# Moon, Inc.: The New Zealand Model of Granting Legal Personality to Natural Resources Applied to Space

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## ABSTRACT

*This article presents a groundbreaking new model for the management of natural resources, introduced into New Zealand (NZ) law in line with the worldview of the indigenous Maori. The article goes on to analyze the model through the lens of the theory of Nobel Laureate Elinor Ostrom and her design principles for managing common-pool resources. Building on this analysis, the article envisages a scenario of applying model under the NZ Act—adapted using Ostrom's theory—to the moon and other space resources and to space habitats. Considering the unsettledness of the debate on the exploitation of space resources and retreat to national arrangements, the article examines whether the model under the NZ Act holds promise for a widely agreed, efficient, and equitable regime for managing space resources and whether it could also be extended to the governance of space habitats. A product of two legal traditions—the common law and that of the indigenous Maori—the NZ Te Urewera Act 2014 is the first statute in the Western legal tradition to grant legal personality to a natural resource—a natural park—and establishes it as something like a common-law corporation. In addition, the Act sets out the usage rights and establishes institutions. The article concludes that the NZ Act satisfies most of Ostrom's design principles and has potential for success. The article therefore continues with an intellectual exercise, applying the model to the moon and other space resources and to space habitats, and tries to appraise the outcome of such an application. However, the article is not necessarily a call to implement the model under the NZ Act to outer space, but rather to consider alternative governance models for space-based governance.*

**Keywords:** space law, space governance, space habitat, space resources, mining space resources, global commons

## INTRODUCTION

### The New "Gold Rush" and "Land Rush"

We are past the beginning of a double rush: a new "gold rush" for space resources and a "land rush" for the establishment of space habitats, notably on the Moon and Mars. The legal basis for each rush is questionable, at best. Even the related economic and business models, as well as the related governance models, are still in their infancy.

In the case of each rush, the private sector is heavily involved and even leading the way. Private corporations are executing many of the projects and initiated many of them, with governments having initiated a few but mainly having provided a legal framework and occasionally financial investment. Three U.S. corporations are pursuing the mining of space resources, on their own initiative and using their own funding: Planetary Resources, Deep Space Industries, and Moon Express.[1] As part of the Commercial Space Launch Competitiveness Act (CSLCA),[2] the United States enacted a controversial basic rule, which grants U.S. citizens title over all asteroid resources that they obtain. In other words, the CSLCA presumes that mining activities, including by private actors, are permitted under the 1967 Outer Space Treaty (OST),[3] to which the United States is a party. In Japan, JAXA, Japan's space agency, signed a memorandum of understanding with a private company, Tokyo-based iSpace, Inc., to establish infrastructure for the mining, transportation, and use of resources on the moon.[4] Luxembourg has set aside €200 million for space mining operations,[5] partnered with the Deep Space Industries and Planetary Resources,[6,7] and adopted a law regulating the extraction of space resources, recognizing that space resources are capable of being owned by private companies.[8] The UAE has set itself the goal of enabling itself to mine asteroids, presumably with financial support from

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the government, and is preparing national space legislation that will regulate this activity.[9,10]

The participants in the "land rush" to establish space habitats involve governments, via their space agencies, and private corporations alike. There have been numerous announcements on plans for space settlement, although it remains to be seen how many will materialize and when since execution is harder than issuing a media release. Russia plans to colonize the Moon by 2030. China plans to reach Mars by 2020 and eventually build a moon base.[11] India is eyeing a return to Mars and a first run at Venus.[12] Japan plans to put a Japanese person on the Moon by 2030.[13] ESA is planning a moon village.[14] NASA is planning an "Earth Independent" Mars colony by the 2030s.[15] In the private sector, Elon Musk famously announced his plans to colonize Mars at the 2016 International Astronautical Congress (IAC) in Guadalajara, Mexico.[16] Moon Express plans to build a lunar outpost by 2020.[17] Lockheed Martin is planning a Mars base camp.[18] No doubt other companies have other plans in mind.

Many questions arise. How will space habitats be governed? How will the extraction of space resources be regulated and managed?

### The Existing Models of Governance in Space

The existing model for the governance of space activities is strictly national, meaning that states are responsible for all space activities. Article VI of the OST,[19] which establishes the basic norms of space law, provides:

> States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty. When activities are carried on in outer space, including the moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization.

Space activities carried on by a national space agency are administered and regulated by the state. However, private space activities too are regulated by the relevant state. The state is obliged to require authorization and continuously supervise these activities, and it also bears international responsibility for them. Activities carried on by several states at a time, notably those involving the International Space Station (ISS), are governed under the intergovernmental agreement that regulates the carrying on of activities and relations between the national space agencies participating in the ISS and their respective space modules and astronauts.

Even the 1979 Moon Agreement,[20] with its specific reference to space resources in Article 11(5), did not provide a governance model for space resources. All that it did was to require the creation of a legal regime, without specifying what kind of regime. Article 11(5) provides:

> States Parties to this Agreement hereby undertake to establish an international regime, including appropriate procedures, to govern the exploitation of the natural resources of the moon as such exploitation is about to become feasible …

Therefore, it could be useful to discuss models that could fill the void left by the Moon Agreement, should this agreement gather enough support in the future.[21]

Intelsat, Inmarsat, and Eutelsat are further examples of models for the governance of space activities beyond the national level, as hybrid public consortia. Intelsat SA[22] is a communications satellite services provider. Currently, in private hands, it was originally established in 1964 as an intergovernmental organization (IGO) under the name International Telecommunications Satellite Organization (ITSO or Intelsat). Intelsat started with 11 participating states, reaching and surpassing 100 in 2001, before its privatization. Intelsat provides services to more than 600 earth stations in more than 149 countries, territories, and dependencies. While it was still in public hands, it was owned by its members and users and governed by them, under an elaborate and effective governance regime.[23] Inmarsat plc,[24] for its part, offers global mobile services.

Like Intelsat, Inmarsat was originally an IGO and was later privatized. It was established by the International Maritime Organization (IMO) in 1979 under the name International Maritime Satellite Organization (Inmarsat), by the 1976 Convention on the International Maritime Satellite Organization. Like Intelsat, Inmarsat was owned and governed by its members and users, until it was privatized in 1999.[25]

Like Inmarsat and Intelsat, Eutelsat[26] too was originally an IGO until it was privatized. It was established in 1977 as the European Telecommunications Satellite Organization (Eutelsat).

### In Search of New Models for Governance in Space

National governance in space raises numerous problems, including the absence of any sovereign, the need for international cooperation, and the difficulty of collective action. The ISS model is working so far but might prove too maladroit for more complicated situations involving a larger number of participants, especially with these participants including non-state participants with complex multivariable operations. The non-state actors having activities aboard the ISS, such as experiments, are sponsored by one of the national space agencies

that are members of the ISS. This model is different from any that would involve a private sector having its own habitat and, even if by authorization of a state, operating an entire habitat. The Intelsat, Inmarsat, and Eutelsat model, although having proved viable, was eventually abandoned in favor of privatization. While we do not rule out any of the existing models, we believe that it would be desirable to seek out new models that may better serve the needs of space exploration and utilization in the New Space era, particularly as far as the governance of space habitats and resources is concerned.

This article looks beyond the existing, well-known, and well-researched models—notably the high seas, the Antarctic, and the ISS—to a new model introduced by the New Zealand (NZ) Te Urewera Act 2014 (the NZ Act), the first statute in the Western legal tradition to grant legal personality to a natural resource—to what was once Te Urewera National Park. Having presented the background to and content of the NZ Act, we analyze the governance model introduced by the NZ Act. This model is specific to its context. However, we examine its possible application in a different context—that of the governance of space habitats and resources. This we do through the lens of the theory of Nobel Laureate Elinor Ostrom and her design principles for managing common-pool resources (CPRs). The analysis shows that while intended to meet specific earthly needs, the model under the NZ Act has promise as a model for the governance of space habitats and resources.

In other words, this article serves to introduce the model under the NZ Act and to test its potential from a governance or economic perspective. For this reason, we do not propose specific wording for the model, beyond references to the wording of the NZ Act itself. However, we do not see any particular wording-related problems with the model. In particular, we do not consider that implementing the model would make it necessary to amend the OST. Article I of the OST provides that "[t]he exploration and use of outer space … shall be the province of all mankind" thus allowing the exploitation of space resources,[27] subject to the limitation set forth by Article II of the OST: "Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means." The OST does not make specific provision for the governance of space habitats and resources, and the suggestions made in this article do not necessitate national appropriation. Therefore, no instrument implementing the model for the purposes of the governance of these would necessarily contradict anything in the OST.

Furthermore, while we use Ostrom's design principles for managing CPRs as an analytical tool, we acknowledge that there are many other analytical tools that we could have used. Our selection of the design principles is intentional, particularly because (as we will discuss), they are empirically founded, and we believe that they should be introduced into the discussion on the governance of space resources and habitats and used to analyze the potential efficacy of governance models to be applied.

## BACKGROUND TO THE MODEL

To understand the NZ Act, it may be helpful to situate it briefly within the broader context of the history of NZ. Historian Michael King divides the history of the country more generally into five periods[28]:

(i) "Prehistory: to 1000 AD";
(ii) "Settlement: to 1850 AD";
(iii) "Consolidation: to 1950 AD";
(iv) "Unsettlement: post-1950 AD"; and
(v) "Post-history: post-2003."

The Settlement saw the arrival in NZ of the Māori and—roughly 800 years later—the Europeans (the Crown).[29] In 1840 (when "the total number of European settlers was a little over 2000"[30]), the Crown entered into a treaty with Māori iwi (tribes): the Treaty of Waitangi (the Treaty). While the Māori-language version of the Treaty recognized the executive power (or government in the administrative sense) of the Crown, the English-language version of the Treaty transferred legislative power (or government in the sense of sovereignty).[31]

However, it was not until the 1950s that the Crown started the Consolidation, as defined by King.[32] In particular, there were the "New Zealand Wars," which "can be seen as a series of British attempts to impose substantive, as against nominal, sovereignty."[33] As Belich notes, "[t]he Māori[] lost in the end," causing "economic damage," "demoralization," and a "diminution of Māori power."[34]

However, from 1950 until 2003, there came the Unsettlement. During this period, Māori opposed the power of the Crown, in particular with "the seventeen-month occupation of [Bastion] Point [in Auckland],"[35] a piece of land claimed by the local iwi, Ngati Whatua. Furthermore, in 1975, the Crown established the Waitangi Tribunal. This tribunal hears any claim—submitted by any Māori—that any Māori has been, is being, or is likely to be "prejudicially affected" by Crown policy "inconsistent with the principles of the Treaty."[36]

Now, NZ finds itself in its Post-History, a period characterized by efforts on the part of the Crown to right the wrongs done by it to the Māori. As part of these efforts, Māori claims have in particular been heard by the Waitangi Tribunal. In fact, it was by way of proceedings before the Waitangi Tribunal that the NZ Act came to be.

The proceedings date back to the start of the 21st century. As Jones notes[37]:

The [Te] Urewera Tribunal was appointed in early 2002 and held 11 hearings of claimant evidence between November 2003 and April 2005 concerning 40 separate claims. Closing submissions by claimant and Crown counsel were presented at Ruatoki in June 2005.

Many wrongs had been done to the Tūhoe, the iwi of the Te Urewera area. Historian Vincent O'Malley describes the background to the NZ Act as "a long and tragic history of interactions with the Crown."[38] The Crown subjected the Tūhoe to "unjust and excessive behavior," "including indiscriminate raupatu [land confiscations], wrongful killings, and years of scorched earth warfare."[39]

To conclude the proceedings before the Tribunal, the Crown and the Tūhoe signed a Deed of Settlement (the Deed), on June 4, 2013.[40] The Crown then drafted the Te Urewera–Tūhoe Bill,[41] which was intended to give effect to the Deed, and from which the Te Urewera Bill[42] was extracted, in June 2014. This new bill received its third reading and Royal assent the next month.

## CONTENT OF THE MODEL

This new Act is the first of its kind in the Western legal tradition, in that it recognizes the ex-Te Urewera National Park as having standing in its own right, by granting it legal personality and establishing it as something like a common-law corporation. In this sense, the NZ Act is the product of two legal traditions: that of the Māori and the common law. The Māori worldview recognizes the concept of "mana," a concept that has no direct Western equivalent. Mana may be seen as giving legal "standing,"[43] as Patterson puts it, to any being possessed of it. The Māori legal tradition sees mana (and therefore standing) in both human beings and the natural world.

Ruru describes the NZ Act as "legally revolutionary."[44] We agree with her, not only because the NZ Act recognizes the mana of Te Urewera but also because the NZ Act declares the natural park, delineated in Schedule 1 to the NZ Act, to be "a legal entity, and [to have] all the rights, powers, duties, and liabilities of a legal person."[45] Incidentally, this land "cease[d] to be vested in the Crown" by effect of the NZ Act,[46] with "[t]he fee simple estate in the … land vest[ing] in Te Urewera."[47]

The Act takes account of the fact that Te Urewera is a non-human legal person by providing that "the rights, powers, and duties of Te Urewera must be exercised and performed on behalf of, and in the name of, Te Urewera … by Te Urewera Board [('the Board')]."[48] Accordingly, the NZ Act generally makes Te Urewera's "liabilities … the responsibility of [the] Board."[49]

The Te Urewera Board was established on July 28, 2014.[50] Each term of the board is 3 years in length.[51] The "first term commence[d] on 20 September 2014."[52] Accordingly, the first subsequent term commenced on September 20, 2017, the second will commence on September 20, 2020, and so on.

At present, the Board is in its second term. Before this term, "the Board consist[ed] of [eight] members,"[53] "[four] appointed by the trustees of Tūhoe Te Uru Taumatua,"[54] and "[four] by the Minister [of Conservation] and the Minister of for Treaty of Waitangi Negotiations (the Ministers)."[55] For each subsequent term (including the current term), "the Board is to consist of [nine] members,"[56] "[six] appointed by the trustees of Tūhoe Te Uru Taumatua"[57] and "[three] by the Minister [of Conservation]."[58] The Board includes a chair and a deputy chair.[59] Each member may hold office in the Board for a maximum of four consecutive terms, whether the office be that of chair, that of deputy chair, or simply that of member.[60] Otherwise, there are no term-related restrictions on holding office in the Board.[61]

In appointing any member, the appointer must follow the procedure set forth in the NZ Act. In particular, the appointer must "notify" and "seek the views" of the other appointers.[62] He/she must "consider [these] views,"[63] as well as "whether the proposed member has the mana, standing in the community, skills, knowledge, or experience: (a) to participate effectively in the Board and (b) to contribute to achieving the purposes of the Board."[64] Furthermore, "[any] Minister [appointer] must seek a recommendation from the New Zealand Conservation Authority in relation to [one] of the members to be appointed by [him/her],"[65] although he/she "is not obliged to give effect to the recommendation."[66]

The Act provides that "[t]he Board has full capacity and all the powers reasonably necessary to achieve its purposes and perform its functions,"[67] including limited powers to "alienate[], mortgage[], charge[], [and] otherwise dispose[]" of Te Urewera land.[68] The Act describes the "purpose" of the Board as if Te Urewera were an "ordinary" corporate legal person: "[t]he purposes of [Te Urewera] Board are: (a) to act on behalf of, and in the name of, Te Urewera; and (b) to provide governance for Te Urewera in accordance with [the NZ Act]."[69] The main "functions" of the Board are[70]:

(a) to prepare and approve [the] management plan [for Te Urewera];
(b) to advise the persons managing Te Urewera on the implementation of the management plan, including by means such as—
  (i) issuing an annual statement of priorities for implementing the management plan;
  (ii) undertaking any specified functions in relation to the annual operational plan for Te Urewera; and
  (iii) monitoring the implementation of the annual operational plan;
(c) to initiate proposals and make recommendations for—

(i) adding land to, or removing land from, Te Urewera;
(ii) acquiring interests in land; and
(iii) establishing specially protected areas, wilderness areas, and amenity areas within Te Urewera;

(d) to make bylaws for Te Urewera;
(e) to authorize activities that must not … be undertaken in Te Urewera without an authorization under [the relevant provisions of the Act];
(f) to prepare or commission reports, advice, or recommendations on matters relevant to the purposes of the Board;
(g) to promote or advocate for the interests of Te Urewera in any statutory process or at any public forum;
(h) to liaise with, advise, or seek advice from any agency, local authority, or other entity on matters relevant to the purposes of the Board;
(i) to perform any other function of the Board specified in [the NZ Act] or in any other enactment; and
(j) to take any other action that the Board considers to be relevant and appropriate in achieving its purposes.

In this connection, the NZ Act provides that "[i]n performing its functions, the Board may consider and give expression to … Tūhoe concepts of management,"[71] belonging to the Māori legal tradition.

The NZ Act also sets forth certain duties for the Board. Indeed, "[i]n performing its functions, the Board must act consistently with: (a) [the NZ Act]; (b) [the] Te Urewera management plan; and (c) any other lawful requirement."[72]

The Board is also subject to the general duties that apply to "all persons performing functions and exercising powers under [the NZ Act]."[73] Such persons "must act so that, as far as possible"[74]:

(a) Te Urewera is preserved in its natural state;
(b) the indigenous ecological systems and biodiversity of Te Urewera are preserved, and introduced plants and animals are exterminated;
(c) Tūhoetanga, which gives expression to Te Urewera, is valued and respected;
(d) the relationship of other iwi and hapu [sub-tribes] with parts of Te Urewera is recognized, valued, and respected;
(e) the historical and cultural heritage of Te Urewera is preserved;
(f) the value of Te Urewera for soil, water, and forest conservation is maintained; and
(g) the contribution that Te Urewera can make to conservation nationally is recognized.

These persons "must [also] act so that the public has freedom of entry and access to Te Urewera, subject to any conditions and restrictions that may be necessary to achieve the purpose of [Act] or for public safety."[75]

In other words, there are many kinds of activity that may be carried on Te Urewera without any particular authorization. One of these is any "cultural, recreational, or educational activity that … is undertaken by an individual or group without any specific gain or reward for that activity, whether pecuniary or otherwise (other than a reasonable charge to recover the reasonable expenses of organising the activity)."[76] Another of these classes includes any "mining activity that is authorised under the Crown Minerals Act 1991."[77] However, this mining-specific exception is not a defining feature of the model under the NZ Act. In theory, the NZ legislature could have just as easily omitted the exception. It so happens that at the time when the NZ Act was drafted and passed into law, the government was the right-of-centre National Party—a party perceived as being relatively or even excessively pro-mining, particularly by the left.[78]

Also, note that the NZ Act is not the only one of its kind. In 2012, the Crown agreed with the Whanganui iwi that the Whanganui River would become a legal person. This agreement predated both the similar (2013) agreement regarding Te Urewera and the (2014) Act. However, the legislation regarding the Whanganui River, the (similar) Te Awa Tupua (Whanganui River Claims Settlement) Act, was passed only last year (in 2017). Like Te Urewera, "Te Awa Tupua," the Whanganui River, "is [now] a legal person and has all the rights, powers, duties, and liabilities of a legal person."[79]

## POLITICAL ECONOMY ANALYSIS OF THE MODEL

The Act introduces a new model whose economic efficiency is yet to be empirically studied by reference to the results of its implementation. However, having examined the model ourselves through the lens of Ostrom's theory on the management of CPRs, we suggest that the model has significant chances for success.

We have come to this finding despite two problems. One—which is more of a problem than the other—regards collective action: the problem of bringing states to some agreement on a model and enacting it on an international level by way of a convention. Suffice it to say that the UN Committee on the Peaceful Uses of Outer Space (COPUOS), the major forum for the preparation and adoption of space-related treaties, has for some time shown itself to be slow to introduce new treaties. This article contributes to the discussion on ways to address the problem of collective action or international cooperation, by introducing a model that may conform to Ostrom's design principles for robust governance systems. As the Nobel committee noted, "[Ostrom's] observations are important not only

to the study of natural resource management, but also to the study of human cooperation more generally."[80] Therefore, the more the governance model conforms to these design principles, the greater the feasibility of achieving international cooperation.

We do not claim that the NZ Act is a panacea—that it is far better suited to resolving the difficulty of achieving cooperation on the international level, including in space, than any other. However, we do not consider the NZ Act to make the model any less worthy of considering for it. Indeed, there is no other model—not that governing the high seas (notably the deep seabed), Antarctic, or the ISS—that is particularly suited to resolving this difficulty.

The other of the two problems is this: there is of course a major difference between space resources and habitats (on the one hand) and Te Urewera (on the other). In particular, Te Urewera is located within a sovereign nation and may thus be regulated by national legislation, whereas space resources and habitats will be beyond national sovereignty and may be regulated at the international level only.

However, in our view, this problem is not a major one. The potential of the model under the NZ Act is independent of the geohistorical circumstances surrounding the NZ Act itself. The potential of the model derives from the fact that it generally conforms to Ostrom's design principles, which correlate with successful governance systems and which can therefore predict to a certain extent the success of such a model. Although derived from the empirical basis of the local commons, these principles have relevance for the global commons. As Ostrom herself notes, with Keohane, "many of the 'design principles' underlying successful self-organized solutions to CPR problems appear relevant to the design of institutions to resolve problems of international cooperation as well as those at strictly local level."[81] In addition, as Dietz, Ostrom, and Stern note, "[t]he general principles for robust governance institutions for localized resources are well established as a result of multiple empirical studies. Many of these also appear to be applicable to regional and global resources, although they are less well tested at those scales."[82]

Elinor Ostrom was awarded the 2009 Nobel Prize in Economic Sciences for her study of diverse institutional arrangements for governing CPRs and public goods. As the Nobel Committee noted, "Ostrom … challenged the conventional wisdom that common property is poorly managed and should be completely privatized or regulated by central authorities."[83] Ostrom demonstrated that decentralized local institutions perform better than their counterparts and argued that the core goal of public policy should be to facilitate the development of such institutions.[84,85]

Ostrom's study demonstrated that it is more effective to have a CPR managed by its users than by others, that users achieve and sustain cooperation, and that users envisage rules and enforcement mechanisms that result in sustainable outcomes. In contrast, governmentally imposed rules are often counterproductive because central authorities lack knowledge of local conditions and have insufficient legitimacy in the eyes of local stakeholders. Moreover, in many cases, government intervention creates more chaos than order.

Analyzing a vast empirical database, Ostrom found regularities and devised eight design principles for building an effective mechanism for the governance of CPRs.[86] Following these principles leads to long-term success in governance. The model under the NZ Act meets most of these principles: (i) it defines who has what entitlements; (ii) actors' responsibilities are in proportion to their benefits and local conditions; (iii) most users are allowed to participate in the making of rules; (iv) monitoring and sanctioning is carried out by the users themselves or by someone who is accountable to the users; (v) sanctions are graduated; (vi) there is a dispute resolution mechanism; (vii) the right of users to self-organize is clearly recognized by outside authorities; and (viii) the institution is nested in the larger national management of natural parks.

Although there has not yet been any empirical study of the results of the implementation of the NZ Act, it seems that the model has good prospects for providing a solid alternative model for the governance of space habitats and resources, the reason being that the model generally meets Ostrom's design principles.

## POSSIBLE APPLICATION OF THE MODEL TO SPACE HABITATS AND RESOURCES

### Applicability of the Model

Some space resources are CPRs because they are (potentially) usable by multiple users, because one user's use of any of them subtracts from the potential use of another user, and because it is difficult—physically or legally, and in this case legally, owing to the principles set forth by Article I of the OST—to prevent actors from using them.[87] Indeed, Article I of the OST provides that "[t]he exploration and use of outer space, including the moon and other celestial bodies … shall be the province of all mankind. Outer space, including the moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind."[88]

### Applying the Model to Space Resources

The model under the NZ Act may be applied to the governance of space resources and their extraction. Moreover, even space habitats may also prove to be CPRs. They will likely have

multiple users, with one user's use subtracting from the potential use of another user. However, whether it is difficult—physically or legally—to prevent actors from using a space habitat will depend on the circumstances. An artificial space habitat floating in void space is a resource that may be easily protected—physically and legally—from use by other actors. In the case of a habitat on the Moon or Mars, Article I of the OST may prevent the exclusion of actors. Thus, while a space habitat floating in void space would not be a CPR, a space habitat on the Moon or Mars could well be.[89] The model under the NZ Act may therefore be applied to space habitats of the kind on the Moon or Mars as well.

Applying the model under the NZ Act would first mean recognizing legal personality in space resources. Since various resources have different economic characteristics and may be far apart from one another, separate legal personality should be recognized for each space resource (*e.g.*, platinum, water, and Earth orbits), for each specific area, or for all the resources that it contains (*e.g.*, resources on the Moon or on a certain near-earth asteroid). While the recognition of legal personality may appear to be a counterintuitive step in the process, the necessity of the rest of actions being performed is easier to understand.

The second step would be to incorporate each space resource, whether an Earth orbit, water, or platinum. Let us use the example of platinum. Incorporation may be local, as in the case of the platinum on a certain celestial body, or of the platinum on a collection of celestial bodies (*e.g.*, near-earth asteroids). For the purpose of such incorporation, the borders of the domain managed by the legal person should be clearly defined. Being beyond the scope of national legislation, the question of what type of legal person to establish is more complex, as the incorporation is unlikely to be made under the law of a single state. The establishment of an IGO of the same kind as Intelsat and Inmarsat would better suit the subject matter; however, it would raise the problem of collective action—the need for the agreement of numerous states. Nevertheless, since the adoption of the model itself would require interstate agreement, any such agreement could possibly take the form of a convention establishing an IGO entrusted with a certain space resource. This step would require the parties to delineate the boundaries of the resource to which the mechanism is applied.

The third step would be to define the main objective of the legal person. If we follow the model under the NZ Act, then the rights, powers and duties of the corporation should be exercised on behalf of and in the name of the space resource. This step may also seem counter-intuitive, but it makes some sense if we think in terms of such concerns as the sustainability of the resource and environmental protection, where there are such concerns; and if we balance these concerns with that of ensuring that the utilization of the resource benefit humankind. Defining the objective may be even more challenging in the case of private-sector mining activities, and in any case may involve adaptations.

Following the example of the NZ Act, the requirements relating to sustainability and environmental protection could be formulated so that they require the preservation of original ecological systems and biodiversity and limit the introduction of plants and animals. These requirements could apply to the soil, subsoil, water, airspace, and any organisms within them.

The fourth step would be to set out which types of activity are permitted, who is able to pursue them, and which types of activity are prohibited—taking into account the dual objectives of sustainability and environmental protection (on the one hand) and utilization of space resources (on the other). The rules could provide that the activities must be performed in a manner that does not interfere with the ability of others to exercise their freedom of exploration and use of outer space any more than necessary for the performance of the specified permitted activities. The performance of these activities could also be made subject to conditions and restrictions necessary for public safety and to achieving the stipulated objectives of the legal person.

The freedom of exploration and use, set forth in Article I of the OST, means that everyone—not only the users specified by the legal person or stakeholders in it—may undertake activities with regard to the space resources, except the mining of space resources. Scientific research and tourism would be examples of activities open to all. However, the legal person would ideally have the power of reasonable regulation of such activities to prevent disruption to other legitimate activities, to maintain public safety, and to ensure sustainability and environmental protection.

The fifth step would be to establish the organs of the legal person, which would require a structure, powers, and the nomination of persons to occupy the various offices. These organs would include a board (similar to the one in the NZ Act) and a C-suite (CEO, CFO, and so on, which have no exact equivalent in the NZ Act). The board could represent both users (state and non-state actors) and the common interest of humankind. To ensure such representation, the users (*i.e.*, actors who extract or use space resources) would nominate some of the board members, whereas COPUOS—representing the common interest of humankind—would nominate the others. The board would nominate the C-suite.

The board would "have full capacity and all the powers reasonably necessary to achieve its purposes and perform its functions"[90] and would operate in conformity with the OST and with the instrument establishing the legal person. *Inter alia*, the board could have the power to "alienate[], mortgage[], charge[and] otherwise dispose[]" of parts of the

reservoir of the resource, as in section 17(1) of the NZ Act. The working procedure for the board could be similar to that of a regular corporation, *mutatis mutandis*.

Following the example of the NZ Act, the board may have the following powers and responsibilities, building on those stipulated in the NZ Act, adapted to the case:

(a) to act on behalf of, and in the name of, the legal person;
(b) to oversee the governance of the legal person in accordance with its goals and articles of association/establishing convention;
(c) to prepare and approve the management plan of the legal person;
(d) to advise the C-suite on the implementation of the management plan, including by means such as:
  (i) issuing an annual statement of priorities for implementing the management plan;
  (ii) undertaking any specified functions in relation to the annual operational plan for the legal person; and
  (iii) monitoring the implementation of the annual operational plan;
(e) to initiate proposals and make recommendations for:
  (i) increasing or decreasing the boundaries of the domain managed by the legal person, subject to approval in accordance to the articles of association/establishing convention;
  (ii) acquiring interests in new reservoirs of space resources; and
  (iii) establishing specially protected areas within the domain of the legal person where extraction of resources is limited or prohibited and other activities are encouraged, limited, or prohibited;
(f) to adopt rules and procedures for the operations of the legal person and any other actors and activities in the domain of the corporation, in conformity with the articles of association/establishing convention;
(g) to authorize activities that need special or specific authorization under the articles of association/establishing convention;
(h) to prepare or commission reports, advice, or recommendations on matters relevant to the purposes of the board;
(i) to promote or advocate for the interests of the corporation in any international forum, regulatory process, and public relations;
(j) to liaise with, advise, or seek advice from any international or national authority, agency, NGO, or other entity on matters relevant to the purposes of the board;
(k) to perform any other function of the board specified in the articles of association/establishing convention or in any other applicable regulation; and
(l) to take any other action that the board considers to be relevant and appropriate in achieving its purposes.

### Applying the Model to Space Habitats

The case of space habitats is different from that of space resources in one major respect: a space habitat is an artificial creation, not a natural one. We are specifically referring to a space habitat populated with humans that need to be governed. We are not referring to a robotic mission, as robots are operated rather than governed. Space resources are more similar to the natural park that is the subject matter of the NZ Act. To apply the model to space habitats would be to extend the scope of the model contemplated under the NZ Act and would require more adaptation. However, we believe that it is worth contemplating extending the scope of the model, as doing so provides valuable insights. The space habitats of the past and present—namely the space stations Mir and Skylab and the ISS—were and are populated by a handful of carefully picked personnel, meaning that the models of governance applied in these habitats may not be suitable for a fully fledged space habitat.

Through the model under the NZ Act concerns resources more than habitats; the prospect of applying the model under the NZ Act to space habitats would appear to be a more intuitive one. After all, recognizing legal personality in a settlement is already the norm on Earth. The first step would therefore be to recognize the legal personality in each space habitat.

The second step would be to incorporate each space habitat. For the purposes of doing so, the borders of the habitat would ideally be clearly defined. As in the case of the incorporation of a space resource, incorporating a space habitat would be difficult, owing to the space habitat being beyond any national sovereignty. As discussed above, establishing an IGO would be a viable option, although not without its difficulties. Yet unlike in the case of space resources, it would not be particularly complex (legally) to incorporate a space habitat under national laws. After all, corporations incorporated under national laws can—and do—operate in space. Incorporation under national laws especially suits cases where the habitat is established by a private corporation to begin with, like SpaceX' planned Mars habitat.

The third step would be to define the objectives of the legal person. In the case of the natural park in NZ and (possibly) of natural resources in space, these objectives would center on ensuring that the rights, powers, and duties of the legal person—exercised on behalf of and in the name of the natural park or space resource. Nothing of the kind needs to be ensured in the

case of a space habitat; being an artificial creation, the habitat would presumably be intended to serve the needs of its creators. The objectives of the legal person would therefore be those pursued in the establishment of the space habitat in the first place. To protect the public interest, it would be advisable for these objectives to incorporate the principles stipulated in Article I of the OST.

The fourth step would be to set out—in view of the objectives—which types of activities are permitted, who would be able to pursue them, and which types of activities are prohibited. As in the case of space resources, the rules would ideally provide that the activities must be performed in a manner that would not interfere with the ability of others to exercise their freedom of exploration and use of outer space—as recognized in the OST—any more than necessary for the performance of the specified permitted activities. It would be possible to make the performance of these activities subject to conditions and restrictions necessary for public safety and to achieving the objectives of the legal person.

The fifth step would be to establish the organs of the legal person, as in the case of space resources, *mutatis mutandis*. The main difference would be this: the legal person would have objectives of a different kind, not having been created to serve a natural resource but rather being an artificial habitat created to serve certain objectives. Therefore, the fiduciary-type duties of the organs and office holders would not be duties toward a natural resource but a function of the objectives of the habitat.

If an artificial habitat is registered under a single state, then that state, according to Article VIII of the OST, "shall retain jurisdiction and control … [over it] … and over any personnel thereof, while in outer space or on a celestial body …" If such a habitat floats in space, then the single state will have jurisdiction over it. This rule does not prevent implementation of the model under the NZ Act. On the contrary, the rule makes implementation easier, as now the implementation of the model will be within the sole remit of a single state, and will not raise the problem of international cooperation. However, the situation would change in the case of habitat placed on a celestial body, such as the Moon or Mars. It is true that in this case, the habitat itself (and everything inside it) would be under the jurisdiction of a single state, but not the surroundings of the habitat. Thus, when the inhabitants of this habitat left the habitat, even for a short while, Article VIII would not suffice for the determination of the applicable jurisdiction.

### Accountability of the Legal Entity

Article VII of the OST and the Liability Convention[91] provides rules on accountability and liability, making launching states (as defined in the treaties) accountable and liable for space activities and their consequences. It is common for national space legislation to require non-state entities conducting launches to purchase insurance to cover potential damage for which the state is liable, under the treaties. If legal personality is granted to space resources or habitats and they are established as IGOs, these IGOs—which are the subject of rights and duties like any other legal entity—will bear responsibility for activities under their domain, including liability for damages. The extension of accountability and liability to these IGOs could be effectuated by amendment to the space treaties or, more simply, by contractual provisions or by conditions in any licenses that they are granted—in the same way that states' responsibility is partially transferred today to non-state entities who perform space activities, namely via the insurance requirement. Such terms may be incorporated in the articles of association or constitution of the IGOs, which may also include provisions on the jurisdiction of courts or dispute resolution panels. If the legal person is incorporated under national law, then liability, insurance requirements and enforcement may be under national law (including private international law) today.

## CONCLUSIONS

This article presents a groundbreaking new model for the management of natural resources, introduced into NZ law in line with the worldview of the indigenous Māori. The NZ Act is the first statute in the Western legal tradition to grant legal personality to a natural resource—what was once Te Urewera National Park. The NZ Act is the product of two legal traditions: that of the Māori and the common law. We have examined the model provided by the NZ Act through the lens of the theory of Nobel Laureate Elinor Ostrom and her design principles for managing CPRs. Building on this analysis, we have envisaged a scenario for applying the model—adapted using Ostrom's theory—to the Moon and other space resources and to space habitats. We have shown that the model holds promise—or at least new ideas—for the governance of space resources and space habitats.

The model under the NZ Act is easily applied to space resources, being a direct equivalent to the natural resources to which the NZ Act applies. Moreover, the findings of Ostrom regarding efficient management of CPRs—to which category space resources belong—suggest that the application of the model under the NZ Act to space resources may turn out to produce efficient governance.

Applying the model under the NZ Act to space habitats would appear to be more intuitive, as recognizing legal personality in a settlement is already the norm on the Earth. However, a space habitat is an artificial creation, unlike the natural park in NZ or

space resources (which are natural). Applying the model to space habitats extends the scope of the model under the NZ Act and requires more adaptation.

This article is not necessarily a call to implement the model under the NZ Act—as is or with adaptations—to outer space. The article does call for considering different models of governance in space, whether for space resources or space habitats, or any other space-based governance. The article further calls for the consideration of a governance model that is independent, or semi-independent, from Earth. Indeed, in this still early stage of human presence in space—still restricted to the ISS—the governance model in place is direct and involves total subordination to Earth, via national space agencies. As humanity's presence in space expands in scope, space, and time, other models will prove more suitable, notably space-based governance. The model under the NZ Act may provide inspiration and ideas for alternative models for space-based governance.

Note: This article does not use macrons in words in the Māori language.

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## AUTHOR DISCLOSURE STATEMENT

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