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SPACE LAW, HUMAN RIGHTS AND
CORPORATE ACCOUNTABILITY

Steven Freeland* and Danielle Ireland-Piper**

ABSTRACT

The international legal regulation of outer space was founded on an assumption that space was (at that time) a new frontier that would enable a far broader range of activities on Earth and in space itself. This has raised important issues both as to the significance of fundamental human rights for space activities, as well as corporate accountability for conduct in outer space that may impact upon human rights. This is particularly so given the increasing involvement of the private sector in space activities. However, there has been relatively little detailed analysis to date of the interaction and intersection between the specific international legal regime of outer space and the international legal regulation of human rights. In that context, this Article undertakes two tasks. First, it establishes why the exploration and use of outer space should be increasingly considered from a human rights perspective. Second, it considers what issues arise in the context of corporate accountability for conduct in outer space affecting human rights. Ultimately, we support calls for a specific and specialised body with jurisdiction to adjudicate conduct by private actors in outer space.

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INTRODUCTION

Human activities in outer space affect life on Earth. Space-based technologies, such as remote sensing tools, can affect (positively and negatively) human health, agriculture, the environment, disaster management, access to education, transportation, communication, and the provision of humanitarian assistance. Space is also vulnerable to military and commercial exploitation. For these reasons and more, human activities in outer space have implications for the enjoyment and realization of human rights. Further, much of the activity in outer space is undertaken by private actors, including corporations.¹ By way of illustration, government space budgets amounted to approximately only 29 percent of the total space sector revenue in 2005 and only around 24 percent in 2015.² Private actors provided the remainder. The global space economy is now estimated to be in excess of US \$400 billion (and growing at eight to ten percent per annum). Approximately three-quarters of this is made up of commercial activities largely undertaken by the private sector.³

1. Christina Isnardi, *Problems with Enforcing International Space Law on Private Actors*, 58 COLUM. J. TRANSNAT'L L. 489, 495 (2020); see Dan St. John, *The Trouble with Westphalia in Space: The State Centric Liability Regime*, 40 DENV. J. INT'L L. & POL'Y 686, 686 (2012).

2. Isnardi, *supra* note 1, at 495; see Matthew Weinzierl, *Space, the Final Economic Frontier*, 32 J. ECON. PERSP. 173, 179 (2018).

3. The United Nations Office for Outer Space Affairs published in its 2020 Outcome Report that the global space economy is estimated that in 2018 the global space

The impact of activities in outer space on human rights and the engagement in those activities by private actors raises at least two questions. First, what is the relevance of human rights law to space law? Second, what issues might arise for corporate accountability in outer space where corporate conduct has consequences for human rights?

As a starting point, the international legal regulation of outer space is founded on an assumption that space was a new frontier, which raised important issues about the future of humanity. The magnitude of importance of space to humanity remains. This is so despite the realities associated with the rapid diversification of space activities to incorporate military uses. The importance of space to our humanity is also so despite the increasing involvement in outer space of commercial (private) enterprise whose agendas may not always match up with a spirit of sharing and community. Given this central “human” element to space activities, the interaction between the specific international legal regime of outer space and the international legal regulation of human rights should be the subject of more scholarship than has traditionally been the case. Apart from a small number of interesting commentaries,⁴ these two legal paradigms have largely been considered in isolation. This is perplexing given the formal codification of each regime coincided in history. The same actors were involved in the detailed conversations and negotiations that led to their finalization.

Notably, however, the rise of private actors began later in the early years of the 21st century. A “new era of commercial space business”⁵ commenced in outer space, raising issues about accountability for corporate conduct in space affecting the realisation of human rights. The reality is that there are gaps in space law when it comes to regulating private actors and legal uncertainty relating to corporate and personal nationality.

In that context, first, and by way of background, the basics of space law and human rights law are recapped to contextualize our discussion. Next, Part II of this Article seeks to establish why the exploration and

economy exceeded US \$400 billion. *The Space Economy Initiative*, U.N. OFFICE FOR OUTER SPACE AFFAIRS, <https://www.unoosa.org/oosa/en/ourwork/topics/space-economy/index.html> (last visited July 25, 2021) [<https://perma.cc/Y7ZY-4QLT>].

4. See, e.g., Irmgard Marboe, *Human Rights Considerations for Space Activities, in IN HEAVEN AS ON EARTH? THE INTERACTION OF PUBLIC INTERNATIONAL LAW ON THE LEGAL REGULATION OF OUTER SPACE* 135, 135 (Stephan Hobe & Steven Freeland eds., 2013); See also generally Danielle Ireland-Piper & Steven Freeland, *Human Rights and Space: Reflections on the Implications of Human Activity in Outer Space on Human Rights Law*, 9 GRONINGEN J. INT’L L. 101 (2021).

5. Isnardi, *supra* note 1, at 494.

use of outer space should increasingly be considered also from a human rights perspective. Part III considers examples of issues that may arise in the context of corporate accountability for conduct in outer space affecting human rights. Last, Part IV summarizes our conclusions.

A. What is Space Law?

Space law is comprised mainly of international law.⁶ There are currently five key international treaties specifically governing space: the Outer Space Treaty,⁷ the Rescue Agreement,⁸ the Liability Convention,⁹ the Registration Convention,¹⁰ and the Moon Agreement.¹¹ In essence, the Outer Space Treaty provides that the exploration and use of outer space is to be free, in the interests of all countries, and not subject to a claim of national sovereignty. The Moon and other celestial bodies are to be used only for peaceful purposes. States are prohibited from placing weapons of mass destruction in the Earth's orbit or outer space and the militarization of celestial bodies is forbidden.¹² States are internationally responsible for national space activities and internationally liable for damage caused by their space objects.¹³

The Rescue Agreement requires States to take all possible steps to rescue and assist astronauts in distress and promptly return them to the launching authority, and to provide assistance to launching States in recovering space objects that return to Earth outside their territory.¹⁴ Under the Liability Convention, which also provides procedures for the settlement of claims for damages, a launching State is, depending on

6. However, in recent times, we have seen in many countries a significant growth in the enactment of national space law, which both complements and supplements the rights and obligations that arise under the relevant treaty law.

7. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

8. Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 672 U.N.T.S. 119 [hereinafter Rescue Agreement].

9. Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 961 U.N.T.S. 187 [hereinafter Liability Convention].

10. Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 1023 U.N.T.S. 15 [hereinafter Registration Convention].

11. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, art. 11(7)(d) Dec. 18, 1979, 1363 U.N.T.S. 3 [hereinafter Moon Agreement].

12. Outer Space Treaty, *supra* note 7, art. IV; *see also* Moon Agreement, *supra* note 11, art. 3.

13. Outer Space Treaty, *supra* note 7, arts. VI, VII; *see also* Liability Convention, *supra* note 9, art. II.

14. Rescue Agreement, *supra* note 8, arts. 2, 4.

the circumstances, potentially liable to pay compensation for damage caused by its space objects.¹⁵

The Registration Convention requires States, and some intergovernmental organizations that have accepted its obligations, to establish national registries and provide information on their space objects to the United Nations (UN) Secretary-General.¹⁶ According to the UN Office for Outer Space Affairs, as of June 2020, over 88 percent of all satellites, probes, landers, crewed spacecraft, and space station flight elements launched into Earth orbit or beyond have been registered.¹⁷ However, the launch of large constellations of smaller satellites and the trend towards miniaturization may put some considerable pressure on the compliance rate in the future.¹⁸ Registration also occurs in accordance with UN General Assembly Resolution 1721B (which allows for notification of objects launched into space) and is still actively being undertaken by States that are not party to the Registration Convention.

The Moon Agreement reaffirms and elaborates on many of the provisions of the Outer Space Treaty relating to the Moon and other celestial bodies, such as the use of celestial bodies being exclusively for peaceful purposes, and the Moon and its natural resources being the “common heritage of [hu]mankind.”¹⁹ It also calls on State parties to the Moon Agreement to establish an international regime to govern the exploitation of resources when such exploitation is about to become feasible.²⁰

In addition to the five space treaties, there are also five key declarations and UN General Assembly principles relating to space: the Declaration of Legal Principles,²¹ the Broadcasting Principles,²² the

15. Liability Convention, *supra* note 9, art. II.

16. Registration Convention, *supra* note 10, art. IV.

17. *United Nations Register of Objects Launched into Outer Space*, U.N. OFFICE FOR OUTER SPACE AFFAIRS, <http://www.unoosa.org/oosa/en/spaceobjectregister/index.html> (last visited July 25, 2021) [<https://perma.cc/X7UX-89ME>].

18. See generally Steven Freeland, *Newspace, Small Satellites, and Law: Finding a Balance Between Innovation, a Changing Space Paradigm, and Regulatory Control*, in *NEWSPACE COMMERCIALIZATION AND THE LAW 107* (Md Tanveer Ahmad & Jinyuan Su eds., 2017).

19. Moon Agreement, *supra* note 11, art. 11(1).

20. *Id.* art. 11(5).

21. G.A. Res. 1962 (XVII), Declaration of Legal Principles Governing the Activities of States in the Exploration and Uses of Outer Space (Dec. 13, 1963) [hereinafter Declaration of Legal Principles].

22. G.A. Res. 37/92, Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting, princ. 2, 6, 11 (Dec. 10, 1982) [hereinafter Broadcasting Principles].

Remote Sensing Principles,²³ the Nuclear Power Source Principles,²⁴ and the Benefits Declaration.²⁵ We will not detail these here because they are not strictly binding and do not deal directly with issues of human rights. We mention them merely for completeness. The International Space Station Intergovernmental Agreement (IGA) is also an important source of law in space law. The IGA is an international agreement signed on January 29, 1998 by the nations involved in the Space Station project, as well as the European Space Agency.

In short, aside from general principles relating to the exploration and use of outer space, there are no specific binding instruments relating to individual human rights in space. Notwithstanding that, there is clear recognition of the need to be cognizant and take account of the “interests and needs of the developing countries,” in, for example, the Moon Agreement.²⁶

B. What Is International Human Rights Law?

International human rights law, along with international criminal law, recognises individual persons as the subject of rights and duties both between themselves and with respect to their relationship with a relevant State. As a starting point, the United Nations Charter, which came into force on October 24, 1945, opens with a commitment to “reaffirm faith in fundamental human rights, in the dignity and worth of the human person, in the equal rights of men and women and of nations large and small.” This language was subsequently adopted in the Preamble of Universal Declaration of Human Rights (UDHR) in 1948, along with a “recognition of the inherent dignity and of the equal and inalienable rights of all members of the human family is the foundation of freedom, justice and peace in the world” and that “human rights should be protected by the rule of law.”

The UDHR is one of three key instruments that make up the International Bill of Human Rights,²⁷ along with the International Covenant

23. G.A. Res. 41/65, Principles Relating to Remote Sensing of the Earth from Outer Space, princ. II, IX, XII, XIII (Dec. 3, 1986) [hereinafter Remote Sensing Principles].

24. G.A. Res. 47/68, Draft Resolution – Principles Relevant to the Use of Nuclear Power Sources in Outer Space, princ. 7(2)(b) (Feb. 23, 1993) [hereinafter Nuclear Power Source Principles].

25. G.A. Res. 51/122, Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries (Dec. 13, 1996) [hereinafter Use of Outer Space for Benefit and Interest of All States].

26. See Moon Agreement, *supra* note 11, art. 11(7)(d).

27. Note, there are also many other international agreements relating to human rights, such as: the International Convention on the Elimination of All Forms of Racial

on Civil and Political Rights (ICCPR),²⁸ and the International Covenant on Economic, Social and Cultural Rights (ICESCR),²⁹ both of which came into effect in 1976. The rights contained in the ICCPR are commonly treated as rights that should be free from State interference.³⁰ By contrast, the rights contained in the ICESCR are generally perceived to pose positive obligations, albeit in some circumstances on a “best efforts” basis. For example, Article 2(1) of the ICESCR provides that State parties to the present Covenant should take steps (particularly economic and technical steps), both individually and through international assistance and co-operation, to achieve “progressively” the full realization of the rights and do so to the “maximum of its available resources.”³¹

Discrimination, *opened for signature* Mar. 7, 1966, 660 U.N.T.S. 195; the Convention of the Elimination of All Forms of Discrimination against Women, *opened for signature* Mar. 1, 1980, 1249 U.N.T.S. 13; the Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment, *opened for signature* Dec. 10, 1984, 1464 U.N.T.S. 85; the Convention on the Rights of the Child, *opened for signature* Nov. 20, 1989, 1577 U.N.T.S. 3; the International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families, *opened for signature* Dec. 18, 1990, 2220 U.N.T.S. 3; the International Convention for the Protection of All Persons from Enforced Disappearance, *opened for signature* Dec. 20, 2005, 2716 U.N.T.S. 3. Also, a number of the foundational conventions have provided optional protocols, including: G.A. Res. 63/435, (Dec. 10, 2008); the Second Optional Protocol to the International Covenant on Civil and Political Rights, aiming at the abolition of the death penalty, *opened for signature* Dec. 15, 1989, 1642 U.N.T.S. 414; the Optional Protocol to the Convention on the Elimination of Discrimination against Women, *opened for signature* Oct. 6, 1999, 2131 U.N.T.S. 83; the Optional Protocol to the Convention on the Rights of the Child, on the Involvement of Children in Armed Conflict, *opened for signature* May 25, 2000, 2173 U.N.T.S. 222; the Optional Protocol to the Convention on the Rights of the Child, on the sale of children, child prostitution and child pornography, *opened for signature* May 25, 2000, 2171 U.N.T.S. 227; the Optional Protocol to the Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment, *opened for signature* Feb. 4, 2003, 2375 U.N.T.S. 237; the Optional Protocol to the Convention on the Rights of Persons with Disabilities, *opened for signature* Dec. 13, 2006, 2518 U.N.T.S. 283; and G.A. Res. 66/457 (Dec. 19, 2011).

28. International Covenant on Civil and Political Rights, *opened for signature* Dec. 19, 1966, 999 U.N.T.S. 171.

29. International Covenant on Economic, Social and Cultural Rights, *opened for signature* Dec. 19, 1966, 993 U.N.T.S. 3.

30. The Human Rights Committee has noted that states retain an obligation to facilitate the realisation of the rights under the International Covenant on Civil and Political Rights, *supra* note 28, through implementation of domestic law; Human Rights Committee; conversely, the State Parties must refrain from interfering with the rights in the International Covenant on Civil and Political Rights, *supra* note 28; U.N. Human Rights Comm., General Comment No. 31: The Nature of the General Legal Obligation Imposed on States Parties to the Covenant, paras. 6–8, U.N. Doc. CCPR/C/21/Rev.1/Add.1326 (Mar. 29, 2004).

31. *See, e.g.*, International Covenant on Economic, Social and Cultural Rights, *supra* note 29, art. 11 (enshrining the Right to Adequate Food. Due to the nature of the right and the qualitative nature of adequacy, the Committee on Economic, Social and Cultural Rights recognized in General Comment 12 that the ‘right to adequate food will have to be realized

On one hand, the ICCPR protects rights such as self-determination, liberty of freedom and movement, the equal rights of men and women, peaceful assembly, the freedom of thought and religion, and equality before the law. It also prohibits practices such as slavery, and arbitrary arrest and detention.³² On the other hand, the ICESCR includes, for example, the right to work; the right to enjoy just and favourable conditions of work; the right of all peoples to freely dispose of their natural wealth and resources; the right to an adequate standard of living, including adequate food, clothing, and housing; the right to the highest attainable standard of physical and mental health; the right to education; the right to take part in cultural life; and the right to enjoy the benefits of scientific progress and its applications.³³

Human rights obligations can apply extraterritorially. It is generally accepted that extraterritorial human rights obligations arise when a state has “effective control” of a territory or a person, although there has been debate as to whether the test should instead be one of “overall control.” In its advisory opinion, *Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory*,³⁴ the International Court of Justice held that State parties to the ICCPR should be bound to comply with its provisions, even when exercising jurisdiction outside national territory.³⁵ This means at the very least, human rights

progressively’); U.N. Comm. on Economic, Social and Cultural Rights (CESCR), General Comment No. 12: The Right to Adequate Food (Art. 11), para. 6 U.N. Doc. E/C.12/1999/5 (May 12, 1999). Generally, the CESCR has noted that States must take steps due to their obligations under the Covenant through implementation of approaches that progressively realize the rights contained; U.N. Comm. on Economic, Social and Cultural Rights (CESCR), General Comment No. 3: The Nature of States Parties’ Obligations (Art. 2, Para. 1, of the Covenant), para. 2, U.N. Doc. E/1991/23 (Dec. 14, 1990).

32. International Covenant on Civil and Political Rights, *supra* note 28, arts. 3, 21, 18, 26, 8, 9.

33. See, e.g., G.A. Res. 217 (III) A, Universal Declaration of Human Rights, Art. 27 (Dec. 10, 1948) [hereinafter UDHR] (includes the right to share in scientific advancement and its benefits, and Article 15(1)(b) of the ICESCR, which identifies “the right to enjoy the benefits of scientific progress and its applications”).

34. *Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory*, Advisory Opinion, I.C.J. Rep. 136 (July 2004).

35. *Id.* at 109. Note, in that case, Israel was found to be bound by its obligations under the ICCPR on the basis that it was exercising a type of territorial jurisdiction over Occupied Palestine. Note also, the decision of the European Court of Human Rights in the case of *Bankovic v. Belgium*, Eur. Ct. H.R. (2001). In that case, an application by six citizens of the Federal Republic of Yugoslavia complained that the bombing of a radio and television building by the North Atlantic Treaty Organization (NATO) during the Kosovo crisis in April 1999, in which several people were killed, violated the right to life in Article 2, and the freedom of expression in Article 10 of the European Convention on Human Rights. The Court declared the application inadmissible on the basis that there was no jurisdictional link between the victims of the act and the respondent States.

obligations may extend into the use of space and outer space where effective control is present. In some specific circumstances, the conduct of non-state actors, such as corporations, can be attributed to States. This means it is possible that human rights violations in space committed by corporations may give rise to State responsibility for that violation. However, there are specific rules on this issue and determining the nationality of a corporation can, in some circumstances, be challenging. We consider this later in the Article.

I. THE USE OF SPACE SHOULD BE CONSIDERED FROM A HUMAN RIGHTS PERSPECTIVE

There are a number of reasons why the exploration and use of outer space should be considered from a human rights perspective. These reasons include a “common genesis” in the parallel development of space law and human rights law, as well as the very real consequences of particular types of activities in outer space on the enjoyment and realization of human rights.³⁶

A. A Common Genesis

The legal regimes underpinning space law and international human rights law were both established during the post-World War II period.³⁷ The late 1940s saw a ratcheting up of distrust between the West and the East, giving rise to diplomatic tensions and, ultimately, the onset of the Cold War. This geopolitical rivalry saw the two main protagonists, the Soviet Union and the United States, intensify their efforts to build upon the weapons-related technology that had been developed during the war period, including in the area of rocket technology. Both superpowers made significant strides towards developing space capabilities and devoted significant resources towards that end.

On October 4, 1957, a Soviet space object, Sputnik I, was launched and orbited the Earth over 1400 times over a three-month period. This milestone heralded the dawn of the space age, the space race, and the legal regulation of the use and exploration of outer space. This launch was followed by an intense period of international discussion regarding how to best provide a framework of legal principles to regulate human activities in outer space, culminating in the first instance in the Outer Space Treaty.

The second World War also starkly illustrated the horrors of gross and systematic violation of human rights and human dignity. Prior to

36. See also generally Ireland-Piper & Freeland, *supra* note 4.

37. *Id.* at 104.

that time, there were barely any international instruments that specifically addressed the concept or content of fundamental rights of the individual. Indeed, the reference in the United Nations Charter to the international community's determination "to reaffirm faith in fundamental human rights, in the dignity and worth of the human person, in the equal rights of men and women and of nations large and small,"³⁸ was, in practical terms, a recognition of the need to codify these rights as a first step towards the promotion and protection of those ideals.

The first stages of this human rights "movement" saw the conclusion of several very significant legal instruments that set out to codify the fundamental rights and freedoms that underpin international human rights law. The "twin covenants" of 1966,³⁹ the previously mentioned ICCPR and ICESCR (both of which incorporated into treaty form the principles set out in the 1948 UDHR),⁴⁰ were being negotiated—sometimes quite fiercely—at the same time that the space race had begun and the most important ground-rules of space law were being developed.

In both instances, the same geopolitical rivalries and ideological differences shaped the final structure of each regime. The ICCPR and ICESCR were finalized by the UN General Assembly and opened for signature on December 16, 1966, just a matter of weeks before the Outer Space Treaty (January 27, 1967).

The development of these two legal regimes also coincided with a process of decolonization, largely under the stewardship of the United Nations system. Both the United Nations Charter and the twin covenants make express reference to the right of self-determination of "peoples."⁴¹ This galvanized action that ultimately led to the establish-

38. U.N. Charter.

39. International Covenant on Civil and Political Rights, *supra* note 28; International Covenant on Economic, Social and Cultural Rights, *supra* note 29. Collectively these two instruments are often referred to as the "twin covenants."

40. UDHR, *supra* note 33; Reference should also be made to other very significant treaties finalized at that time, including the Convention on the Prevention and Punishment of the Crime of Genocide, *opened for signature* Dec. 9, 1948, 78 U.N.T.S. 277; Geneva Convention for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field (First Geneva Convention), Aug. 12, 1949, 75 U.N.T.S. 31 [hereinafter First Geneva Convention]; Geneva Convention for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea, Aug. 12, 1949, 75 U.N.T.S. 85 [hereinafter Second Geneva Convention]; Geneva Convention Relative to the Treatment of Prisoners of War, Aug. 12, 1949, 75 U.N.T.S. 135 [hereinafter Third Geneva Convention]; Geneva Convention Relative to the Protection of Civilian Persons in Time of War, Aug. 12, 1949, 75 U.N.T.S. 287 [hereinafter Fourth Geneva Convention]; Convention for the Protection of Human Rights and Fundamental Freedoms, *opened for signature* Nov. 4, 1950, 213 U.N.T.S. 221 [hereinafter ECHR].

41. See U.N. Charter art. 1(2); International Covenant on Civil and Political Rights, *supra* note 28, art. 1(1); International Covenant on Economic, Social and Cultural Rights,

ment of a significant number of new States in the period between the 1950s and 1970s, mostly in Asia and Africa.⁴² Most of these new States were established as a result of decolonization, and with this newly-won independence came the clear resolve of those States to be *fiercely* independent and to reject as much as possible the geopolitics and single-minded resource exploitation that had existed during the time of colonialism.

This insistence by “non-space faring countries” on being recognised within the fundamental legal framework for outer space is reflected, for example, by the opening Article of the Outer Space Treaty, which demands that the exploration and use of outer space shall be carried out “for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development,” and that space “shall be free for exploration and use by *all* States [i.e. not just limited to States parties to the treaties] without discrimination of any kind, on a basis of equality and in accordance with international law (emphasis added).”

Nonetheless, the 1950s to 1970s were also characterized by an increasing divide, both in actual and ideological terms, between what became known as “developed” and “developing” States—a division that formed an important, and sometimes controversial,⁴³ element in the formulation of various space law source documents.⁴⁴ Moreover, the overall trusteeship of the two international legal regimes remains to a large degree (although not exclusively) within the United Nations; space law through the UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS) and the UN Office of Outer Space Affairs (UNOOSA), as well as human rights law through a series of Charter Bodies; including the Office of the High Commissioner for Human Rights (OHCHR); the Human Rights Council (which replaced the UN Commission on Human Rights in 2006), and the Economic and Social Council (ECOSOC); and various UN Treaty Bodies such as the Human Rights Committee, which was established to monitor compliance with the ICCPR.

In addition to their shared historical antecedents, the lack of a coordinated analysis of these coinciding regimes is also at odds with

supra note 29, art. 1(1).

42. For example, at the time of the adoption of the UDHR in 1948, the membership of the United Nations stood at 56. By 1967, when the twin covenants and the Outer Space Treaty had been finalized, this number had more than doubled.

43. Moon Agreement, *supra* note 11.

44. See Broadcasting Principles, *supra* note 22; Remote Sensing Principles, *supra* note 23; G.A. Res. 47/68, *supra* note 24; G.A. Res. 51/122, *supra* note 25.

the structure of outer space regulation itself. It is undisputed that, from a “legal rules” perspective, the international regulation of outer space—past, present, and future—is “embedded” in international law. It is not an esoteric and separate paradigm limited solely to the *lex specialis* of space law. In a sense, this is an obvious point, particularly given the complexity of human activities in space and their impacts on all of us, but one that is worthwhile emphasizing.

The space-related instruments cannot and do not purport to provide a comprehensive legal framework for every activity or for every contingency that may arise. Whilst it is clear that the fundamental principles in the UN Space Treaties, particularly the Outer Space Treaty, are relevant and applicable to all space activities, there are *lacunae* within these instruments with respect to the specifics of many space activities. This trend continues to become increasingly apparent as new uses of space are being contemplated, developed, and undertaken that would almost certainly have been outside of the contemplation of the drafters of those documents in the 1960s and 1970s. In short, notwithstanding the continuing applicability of the fundamental framework of space principles, it will become increasingly necessary to draw upon other areas of (international) law to seek to resolve a particular dispute.

This is also a logical consequence of the wording used in Article III of the Outer Space Treaty, which requires that activities in the exploration and use of outer space are to be carried out “in accordance with international law, including the Charter of the United Nations.”⁴⁵ Various authors have previously sought to highlight this point in relation to other international law contexts,⁴⁶ and it remains no less relevant when it comes to the relationship between the regulation and conduct of outer space activities and the fundamental human rights of individuals on Earth.

We now reflect on these issues with a view to advancing dialogue on the intersection between space activity, space law, and international human rights law. We do so by considering the impacts of certain aspects of extra-terrestrial activity, such as access to space and remote sensing-activities, space debris, assertions of criminal jurisdiction

45. Outer Space Treaty, *supra* note 7, art. III.

46. See, e.g., Ram Jakhu & Steven Freeland, *The Relationship between the United Nations Space Treaties and the Vienna Convention on the Law of Treaties*, in PROCEEDINGS OF THE INTERNATIONAL INSTITUTE OF SPACE LAW 375 (Scott Hatton ed., Eleven International Publishing, 2012); Ram Jakhu & Steven Freeland, *The Sources of International Space Law*, in PROCEEDINGS OF THE INTERNATIONAL INSTITUTE OF SPACE LAW 461 (Scott Hatton ed., Eleven International Publishing, 2012).

in outer space, space mining, and the weaponization and militarization of space.

B. The Consequence of Human Activities in Outer Space on Human Rights

Human activities in outer space may impact the realization and enjoyment of a number of human rights, including rights related to access to space and to the information gathered in space.

1. Rights Relating to Access and Information

Human access to outer space has increased, and this trend will undoubtedly continue. However, this does not necessarily represent an equality of access. At present, of the 195 Member States of the United Nations, approximately 70 to 80 are engaged in space activities and thus involved in domestic capability development (i.e., development of technical capacity to access space) to allow them to participate actively in directly accessing space. Of course, viewed from another perspective, this also means that somewhere approaching two-thirds of the world's countries do not currently have *any* indigenous space capability whatsoever, placing them at an increasing comparative disadvantage over time and rendering them entirely dependent on others for access to space infrastructure and, indeed, access to space itself. If these "taps" are turned off, this would have profound implications for the lives and livelihoods of the communities within those countries.

a. The Right to Enjoy the Benefits of Scientific Progress and its Applications

This issue of access to outer space, and the associated ensuing benefits, have consequences for the right to enjoy the benefits of scientific progress (REBSP) and its applications, as enshrined in Article 27 of the UDHR, which stipulates that "everyone has the right . . . to share in scientific advancements and its benefits;" and in Article 15 of the ICESCR, which recognises "the right of everyone to enjoy the benefits of scientific progress and its applications." In turn, this right is "especially connected"⁴⁷ to other rights including, but not limited to, the right to education (in Articles 13 and 14 of the ICESCR, for example), the right to seek, receive, and impart information (in Article 19 of the UDHR, for example) and the right to development, such as is recognised in the United Nations Declaration on the Right

47. UNESCO Experts' Meeting on the Right to Enjoy the Benefits of Scientific Progress and its Applications Programme and Meeting Document, SHS/RSP/HRS-GED/2009/PI/H/1, 5 (July 17, 2009) [hereinafter Experts' Meeting on Scientific Progress].

to Development.⁴⁸ The connection between these rights and human activities in space is particularly pronounced given the humanitarian applications of space technologies and access, such as remote sensing technologies that enable the delivery of humanitarian aid and monitor the Earth's climate. Further, in a general sense, the REBSP "is important to redress the negative effects of globalization and to eradicate poverty."⁴⁹

It is also true, however, that "individuals should be protected from possible negative effects of scientific and technological progress on the enjoyment of human rights."⁵⁰ One way in which these competing interests arise relates to the capability to access space for the purpose of remote sensing. Remote sensing is conducted via satellites and aircrafts that detect and record imagery.⁵¹ Some satellite images are commercially available, with such images "becoming sharper and taken more frequently."⁵² In 2008, there were 150 Earth observation satellites in orbit; by June 2019, there were 768.⁵³ These numbers are set to increase even more dramatically with the advent of proposed large constellations of small Earth observation satellites. The Principles relating to Remote Sensing of the Earth from Outer Space describe remote sensing as "making use of the properties of electromagnetic waves emitted, reflected or diffracted by the sensed objects, for the purpose of improving natural resources management, land use, and the protection of the environment."⁵⁴

Remote-sensing technologies have humanitarian applications, including assisting in promoting access to, for example, the right to education through remote delivery and the advancement of scientific knowledge. The right to education is recognised in Article 26 of the UDHR, as well as in Article 28 of the Convention on the Rights of the Child,⁵⁵ and Article 13 of ICESCR. Given the agricultural applica-

48. G.A. Res 41/128, Declaration on the Right to Development, U.N. Doc. A/RES/41/128 (Dec. 4, 1986).

49. Experts' Meeting on Scientific Progress, *supra* note 47, at 4.

50. *Id.* at 5.

51. *What is Remote Sensing?*, EARTHDATA, <https://earthdata.nasa.gov/learn/backgrounders/remote-sensing> (last updated Mar. 10, 2021 at 9:59 AM) [<https://perma.cc/ZT28-6QFZ>].

52. Christopher Beam, *Soon, Satellites Will Be Able to Watch You Everywhere All the Time: Can Privacy Survive?*, MIT TECH. REV. (June 26, 2019), <https://www.technologyreview.com/2019/06/26/102931/satellites-threaten-privacy> [<https://perma.cc/M53L-7BQG>].

53. *Id.*

54. Remote Sensing Principles, *supra* note 23, princ. I.

55. Convention on the Rights of the Child, *supra* note 27, at 12; International Covenant on Economic, Social and Cultural Rights, *supra* note 29, art. 13.

tions of these technologies, there are also consequences for the right to food, as recognised in Article 2 of the ICESCR and further articulated in General Comment No. 12, and the right to safety (from, for example, natural disasters). Incidentally, the right to food is a significant right because it is “indivisibly linked to the inherent dignity of the human person and is indispensable for the fulfilment of other human rights.”⁵⁶

However, such technologies and the data collected can also be used to achieve national security objectives, some of which are consistent with human rights objectives, but others less so. For example, in the United States, the U.S. Commercial Space Launch Competitiveness Act refers to “the need to protect national security while maintaining United States private sector leadership in the field, and reflect the current state of the art of remote sensing systems, instruments, or technologies.”⁵⁷ The reality is that there will at some point always be tension in balancing the need to protect national security on the one hand, and the commitment to provide the full gamut of available human rights to the populous on the other.

Recognition of the link between remote sensing and various human rights issues is evident in, for example, the UN Resolution 41/65, Principles Relating to Remote Sensing of the Earth from Outer Space,⁵⁸ which mirrors sentiments expressed in Article I of the Outer Space Treaty, and provides that remote-sensing “shall be carried out for the benefit and in the interests of all countries,” and also taking “into particular consideration the needs of the developing countries.”⁵⁹ Principle III calls for compliance with international law. Principles X and XI provide that remote sensing should help protect the natural environment on Earth and humans from natural disasters.

The Outer Space Treaty contains no explicit mention of remote-sensing technologies.⁶⁰ The nuance in this context is that, while the sensing itself may take place in “space,” much of the data gathered will relate to activities and information on Earth. This means international human rights law is certain to apply.

56. Substantive Issues Arising in the Implementation of the International Covenant on Economic, Social and Cultural Rights on Its Twentieth Session, General Comment No. 12: The Right to Adequate Food (Art. 11), para. 4, U.N. Doc. E/C.12/1999/5 (May 12, 1999).

57. U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114–90, § 202, 129 Stat. 704, 720.

58. Remote Sensing Principles, *supra* note 23.

59. *Id.*, princ. II.

60. I. H. Ph. Diederiks-Verschoor, *Current Issues in Remote Sensing*, 5 MICH. J. INT’L L. 305, 308 (1984).

b. The Right to Privacy

Remote-sensing technologies also have consequences for the right to privacy, a right recognised in Article 12 of the UDHR and Article 17 of the ICCPR, among others. Privacy advocates have warned that innovation in satellite imagery is outpacing its regulation and this means that private actors will have access to images that previously only intelligence services could have obtained.⁶¹

Erosions in privacy matter because “privacy give[s] us the ability to assert our rights in the face of significant power imbalances” and “is an essential way we seek to protect ourselves . . . from others who may wish to exert control.”⁶² Thus, there is tension between information gathering and humanitarian causes on the one hand, and privacy rights on the other. Put simply, the right of privacy—apart from being an important right as such—is an enabler of the exercise of several other human rights and a cornerstone of any democratic society.

It is also relevant to note that the broadly stated right of privacy found in various human rights instruments, in practice is often protected and operationalised via detailed data privacy laws, such the well-known General Data Protection Regulation (GDPR) of the European Union.⁶³ These instruments may impose significant limitations on certain space activities. For example, Article 3(2)(b) of the GDPR makes clear that the “Regulation applies to the processing of personal data of data subjects who are in the Union by a controller or processor not established in the Union, where the processing activities are related to: [...] monitoring of their behaviour as far as their behaviour takes place within the Union.” Thus, where satellite imagery captures “personal data” of a data subject who is in the European Union, the rules of, and potential high fines associated with, the GDPR apply. Furthermore, Article 3(3) of the GDPR states that: “This Regulation applies to the processing of personal data by a controller not established in the Union, but in a place where Member State law applies by virtue of public international law.” As discussed in detail by Svantesson,⁶⁴ exactly how this provision

61. Beam, *supra* note 52.

62. *What Is Privacy?*, PRIV. INT'L (Oct. 23, 2017), <https://privacyinternational.org/explainer/56/what-privacy> [<https://perma.cc/Z5M3-K2EX>].

63. Regulation 2016/976 of the European Parliament and of the Council of 27 April 2016 on the Protection of Natural Persons with Regard to the Processing of Personal Data and on the Free Movement of Such Data, and Repealing Directive 95/46/EC (General Data Protection Regulation), 2016 O.J. (L 119) 1.

64. Dan Jerker B. Svantesson, *Article 3. Territorial Scope*, in *THE EU GENERAL DATA PROTECTION REGULATION (GDPR): A COMMENTARY* 74, 92–95 (Christopher Kuner et al. eds., 2020).

applies is unsettled. However, it seems possible to conclude that it may extend the operation of the GDPR to certain space activities.

We now move to consider the issues of space debris and space mining. Both activities raise issues about access, safety, and the emerging right to a safe environment.

C. Rights Relating to Life and the Environment

The right to life is enshrined in international human rights law by virtue of, for example, Article 6 of the ICCPR. Further, the right to a clean environment is considered an emerging right connected to other rights, such as those relating to safety, self-determination, food, and so forth, particularly in the context of a warming planet and the challenges to human life posed by climate change. While the right to a healthy environment has not yet been expressly incorporated into an international convention, it is reflected in various forms in many national constitutions.⁶⁵ There is broad consensus that the protection of the environment “is a vital part of contemporary human rights doctrine and a sine qua non [essential element] for numerous rights, such as the right to health and the right to life.”⁶⁶

Space debris—sometimes referred to as “space junk”⁶⁷—represents one of the greatest challenges for the long-term environmental sustainability of space activities. According to estimates, as of January 2019, there were more than 128 million pieces of debris smaller than one centimetre, about 900,000 pieces of debris one to ten centimetre in length, and around 34,000 pieces larger than ten centimetre in the Earth’s orbit.⁶⁸ Space debris is typically comprised of orbital debris and natural debris.⁶⁹ Space debris principally comprises of space objects (satellites) that have reached their end of life, various launch stages (for example, rocket bodies or upper stages of launch vehicles), and the

65. DAVID R. BOYD, *THE ENVIRONMENTAL RIGHTS REVOLUTION: A GLOBAL STUDY OF CONSTITUTIONS, HUMAN RIGHTS, AND THE ENVIRONMENT* (2011).

66. Gabcikovo Nagymaros Project (Hung./Slovk.), Judgment, 1997 I.C.J. 88, 91–92 (Sept. 1997) (separate opinion by Weeramantry, Vice President); ASIA PACIFIC F. OF NAT’L HUM. RTS. INSTITUTIONS, *HUMAN RIGHTS AND THE ENVIRONMENT BACKGROUND PAPER 33–34* (2007); HUMAN RIGHTS AND EQUAL OPPORTUNITY COMMISSION, *HUMAN RIGHTS AND CLIMATE CHANGE BACKGROUND PAPER 3–4* (2008).

67. Mark Garcia, *Space Debris and Human Spacecraft*, NAT’L AERONAUTICS & SPACE ADMIN. (last updated May 27, 2021), https://www.nasa.gov/mission_pages/station/news/orbital_debris.html [<https://perma.cc/4AVL-GCYW>].

68. *Space Debris by the Numbers*, EUR. SPACE AGENCY (last updated Aug. 12, 2021), https://www.esa.int/Safety_Security/Space_Debris/Space_debris_by_the_numbers, [<https://perma.cc/CJ9A-F3EA>].

69. Steven Freeland, *Orbital Space Debris*, in *ESSENTIAL CONCEPTS OF GLOBAL ENVIRONMENTAL GOVERNANCE 175–77* (Jean-Frederic Morin and Amandine Orsini eds., 2020).

remnants of space objects from explosions, conjunctions or deliberate destruction, but also includes other items that are deliberately or accidentally released during a space mission.

The issue of space debris poses obvious threats of property damage, safety, and in the case of severe collisions, the right to life. Congestion and ensuing safety risks also potentially have implications for equality of access to space (and therefore the knowledge and information rights discussed above). There are also likely risks to the natural environment. In the same way that plastics pose risks to the marine environment and therefore, to any ensuing human rights enjoyments, this may also prove to be true of debris in our atmosphere.

In more general terms, the avoidance of a “tragedy of the commons” scenario⁷⁰ is crucial if humankind is to garner the maximum benefit from what space can offer.

Efforts to address the issue of mitigation guidelines include the *IADC Space Debris Mitigation Guidelines*,⁷¹ and the *United Nations Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space (UN Space Debris Guidelines)*.⁷² Regional organisations, including the European Space Agency (ESA),⁷³ and domestic space agencies including those of China,⁷⁴ France,⁷⁵ Germany,⁷⁶ Japan,⁷⁷

70. See Garrett Hardin, *The Tragedy of the Commons*, 162 *SCIENCE* 1243 (1968). For a discussion of the implications of the tragedy of the commons to the use of outer space, see generally Steven Freeland, *Common Heritage, Not Common Law: How International Law Will Regulate Proposals to Exploit Space Resources*, 35 *QUESTIONS INT'L L.* 19 (2017).

71. Inter-Agency Space Debris Coordination Committee [IADC], *IADC Space Debris Mitigation Guidelines* IADC Doc. 02–01 (Sept. 2007), https://orbitaldebris.jsc.nasa.gov/library/iadc_mitigation_guidelines_rev_1_sep07.pdf [<https://perma.cc/F3MB-M2M2>].

72. G.A. Res. 62/217, *International Cooperation in the Peaceful Uses of Outer Space* (Feb. 1, 2008).

73. See JOHNSON ET AL., *ORBITAL DEBRIS MANAGEMENT & RISK MITIGATION* 23 (2012) (citing *SPACE DEBRIS MITIGATION HANDBOOK* (1999); *SPACE DEBRIS SAFETY AND MITIGATION STANDARD* (2000)) [hereinafter JOHNSON ET AL.].

74. See Comm'n for Sci., Tech. and Indus. for Nat'l Def. [COSTIND], *Requirements for Space Debris Mitigation*, COSTIND Doc. QJ3221–2005 (2015).

75. See LOI n° 2008–518 du 3 juin 2008 relative aux opérations spatiales [French Space Operations Act n°2008-518 of 3 June 2008] (June 3, 2008) (Fr.); Arrêté du 31 mars 2011 relatif à la réglementation technique en application du décret n° 2009–643 du 9 juin 2009 relatif aux autorisations délivrées en application de la loi n° 2008–518 du 3 juin 2008 relative aux opérations spatiales [Decree on Technical Regulation issued pursuant to Act n°2008-518 of 3 June 2008, 31 March 2011] (Mar. 31, 2011) (Fr.) [<https://perma.cc/7HZ3-463H>].

76. See European Space Agency, 1 *European Code of Conduct for Space Debris Mitigation* (June 28, 2004) [hereinafter *ECCSDM*].

77. See Japan Aerospace Exploration Agency [JAEA], *Space Debris Mitigation Standard*, JAEA Doc. JMR-003C (2014).

the United Kingdom,⁷⁸ the United States,⁷⁹ and Russia⁸⁰ have also developed guidelines.⁸¹ NASA has developed programs such as LEGEND and ORDEM 3.0 to predict future debris environment.⁸²

There have been, for example, discussions around utilising nets and harpoons to capture debris, and tethers, drag augmentation devices, and solar sails to remove debris.⁸³ However, there has been little discussion of the human rights implications of the increasing proliferation of space debris, and we argue that the issue must also be considered from a human rights perspective.

Another space activity with implications for human rights is that of space mining. The Solar System is replete with resources such as water, minerals, and precious metals found on moons and asteroids. These resources have attracted interest from both scientists and entrepreneurs. Not only are such resources of enormous potential financial value if transported back to Earth, they may also assist in further onward space travel and the building of future settlements and outposts. While technological equipment required for space mining is still very much in its developmental phases,⁸⁴ rapid progress is being made. For example, a collection of rock samples was taken from the asteroid Ryugu by

78. See UK SPACE AGENCY, <https://www.gov.uk/government/organisations/uk-space-agency> (last visited Oct. 21, 2021); see also Outer Space Act, 1986 (UK), available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/295760/outer-space-act-1986.pdf [<https://perma.cc/8EXG-6J9R>].

79. See, e.g., U.S. Gov't, *Orbital Debris Mitigation Standard Practices* (2001); NASA Office of Safety and Mission Assurance, *Procedural Requirements for Limiting Orbital Debris and Evaluating the Meteoroid and Orbital Debris Environments*, NASA Doc. NPR 8715.6B (Feb. 16, 2017).

80. See Federal Law of August 20 1993, No. 5663-I (Russ.); Federal Law of July 13 2015, No. 215-FZ (Russ.); Federal Law of June 29 2015, No. 162-FZ (Russ.) [<https://perma.cc/Y3WX-86R4>]; Order of the Federal Agency for Technical Regulation and Metrology, *Space Technology Items: General Requirements for Space Vehicles for Near-Earth Space Debris Mitigation*, Doc. GOST R 52925–2018 (Sept. 21, 2018) [<https://perma.cc/E3CL-3RBN>]. See also Federal Space Program of Russia for 2016–2025 (approved by the Russian Federation Government Decree of Mar. 23, 2016 N 230) [<https://perma.cc/LZ8J-EXYD>]; Fundamentals of the Russian Federation's State Policy in the Field of Space Activities for the Period up to 2030 and Beyond (approved by the President of the Russian Federation on April 19, 2013 N Pr-906).

81. JOHNSON ET AL., *supra* note 73, at 23.

82. *Id.* at 5.

83. DONALD J. KESSLER ET AL., *LIMITING FUTURE COLLISION RISK TO SPACECRAFT: AN ASSESSMENT OF NASA'S METEOROID AND ORBITAL DEBRIS PROGRAMS* 59 (Nat'l Academies Press, 2011).

84. See Vanessa Zhou, *Mining Beyond the Ends of the Earth*, AUSTRALIAN MINING (May 5, 2021), <https://www.australianmining.com.au/features/mining-beyond-the-ends-of-the-earth/>; Virginie Blanchette-Seguín, *Reaching for the Moon: Mining in Outer Space*, 49 N.Y. U. J. INT'L L. AND POL. 959, 969 (2017).

Japanese spacecraft Hayabusa-2 in 2019.⁸⁵ This collection occurred approximately 300 million kilometres from Earth, with its successful return landing occurring at Woomera, Australia in December 2020.⁸⁶

The legalities of space mining turn on a myriad of issues, including interpretation of the Outer Space Treaty, the Moon Agreement (for its small number of State Parties), and how the global commons principle manifests in outer space.⁸⁷

The obvious starting point for a human rights analysis of space mining is that space belongs to everyone. As noted at the outset, Article III of the Outer Space Treaty requires that:

States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the Moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international co-operation and understanding.⁸⁸

There are a number of conflicting rights that arise here. International law does recognise a sovereign right to natural resources, which has long been accepted.⁸⁹ However, little is known about the potential impact of mining in space on environmental stability both in space and on Earth. This is potentially problematic in several ways, including in the context of “emerging rights to a clean and healthy environment.”⁹⁰ Given this uncertainty, the precautionary principles and the principle of intergenerational equity may be relevant to the extent that they might be applicable to activities carried out in outer space. Naturally, however, there are questions as to how and to what extent these (and other terrestrial international law principles) can be adapted to appropriately apply to the unique legal environment of space.

85. Steven Freeland & Annie Handmer, *Giant Leap for Corporations? The Trump Administration Wants to Mine Resources in Space, but is it Legal?*, CONVERSATION (Apr. 20, 2020), <https://theconversation.com/giant-leap-for-corporations-the-trump-administration-wants-to-mine-resources-in-space-but-is-it-legal-136395> [https://perma.cc/W83J-P9S9].

86. *Id.*

87. Interview with Steven Freeland, SPACEWATCH ASIA PACIFIC (Apr. 6, 2020) <[https://spacewatch.global/2020/04/spacewatchgl-perspective-john-sheldon-on-the-us-executive-order-1-2-2-2-2-2/](https://spacewatch.global/2020/04/spacewatchgl-perspective-john-sheldon-on-the-us-executive-order-1-2-2-2-2/)> [hereinafter Steven Freeland Interview]. Note, however, that the Executive Order issued by the Trump Administration on April 6, 2020 asserted that, from the perspective of the United States, outer space was *not* to be regarded as a “global commons.”

88. Steven Freeland & Ram Jakhu, *What's Human Rights Got to do With Outer Space? Everything!*, in PROCEEDINGS OF THE INTERNATIONAL INSTITUTE OF SPACE LAW 2014 365, 370 (Rafael Moro-Aguilar, P.J. Blount & Tanja Masson-Zwaan eds., Eleven International, 2014) (citing *Outer Space Treaty*, *supra* note 7, art 3).

89. G.A. Res. 1803 (XVII), Permanent Sovereignty Over Natural Resources, U.N. Doc. A/RES/3171 (Dec. 17, 1973).

90. Experts' Meeting on Scientific Progress, *supra* note 47, at 5.

The precautionary principle urges caution where environmental outcomes are uncertain. One of the better-known iterations of the principles can be found in Principle 15 of the *Rio Declaration on Environment and Development*. The *Rio Declaration* states that in order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.⁹¹

Since then, the principle has gained recognition in a plethora of multilateral environmental agreements and in domestic laws and policies, including those that deal with “climate change, biodiversity, endangered species, fisheries management, wildlife trade, food safety, pollution controls, chemicals regulation, exposure to toxins, and other environmental and public health issues.”⁹² The precautionary principle might possibly be relevant, although not necessarily directly applicable, to both human rights and human activities in outer space, particular given that so much is unknown about the environmental consequences for Earth of destabilizing the Moon through mining activities.

Further, the principle of intergenerational equity, a related concept, is based on the notion that every generation holds the Earth in common not only with members of the present generation, but also with future generations.⁹³ In turn, the principle calls for fairness between “generations in the use and conservation of the environment and its natural resources.”⁹⁴

In international law, the principle builds upon the use of equity and for this reason, is connected to human rights law and enumerated principles of equal rights before the law. In short, equity in this context requires “that each generation pass on the planet in no worse condition than received and have equitable access to its resources.”⁹⁵ This, and other concerns, give context to calls for “great swathes of the

91. U.N. Conference on Environment and Development, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/26/Rev.1 (Vol. I), annex I, princ. 15 (Aug. 12, 1992).

92. Deborah Peterson, *Precaution: Principles and Practice in Australian Environmental and Natural Resource Management*, PRODUCTIVITY COMM’N PRESIDENTIAL ADDRESS, 50TH ANN. AUSTRALIAN AGRIC. & RES. ECON. SOC’Y CONF. 8 (Feb. 10, 2006), <https://www.pc.gov.au/research/supporting/precaution/precaution.pdf> [<https://perma.cc/9LK2-RHN7>].

93. Edith Brown Weiss, *Intergenerational Equity*, in MAX PLANCK ENCYCLOPEDIA OF INTERNATIONAL LAW (2020).

94. *Id.*

95. Edith Brown Weiss, *Climate Change, Intergenerational Equity, and International Law*, VT. J. ENV’T L. 615, 622–23 (2008).

solar system” to be “preserved as official ‘space wilderness’ to protect planets, moons and other heavenly bodies from rampant mining and other forms of industrial exploitation.” For example, one proposal “calls for more than 85% of the solar system to be placed off-limits to human development.”⁹⁶

In this regard, it is pertinent to note that Article 4 of the Moon Agreement specifically requires that “[d]ue regard shall [*inter alia*] be paid to the interests of present and future generations” Notwithstanding that this treaty has a low number of ratifications, its terms had been agreed through a consensus process at UNCOPUOS, including reference to this recognition of the concept of intergenerational equity.⁹⁷

Further, tensions over natural resource exploitation on Earth have previously escalated international relations into armed conflicts in human history. There is a genuine concern that the same risks exist in relation to competing claims to resources in outer space. Notwithstanding this, countries including Luxemburg, the United Arab Emirates (UAE), and the United States, have indicated, through their domestic laws, an intention to facilitate and regulate space mining. Luxembourg passed legislation in 2017 “granting businesses operating within its jurisdiction rights in resources extracted in outer space.”⁹⁸ That legislation asserts that “space resources are capable of being appropriated in accordance with international law.”

In the UAE, Federal Law No. (12) of 2019 on the Regulation of The Space Sector,⁹⁹ expressly contemplates permits for the exploration, exploitation, and use of Space Resources.¹⁰⁰ In 2015, the US adopted

96. Ian Sample, *Protect Solar System from Mining ‘Gold Rush’; Say Scientists*, GUARDIAN (May 13, 2019), <https://www.theguardian.com/science/2019/may/12/protect-solar-system-space-mining-gold-rush-say-scientists> [<https://perma.cc/M2SY-UZK6>].

97. G.A. Res. 34/68, art. 4.

98. LOI DU 20 JUILLET 2017 SUR L’EXPLORATION ET L’UTILISATION DES RESSOURCES DE L’ESPACE [LAW OF 20 JULY 2017 ON THE EXPLORATION AND USE OF SPACE RESOURCES] art. 1 (Vincent Wellens trans.) (Lux.) [hereinafter LUXEMBOURG SPACE LAW]; See also the discussion of Luxembourg’s contentious space mining laws as compared with Article II of the Outer Space Treaty in Philip De Man, *Luxembourg Law On Space Resources Rests On Contentious Relationship With International Framework* 5 (Ku Leuven, Leuven Ctr. for Glob. Governance Stud., Inst. for Int’l L., Working Paper No. 189 2017).

99. FEDERAL LAW NO. (12) OF 2019 ON THE REGULATION OF THE SPACE SECTOR (U.A.E) (corresponding to 22 Rabi’ Al-Akhar 1441H); See also, Kelsey Warner, *UAE Looks To Regulate Asteroid Mining As It Aims To Lure Private Space Sector*, NATIONAL (Nov. 26, 2019), <https://www.thenational.ae/uae/science/uae-looks-to-regulate-asteroid-mining-as-it-aims-to-lure-private-space-sector-1.943028> [<https://perma.cc/33DY-UFTB>]; Sam Bridge, *New UAE Space Law to open doors to foreign investment*, ARABIAN BUS. INDUS. (Feb. 28, 2020), <https://www.arabianbusiness.com/technology/441175-new-uae-space-law-to-open-doors-to-foreign-investment> [<https://perma.cc/HW9M-KJH5>].

100. FEDERAL LAW NO. (12) OF 2019 ON THE REGULATION OF THE SPACE SECTOR, *supra*

the US Commercial Space Launch Competitiveness Act (H.R.2262)¹⁰¹ to facilitate “commercial exploration for and commercial recovery of space resources by United States citizens.”¹⁰²

More recently, NASA and several partner countries (Australia, Canada, Italy, Japan, Luxembourg, United Arab Emirates, United Kingdom, and the United States of America) signed the Artemis Accords. The Artemis Accords establish principles “to guide space exploration cooperation among nations participating in the agency’s 21st century lunar exploration plans.”¹⁰³ The Artemis Accords are intended to reinforce the Outer Space Treaty, the Registration Convention and “other norms of behavior that NASA and its partners have supported, including the public release of scientific data.”¹⁰⁴ The Artemis Accords should also be understood in the context of international human rights law, particularly given key principles in the accords such as peaceful exploration, preserving heritage, deconfliction, and safe disposal of space debris, all of which are linked to, human rights relating to life, safety, and health. Ideally, other countries will also join the Artemis Accords in the months and years ahead. NASA hopes that “working with emerging space agencies, as well as existing partners and well-established space agencies, will add new energy and capabilities to ensure the entire world can benefit from . . . exploration and discovery.”¹⁰⁵ This has the potential of conceptualizing human activities in outer space in the context of international human rights law, which in itself is premised on our collective membership of humanity.

note 101, art. 18.

101. U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90, 129 Stat. 704.

102. Steven Freeland Interview, *supra* note 88 (referring to U.S. Commercial Space Launch Competitiveness Act, *supra* note 57); Freeland & Handmer, *supra* note 85 (U.S. Commercial Space Launch Competitiveness Act, *supra* note 57); Stephan Hobe, *The International Institute of Space Law Adopts Position Paper on Space Resource Mining*, 65 GER. J. AIR & SPACE L. 204, 204 (2016) (referring to U.S. Commercial Space Launch Competitiveness Act, 4 U.S.C. § 402 n.57 (2015)); *see also* Mariella Moon, *Luxembourg’s Asteroid Mining Law Takes Effect August 1st*, ENGADGET (July 30, 2017), <https://www.engadget.com/2017-07-30-luxembourg-asteroid-mining-law-august-1.html> [<https://perma.cc/CL2N-H7EB>]; *see also* Stefan A. Kaiser, *Legal Protection Against Contamination from Space Resource Mining* 66 GER. J. AIR & SPACE L. 282, 282-86 (2017).

103. Press Release, Sean Potter & Cheryl Warner, Nat’l Aeronautics & Space Admin. NASA, International Partners Advance Cooperation with First Signings of Artemis Accords (Oct. 13, 2020), <https://www.nasa.gov/press-release/nasa-international-partners-advance-cooperation-with-first-signings-of-artemis-accords> (last updated Jan. 4, 2021) [<https://perma.cc/6RDQ-6C8R>].

104. *Id.*

105. *Id.*

1. Rights Relating to Humanitarian Law and Armed Conflict

The “development of weapons technologies endangers the enjoyment of human rights worldwide,”¹⁰⁶ and the weaponization of space is no different. In particular, the militarization and weaponization of space raises concerns for specific rights, such as the right to life, the right to a safe environment, the right to development, the right to peace, among others.¹⁰⁷

Moreover, if military activities in space lead to irreversible consequences that compromise humankind’s ability to utilize space in the future, this will undoubtedly negatively impact the myriad of other rights connected to sustainable uses of space for present and future generations. Clearly, resorting to irresponsible behaviour in space has the potential to give rise to consequences that are beyond contemplation. Given that the authors believe the future of humanity is inextricably tied to access and use of space for peaceful purposes, the ongoing militarization and threatened weaponization of space represents a significant challenge.

Since the launch of Sputnik I in 1957, humankind has largely respected the “peaceful purposes” requirement that underpins the UN Space Treaties. We have not seen a space object destroyed in anger—although several States have deliberately destroyed their own satellites¹⁰⁸—and space has not become a theatre of warfare, notwithstanding more recent calls by some for it to be regarded as a “war fighting domain.” Such a categorization should, in the authors’ opinion at least, be resisted and rejected whenever possible.¹⁰⁹ From this

106. Experts’ Meeting on Scientific Progress, *supra* note 47, at 5.

107. See generally UDHR, *supra* note 33; International Covenant on Civil and Political Rights, *supra* note 28; International Covenant on Economic, Social and Cultural Rights, *supra* note 29.

108. Indeed, just as this Article was being finalized, Russia conducted a “test” of an ASAT missile to deliberately destroy its defunct Cosmos 1408 intelligence satellite, which was orbiting at approximately 480 kilometres above the Earth. See Theresa Hitchens, *Russian Suspected Ground-Launched ASAT test scatters dangerous debris through LEO*, BREAKING DEFENSE (Nov. 15, 2021), <https://breakingdefense.com/2021/11/suspected-russian-ground-launched-asat-test-scatters-dangerous-debris-through-leo/>. In addition, as is well known, India had conducted a similar test on March 27, 2019—ironically three days before the start of the 58th session of the Legal Subcommittee of UNCOPUOS—when it deliberately destroyed by kinetic means an Indian satellite orbiting at approximately 285 kilometres; See Marco Langbroek, *Why India’s ASAT Test was Reckless*, DIPLOMAT (Mar. 30, 2019), <https://thediplomat.com/2019/05/why-indias-asat-test-was-reckless/> [<https://perma.cc/PPG4-M9G2>].

109. See Steven Freeland, *The US Plan for a Space Force Risks Escalating a ‘Space Arms Race’*, CONVERSATION (Aug. 10, 2018), <https://theconversation.com/the-us-plan-for-a-space-force-risks-escalating-a-space-arms-race-101368> [<https://perma.cc/N4VS-H4NV>].

perspective, space law has proved to be quite a remarkable feat, especially when one considers the efficacy of the law in facilitating what have largely been responsible norms of behaviour in space despite the rapid development of military space technology over the past six decades. In this regard, space law has played a positive role, by allowing for—and not unduly restricting—the development of space-related technology, while discouraging and proscribing bad behaviour.

At the same time, the existing legal regime has not prevented the development of military technology capable of utilizing outer space. Whilst there are some restrictions in the Outer Space Treaty, these were specified in relatively general terms and were open to divergent interpretation as to what they did and did not prohibit. For example, some have simplistically and, in our view incorrectly, attempted to apply the so-called “Lotus principle” (of permissiveness at international law in the absence of a prohibitive rule) to Article IV of the Outer Space Treaty. Proponents of this argue that apart from the express exclusions referred to in that provision, there are no further restrictions relevant for military activities or operations in space. This claim ignores the overall object and purpose of that treaty which relates quite clearly to the peaceful uses of space—as reflected in, for example, preambular paragraphs 2, 3, 4, and 5, as well as Articles I, III, VI, and IX among others. Such a purpose is not entirely surprising, given the era in which this instrument was concluded (1967), and that the development of space-related technology was, at least initially, inextricably related to military strength—both in reality and as perceived by others. Indeed, it is no coincidence that the space race emerged at the height of the Cold War, when both the United States and the Soviet Union strove to flex their respective technological muscles. As we noted earlier, the early stages of human space activity coincided with a period of considerable tension, with the possibility of large scale and potentially highly destructive military conflict between the space superpowers of the time always lurking in the background. Despite the possibilities for humankind that it presented, the successful launch of Sputnik generated unease in the West, since the technology used was similar to that of ballistic missiles.¹¹⁰

Within this highly sensitive context, it was crucial that efforts were made by the international community to regulate this new frontier to avoid both a build-up of weapons and armed conflict in space. In

110. See 1957, NATO UPDATE (Nov. 6, 2001), <https://www.nato.int/docu/update/50-59/1957e.htm> [<https://perma.cc/293G-7VAP>].

more modern parlance, such efforts are referred to as the Prevention of an Arms Race in Outer Space (PAROS).¹¹¹

The conventional obligations and restrictions that were eventually agreed upon and codified in the major space treaties addressed, in part, specific military and weapons-related aspects of space activities. However, as described below, they were neither entirely clear nor sufficiently comprehensive to meet all of these military and weapons-related challenges. The Moon and celestial bodies were declared to be used “exclusively for peaceful purposes.”¹¹² While most space scholars would subsequently interpret the relevant provisions as prohibiting military activities in outer space, this was not followed in practice of those nations that actually possessed space capability. Indeed, with the benefit of hindsight, it is now clear that space has been utilized to support terrestrial military activities almost from the commencement of the space age.

If anything, since those early days the situation has become significantly more complex, with potentially drastic and catastrophic consequences. Just as the major space-faring nations have been undertaking what might be termed passive military activities in outer space, outer space is increasingly now being used as part of active engagement in the conduct of armed conflict.¹¹³ Not only is information gathered from outer space—for example, through the use of remote satellite technology and communications satellites—being used to plan military engagement on Earth, but space assets are also now used to direct military activity and represent an integral part of major powers’ military hardware.

It is now within the realms of reality that outer space may become an emerging theatre of warfare. Designations of space as “contested,

111. Refer to the numerous United Nations General Assembly (UNGA) Resolutions, beginning with G.A. Res. 36/97C, Prevention of an Arms Race in Outer Space (Dec. 9, 1981); for developments in this regard in 2019, see Press Release, General Assembly, First Committee Approves 11 Drafts Covering Control Over Conventional Arms, Outer Space Security, as United States Withdraws Text on Transparency, U.N. Press Release GA/DIS/3642 (Nov. 5, 2019).

112. Outer Space Treaty, *supra* note 7, art. IV.

113. See, e.g., Jackson Maogoto & Steven Freeland, *The Final Frontier: The Laws of Armed Conflict and Space Warfare*, 23 CONN. J. INT'L L. 165 (2007); David Simonds, *A New Arms Race in Space?*, ECONOMIST (Jan. 25, 2007), <https://www.economist.com/leaders/2007/01/25/a-new-arms-race-in-space> [https://perma.cc/63QY-QQ58]; Thomas E. Ricks, *Space is Playing Field for Newest War Game; Air Force Exercise Shows Shift in Focus*, WASH. POST (Jan. 29, 2001), <https://www.washingtonpost.com/archive/politics/2001/01/29/space-is-playing-field-for-newest-war-game/938e9674-0c3b-4d66-b67b-e3195b1275fd/> [https://perma.cc/YBD4-2JG8].

congested and competitive,”¹¹⁴ or a “war fighting domain,”¹¹⁵ with war in space described in some military circles as inevitable, are dangerously self-fulfilling and largely self-defeating. All States, particularly the major space-faring ones, will suffer if activities in space are undertaken in such an irresponsible manner as to cross certain “red lines” of accepted behaviour. As this trend continues, there is a danger that the weaponization of space, as well as its evolution into a distinct theatre of military operations, may become a reality,¹¹⁶ particularly given the extent to which the major powers rely on space capability as part of their national security infrastructure.

In this context, one of the authors of this article has previously suggested, “if one were to adopt a hard-line pragmatic (and perhaps non-legal) view of the current situation, one could suggest that the ‘non-military v. non-aggressive’ debate” as to the precise meaning of ‘peaceful purposes’,”¹¹⁷ which was once a major point of discussion, has ceased to have practical relevance (even though it initially represented an extremely important issue of interpretation of the principles set out in the Outer Space Treaty). Instead, the focus of the discussion has now shifted to the imperative to avoid weaponization of space and the implications that would have for international relations, particularly between the major powers. In sum, the militarisation of space has considerable implications for international human rights law.

II. CORPORATE ACCOUNTABILITY FOR CONDUCT IN OUTER SPACE AFFECTING HUMAN RIGHTS

As set out in Part II, activity in outer space has implications for human rights. However, it is notable that much of the activity in outer space, particularly satellite and launch activity, is conducted by private actors, including corporations, who may not directly owe human rights obligations themselves (other than to the extent they are obliged to do so as a matter of domestic law or by way of attribution of their conduct

114. See, e.g., U.N. Disarmament Commission, Working Group on Transparency and Confidence Building Measures in Outer Space Activities, U.N. Doc. A/CN.10/2018/WG.II/CRP.1 (Mar. 28, 2018).

115. Gregory Gagnon, Christopher McLeod & David Thompson, *Space as a War-fighting Domain*, AIR & SPACE POWER J., 2018, at 4.

116. See, e.g., Jonathan Marcus, *UK and US Say Russia Fired a Satellite Weapon in Space*, BBC (July 23, 2020), <https://www.bbc.com/news/world-europe-53518238> [<https://perma.cc/5Y6V-6A4B>].

117. Steven Freeland, *The 2008 Russia/China Proposal for a Treaty to Ban Weapons in Space: A Missed Opportunity or an Opening Gambit?*, 51 PROC. INT’L INST. SPACE L. 261, 262 (2008).

to a nation State). This raises the question: what issues might arise for corporate accountability in outer space?

A. Private Actors in Space

While the early stages of human space activity did not involve private actors, the twenty-first century has seen a burgeoning “new era of commercial space business”¹¹⁸ in outer space. Space is now routinely used for many aspects of life, including medicine, agriculture and everything in between, and “most of these services are provided by private companies.”¹¹⁹ This is so with respect to the satellite and launch industries. For example, the satellite industry is “increasingly privatised”¹²⁰ which is significant because satellite activity has consequences for human rights relating to access to space and the information garnered in so doing (as discussed above in Part II).

Notably, as mentioned above, “revenue from satellite-related commercial activities accounts for the vast majority of the space economy’s overall revenue.”¹²¹ The space launch industry is also dominated by private actors. However, unlike the satellite industry where private sector dominance occurred through the efforts of hundreds of private satellite companies, the space launch industry is dominated by a relatively small (but growing) number of private companies, including Space Exploration Technologies Corporation (“SpaceX”).¹²² SpaceX’s global market share of commercial launches is more than that of all countries combined.¹²³

Likewise, space tourism is currently controlled by private actors.¹²⁴ This is significant given that in 2021 the global space tourism market is expected to reach \$34.46 billion.¹²⁵ Space tourism has

118. Isnardi, *supra* note 1, at 494.

119. Julian Selman Ayetey, *In Support of Global Accountability for Private Commercial Space Actors*, 48 GA. J. INT’L & COMP. L. 761, 761 (2020) [hereinafter Ayetey].

120. Isnardi, *supra* note 1, at 495.

121. See Jeff Foust, *A Trillion-Dollar Space Industry Will Require New Markets*, SPACE NEWS (July 5, 2018), <https://spacenews.com/a-trillion-dollar-space-industry-will-require-new-markets/> [<https://perma.cc/96ZN-3948>].

122. See Hailey Rose McLaughlin, *Private Spaceflight Companies Soar While SLS Remains Grounded*, ASTRONOMY (Jan. 22, 2021), <https://astronomy.com/news/2021/01/private-spaceflight-companies-soar-while-sls-remains-grounded>.

123. Jay Bennet, *One Chart Shows How Much SpaceX Has Come to Dominate Rocket Launches*, POPULAR MECHANICS (Jul. 13, 2017), <https://www.popularmechanics.com/space/rockets/a27290/one-chart-spacex-dominate-rocket-launches/> [<https://perma.cc/83YBHQ7T>].

124. *List of Space Tourism (Personal Spaceflight) Companies*, RANKER (Jun. 8, 2017), [https://www.ranker.com/list/space-tourism-_personal-spaceflight\)-companies/reference](https://www.ranker.com/list/space-tourism-_personal-spaceflight)-companies/reference) [<https://perma.cc/W6PT-UMCU>].

125. Jesse Maida, *Top 3 Emerging Trends Impacting the Global Space Tourism Market*

been described as taking “commercialisation and privatisation one step further,”¹²⁶ because “anything involved in manned spaceflight—the manufacture of vehicles, launch and other in-space operations . . . and . . . the space travellers themselves—could well be private” Citizens.¹²⁷ Space tourism has less obvious impacts on terrestrial human rights, but may have impacts relating to the natural environment. Of course, issues with regards to the human rights of people whilst *in space*—whether on corporate adventures in sub-orbital or orbital flights or in more permanent human settlements in orbit or on celestial bodies—will also soon become very pertinent. In our view, it will not be legally or morally satisfactory that corporations providing such services require the individual participants to sign away their rights through contractual exclusion of liability clauses. This requires space lawyers and agencies to work with the private sector, as well as international governance institutions, to determine what fundamental and non-derogable rights space tourists or settlers should have. For example, relevant rights might include a right to return, a right to be rescued, a right to communication, and a right to continuous provisions, among many other relevant considerations.

Private actors, including corporations, also have an interest in the possibilities presented by the mining of natural resources in space due to the extraordinary financial value of such resources. For example, it has been estimated by one database that the 10 most ‘cost effective’ currently known asteroids possess an estimated total value exceeding \$6 trillion.¹²⁸ One such asteroid, the 225-kilometre wide “Psyche 16,” is estimated to be worth over \$10,000 quadrillion.¹²⁹ Clearly the enticement of incredible returns on investment has led to an “influx of new actors looking to expand space activities” that involve proposals for the extraction of space resources.¹³⁰

from 2017–2021: *Technavio*, BUS. WIRE (Jun. 16, 2017), <https://www.businesswire.com/news/home/20170616005756/en/Top-3-Emerging-Trends-Impacting-Global-Space> [<https://perma.cc/F59K-6YQK>] (as cited in Isnardi, *supra* note 1, at 497).

126. Frans G. von der Dunk, *Space Tourism, Private Spaceflight and the Law: Key Aspects* 27 SPACE, CYBER, and TELECOMM. L. PROGRAM FAC. PUBL’N 145, 147 (2011).

127. *Id.*

128. See ASTERANK, <http://www.asterank.com/> (last visited Nov. 20, 2021) (documenting specific asteroids as cited in Isnardi, *supra* note 1, at 498) [<https://perma.cc/3SRP-5RAJ>].

129. Matthew Davis, *Will Asteroid Mining Be an Outer-Space Gold Rush?*, BIG THINK (Sept. 28, 2018), <https://bigthink.com/technology-innovation/economic-impact-of-asteroid-mining> (as cited in Isnardi, *supra* note 1, at 498) [<https://perma.cc/NUQ9-ZRJC>].

130. Laura Delgado-Lopez, *Beyond the Moon Agreement: Norms of Responsible Behavior for Private Sector Activities on the Moon and Celestial Bodies*, 32 SPACE POL’Y 1, 2 (2015).

As Part II discussed, there are a number of conflicting rights that arise in the context of space mining. On the one hand, international law does recognise a sovereign right to natural resources—which has long been accepted—although the right itself belongs to States and their peoples, and not to private actors directly.¹³¹ On the other hand, little is known about the potential impact of mining in space on environmental stability both in space and on Earth. This is potentially problematic in several ways, including in the context of “emerging rights to a clean and healthy environment.”¹³² Given this uncertainty, and as mentioned above, the precautionary principles and the principle of intergenerational equity may be relevant to the extent that they might be applicable to activities carried out in outer space.

In sum, the role of private actors, including corporations, in accessing space means that the conduct of such corporations will have an impact on human rights, as is the case with most human activities in outer space. Put another way, private actors may cause harm. This harm “may be irreversible—to the outer space environment or the Earth,”¹³³ and thus has serious adverse consequences for many aspects of the rights of humans.

However, current space law is “not equipped with adequate methods”¹³⁴ to enforce its rules as against private actors. Cristina Isnardi considers this issue at length. In her view, the Outer Space Treaty and the Moon Agreement “do not offer detailed provisions on the involvement of private entities in space activities,” and “the treaties may cover private entities only to the extent that such an interpretation can be implicated, and such implications are ambiguous at best.”¹³⁵ Further, even if the treaties covered corporations, the lack of enforcement mechanisms within the five treaties mean that it would be difficult to hold private actors responsible for a contravention of the law.¹³⁶

While Isnardi goes on to explore the capacity of the Permanent Court of Arbitration, the World Trade Organisation, the International Telecommunication Union, and domestic courts to adjudicate actions of private actors, she ultimately concludes that possible solutions to the regulatory gap may require or involve creating a new legal entity or expanding the authority of UNCOPUOS. That legal entity (or

131. G.A. Res. 1803 (XVII), Permanent Sovereignty Over Natural Resources, U.N. Doc. A/RES/3171 (Dec. 17, 1973).

132. Experts' Meeting on Scientific Progress, *supra* note 47 at 5.

133. Ayetey, *supra* note 119, at 764.

134. Isnardi, *supra* note 1, at 491.

135. *Id.* at 511.

136. *Id.* at 512.

expanded UNCOPUOS) should have the “regulatory, adjudicative, or arbitral authority necessary to compel private actors to comply with the space law treaties.”¹³⁷

Additionally, domestic laws regulating extraterritorial and extra-terrestrial corporate conduct may be strengthened. We agree with Inardi on this point. However, one issue that may arise in domestic regulation of extra-terrestrial corporate activities is that of determining corporate nationality, and, therefore, the extent to which a nation state can legitimately regulate a corporation.

B. Corporate Nationality

Liability, particularly criminal liability, in outer space relies heavily on the nationality principle of jurisdiction (i.e., the applicable criminal law will typically be the nation of registration, in the case of an object; or citizenship, in the case of a legal person).¹³⁸ This nationality, or personality, principle of jurisdiction allows States to assert authority over conduct occurring extraterritorially on the basis of nationality.

Civil law jurisdictions, such as France and Belgium, rely on the nationality principle to a greater extent than common law countries. Common law countries, by contrast, tend to assert nationality jurisdiction only on an ad-hoc basis, and only for specific offences.¹³⁹ This means that not all criminal offences in those jurisdictions will have extraterritorial effect, and they are generally presumed not to unless otherwise specified.

Therefore, in order for domestic courts in common law countries to hold corporations liable for actions that may violate human rights in outer space, specific legislation needs to extend that liability both; a) extraterritorially; and b) to corporate bodies. A common example of such legislation is the extraterritorial extension of laws criminalizing child sex tourism to extraterritorial conduct, which also apply to corporations.¹⁴⁰

One other contemporary challenge to the nationality principle, however, is that traditional models of citizenship and nationality have

137. *Id.* at 523.

138. See Danielle Ireland-Piper & Steven Freeland, *Star Laws: Criminal Jurisdiction in Outer Space*, 44 J. SPACE L. 44 (2020) (discussing the principles of jurisdiction in outer space).

139. See generally DANIELLE IRELAND-PIPER, ACCOUNTABILITY IN EXTRATERRITORIALITY: A COMPARATIVE AND INTERNATIONAL PERSPECTIVE (2017).

140. See, e.g., Danielle Ireland-Piper, *Extraterritoriality and Sexual Conduct of Australians Overseas*, 22(2) BOND L. REV. 16, 16 (2011).

been altered by globalization and the increased mobility of persons,¹⁴¹ as well as by the movement of corporate bodies' registration and head-quartering and of persons acting on their behalf. As Ireland-Piper has previously observed:

Conceptions of nationality have become blurred. Individuals are more mobile than ever before. We can live and work in different parts of the world. We may even have a connection to more than one State. However, international law is generally neutral towards a grant of nationality, provided the granting State does not breach certain international obligations, such as those under the *Convention on the Reduction of Statelessness* [footnote omitted]. This means that determination as to who is a 'national' for the purpose of the nationality principle is a matter largely left to individual states. Laws about who is and who is not a citizen vary significantly between nations. For dual citizens, there is also the possibility of persons being subject to multiple, and potentially conflicting, legislative regimes.¹⁴²

More relevantly, there are also no internationally consistent rules for the determination in every case of the nationality of a corporation.¹⁴³ Therefore, "the same corporation may have different nationalities,"¹⁴⁴ leading to potential confusion about which domestic legal regime will apply. While common law States "usually adhere to the rule that a corporation is granted the nationality of the state under whose law it has been incorporated,"¹⁴⁵ other approaches, such as those of France and Germany, involve identifying a corporate entity's nationality based upon its principal center of business.¹⁴⁶

Notwithstanding these difficulties, in the absence of an established body with jurisdiction to adjudicate on the conduct of private companies in outer space, domestic legislation is likely the more effective option at present. By way of analogy, as part of its ratification of the Rome Statute of the International Criminal Court (ICC Statute), Australia introduced offences into existing criminal legislation that

141. Kim Rubenstein, *Citizenship in an Age of Globalisation: The Cosmopolitan Citizen?*, 25(1) L. CONTEXT: A SOCIO-LEGAL J. 88 (2007); see also Michael B. Krakat, *Genuine Links Beyond State and Market Control: The Sale of Citizenship by Investment in International and Supranational Legal Perspective*, 30(1) BOND L. REV. 145 (2018).

142. DANIELLE IRELAND-PIPER, *Extraterritoriality in East Asia: Jurisdiction and Criminal Law in China, Japan, and South Korea*, in RECAPPIING PRINCIPLES OF JURISDICTION AT INTERNATIONAL LAW 13, 22 (Edward Elgar Publishing Limited, 2021).

143. *Id.*

144. GUY STESENS, *MONEY-LAUNDERING: A NEW INTERNATIONAL LAW ENFORCEMENT MODEL* 233–234 (Cambridge Univ. Press, 2000).

145. *Id.*

146. *Id.*

already conferred jurisdiction in certain circumstances to prosecute corporations.¹⁴⁷

In essence, while “international criminal law applies to individual corporate employees just as it applies to other private, non-state individuals . . . the issue of corporate criminal liability for international law violations remains unresolved.”¹⁴⁸ The same is true of international human rights law more generally, particularly in the context of outer space given the state-centric premise of space law at the time it was drafted.¹⁴⁹ This means that domestic legislation extending territorially, and applying to corporations, may be the more pragmatic means of seeking to address the issue of corporate accountability in outer space for conduct affecting the enjoyment and realization of human rights.

CONCLUSION

Human activities in outer space, including corporate activities, have consequences for the realisation and enjoyment of human rights. Therefore, international human rights law is a necessary part of space law to which corporate activities should be subject. In this article, we have argued that activities in outer space should be considered through the lens of international human rights law. We have also asked: what issues arise in holding corporations accountable for conduct in outer space?

Our answer to that question is that the issues are at least two-fold: first, that space law currently does not have adequate mechanisms for holding corporations accountable, but that with reform it certainly could; and second, that there is not a consistent position on determining corporate nationality and therefore the applicable domestic regime, not least because international law is generally permissive when it comes to grants of nationality (subject to the caveats mentioned above). This could potentially lead to multiple claims to jurisdiction, which can cause tension between nation states and disturbances in international relations. To that end, we support calls for a specific and specialised body, having particular expertise in human rights, with jurisdiction to adjudicate conduct by private actors in outer space. However, in the absence of such a body, domestic legislation allowing for the adjudication of corporate

147. See, e.g., Joanna Kyriakakis, *Australian Prosecution of Corporations for International Crimes: The Potential of the Commonwealth Criminal Code*, 5 J. INT'L CRIM. JUST. 809, 810 (2007).

148. Ronald Slye, *Corporations, Veils, and International Criminal Liability*, 33(3) BROOK. J. INT'L L. 955, 955 (2008).

149. See St. John, *supra* note 1, at 711.

conduct in outer space affecting human rights appears to be the most immediately practical option.

As humankind continues in its quest to engage in ever more ambitious and significant activities in outer space, we must come to realise how inextricably connected to space our future will be. This calls for a broader and multilateral consideration of how to approach and address the myriad relevant human issues, including fundamental rights pertaining to humans that inevitably will arise both on Earth and, ultimately, for humans in space. This is a discussion that is only now taking embryonic shape, and we hope that all relevant stakeholders, including States, corporations and various levels of civil society, will participate and contribute in a positive way. Any less ambitious goal will do us all a disservice.