

# Governing International Spaces: Antarctica and Beyond

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## **INTRODUCTION**

The Antarctic Treaty System (ATS) is one of the most successful arrangements created during the twentieth century to address the need for governance at the international level and, therefore, to supply governance in a society that lacks a government in the sense of a supranational body endowed with the authority to make decisions binding on its individual members. This makes the ATS a subject of intense interest not only to those concerned with the fate of Antarctica itself but also to those interested in addressing a wide range of other issues generating a need for governance at the international level.

In this chapter, I take the case of the ATS as a point of departure for a broader assessment of issues relating to the governance of international spaces or, in other words, regions and resources that lie beyond the jurisdictional reach of individual states in international society. My argument proceeds as follows. The first substantive section deals with the nature of international spaces and provides some summary information concerning their location and extent. The next section discusses the legal and political status of international spaces and introduces emerging concepts in this realm, such as the “common heritage of humankind.” The sources of the need for governance regarding human activities taking place in international spaces or affecting international spaces are the focus of the following section. A discussion of the options for supplying governance for international spaces with particular reference to innovative approaches emerging as human uses of these spaces rise is the theme of the penultimate section. The concluding section provides a brief commentary on future directions in the governance of international spaces.

## **WHAT ARE INTERNATIONAL SPACES, AND HOW EXTENSIVE ARE THEY?**

International spaces are regions and resources that lie beyond the reach of the legal and political jurisdiction of the individual members of international society. Outer space and sizable segments of the world’s oceans belong to this category, at

least in part, by virtue of their remoteness and the limited capacity of states to exercise jurisdiction in these relatively remote regions. (Nevertheless, states can and do assert jurisdiction over their nationals operating in international spaces aboard ships, aircraft, spacecraft, and so forth.) But as these examples themselves suggest, international spaces are in large measure socially constructed. Technological advances can and often do increase the capacity of states to exercise authority in remote regions. States may assert jurisdictional claims in far away places (e.g., Antarctica), even in cases where their capacity to exercise authority is severely limited. The expansion of jurisdictional claims sometimes reflects the realities of economic and political influence more than any compelling rationale rooted in the requirements of sound management or sustainability. The emergence of coastal state jurisdiction over exclusive economic zones extending seaward 200 nautical miles from the coast, for example, owes much to such economic and political pressures. Shifts in prevailing attitudes and discourses constitute yet another force capable of generating changes in the scope of jurisdictional claims. The development during the latter decades of the twentieth century of the concept of the “common heritage of humankind,” for instance, has played a role in curbing some efforts to expand the jurisdictional claims of states at the expense of international spaces.

For the most part, we have construed the category of international spaces to encompass spatially delimited material entities like the oceans, outer space, and (with some reservations) Antarctica. Because these entities are essentially fixed, the category of what I will call traditional international spaces is finite. More recently, technological advances have opened up a range of resources that raise similar concerns about governance, though they are not material entities like Antarctica or the oceans. The category of what I will call “new” international spaces includes such entities as the electromagnetic spectrum, the stratospheric ozone layer, the Earth’s climate system, and, arguably, the Internet. As these examples suggest, new international spaces are more difficult to locate in spatial terms. It is likely that additional members of this category will emerge with the growth of knowledge and the development of new technologies over time. Yet these resources are sufficiently similar to traditional international spaces with regard to the issues of governance they raise to make it appropriate to include them in the discussion to follow.

The oceans cover about 70% of the Earth’s surface. Subtracting the exclusive economic zones, which collectively account for 10%–12% of the oceans and are now

subject to the jurisdiction of coastal states, leaves about 60% of the Earth’s surface as international space. Antarctica is a special case because most of the continent is subject to (sometimes overlapping) territorial claims articulated by seven states during the first half of the twentieth century. But the 1959 Antarctic Treaty established a regime under which the parties have managed the south polar region for all practical purposes as an international space over the last 50 years. The prospect of any change in the basic character of this arrangement occurring during the foreseeable future is remote. Since the Antarctic continent covers a little over 6% of the Earth’s surface, we can conclude that something like two-thirds of the surface of the Earth currently belongs to the category of international spaces. The areal extent of outer space is harder to determine because of ambiguities regarding both its inner and outer boundaries. States now exercise jurisdiction over the air space above their territories. But there is a lack of precision regarding where air space ends and (outer) space begins. Similarly, space has no clear outer boundary. Functionally, the outer boundary of space is determined by the capacity of humans to use space or to act in ways that affect space in such forms as altering the Earth’s climate system. Defined in this way, the outer boundary of space is subject to change over relatively short periods of time.

Thus, the extent of traditional international spaces is great. The issue of extent is more complex with regard to new international spaces. How can we characterize the Earth’s climate system, much less the Internet, in areal terms? Even the electromagnetic spectrum and the stratospheric ozone layer are dynamic, so that it is impossible to calculate their extent in a manner comparable to calculations of the extent of the oceans or Antarctica. Equally if not more important is the fact that the significance of the new international spaces is functional rather than spatial. So long as the stratospheric ozone layer inhibits the penetration of UVB radiation, its spatial characteristics are unimportant. Much the same is true of the Earth’s climate system whose significance lies in the regulation of radiative forcing rather than in any measure of its size or extent. As we move toward a growing concern with the governance of new international spaces, therefore, questions regarding the extent of international spaces are likely to become less prominent. This may have implications for efforts to draw lessons from experiences in governing traditional international spaces that are relevant to addressing issues of growing importance regarding the governance of new international spaces.

## WHAT IS THE LEGAL AND POLITICAL STATUS OF INTERNATIONAL SPACES?

International spaces are widely construed as belonging to the class of things known to international law and international politics as *res communis*, or common property. This ensures that they are not subject to the assertion of property rights or exclusive jurisdiction on the part of individual members of international society. But the doctrine of *res communis* has two major variants that differ sharply in their implications for governance. One variant asserts that the region or resource in question is open to entry (and exploitation) on the part of any member of international society acting on its own authority with no obligation to obtain the consent of the other members of this society. The other variant asserts that the members of international society have the authority as a group to promulgate and implement rules governing the use of international spaces on the part of individual members and perhaps even the authority to approve or reject specific plans on the part of members to use a region or resource. This variant may also allow members of international society, as the idea of the common heritage of humankind suggests, to lay claim to a share of any proceeds arising from uses of international spaces on the part of individual members.

It is easy to see that the two variants can and often will generate different outcomes when applied to specific situations. So long as the resources are plentiful and not subject to depletion or degradation as a result of the actions of individual users, the two variants may produce similar results. But the first variant of the doctrine of *res communis* can lead directly to situations exhibiting the characteristics of the tragedy of the commons as the demands of individual users of the resources grow. It is this realization that has led communities at other levels of social organization to adopt, formally or informally, a variety of rules applying to uses of common property and to develop the social and intellectual capital associated with the idea of governing the commons (Ostrom et al., 2002). Familiar as this perspective is at the local level, however, it is a development that some powerful actors have resisted at the international level. The views of many American policymakers and industrialists regarding access to the mineral resources of the deep seabed constitute a prominent example. Nevertheless, it is probably correct to say that we are witnessing today a marked shift in the form of the evolution of customary law toward acceptance of the second variant of the doctrine of *res*

*communis* with regard to issues involving the governance of international spaces.

Once we accept the proposition that there is a need for governance in guiding human uses of international spaces and observe that governance systems are, in fact, emerging for a variety of these spaces, the distinction between constitutive rules and operating rules comes into focus (Ostrom, 1990). Constitutive rules provide broad frameworks within which human activities occurring in or affecting a particular region or resource are permitted to go forward. Constitutions are familiar arrangements that perform this role at the national level. The most extensive constitutive arrangement now in place for an international space is the set of rules and procedures articulated in the 1982 UN Convention on the Law of the Sea (UNCLOS). As it has evolved from the initial Antarctic Treaty of 1959, the Antarctic Treaty System has come to assume increasingly the role of a constitutive arrangement covering human activities in the high southern latitudes. Despite the existence of specific agreements relating to space (e.g., the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, or Outer Space Treaty), the constitutive system for space remains underdeveloped. Not surprisingly, a critical topic for debate today concerns the extent to which we should attach high priority to developing or strengthening constitutive arrangements for a variety of international spaces and, in particular, what I have called new international spaces.

The existence of a constitutive arrangement is important, but it is not sufficient to meet the needs for governance relating to any specific international space. Constitutive arrangements are frameworks. They provide a necessary foundation for the supply of governance, but by themselves they do not and cannot meet needs for governance with regard to specific issues. Ocean governance again provides a clear illustration (Oude Elferink, 2005). Important as it is in constitutive terms, UNCLOS does not deal in a substantive way with a range of concrete issues regarding matters like marine shipping, ocean dumping, pollution from land-based sources, the exploitation of highly migratory stocks of fish, and so forth. These matters require the development of operating rules through the actions of authorized bodies like the International Maritime Organization or the development of issue-specific agreements, such as the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention) and the 1995 UN Straddling Fish Stocks Agreement dealing with fish stocks that are highly migratory

or cut across boundaries between adjacent exclusive economic zones or between exclusive economic zones and the high seas. Whereas constitutive arrangements are meant to be relatively long-lasting and stable (though not beyond interpretation to meet changing circumstances), operating rules are intended to be more adjustable, shifting over time as existing activities change and new activities become prominent. In a well-functioning governance system, constitutive arrangements and operating rules operate in tandem, providing both stability and flexibility in addressing shifting complexes of human activities. Such systems are comparatively rudimentary with regard to the governance of international spaces. Even the governance system for the oceans is primitive compared with parallel systems that have evolved to deal with needs for governance arising in national spaces. The governance systems for most other international spaces are less developed. But as human activities occurring in or affecting international spaces expand, questions pertaining to the governance of international spaces are destined to emerge as increasingly important items on the international agenda.

### **WHAT ARE THE SOURCES OF NEEDS FOR GOVERNANCE REGARDING INTERNATIONAL SPACES?**

Governance emerges as an issue of public concern when the actions of humans give rise to unsustainable practices (e.g., depletion of stocks of living resources), interfere with one another's goal-directed activities (e.g., degradation of neighboring properties arising from the actions of nearby property owners), or lead to more general problems of public order that are harmful to members of the community (e.g., breaches of the peace or acts of aggression). Typically, the need for governance is low when the number of users is small relative to the availability of resources or the density of users is low in a given space. There is little need to develop regulatory arrangements to avoid the tragedy of the commons, for example, when individual users are few in number and harvesters have a limited capacity to capture or consume living resources. But the need for governance grows, often exponentially, as human numbers and human capacities grow.

Needs for governance regarding international spaces arise from several distinct sources (Young, 1999). We are apt to take for granted the existence of public order as a precondition for success in most human endeavors. But because international spaces lie beyond the reach of the jurisdiction of states in a realm that lacks a government

in the ordinary sense, we cannot adopt a similar attitude regarding these spaces. It is therefore easy to understand the concern for the development of alternative means for ensuring the maintenance of public order in many efforts to devise governance systems for international spaces. Both the 1959 Antarctic Treaty and the 1967 Outer Space Treaty, for instance, contain specific provisions regarding peaceful uses of these areas. The Antarctic Treaty specifies that human actors are to use Antarctica for peaceful purposes only. Both this treaty and the Outer Space Treaty contain provisions prohibiting the deployment of nuclear weapons or weapons of mass destruction. Given the importance of naval forces in the arsenals of powerful states, no such treatment of the world's oceans is politically feasible. Even so, UNCLOS does contain a provision (Article 88) stating that "the high seas shall be reserved for peaceful purposes," and the convention does include a number of provisions (e.g., those pertaining to transit passage) spelling out rules designed to govern the activities of naval vessels and the use of marine systems for military purposes.

The new international spaces may seem less susceptible to problems of public order. Yet it would be naïve to suppose these spaces are immune from the impacts of hostile actions intended to harm or weaken unfriendly human actors. The concerns that led to the negotiation of the 1977 Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques offer testimony to this fact. Advances in technology over the intervening decades have enhanced the capacity of states and a variety of nonstate actors to engage in hostile acts regarding new international spaces. Rising concerns regarding hostile or aggressive uses of the Internet offer a prominent example.

Assuming we are able to meet the need for public order regarding international spaces in a manner that allows normal human activities to proceed, a variety of other needs for governance come into focus. Some of these have to do with familiar problems of depletion arising from unregulated harvesting of living resources or of congestion arising from intensive uses of flow resources like favorable shipping routes or the electromagnetic spectrum (Brown et al., 1977). Technological advances can alleviate, if not eliminate, some of these problems. Increases in the technological sophistication of broadcasting systems, for example, have made it possible for large numbers of users to exploit the electromagnetic spectrum for purposes of broadcasting without interfering with one another's activities. But many cases present classic problems of governance requiring the introduction of mechanisms like catch shares and rules of the road to allow users to make use of

the resources of international spaces in a manner that is sustainable and efficient. Parallel challenges arise in cases where security of tenure is an important factor in motivating prospective users to make the investments required to use the resources of international spaces. Licenses to use broadcast frequencies in the electromagnetic spectrum, for instance, would be of little value if they were not secure against encroachment on the part of outsiders. Similar considerations underlie the concerns of those who have advocated the creation of a system of secure licenses, if not full-scale property rights, in segments of the deep seabed as a precondition for success in the development of deep-seabed mining (Eckert, 1979). In all these cases, the challenge is to find ways to address demands for governance in international spaces in the absence of anything resembling a world government.

A somewhat different class of problems encompasses situations in which there are existing or anticipated conflicts among alternative uses of international spaces. Two types of conflicts, both of which loom large in efforts to govern international spaces today, are worth distinguishing in this connection. In the most direct case, a decision to designate an area for a particular use can have the effect, implicitly if not explicitly, of prohibiting other uses of the area. Classic cases involve trade-offs between consumptive uses and nonconsumptive uses. The decision to set aside the 1988 Convention on the Regulation of Antarctic Mineral Resource Activities and to move forward with the adoption of the 1991 Protocol on Environmental Protection to the Antarctic Treaty (Environmental Protocol), for instance, is a development of far-reaching importance precisely because designating Antarctica as a “natural reserve” means banning the extraction of both nonfuel minerals and hydrocarbons as a matter of policy. Debates about the merits of establishing large marine protected areas in various parts of the world’s oceans prohibiting or severely limiting traditional activities like fishing raise many of the same concerns. Even with regard to major consumptive uses, trade-offs involving conflicts of use can and often do give rise to needs for governance. Interference between the operations of fishers and shippers in marine systems is a case in point.

Short of direct conflicts between alternative uses, the occurrence of a wide range of externalities or unintended side effects has become an important source of the need for governance regarding international spaces. These are situations in which the activities of those engaged in normal and lawful activities generate side effects that are harmful to resources that are valuable to others. Common examples involve the harmful effects of trawl fisheries

on benthic communities and of commercial shipping on marine mammals. A major development in this regard, which poses particularly challenging problems of governance regarding international spaces, centers on what we have come to think of as the destruction or degradation of ecosystem services resulting from a variety of human activities. The removal of key species can cause large ecosystems to undergo dramatic changes or even to collapse. Intentional or accidental discharges of oil at sea can produce far-reaching environmental impacts. The rise of the concept of ecosystem-based management with its associated intellectual capital has drawn increasing attention to this class of problems and the need to create governance systems to address them (McLeod and Leslie, 2009).

As these examples suggest, some externalities arise from activities occurring within international spaces whose impacts are felt within the same spaces. But there is another class of externalities in which activities occurring wholly or largely outside international spaces have impacts that are felt within these spaces. Prominent cases include the growth of dead zones at sea, the thinning of the stratospheric ozone layer, and rising concentrations of greenhouse gases in the Earth’s atmosphere. Dead zones are largely products of agricultural practices taking place in national spaces and often far from the coast. The production and consumption of ozone-depleting substances arose in response to the demand for a range of products on the part of consumers located within national spaces. Emissions of greenhouse gases are, for the most part, by-products of human activities taking place within national spaces. The protection of international spaces from the impacts of these externalities poses a particularly serious challenge for governance. Decisions about the regulation of agricultural practices, the production and consumption of ozone-depleting substances, and the emission of greenhouse gases are all made within national governance systems in which international spaces are essentially unrepresented. No one represents the stratospheric ozone layer or the Earth’s climate system in the policymaking of states. The citizens of individual states have an interest in what happens to international spaces like the stratospheric ozone layer or the climate system, and it is perfectly possible for states to band together to devise international governance systems designed to regulate externalities of this sort. Nevertheless, the demand for governance is different in such cases than it is in situations where users of fish stocks, shipping lanes, or the electromagnetic spectrum must join forces to devise governance systems that allow them all to benefit from sustainable uses of the relevant resources.



## WHAT ARE THE OPTIONS FOR SUPPLYING GOVERNANCE FOR INTERNATIONAL SPACES?

The specific mechanisms needed to govern human uses of international spaces differ from case to case. Yet some useful generalizations are possible in this realm. In every case, it is desirable to establish a combination of constitutive provisions, in the sense of broad framework arrangements intended to provide an enduring matrix within which to address a range of more-specific issues, and operating rules, in the sense of more-detailed regulatory arrangements dealing with substantive and often functionally specific issues. The relationship between UNCLOS as a constitutive arrangement and the specific provisions of the 1972 London Convention dealing with the discharge of wastes at sea illustrates this proposition. It is always desirable, moreover, to strike a balance between stability in the sense of providing governance systems with some measure of staying power and flexibility or agility in the sense of endowing these systems with the capacity to adapt to changing circumstances. All governance systems require some administrative capacity in the sense of organizational arrangements that can make decisions, apply these decisions to the complexities of concrete situations, address matters of compliance, provide authoritative interpretations in cases where parties disagree regarding the meaning of specific provisions, and mobilize the funding needed to operate the system.

The Antarctic Treaty of 1959, the Outer Space Treaty of 1967, and the 1982 UN Convention on the Law of the Sea are all constitutive in the sense that they seek to establish broad frameworks covering human activities relevant to the international spaces in question. But they are not equally effective in terms of providing foundations for the development of full-fledged governance systems. The Antarctic Treaty System is particularly evolved in these terms. The Antarctic Treaty itself has proven successful both in creating a mechanism for making collective decisions about the south polar region and in laying the basis for the maintenance of public order in the area. With the addition of the 1991 Environmental Protocol, the parties to the ATS simplified the governance problem by designating Antarctica a “natural reserve, devoted to peace and science,” and explicitly banning mining or the extraction of nonrenewable resources in the area. The effect of these actions has been to avoid potential conflicts among competing uses and to minimize governance issues arising from competition among users of material resources. The protocol has created a basis for developing a variety of operating rules

pertaining to matters like waste disposal, the conduct of environmental impact assessments, the establishment of protected natural areas, and the promulgation of liability rules. It established a Committee on Environmental Protection to administer the resultant governance system. The functional integration of the Scientific Committee on Antarctic Research (SCAR), officially a body belonging to the International Council of Science (ICSU), into this governance system has helped substantially in addressing the need to provide advance notice of changing conditions calling for the development of new operating rules or the adaptation of existing ones. This does not mean that this governance system is immune to the impact of stress or able to operate without challenges (Young, 2010: chap. 3). Many complex issues remain regarding efforts to practice ecosystem-based management under the terms of the Convention on the Conservation of Antarctic Marine Living Resources dealing with consumptive uses of fish and other living resources. Some of the most severe threats facing Antarctica during the foreseeable future will arise from large-scale occurrences, such as the thinning of stratospheric ozone, climate change, and ocean acidification, that are largely beyond the control of the ATS.

By comparison, the governance systems we have put in place for the world’s oceans and for space are less adequate to meet emerging needs for governance in these international spaces. The UNCLOS does provide a constitutive system for the oceans, and more or less elaborate operating rules have emerged to address a range of functionally specific activities like shipping, fishing, deep-seabed mining, tourism, and environmental protection (Oude Elferink, 2005). But the capacity of these arrangements to meet the rising demand for governance is limited. Despite the provisions of Article 88 of UNCLOS, it is an illusion to suppose that the high seas are reserved for peaceful purposes. The track records of most regional fisheries management organizations leave a lot to be desired. The governance system for the deep seabed, rooted in Part XI of UNCLOS, has never become operational and remains a bone of contention among powerful actors in the system. Major issues relating to the management of marine shipping are looming on the horizon. It is hard to make progress toward implementing the ideal of ecosystem-based management in the oceans because of the effects of externalities arising both from the exploitation of marine resources (e.g., commercially valuable fish stocks) and from land-based activities affecting marine systems (e.g., contaminants associated with agricultural production). What is more, the existing governance system for the oceans has little or no capacity to stem the impacts of a variety of large-scale processes,

like ocean acidification, arising from human activities having nothing to do with the use of ocean resources. There is a need for a major upgrade in the governance system for the oceans treated as an international space.

The case of space poses yet another set of problems. The 1967 Outer Space Treaty does create a constitutive arrangement for outer space in the sense of providing for public order; banning the establishment of military bases, installations, or fortifications on the Moon and other celestial bodies; and prohibiting the extension of jurisdictional claims on the part of states to these bodies. But there is a disconnect between these constitutive arrangements for space and the development of operating rules dealing with a variety of functional concerns. Some of these concerns (e.g., the protection of the stratospheric ozone layer, the control of climate change, and the use of the electromagnetic spectrum) may lie outside the scope of the 1967 treaty. Others (e.g., the management of space debris and the development of space-based forms of geoengineering intended to address the problem of climate change) involve issues unforeseen during the 1960s. There have been some successes in meeting specific needs for governance relating to atmospheric issues. The ozone regime is rightly regarded as a success story, and efforts to address a range of issues relating to broadcasting have met with substantial success. Still, we are left in the case of space with a fragmented or incoherent governance system in which the constitutive arrangements do not encompass efforts to address specific matters, such as broadcasting and climate change, and the functionally specific regimes, such as the arrangement for the stratospheric ozone layer, do not serve to strengthen the constitutive framework. A fundamental question in this realm is whether to make an effort to link these arrangements together, thereby creating a governance system in which the whole is greater than the sum of the parts.

Turning to the class of new international spaces, the first question regarding the supply of governance concerns the relative merits of assimilating these spaces into existing governance systems versus treating them as separate cases with regard to issues of governance. As the preceding paragraph suggests, we could treat matters relating to the stratospheric ozone layer, the Earth's climate system, and the electromagnetic spectrum as issues of concern to space and seek to subsume them within an expanded constitutive system for space when it comes to matters of governance (Soroos, 1997). For the most part, however, this is not the approach that the international community has adopted in efforts to supply governance for these new international spaces. The constitutive provisions of

the Outer Space Treaty have little bearing on the operation of the ozone regime and the climate regime. The efforts of bodies like the International Telecommunication Union (ITU), the World Administrative Radio Conferences (WARCs), and the International Telecommunications Satellite Consortium (INTELSAT) to regulate broadcasting and to manage uses of the electromagnetic spectrum more generally have little to do with the overarching provisions of the Outer Space Treaty. What lies ahead in this realm? As things stand now, it is hard to foresee any serious move to integrate efforts to address a variety of specific issues like climate change or the use of the electromagnetic spectrum into some overarching constitutive arrangement for space. Yet this could change as we find ourselves thinking more about matters like the management of space debris or geoengineering that pose important questions relating to the provision of public order (Royal Society, 2009).

### WHERE DO WE GO FROM HERE?

The challenges of governing international spaces highlight the importance of finding ways to address needs for governance in the absence of government (Rosenau and Czempiel, 1992). As human activities occurring in or affecting areas that lie beyond the jurisdiction of states intensify and as new international spaces become objects of attention, needs for governance in this realm are destined to grow. For this reason, it is desirable to identify and draw attention to success stories in governing international spaces. The Antarctic Treaty System has not only maintained public order in the south polar region over the last 50 years, it also has demonstrated a capacity to come to terms with major issues regarding competing uses of Antarctica's natural resources and ecosystems. The ozone regime has proven successful in bringing about drastic reductions in the production and consumption of a large number of ozone-depleting substances; it also has brought about greater reductions in emissions of greenhouse gases than the climate regime itself (Velders et al., 2007).

Yet pointing to these successes provides no basis for adopting an attitude of complacency regarding the governance of international spaces. The existing arrangements leave much to be desired in meeting current needs for governance. They are even more inadequate when it comes to tackling growing challenges like the disruption of marine ecosystems caused by industrial-scale fishing and the dramatic consequences of climate change and associated phenomena, such as ocean acidification. What is needed in this connection is an approach grounded in the idea of

stewardship, based on a tighter integration of constitutive arrangements and operating rules, and alert to the need for adaptive capacity to cope with changes that are often nonlinear, frequently abrupt, and commonly irreversible (Chapin et al., 2009). We have made progress in addressing such issues, but the challenges before us are great when it comes to achieving governance without governance of the sort required to meet the need for stewardship in the use of international spaces.

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