Regulation

No sovereign government is in place for Antarctica. The continent is governed by the Antarctic Treaty with additional Conventions, Protocols and Measures, jointly referred to as the Antarctic Treaty System (ATS). The 28 Antarctic Treaty Consultative Parties (ATCPs) meet annually to make agreements, for which consensus is required. Tourism is regulated by the 1991 Madrid Protocol, which has made the performance of environmental impact assessments a prerequisite for the organisation of any Antarctic activity originating from ATCP nations. In recent years, a number of voluntary and binding measures were added to the ATS on issues such as codes of conduct, pre-trip and post-trip trip notification, information exchange between ATCPs, compulsory insurance, contingency planning, and site-specific guidelines (ATS 2005; Molenaar 2005).

In spite of the introduction of these measures, Antarctic tourism regulation by the ATS has been considered weak. The decision making and implementation process is arguably too slow to deal with the dynamic tourist industry (Bastmeijer and Roura 2004). Many regulations specifically applying to Antarctic tourism are not legally binding. Those that are binding are implemented into the ATCPs domestic legislations, leaving much room for national translation and interpretation (Kriwoken and Rootes 2000; Bastmeijer 2003). In addition, the rules can hardly be policed and enforced in the field (Tracey 2001; Molenaar 2005), and they do not apply to operators from Third Party states, i.e. non-signatories to the Antarctic Treaty. For a more in-depth treatise of the legal and jurisdictional peculiarities, the reader is referred to Bastmeijer (2003), Bastmeijer and Roura (2004), Hemmings and Roura (2003), Molenaar (2005), and Richardson (2000).

2.3 Self-regulation

The remote location and extreme conditions, the growth of tourism activities, the temporal and spatial concentration of activities, the activities of other users in the region, the fragility of ecosystems, issues of human safety and the absence of a strong regulatory regime point at a range of uncertainties involved in tourism development and the potential impacts. Therefore, tour operators have an incentive to organise themselves, coordinate travelling schedules, and institutionalise best-practice guidelines that are subsequently enforced on its members (Spletstoesser 2000; United Kingdom 2004). Through the establishment of the International Association of Antarctica Tour Operators (IAATO) many of the emerging problems related to tourism have been successfully solved.

IAATO was founded by seven tour operators¹ in 1991 in order to guarantee and promote safe, environmentally sound and responsible travel to Antarctica (Spletstoesser 2000). A further, rarely cited reason for the establishment of IAATO in the early 1990s was the friendly coercion by the National Science Foundation to US-based tour operators to get organised and take a united stance (pers. Comm., 07², 2006). Over the years, IAATO has grown to a total of 82 members from a wide range of countries, although most of the tour operators are based in affluent Western countries in Europe and North America (IAATO 2006b).

IAATO members are grouped in four different membership types (full members, associate members, provisional members and probational members) and can further be distinguished by their primary activities in the Antarctic and the size of the operation in terms of passenger numbers. Table 1 provides a comprehensive overview of membership types and categories.

Self-regulation and self-organisation within IAATO works on two levels – on an administrative and policy-level and on a operational level. The administrative and policy-level incorporates, for instance, annual general meetings, work in standing committees to prepare and facilitate decision-making processes, and administrative and representative tasks which are primarily dealt with through the IAATO secretariat. The operational level relates to the application of ethos to practice. In the field, daily communication among vessels to schedule and coordinate their activities is of utmost importance (pers. comm., 06, 2006). Moreover, the field level comprises the practices of tourist management through briefings, reiteration of importance of environmentally sound behaviour, debriefings, and a high guide-passenger ratio (1:20). Generally, IAATO members are required to apply the stringent guidance for visitors and tour operators in the Antarctic.

Focus	Provisional	Full	Associate	Total
Ship-based <200 pax	7	26	11	44

¹ When we speak of Antarctica tour operators we refer to organisers of tourism to the Antarctic with a commercial interest (i.e. private, non-commercial expeditions are excluded).

² One of the authors conducted interviews with a range of Antarctic tourism stakeholders, some of which are used to support our argument in this paper. However, as these interviews do not represent the centre piece of this paper, we will not elaborate in detail upon the interview methodology. Please refer to Haase Haase, et al. (in Press). for a more detailed account of the interview methodology. In accordance with Human Ethics regulations of the University of Canterbury and in order to maintain the confidentiality of the data, the identity of the interviewees will be protected and a coding system has been applied. Consequently, in the following, only the codings will be provided in the citations.

Ship-based 200-500 pax	2	4	0	6
Ship-based >500 pax	0	3	0	3
Land-based tourism	1	1	0	2
Air/cruise	0	1	0	1
Overflights	0	0	1	1
Support (travel agents)	0	0	11	11
Support (logistics, e.g. port agents)	0	0	6	6
Support (promoting tourism)	0	0	3	3
Other support (education, conservation, expedition planning)	0	0	5	5
Total	10	35	37	82

Table 1: Number of IAATO members in terms of membership types and membership categories (2006).

The self-regulatory system operates through guidelines which have been developed from best practices and involve peer pressure to maintain the highest level of compliance (pers. comm., O4, 2006). These guidelines or codes of conduct aim at “guiding” behaviour by providing instructions or advice as well as the reasoning behind these instructions (Mason and Legg 1999). The resulting operational rules are institutionalised in the by-laws of the association. To give the reader an impression a selection of the rules applied by IAATO are provided in Textbox 1. Detailed accounts of the rules and guidelines are given elsewhere and will not be recounted in detail at this place³ (Spletstoeser and Folks 1994).

- Operations take place within the parameters of the Antarctic Treaty System, including the Antarctic Treaty and the Protocol on Environmental Protection to the Antarctic Treaty, along with IMO Conventions and similar international and national laws and agreements.
- Members of IAATO subscribe to the principle that their planned activities will have no more than a minor or transitory impact on the Antarctic environment.
- To foster continued cooperation among its members; to monitor IAATO programs, including the pattern and frequency of visits to specific sites within the Antarctic; and to coordinate itineraries so that no more than 100 passengers are ashore at any one time in any one place.
- To ensure that the best qualified staff and field personnel are employed by IAATO members through continued training and education; and to encourage and develop international acceptance of evaluation, certification and accreditation programs for Antarctic personnel. IAATO expects its members to hire a staff team comprised of individuals with at least 75% previous Antarctic experience.
- Cruise ships carrying more than 500 passengers are not permitted to make any landings.

Textbox 1: Selection of IAATO rules found in the IAATO bylaws (based on IAATO 2006b)

³ For further reference, the IAATO website (www.iaato.org) provides a comprehensive overview of the bylaws and guidelines.

An important aspect of IAATO's general policies, which we will refer to in more depth in one of the following sections, is the coordination of the activities of tour operators in accordance with the "one ship, one place, one moment" principle (IAATO 2006b). A web-based ship scheduler is utilised to coordinate the itineraries of individual operators in such a way that interferences and the visible lining up of vessels at landing sites are avoided. Tour operators are required to enter their schedules online, and under consideration of site-specific aspects such as the environmental sensitivity and the aforementioned principle, landing sites are allotted on a first-come, first-serve basis. The ship scheduler also takes non-members into consideration, which will be of importance for the discussion of potential free riding options.

Aside from providing guidance regarding the practice of tourism in the Antarctic, IAATO plays an important role representing its members and their interests at international meetings and conventions (Bastmeijer and Roura 2004). Most importantly, IAATO attempts to pro-actively influence decision-making processes and pre-empt tourism regulation through the Antarctic Treaty Consultative Parties. This kind of strategic planning allows IAATO to be one step ahead and prevent more restrictive policies through the ATS being implemented (Richardson 2000).

3. *Collective action in common pool resources*

Common pool resources (CPR) are natural or man made resources characterized by high levels of subtractability and non-excludability, meaning that every unit consumed by one individual is subtracted from the resource system, while it is very difficult to exclude other users. CPR differ from private and public resources in that for the first, the subtractability is also very high while it is very easy to exclude others, and for the latter, subtractability and excludability are both very low (Ostrom 2006). When CPR are valuable and no institutional restrictions are in place, individual users have an incentive to appropriate more and more, leading to cumulative effects such as congestion, overuse, and sometimes eventually to the destruction of the resource. When a group of individual users does decide to collectively restrict themselves, and share the benefits of the resource, others might free-ride on the benefits provided by the collective action of others (Ostrom 2006).

The publication of *The Logic of Collective Action* by Mancur Olson (1965) provided a basis for academic work on the preconditions of humans to take collective action, including public goods. Olson claimed that no self-interested person would contribute to a public good, unless the number of individuals participating is small and there is coercion or some other incentive to make individuals act in their common interest (Olson 1965). This argument, also known as the "zero-contribution thesis" was adopted in the *Tragedy of the Commons* theory developed shortly afterwards (Hardin 1968). In similar fashion Hardin argues that individuals cannot overcome collective action problems and need to have externally enforced rules to achieve their own long-term self-interest. As a solution for the tragedy Hardin argues for either the development of private property or public resource management by the state.

Building on the work of Olson (1965) and Hardin (1968), Ostrom (1990, 2005) has challenged the zero-contribution thesis analyzing numerous everyday life examples

where individuals voluntarily organize themselves and effectively manage the resource for a long time. Ostrom's theory is not so much opposing the work of theorists like Olson but enriching the set of variables that contribute to the success or failure of collective action. In several of her works, a revised theory of collective action is presented by means of a set of design principles that are important for enduring and robust institutions. These design principles have been applied widely as an analytical tool in institutional case studies and experimental settings all around the world and have seen slight modifications ever since their first publication. Moreover, these principles have been used numerous times in regime analysis for different resources and are believed to be generic enough to justify their application to the analysis of all kinds of common pool resources (Ostrom 2005). Textbox 2 provides an overview of the design principles and summarises its contents.

- 1. Clearly defined boundaries**
The boundaries of the resource system and the individuals or households with rights to harvest resource units are clearly defined.
- 2. Proportional equivalence between benefits and costs**
Rules specifying the amount of resource products that a user is allocated re related to local conditions and to rules requiring labor, materials, and/or money inputs.
- 3. Collective-choice arrangements**
Many of the individuals affected by harvesting and protection rules are included in the group who can modify these rules.
- 4. Monitoring**
Monitors, who actively audit biophysical conditions and user behavior, are at least partially accountable to the users and/or are the users themselves.
- 5. Graduated sanctions**
Users who violate rules-in-use are likely to receive graduated sanctions (depending on the seriousness and context of the offense) from other users, from officials accountable to these users, or from both.
- 6. Conflict-resolution mechanisms**
Users and their officials have rapid access to low-cost, local arenas to resolve conflict among users o between users and officials.
- 7. Minimal recognition of rights to organize**
The rights of users to devise their own institutions are not challenged by external governmental authorities, and users have long-term tenure rights to the resource.
- 8. Nestled enterprises (for resources that are parts of larger systems)**
Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises.

Textbox 2: The design principles for robust common pool regimes (Ostrom 2005)

We make use of the design principles for robust institutions that appeared in a recent publication by Ostrom (2005) on this topic. Since Hardin's options of private and public resource management are both not feasible in the current Antarctic governance setting, the collective action exercised by the Antarctic tourism industry is one of the only options we have. By applying Ostrom's (2005) design principles for robust institutions we will

analyse and discuss the Antarctic tourism self-regulatory regime using different parameters.

4. *Analysing the IAATO case with the theoretical framework*

4.1 Introduction

Although Ostrom's theory is based on extensive empirical cases of small-scale collective action initiatives as well as experimental evidence from laboratory settings, it has already proven to be meaningful in the context of global and international commons, like Antarctica (Buck 1998). Buck (1998) has applied the design principles to the institutional setting of the Antarctic Treaty System and argues that the ATS has managed to stay successful over the past decades because all levels of institutional choice are given full legitimacy by both the Treaty Parties, as well as external actors. Further, the boundaries of the resource domain are well-defined (e.g. the area below 60° S.L.), and the user group can be clearly differentiated. There is no dispute on the way that countries and organizations may participate in decision-making processes, and so far the actual users (e.g. predominantly the science communities) are recognized both internally and internationally. The extreme physical conditions in Antarctica have contributed to the success of the regime, as other users are discouraged by the physical limitations. Communities who do participate have generally been self-regulated and well-disciplined, making sanctioning an issue of lesser importance. But Antarctica itself is a complex resource system. The overall system encompasses many and varied resource units such as fisheries, minerals, fresh water in the form of ice, flora and fauna, wind energy, or space, just to name a few, along with a wide range of resource users. The stability of the ATS could be threatened by the increase of user groups that operate outside of the regulatory system.

Our study does not focus on the resource domain of the entire Antarctic Treaty System but rather on the collective action exercised by the tourism industry. With the rapid growth of tourism the boundaries of the resource domain and the user group may become blurry. Will the current self-regulatory regime be capable to cope with increasing numbers of tour operators, with increasing diversity of activities and interests? Buck's point about self-regulation and well-disciplined behavior of actors in Antarctica certainly applies to the largest share of tour operators that are active in the Antarctic. However, logistical innovations in the Antarctic and extensive media coverage may be opening up the region for different types of tourism operations. Whether qualities, such as self-regulation and self-discipline, will also apply to these new users remains to be seen. In the next section these questions will be answered using Ostrom's (2005) design principles.

4.2 Well-defined boundaries

Since Antarctic tourism is largely equated with a wilderness experience (Cessford 1997; Davis 1999; Maher, Steel et al. 2001), the main resource utilised by tour operators is space. In order to protect space or the right to use space for their members, IAATO advocates the "one ship, one place, one moment" principle. This principle demands that tour operators are to coordinate their itineraries in such a way that especially when

landing they do not enter other vessels' lines of sight. So far, the size of the Antarctic tourism sector and the numbers of vessels visiting the Antarctic still allow for that. In fact, according to one tour operator only about 40% of the landing slots available for tour operators on Deception Island (one of the more popular landing sites) for instance were utilised in the 2005/2006 season (pers. comm., O11, 2007). However, a pertinent question remains – what will happen if space relative to the number of vessels active in the Antarctic becomes scarce? The current trends of rapidly increasing visitor numbers (Bastmeijer 2003; Hemmings 2004; Molenaar 2005) as detailed in Figure 1 indicate that such a scenario may not be totally inconceivable. From an ethical viewpoint we can ask the question whether “filling the slots” is in line with the designation of the Antarctic as a global wilderness, as is done in the Madrid Protocol.

The physical boundaries of the Antarctic resource system are generally well accepted, despite slight variations in the clear delineation of the boundaries due to the sheer complexity and vastness of the geographical area. These variations, which largely originate in the different definitions of the Antarctic continent in the geophysical, biological or geopolitical sense, are meaningless for our discussion as the Antarctic is represented by a strong natural boundary, its geophysical isolation, which needs to be overcome in order to benefit from its resource pool. Consequently, it can be argued that only those willing to incur the costs and dealing with the risks of going to Antarctica will be able to access its resources. Coupled with these natural thresholds to accessing Antarctic resources, it is sensible to apply the previously mentioned legal and geopolitical boundary of 60° S.L. to our discussion of Antarctic tourism self-regulation. Although the provisions of the Antarctic Treaty System do not apply to tour operators from non-signatory states, the majority of operators are based in signatory nations and are hence regulated by the Treaty.

Ostrom (2005) stresses that clearly defining the boundaries of groups of users in order to be able to deal with free-riding is as important as defining the boundaries of the resource system itself. With respect to the Antarctic tourism case, the clear delineation of user groups and the excludability of non-members prove to be very tricky for a number of reasons. First of all, two main resource governance regimes with different levels of decision-making power coexist for Antarctic tourism. The Antarctic Treaty System assumes responsibility for the governance of all aspects of human activities in the area south of 60° S.L., and IAATO focuses on self-governing the activities of Antarctic tourism operators. Both regimes are applicable to members or, in the case of the Antarctic Treaty, signatory states only, which allows non-members to freely use the Antarctic resource pool without legal hindrance (Molenaar 2005). This non-excludability of non-members constitutes a great legal and political challenge which might even gain in significance once technological advancement results in a diminishing importance of the natural barriers as a ‘gatekeeper’ to the Antarctic.

In the case of IAATO, tour operators that are not members cannot be hindered to go to Antarctica (Molenaar 2005) and use the resource pool in the same way as IAATO members can. This may open the door to free-riders, who are inclined to benefit from IAATO's activities in terms of, for instance, vessel scheduling, which will be explained in greater detail at a later stage in our paper. The user groups that have organised themselves under IAATO cannot easily defend themselves against growing numbers of outsiders, which may considerably decrease the robustness of the self-regulatory regime.

We have seen that the definition of boundaries is still a problematic issue, particularly in view of membership and excludability. Whereas, the legal and political boundaries are well-defined and applicable to Antarctic tourism, the demarcation of user groups organised under the self-regulatory regime is difficult. Principles of non-excludability pertain and could potentially severely damage the regime in the future. Moreover, as we discussed, looking at Antarctica as a single resource unit is problematic. It is far too diverse, complex and large to allow meaningful resource management. Therefore, it might be useful to create boundaries for smaller manageable resource units (e.g. individual landing sites) in order to facilitate an improved governance of the system. This idea of zoning is currently exploited in the development of site-specific guidelines.

4.3 Proportional equivalence between benefits and costs

Ostrom (2005) argued that it is important to design fair rules of distribution of costs and benefits for appropriators of the resource system in question. For the IAATO case, an analysis of the fairness of distribution requires a closer look at the costs of membership as well as the benefits derived from it.

The main direct costs incurred by IAATO members are represented by the membership fee, a fixed amount per passenger (pers. comm. O10 and O11, 2007). Consequently, operators with larger vessels pay a proportionally greater amount of money than small-ship or land-based operators while the latter category benefits more because of the landings made. In order to be accepted as a member an IAATO observer will travel with the provisional tour operator to check all the requirements. The costs have to be covered by the tour operator. Other indirect costs of membership include the time that has to be set aside for the annual general meetings and for committee work, both of which depend on the degree of involvement of the respective operators in the decision-making processes. Additional time has to be reserved for administrative work in conjunction with the IAATO membership. Examples include regular communication with the executive committee, developing detailed itineraries for activities in the upcoming season and providing these itineraries to IAATO and other members by means of the web-based ship scheduler, or thoroughly reporting back on last season's activities and experienced or observed difficulties (pers. comm.. O2, O3 and O4, 2006). Finally, costs could also refer to constraints in resource use, which is imposed by IAATO guidelines through the "one ship, one place, one moment" principle (IAATO 2006b). This principle regulates ship-borne tourism by demanding that vessels have to schedule their itineraries and particularly landings in such a way that they avoid crossing pathways, interfering with each other's landings or visibly lining up at landing sites thus 'visually polluting the scenery' for the tourists.

The "one ship, one place, one moment" principle constitutes not only an indirect cost, but also a clear benefit for the tour operators as the illusion of loneliness and wildness is maintained and the wilderness experience is safeguarded for the tourists. On the practical side the pressure on landing sites may be reduced if time and itinerary constraints are enacted such that actual time spent ashore and the overall numbers of vessels landing are limited.

Further benefits of an IAATO membership include immeasurable benefits such as a better reputation for members as IAATO is acknowledged as an association that promotes and practices environmentally sound tourism to the Antarctic (Spletstoeser 2000). Representation of the interests of tour operators at international meetings, and in particular at the annual Antarctic Treaty Consultative Meetings, where IAATO can provide its expertise and influence decision-making (Herr 1996; Murray and Jabour 2004), constitute important benefits for member companies as well. In addition, IAATO members benefit from sharing information, jointly filing permits and EIAs in some Antarctic Treaty countries, greater transparency within the Antarctic tourism sector, and the preference that some Treaty Parties give to IAATO tour operators for station visits and even landings on national territory (e.g. British stations and sub-Antarctic Islands only accept visits by IAATO members) (United Kingdom 2004).

Membership numbers, which consistently increased over the years from seven founding members in 1991 to 82 members in 2006 (IAATO 2006b) are an indication that most tour operators perceive the benefits of being a member of IAATO as outweighing the costs. This being said, free riding continues to present a challenge, particularly as IAATO tries to include non-members in their ship scheduling system, such that non-members benefit from the same high-quality resource use without visual disturbance by other vessels as IAATO members. Two US-based large-vessel operators⁴, Orient Lines and Discovery World Cruises, organise Antarctic cruises outside the IAATO framework. Both companies operate vessels with a capacity of slightly more than 500 passengers and would hence fall outside IAATO's category of ship-borne tourism with landings⁵. Yet, they do include landings in their itineraries. Aside from that they largely operate in accordance with IAATO's general principles and policies and have experienced expedition leaders (pers. comm.. O12, 2006). Moreover, as Orient Lines already has a representative attending IAATO meetings, IAATO members are convinced that before long, this company will join IAATO (pers. comm.. O2 and O3, 2006; O10, 2007). Apart from these two large-vessel operators, the non-IAATO Antarctic tourism sector is dominated by a number of small yachts, numerous small organizers of Polar expeditions from various countries that do not always advertise their trips on the internet and hence are difficult to keep track of.

As it has been shown, the delineation between members and non-members is thin in the way that non-members cannot be excluded from enjoying the utilisation of the same resource and even from benefiting from the organisational and operational procedures within the IAATO framework. Nevertheless, the membership body is constantly growing, which shows that other factors that go beyond a mere cost-benefit analysis come into play. There seems to be a considerable dedication to environmentally sound tourism in the Antarctic as interviews conducted by one of the authors have shown (Haase, Storey et al. in press). A love for the Antarctic that many of the current operators express (Haase, Storey et al. in press) and the wish to keep the environmental standards up (Richardson 2000) seems to propel them towards institutionalised cooperation and coordination. Another reason might be the option of being allowed to use the IAATO logo, and sail on its image of excellent environmental management. Increasing numbers

⁴ These operators provided altogether 23 voyages to the Antarctic Peninsula region (MV Discovery: 17 trips; Marco Polo: 6 trips) during the 2006/7 season.

⁵ In 2004/5, IAATO non-member Oceania Cruises operated a large vessel (669 pax.), the *Isignia*, on a single cruise to the Antarctic (Molenaar, E. J. (2005). "Sea-Borne Tourism in Antarctica: Avenues for Further Intergovernmental Regulation." *International Journal for Marine and Coastal Law* 20(2): 247-295.

of IAATO members also indicate the weight that the non-monetary benefits of being organised under the umbrella of IAATO entail – aside from also highlighting the rapid growth experienced by the Antarctic tourism sector over the last two decades (Enzenbacher 1992; Bastmeijer 2003; Stewart, Draper et al. 2005). Despite the potential for free-riding, an analysis of the costs and benefits of IAATO membership clearly tips the scale towards the benefits, which *ceteris paribus* promises a long-surviving institution.

4.4 Collective-choice arrangements

Decision-making within IAATO is facilitated through committee work, which largely depends on individual involvement and initiative (pers. comm., O2, 2006), and is finalised during the annual general meetings. The latter allow each member company, irrespective of its size or the numbers of passengers it takes to Antarctica each season, to vote for proposed guidelines, rules or recommendations.

The development of rules and recommendations is achieved through participatory methods, which involve all members to the degree they want to be involved. The path IAATO follows is determined by the members and their involvement in committee work. According to Ostrom (2005), employing the principle of participatory decision-making, enables resource regimes to better shape their rules and regulations in accordance with practical realities and the collective needs and interests of the users of the resource system. IAATO as a system is founded on the principles of participatory decision-making, which fully meets Ostrom's theoretical requirements regarding collective-choice arrangements.

Practically speaking IAATO has managed to develop a broad set of rules and guidelines with an ever growing representativeness among Antarctic tour operators. Their adaptive capacity has been proven in various examples. As a result of growing numbers of larger tourist vessels (i.e. carrying more than 400 passengers) with the desire to conduct landings, in recent years the by-laws were adjusted with the ships size limit for landing being set at 500 passengers (IAATO 2002). Although such adaptations have been criticised for being a relaxation of the operational standards, it is an indication of the adaptive capacity of IAATO to respond to changing conditions and structure of the tourism industry.

4.5 Monitoring

As Ostrom (2005) maintains, “few long-surviving resource regimes rely primarily on internal levels of trust and reciprocity among appropriators to keep rule breaking levels down.” Monitoring in order to enable effective rule enforcement represents an important aspect of institutional robustness but also constitutes a challenge for any self-regulatory regime. One can imagine that monitoring in a region as remote as Antarctica poses particular challenges.

IAATO could be regarded as having a two-tiered system of monitoring. On a continuous and internal level, members monitor members as much as they watch out for each other (Haase, Storey et al. in press). Any infringements or problems are reported to the executive committee and subsequently to the other members and appropriate actions

are decided on, which we will discuss in greater detail in the next section. A second tier is added by the extraordinary and exogenous monitoring that is required for probationary and provisional members who want to become full members. IAATO utilises an observer scheme for these cases and appoints an official observer, typically an IAATO outsider and Antarctic tourism expert, to join an expedition by the respective member and prepare a report for the executive committee and the membership body. This report is then used to decide on whether full membership will be granted to the applicant during the annual general meetings.

From an institutional perspective, this two-tiered monitoring system works well as various IAATO members attested (Haase, Storey et al. in press). In the case of IAATO, a strong, common interest by the tour operators to maintain the pristine Antarctic environment in order to guarantee their customers a true wilderness experience seems to powerfully supplement the more official monitoring procedures. As long as IAATO members describe the internal monitoring process as 'looking out for each other' (pers. comm., O4, 2006) rather than a necessary evil, it seems to be a stabilising factor which aids institutional robustness.

4.6 Graduated sanctions

In Ostrom's (2005) view, graduated sanctions are effective tools to achieve 'quasi-voluntary' cooperation (Levy, 1988 as cited in Ostrom, 2005: 267) in self-organised systems. At the first glance IAATO does not seem to employ a system of graduated sanctions, apart from probation. Any member can be put on probation, if not complying with the bylaws, which implies that environmental infractions as well as for not fulfilling the financial duties of paying membership fees can result in probation (IAATO 2006b), pers. comm. O10, 2007).

This may seem to be a harsh sanction for some cases, but on the other hand, so far the probationary rule did not have to be used often (pers. comm., O10, 2007). Every member of IAATO attempts to maintain a member in good standing and wants to adhere to the rules that have collectively been decided on (Haase, Storey et al. in press); pers. comm., O10, 2007).

As part of this intrinsic motivation to maintain a good reputation within the member body of IAATO, a whole new dimension is added to the sanctioning system. As we discussed in the previous section, members monitor members and report infractions to the executive committee and the other members. In a self-regulating system such as IAATO that relies on strong cooperation, reciprocity, intrinsic motivation and common interest, being reported back as a 'bad neighbour' could be viewed as a relatively rigorous punishment for that member already (pers. comm., O4, 2006). Therefore, negative reporting could already be considered a sanction in its own right and, alongside the probationary rule, might result in a system of subtly and indirectly graduated sanctions.

According to Ostrom (2005),

"Over time, further adherence to share norms evolves and high levels of cooperation are achieved without the need to engage in extensive monitoring and the composition of costly sanctions in all cases of observed infractions in order to achieve rule conformance."

IAATO can be viewed as a model for cooperation and has over time solidified and extended shared norms and visions, which allow for a less extensive monitoring and sanctioning system. The latter can be viewed as another example that fortifies Ostrom's (2005) theory.

4.7 Conflict-resolution mechanisms

The resolution of conflicts among IAATO members is generally dealt with through internal mechanisms. Here, personal communication, peer pressure and the aforementioned dedication to maintain the reputation of a member in good standing aids the resolution of conflict, if not decreases the likelihood of having conflicts arise in the first place. In fact, mutual cooperation, effective communication and a constant effort to uphold a good relationship among all members has been mentioned by tour operators to be important factors for the success of IAATO (Haase, Storey et al. in press).

Despite the lack of external conflict-resolution mechanisms, the system seems to work well, not the least because of the fact that the rules of engagement have been designed in a cooperative effort and, if necessary, are revised and updated through committee work and at annual general meetings.

However, the interaction with external users and official authorities is not organised very well. Arenas to resolve conflict are largely absent due to the geopolitical peculiarities of the Antarctic Treaty System. Conflicts with Antarctic Treaty Parties may be addressed at the annual Antarctic Treaty Consultative Meetings, but doing so is unlikely to result in any radical changes as influence and decision-making power ultimately rest with the Antarctic Treaty Parties.

4.8 Minimal recognition of rights to organise

Ostrom (2005) quotes an observation by Johnson and Libecap (1982 as cited in Ostrom, (2005):

“When external governmental officials presume that only they can make authoritative rules, then it is difficult, but not impossible, for local users to sustain a self-organized regime.”

In the Antarctic tourism context, we virtually move onto thin ice in this respect as the lack of undisputed sovereignty (Polk 1998) pre-empts a strong, unilateral and comprehensive governance regime. An international treaty, the Antarctic Treaty System, which is operationalised through annual Antarctic Treaty Consultative meetings, assumes responsibility for governing the area south of 60° S.L. (Joyner 1994). Antarctic tourism activities fall under the auspices of the Antarctic Treaty System and the Antarctic Treaty Parties reserve the ultimate responsibility for regulating tourism in the Antarctic Treaty area. In fact, the Antarctic Treaty Parties aim at exclusivity regarding the governance over Antarctica, although at the moment they strongly rely on industry self-regulation for Antarctic tourism aspects (Molenaar 2005).

Despite the applicability of the Antarctic Treaty only to signatory nations, the Antarctic Treaty Parties would have the means to give legitimisation to the guidelines and rules

that IAATO establishes. However, Antarctic Treaty Parties recognise IAATO only in relative terms – they recognise the work IAATO does with respect to ensuring that guidelines set by the Treaty Parties are met (Richardson 2000), but do not provide them with any official power (Haase, Storey et al. in press). The lack of true recognition in terms of legitimate sanctioning powers has been lamented by some tour operators (Haase, Storey et al. in press); pers. comm., O8, 2006), and can be viewed as a destabilising factor. Moreover, the power imbalances and asymmetries between Antarctic Treaty Parties and IAATO may complicate cooperation and the exchange of information in the future.

4.9 Nested enterprises

Despite Antarctica being a complex, large-scale resource system, nested enterprises within the Antarctic tourism sector do not exist to the degree that one would assume they might. Overall, there is not one comprehensive, coordinated governance system, but rather separate independent entities responsible for managing specific aspects of human activities in Antarctica. In terms of tourism regulation, IAATO is currently the only self-organised system that assumes responsibility specifically for the regulation of Antarctic tourism.

Although various rules for certain Antarctic tourism activities exist outside the Antarctic Treaty System and IAATO, some argue that a comprehensive approach to governing Antarctic tourism is needed (Bastmeijer and Roura 2004; Molenaar 2005). Examples for outside regulation include, for instance, the International Maritime Organization that demands the fulfilment of certain safety and navigation requirements, which are applicable to all ship-based Antarctic tourism activities and as such have to be embraced by IAATO members and non-members that are active in ship-borne tourism (Molenaar 2005).

Whereas one might argue that we are dealing with a polycentric Antarctic tourism governance system in the sense Ostrom (2005) describes it, we maintain that despite polycentric aspects of the current regime in the literal sense, Ostrom's (2005) requirements for polycentric systems are not fulfilled. Ostrom's (2005) description of polycentric systems refers to such systems where citizens have a choice to organise resource governance through a multitude of authorities at various scales. Antarctic tourism operators face two main options: either they join IAATO or they choose to operate outside the IAATO framework. Obviously, the activities of all operators from Treaty nations fall under the auspices of the Antarctic Treaty System and have to be in accordance with the respective regulations. However, the individual tour operators do not have any direct influence as to how the Antarctic resource system is governed by the Treaty Parties. Only as a community and indirectly, through IAATO, can they voice their opinions. This situation is neither consistent with Ostrom's (2005) approach to polycentric systems nor her description of nested enterprises.

Remarkable enough during several stakeholder workshops organised by the authors in the Netherlands and New Zealand, tour operators voiced their concern with the lack of nested enterprises in Antarctica (Haase and Lamers 2006; Lamers and Amelung 2006). As a result in discussions many called for more recognition and regulation from the Antarctic Treaty Parties.

5. Trends in Antarctic tourism and their consequences for collective action: a discussion

The success of IAATO over the last 16 years is testified in its growth and increasing international influence. Institutionally IAATO has developed and evolved as well; for instance, an environmental officer has recently joined the executive committee, the existence and work of standing committees symbolise the growing complexity of the organisation, and amendments to rules and regulations as well as the development of new guidelines hint at an active learning and maturing governance system at the same time. Does evolution and success over the last 16 years represent institutional robustness?

This question is difficult to answer, but analysing the case of IAATO within Ostrom's design principles has shed some light on a range of issues. In section four we have seen that the strong characteristics of IAATO are primarily related to the proportional benefits that IAATO membership brings in managing their main common pool resource, wilderness space. Further, the administrative service, the positive reputation that IAATO has gained, and the collective decision making arrangements that are applied strongly add up to the benefits of IAATO membership. The weak points are mainly related to the non-excludability of other resource users, the enormous scale of their current resource pool and the uncertain position of the association within the Antarctic Treaty System. The observed lack of conflict-resolution mechanisms and nested enterprises is related to this last point but may also largely result from the limited scale of violations and conflicts that IAATO has experienced. Despite these weak points, so far, IAATO has been capable of accommodating the diverging interests of a growing list of tour operators in one institutional structure.

This does not guarantee that such violations and conflicts will not occur in the future. We can state that IAATO has managed to successfully self-organise and self-regulate every aspect of Antarctic tourism over which it exercises full control. There are however developmental factors that lay largely or partly outside of their control. In section two of this paper we have seen that tourism in Antarctica is currently growing both in size and diversity. At the same time in the Antarctic Treaty Consultative Parties vividly discuss the development of tourism regulation. According to Ostrom (2005) both internal and external changes can have consequences for the collective action. In the following paragraphs we will explore the potential consequence of a number of earlier observed trends.

External efforts of ATS policy making (or the lack of it) may affect the sensitive balance of internal collective choice arrangements. As we have seen in the previous section, IAATO self-regulatory is recognised by the ATS but to date its rules and guidelines are not backed up by legally binding measures. If ATS support in the form of binding policy will not be agreed upon, at some point IAATO is faced to use its collective choice capacity and adapt their bylaws and guidelines to emerging conditions. In practice such adaptations will hardly ever result in improvements, with regard to environmental standards. On the other hand, inconsiderate policy options from the ATS may have severe consequences for the individual balance of costs and benefits of tour operators to join a self-regulatory regime. Given the fact that collective action is the only option we have, well considered decisions have to be made.

The current development trend indicates that it is very likely that more tour operators will appear in the Antarctic in the coming years. Given the proportional benefits many of these new actors will apply for IAATO membership. More actors and new entrants will influence relationships built upon mutual trust, and will have consequences for decision making processes as it becomes more difficult to exercise what we currently experience as a very generous and open-channelled collective choice approach. In several publications Ostrom stresses the importance of face to face communication for reaching agreement at limited costs. The larger the group of participants, the more difficult it is to facilitate direct communication. As operational rules have been developed by the older generation of member companies, new entrants might not share the same norms and cause a transmission failure from one generation of tour operators to the next. As a result both new and old participants might then see the costs of a membership exceeding the benefits and decide to terminate their membership.

On the other hand new member companies might also have different interests from the ones upheld by the older generation of tour operators. The resulting a-symmetry of interests may increase the costs for reaching agreement and thereby negatively influence the collective choice arrangements. Having started as an association of predominantly expedition cruise operators, IAATO has recently seen increasing numbers of both small yacht operators and large cruise operators applying for membership. Both operator categories are very likely to have diverging interests, and will perceive the equivalence of benefits and costs in a different way. In the future we might further see an increase in the numbers of land based operators and fly-cruise operators. When these different membership categories do not sufficiently benefit from membership and see their interests looked after they might decide to establish their own association focusing on specific operator types or Antarctic regions.

Because of a lack of information or different interests some of the new entrants may decide not to become members in the first place. A growing pool of free-riders operating outside of the association, benefiting without sharing the burden of costs will influence the perception of the participants inside the system.

How individual tour operators make choices with regard to IAATO membership in the future proves to be an essential question. This question will be the focus in following steps of this research project. In the next section we will briefly outline our ideas for the development of a conceptual model.

6. *Towards a conceptual model*

Ostrom's (1990; 2000; 2005) rules and insights on collective action for managing common pool resources can be formalised into conceptual models and computer simulation models. Ostrom (1990) provides a conceptual model describing the main factors influencing an individual's decision to either support the existing management system or to support changes in this system (see Figure 2). The group's decision follows from an aggregation of the individuals' decisions. To apply this model to the behaviour of individual companies rather than individuals, the assumption has to be made that companies also behave like monolithic, rational actors. Given the small size of most tour

operators active in the Antarctic, this assumption does not seem to be overly problematic.

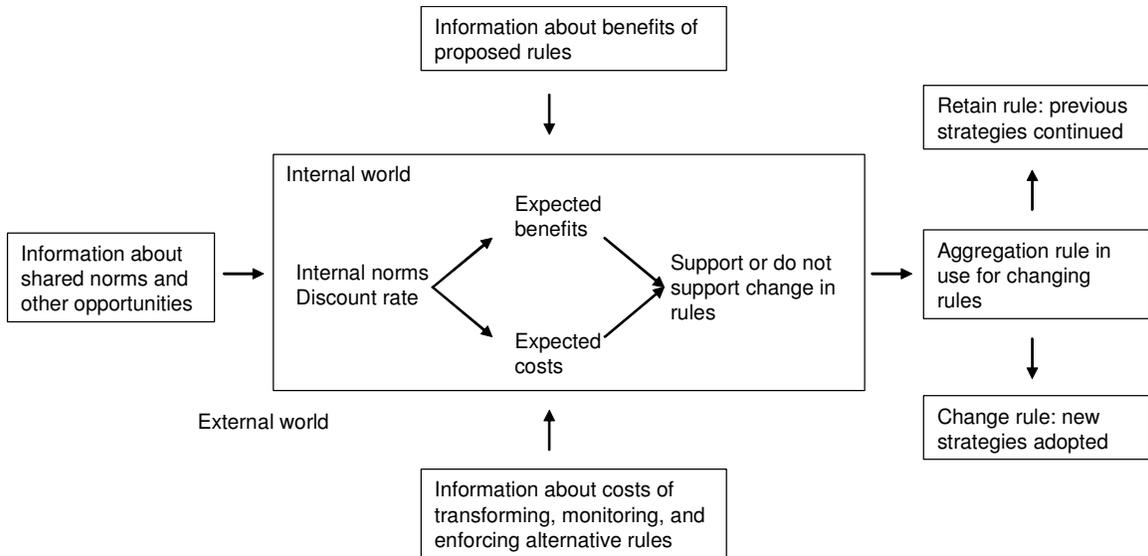


Figure 2: Conceptual model of institutional choice by individuals (adapted from Ostrom (1990))

In a later paper, Ostrom (1998) conceptualised the interactions between reputation, trust and reciprocity, which are crucial factors for the stability of systems for managing the commons (see Figure 3). Castillo and Saysel (2005) used this conceptual model as the basis for their behavioral model of collective action, based on system dynamics principles.

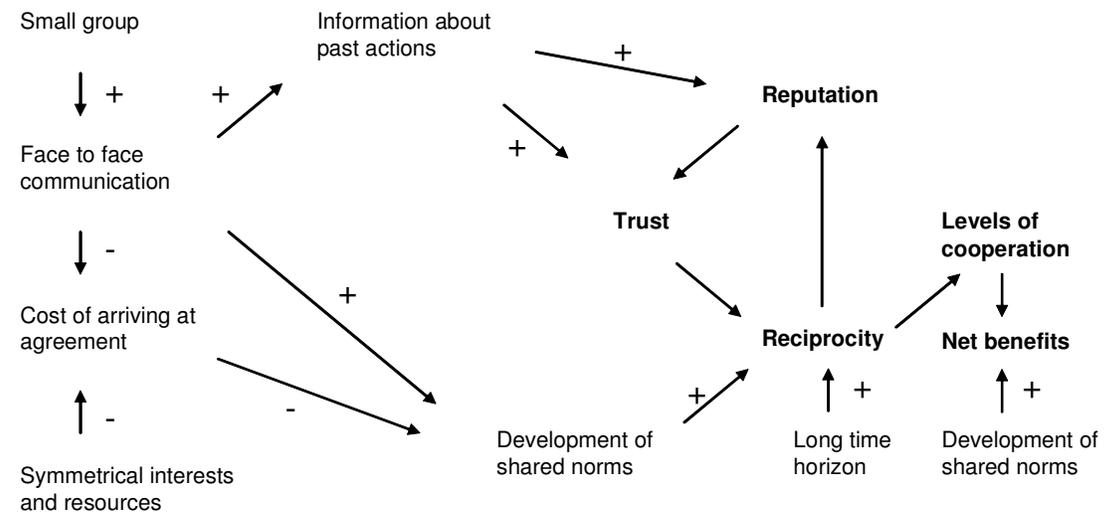


Figure 3: Structural variables affecting reputation, trust and reciprocity (Ostrom (1998))

These two models combined provide a solid framework for modeling the dynamics of IAATO. The first model can capture the core decision-making processes of individual IAATO members, for instance when deciding to join or leave the organisation, or to support a change of its rules. The second model captures the essence of the IAATO system at a meta-level, indicating the main feedback mechanisms and influential external factors. Castillo and Saisel (2005) have used Ostrom's conceptual framework as the basis for a behavioural system dynamics model for the management of common pool resources. For the IAATO case, we anticipate to use an agent based modeling paradigm, to emphasise our focus on behaviour and interaction between actors rather than the physical development of the common pool resource.

Different classes of actors will be modeled, including several classes of tour operators that will be based on the different membership categories of IAATO. *AnyLogic* will be used as the software platform for the modeling exercise as it explicitly supports the development of agent based models and provides a range of possibilities to integrate these models with Geographical Information Systems and system dynamics models. This latter feature will be used to combine agent behaviour with stocks and flows in the physical external world.

7. Conclusion

Tourism activities in Antarctica have seen a rapid development in the past two decades, both in terms of absolute growth and the diversity of transport types, activities and itineraries. At the same time we have seen that the governance regime set out for the Antarctic faces particular challenges, with regard to decision making, monitoring and enforcement. As a result tour operators have established a self-regulatory regime, called IAATO, in which collective choices are made for environmentally sensitive, safe and operationally sensible rules and guidelines. Self-regulation has proven to be very successful in terms of membership and provides the only option in the Antarctic for effective on-site tourism management and regulation.

In this paper we have seen that the success of IAATO can largely be explained by the design principles for robust institutions developed by Ostrom (2005). The analysis has shown that the benefits for membership currently outweigh the costs, especially with regard to the allocation of wilderness space and landing sites, the positive image and the administrative services of IAATO. Further, IAATO has managed to maintain an open structure with participatory collective decision making arrangements. Despite the current dominance of the benefits major challenges persist with regard to the enormous scale of the resource, the excludability of non-member tour operators, and the indefinite position of IAATO within the Antarctic Treaty System.

In the discussion we have seen that several of these internal and external factors may affect the future of Antarctic tourism self-regulation. The non-existence of a comprehensive ATS regulation regime or future ATS tourism regulations can have consequences for the current equilibrium within IAATO. Second, the growing numbers and diversity of tourists and tour operators will most likely influence individual tour operators decisions with regard to existing and potential membership. Since it is still largely difficult to say what the consequences of these internal and external factors will

be on individual choices of tour operators, an agent based model will be developed to start providing an answer to these remaining questions.

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