UNIVERSIDAD DE SEVILLA
FACULTAD DE DERECHO

Tesis Doctoral

# DERECHO DEL ESPACIO ULTRATERRESTRE Y DESARROLLO SOSTENIBLE

## OUTER SPACE LAW AND SUSTAINABLE DEVELOPMENT

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Junio 2017

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**ACKNOWLEDGEMENTS**

I have been privileged to be guided by Prof. Dr. Joaquín Alcaide Fernández throughout my Ph.D. process. His expert comments have been invaluable.

Special thanks go to Dr. Claudia Cinelli for continuous intellectual inspiration, to Jeremy Pacht for his professional editorial input, to Prof. Dr. Fernando Álvarez-Ossorio Micheo for support and to all other people to whom I am in intellectual debt.

Finally, I would like to thank my husband and other members of the family for the encouragement, support and patience. The writing process could have been faster without three toddlers, but the overall experience would have not been so rich. After all, the process is as much important as the outcome.

**ABBREVIATIONS**

| | |
|---|---|
| AEB | Brazilian Space Agency |
| INTA | Instituto Nacional de Técnica Aeroespacial |
| ASAT | Anti-satellite weapons |
| CD | Conference on Disarmament |
| CHM | Common Heritage of Mankind |
| CNES | Centre National d'Etudes Spatiales |
| COSPAR | Committee on Space Research |
| CSA | Canadian Space Agency |
| CSD | Commission on Sustainable Development |
| CTBT | Comprehensive Nuclear Test Ban Treaty |
| CWC | Chemical Weapons Convention |
| DLR | National Research Center for Aeronautics and Space |
| EC | European Commission |
| ELD | Environmental Liability Directive |
| ESA | European Space Agency |
| EU | European Union |
| EUMETSAT | European Organisation for the Exploitation of Meteorological Satellites |
| FAA | Federal Aviation Administration |
| GEO | Geostationary orbit |
| GGE | Group of Governmental Experts |
| GPS | Global Positioning System |
| GLONASS | Global Navigation Satellite System |
| IAA | International Academy of Astronautics |
| IADC | Inter-Agency Space Debris Coordination Committee |
| IAEA | International Atomic Energy Agency |
| IAF | International Astronautical Federation |
| IAU | International Astronomical Union |
| ICAO | International Civil Aviation Organization |
| ICJ | International Court of Justice |

| | |
|---|---|
| ICoC | International Code of Conduct for Outer Space Activities |
| ICSU | International Council for Science |
| IGY | International Geophysical Year |
| ILA | International Law Association |
| ISDL | Centre for International Sustainable Development Law |
| IASL | Institute of Air and Space Law |
| IIASL | International Institute of Air and Space Law |
| IISL | International Institute of Space Law |
| ISS | International Space Station |
| ITLOS | International Tribunal for the Law of the Sea |
| ITU | International Telecommunication Union |
| IUCN | International Union for Conservation of Nature |
| JAXA | Japan Aerospace Exploration Agency |
| LEO | Low Earth orbits |
| LTSSA | Long-Term Sustainability of Space Activities |
| NASA | National Aeronautics and Space Administration |
| NGO | Nongovernmental Organisation(s) |
| NIEO | New International Economic Order |
| NPS | Nuclear Power Source(s) |
| OJ | Official Journal (of the EU) |
| OECD | Organisation for Economic Co-operation and Development |
| OST | Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty) |
| PAROS | Prevention of an Arms Race in Outer Space |
| PBS | Public Broadcasting Service |
| PCA | Permanent Court of Arbitration |
| PCIJ | Permanent Court of International Justice |
| PPP | Planetary Protection Policy |
| PPWT | Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects |
| PTBT | Partial Nuclear Test Ban Treaty |
| SD | Sustainable Development |

| | |
|---|---|
| TCBMs | Transparency and confidence building measures |
| TEU | Treaty on European Union |
| TFEU | Treaty on the Functioning of the European Union |
| SAT-AIS | Satellite Automatic Identification System |
| UK | United Kingdom |
| UKSA | UK Space Agency |
| UNCED | United Nations Conference on Environment and Development |
| UNCHE | United Nations Conference on the Human Environment |
| UNCLOS | United Nations Convention on the Law of the Sea |
| UNCOPUOS | United Nations Committee on the Peaceful Uses of Outer Space |
| UNEP | United Nations Environment Program |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| UNGA | United Nations General Assembly |
| UNISPACE | United Nations Conference on the Exploration and Peaceful Uses of Outer Space |
| UNOOSA | United Nations Office for Outer Space Affairs |
| US | United States |
| USRR | Union of Soviet Socialist Republics |
| VCLT | Vienna Convention on the Law of Treaties |
| WCED | World Commission on Environment and Development |
| WSSD | World Summit on Sustainable Development |
| WTO | World Trade Organization |

# INTRODUCTION

## i. Background

Outer space has inspired human imagination ever since. It has occupied an important role in human tradition, religion, science, and science fiction. It has served as an outlet for human curiosity and as an immense source of inspiration. But it is only with the technological developments of the 20th century, especially in rocket technology, that 'touching' space became possible. Since the launch of Sputnik 1 into orbit in 1957, humankind has engaged in a constant effort to realise ever more ambitious plans for the use and exploration of space. Although only few humans have physically travelled beyond the Earth's atmosphere, technology has made outer space a common experience.

Many areas of our everyday life rely on technological solutions made possible by the conquest of space. Modern television and radio, internet routing, navigation, credit card authorisation and automated teller banking services all would be impossible without satellite communication.[1] Data obtained through satellite remote sensing has become an indispensable factor in development programmes facilitating natural resources management, land use, weather forecasting, handling natural or man-made disasters, telemedicine and education.[2] Moreover, States heavily rely on space technologies to ensure their strategic security.[3] Finally, the commercial services and products that have been derived from the space sector over the years now constitute an important part of the world economy.[4]

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[1] For examples of satellite services, see Joseph N. Pelton, *The Basics of Satellite Communications* (IEC Publications 2006), 3.

[2] Space Millennium: Vienna Declaration on Space and Human Development, in: Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, A/CONF.184/6, 18 October 1999, 6; United Nations Office for Outer Space Affairs (UNOOSA), *Solutions for the World's Problems* (UNOOSA, 2006).

[3] The Space Council (i.e. regular joint meetings of the EU and the European Space Agency at ministerial level for developing European space policy) has recognized the space sector as 'a strategic asset contributing to the independence, security and prosperity of Europe'. See 4th Space Council Resolution on the European Space Policy (Council of the European Union, 2007), found at: <http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/intm/94166.pdf>, at Section I. The US government highlights that space system and technology development contribute significantly to the 'most critical national security interests'. See National Space Policy of the United States of America (2010), found at: <http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf>, at 13.

[4] Organisation for Economic Co-operation and Development (OECD), *The Space Economy at a Glance 2011* (OECD, 2011).

Since the launch of Sputnik 1, outer space has been transformed from a domain used by an exclusive club of two States into a realm of widespread activity.[5] As of June 2017 there are ninety four governments and intergovernmental organisations operating satellites,[6] among which twelve governmental agencies and the ESA have launching capabilities.[7] But outer space is no longer the exclusive preserve of State-sponsored agencies and State-controlled private venture. The commercialisation of outer space acquired a new dimension in 2012 when a private company, SpaceX, launched the first official commercial flight to the International Space Station.[8] Since then, SpaceX has provided regular cargo resupply missions for NASA, developed a reusable rocket and worked on technology enabling private space travel and, ultimately, the settlement of other planets.[9] Other companies such as Planetary Resources and Deep Space Industries are investing millions of dollars in technology with a view to mining asteroids for their mineral resources in the near future. In 2016, Moon Express became the first private company in history to receive government permission to travel beyond Earth's orbit, in late 2017. The company's goal is to mine the Moon for valuable resources,[10] and to help researchers develop human space colonies for future generations.[11] In all these cases private companies are the primary agents of space activity, not States. The new role of a State is that of a facilitator or an investor.[12] In addition, States who want to engage in commercial activities in space soon will find themselves in a competitive market

[5] For the expanding spectrum of stakeholders in the space sector, see G. Lafferranderie and D. Crowther (eds.), *Outlook on Space Law over the Next 30 Years* (Kluwer Law International, 1997), 21-64; L. Viikari, *The Environmental Element in Space Law: Assessing the Present and Charting the Future* (Martinus Nijhoff, 2008), 21-28. On the commercial use of outer space and legal implications, see I.H.P. Diederiks-Verschoor and V. Kopal, *An Introduction to Space Law* (Kluwer Law International, 2008), 106-121.On the diversification of actors and stakeholders, and its impacts on outer space law see, for example, I. Baumann, 'Diversification of Space Law', in: M. Benkö and K.-U. Schrogl (eds.), *Space Law: Current Problems and Perspectives for Future Regulation*, *vol. 2* (Eleven International Publishing, 2005), 49.

[6] CelesTrak Database, online: www.celestrak.com, data retrieved 28 June 2017.

[7] Space Foundation, Public Policy and Government Affairs, online: < https://www.spacefoundation.org/programs/public-policy-and-government-affairs/introduction-space/global-space-programs>.

[8] Before SpaceX commercialisation was linked to space-derived technologies and data obtained by satellites, development and production of space-based systems, rockets and other vehicles used in outer space under the procurement agreements with State space agencies.

[9] SpaceX, online: < http://www.spacex.com>, accessed 16 May 2017.

[10] The resources include Helium-3 (source of clean and non-radioactive energy), gold, platinum rare metals and water

[11] Moon Express, online: http://www.moonexpress.com/files/moon-express-press-kit.pdf, accessed 15 May 2017.

[12] Luxembourg recently invested over 200 mln euros in space mining business, including American Planetary Resources [Forbes, online: < https://www.forbes.com/sites/davidschrieberg1/2017/04/30/space-industry-ready-to-blast-off-fueled-by-government-partnerships/#2de816a255e2>, accessed 2 June 2017].

comprising private, multinational companies in addition to other States.[13] Hence, commercialisation and the prospect of immense benefits have been reshaping the space sector, prompting changes to established roles and *modi operandi*. Commercialisation of outer space may also entail an extension of economic standards to outer space. Once the exploitation of outer space resources becomes possible, the economics of the free market that thrives on profit-oriented goals, competitiveness and property rights will probably be forced on outer space, since reachable outer space is a direct extension of our theatre and means of operation hitherto. But free market, if unrestricted, tend to be oblivious to social justice and environmental issues. The existing international legal regime covering space activities is not well suited to the guidance of large-scale commercial access to space, let alone to handling conflicting interests linked to environmental protection and international social justice.[14] At the same time, the reluctance to develop international binding rules covering space activities is striking, as across international law in general. It is notable that recently enthusiasm for multilateralism has waned when it comes to the creation of legal obligations. Soft law instruments to some extent mitigate the lack of the multilateral arrangements, but the recourse to bilateral and national tools has become more prominent. Therefore, the key regulations concerning emerging space activities are more likely to be addressed at a national, rather than an international level. This favours a situation in which space powers and other key stakeholders in the space sector are more likely to pursue their vested interests without accommodating the interests of other States or mankind in general. The harbinger of this openly-stated retreat from the mankind-centred rhetoric was the Space Resource Exploration and Utilization Act of 2015 (a subset of the US Commercial Space Launch Competitiveness Act).[15] This Act unilaterally regulates some key aspects of the contentious issue of property rights in outer space. It 'promotes the right of United States commercial entities to explore outer space and utilize space resources, in accordance with the existing international obligations of the United States,

[13] Like, for example, Chinese government that also announced plans to mine Helium-3 and other valuable resources on the Moon [PBS, online: <http://www.pbs.org/newshour/making-sense/china-wants-to-mine-the-moon-for-space-gold/>, accessed 3 June 2017].

[14] Even fundamental principles of space law are more and more often questioned in relation to their adequacy to serve as a general legal framework in reality significantly different from that when space treaties were drafted.

[15] US Commercial Space Launch Competitiveness Act, Pub L. 114-90, 129 Stat. 704 § 101 (2015) ('US Space Act').

free from harmful interference, and to transfer or sell such resources'.[16] It states that 'any asteroid resources obtained in outer space are the property of the entity that obtained such resources.'[17] Putting the merits and the logic of the Act aside,[18] a unilateral way of dealing with international issues favours particularism and hence carries the seeds of a further deepening of inequalities between space-established and space-aspiring actors and of a division between the rich and the poor. The US Space Act clearly points to an emerging rhetoric on outer space that is well aligned with the 'first come first served' maxim that has contributed to the degradation of natural resources on Earth.

The situation with respect to outer space is further complicated by the fact that outer space constitutes part of the global commons, where special care is needed to protect the equal rights of all States and those of future generations. Yet the *laissez-faire* approach that has so far underpinned use of the Earth's orbital space is more reminiscent of the 'overexploited pasture' of Hardin's influential article 'The tragedy of the commons'[19] than of the 'province of mankind', let alone the 'common heritage of mankind'. The space debris issue is one manifestation of the 'tragedy of the commons' problem: benefits of individual space missions accrue mostly to the entities conducting these activities but the detrimental impact of space exploitation negatively impact all States, including those already involved in the sector and those who will seek such involvement in the future. Even if it is too early or altogether inadequate to talk about degradation of space resources in general, the tensions among States relating to the exploitation of common resources and environmental issues need to be considered and addressed.

[16] Ibid., Para 51302 (a)(3)

[17] Ibid., Para 51303 (a)

[18] On the other hand the introduction of the Act was long expected by the private sector willing to invest in space mining.

[19] In his article, 'The tragedy of the commons', Garret Hardin examines the concept of 'global commons', natural and cultural resources that no one owns and that should be available for everyone. There is the metaphor of a pasture open for everyone, and everyone trying to get as many cattle on it as possible, a scheme that will work for a while. However, due the non-stop population growth of humans and cattle, eventually the pasture will collapse, leading to what he describes as an 'inevitable tragedy'[Garrett Hardin, 'The tragedy of the commons' (1968) 162 3859 *Science* 1243].For a more detailed assessment of the tragedy of the commons problem, see, for example John Vogler, *The global commons: environmental and technological governance* (JohnWiley & Sons 2000), 10–15.

### ii. Hypothesis

Along with the commercialisation of outer space, complex conflicts arising at the intersection of economic, environmental and social interests stand to acquire yet another dimension: outer space. The present thesis argues that there is a need to integrate environmental and social values into space activities, which should be clearly recognised. To this end it proposes the formal extension of the concept of sustainable development to outer space, with a view to providing a framework for future legal developments in space law that accords with the spirit of inter- and intragenerational equity.

However, the process of extending sustainable development to outer space is by no means easy, since it raises a mixture of political, economic and legal difficulties. There is a general lack of political will to extend sustainable development to outer space, underpinned by a fear that the application of fairer, commonly accepted rules to space exploitation might discourage private venture.[20] From an economic perspective, the 'freedom of use of space' best secures the competitive advantage of those in possession of technology enabling space use and exploration. But this principle serves them best only so long as the number of States with the technology is relatively small. As soon as the number of actors increases, a system of regulations becomes desirable, because, according to Hardin's theory, freedom of use exercised by many can greatly deteriorate the resource. Nevertheless, the fact that increased legal restrictions are being proposed only now, at a time where new States wish to enter the space sector, causes defiance among the newcomers. Changing the rules of the game after space powers have reaped the benefits of their unrestrained use of space, is perceived by the newcomers to outer space as an unjust restraint on their freedoms and rights and as a tactic to hinder competition. Therefore, while newcomers to space may not be keen to support sustainable development of established space activities in the Earth's orbital space, they might support sustainable development in new activities such as space mining, where they see their interests being better secured by more specific regulations. Those in possession of new technologies may be interested in supporting sustainable development, especially its environmental dimension, with respect to activities taking

[20] The example of the seabed exploitation is often raised at this point. The extension of the CHM to the Seabed is often blamed for the stagnation of the process towards use of seabed resources.

place in Earth's orbital space, yet oppose it when it comes to activities such as space mining. The result of such conflicting interests is a persistence of the *status quo* in the binding regime.[21]

When it comes to legal issues surrounding the extension of sustainable development to outer space, these are primarily a function of general problems in international law-making and questions relating to general issues of dynamism, change and stability in international law.[22] There seem to be no legal obstacles within the ambit of international *corpus iuris spatialis*. To the contrary, Space law is a fertile ground for sustainable development and its innovative legal approaches, and in many respects resonates well with concepts such as 'mankind' and 'common benefit'. Sustainable development seems to be a natural framework continuum for space law.

Further legal issues of a technical nature arise from within the concept of sustainable development itself. Analysis of legal doctrine writings reveals a failure to unequivocally define the content and legal nature of sustainable development. These difficulties of conceptualisation are mainly driven by the complexity and evolutivity of sustainable development.

In general, when problems are complex, solutions are imperfect. Actions taken in the face of complexity inevitably need to deal with a mixture of gains, losses, and ambiguities. Furthermore, these gains, losses, and ambiguities are understood and experienced from a variety of perspectives, none of which can justifiably claim to command a total view. Thus, not only are solutions to complex problems imperfect, there are no definitive criteria by which to interpret or evaluate the imperfection. Even so system theories provide a number of tools that facilitate understanding of complexity and complex issues.

### iii. Overview of the thesis and the methodology

This thesis is composed of nine chapters (A-I). Following a general introduction, the first chapter of the thesis (A) provides an analysis of the current international legal framework governing the use and exploration of outer space. The analysis focuses on

[21] The developments in soft law and on domestic level to some extent alleviate the situation.

[22] See for example: Antonio Cassese and Joseph H.H. Weiler, *Change and Stability in International Law-making* (Walter de Gruyter 1988).

the fundamental set of international legal documents relating to space activities, that is, on five international treaties constituting the *corpus iuris spatialis* and related soft instruments. The study identifies *lacunae* in space law and key issues in space law that could have an impact on the process of extending sustainable development to outer space, namely issues linked to the general character of key norms, a lack of coherence between the letter of law and State practice, and difficulties in the current law-making processes.

The second chapter of the study (B) analyses legal developments relating to space law that address the issues threatening sustainable long-term use of outer space. It establishes that apart from addressing security issues, current legal initiatives focus simply on warranting long-term use of space-based systems, rather than on ensuring the sustainability of space activities through systemic solutions based on the integration of environmental and social concerns in laws governing the use and exploration of outer space.

In order to provide for a fairer and more holistic approach to the issue of sustainability of outer space, the thesis proposes the extension of the legal concept of sustainable development to outer space (Chapter B5). In order to analyse the feasibility and eventually the key aspects of this extension, the paradigm of sustainable development in international law is first analysed. (Chapter C) The analysis draws on a combination of jurisprudence, case law of the ICJ and other international tribunals as well as insights provided by the legal doctrine and by political, social and environmental theorists.

Sustainable development is an issue that enters into a number of great debates in jurisprudence revolving around issues of morality, justice or normativity of law.[23] Although these debates lie outside the scope of the present study, it is important to note one general point. This study approaches sustainable development as a paradigm enabling the overall process of human development towards justice. The legal conception of sustainable development is not approached as a strict tool for imposing choices and predetermined moral values. At first sight, this approach may appear similar to Hart's proposition of law as a system that allows one 'to predict and plan the future

[23] See for example Nicholas J. McBride and Sandy Steel, *Great Debates in Jurisprudence* (Palgrave 2014).

course of our lives within the coercive framework of the law'.[24] Yet, as Decleris has argued, conventional legal culture and conventional political theory are not a sufficient basis for the emergence of sustainable law. Since the concept of sustainable development is dynamic and constantly reformulated, law based on the interpretation of static rules will not serve the purpose of achieving sustainability and ultimately justice.[25] He adds that 'new law will move away from rules and towards decisions, because it has to discover the practical objectives of sustainable society with the aid of fixed general principles. Legislators, judges and public officials will have to learn the Science of Decisions'. The present study concurs with this view and recognise that the challenge in embracing sustainable development is to view arising issues in a holistic and integrated fashion, which is generally contrary to the way legislation is passed and regulations are constructed.[26] Attempts to formulate sustainable development within current mainstream international law have been hampered by its reductionist character and the associated use of tools ill-suited to understanding complexity and evolutiveness. These factors have fostered a lack of conceptual clarity and ambiguity, and above all, have made it hard to grasp the complexity of sustainable development

In order to tackle the issues of complexity and evolutiveness with a view to eventually shedding light on the legal aspects of the extension of sustainable development to outer space, this study proposes a novel approach to the legal conceptualisation of sustainable development, based on the idea that sustainable development can be better understood as a hierarchical structure rather than as a flat concept (Chapter D). This 'hierarchy theory' may be viewed as an analytic approach that facilitates understanding of complex systems and concepts such as sustainable development, and is used in the present study to clarify the concept of sustainable development for the purposes of current legal practice. It attempts on the one hand to acknowledge the complex character of sustainable development and, on the other hand to adapt it to the constraints of the mainstream international legal system.

The hierarchy theory proposes that sustainable development may be apprehended as a legal concept on four levels: 1) as an objective, 2) as the principle of integration, 3) as

[24] H. L. A. Hart, *Punishment and responsibility: Essays in the Philosophy of Law* (Oxford University Press 1968), 181.

[25] Michael Decleris, *The law of sustainable development: General principles. A report produced for the European Commission* (Office for Official Publications of the European Communities 2000), 42.

[26] Commission on Sustainable Development, Report of the Secretary-General: Integrating environment and development in decision-making (1996), E/CN.17/1996/11, para. 13.

a set cross-sectoral tools enabling integration towards sustainable ends, 4) as sectoral principles/norms advancing the transition towards sustainable development.

The conceptualisation of sustainable development as a hierarchical structure accommodates different legal visions of sustainable development and allows for an explanation of the relation between particular levels and elements of the structure, in our case between the principles and other norms pertaining to sustainable development. It is not, however, the structure that imposes a specific hierarchy but international law. Deeper analysis of specific principles and norms on sustainable development reveals that their status is not equal. Some of them enjoy the status of broad objectives, some are procedural propositions. The principle of integration enjoys a special status and contains both procedural and substantive aspects. Some of the norms rely on others for their realisation, some are cross-sectoral and others pertain to a specific legal regime. The study attempts to accommodate the largest possible number of different views and conceptualisations of sustainable development in international law, in order to provide for clearer conceptualisation of a legal concept of sustainable development in international law.

The conceptualisation of sustainable development within the framework of the hierarchy theory enables a clearer vision of the relations between the principles and norms pertaining to sustainable development and helps clarify ambiguities in that concept, with a view to developing a more favourable approach towards its extension to outer space.

Chapter E of the thesis considers whether there are possible legal constraints on the extension of sustainable development to outer space. It takes into account international space law and international legal acts relating to sustainable development. It also approaches the issue of space law as the so-called self-contained legal regime.

The last four Chapters (F, G, H, I) of the study analyse the main implications of the extension of sustainable development to outer space, by applying and taking as a point of reference each level of the proposed hierarchical structure.

In analysing the extension of the concept of sustainable development to outer space the study focuses on key implications relating to the proposed novel structure. The first and second levels of the structure and their interrelations are analysed in greater detail than the third level, which deals with the application of specific elements of sustainable development and is treated only in an illustrative and non-exhaustive way. The study

does not reopen issues relating to the legal status of the substantive and procedural elements of sustainable development grouped at the third level of the structure.

The analysis of the fourth level focuses on the analysis of 'mankind provisions' in space law. It argues that from the perspective of sectoral norms of space law, sustainable development in outer space needs to revolve around mankind provisions in order to ensure sustainability of outer space as global commons. This last part is a proposition that pertains to the realm of *lex ferenda*. The actual shape of space law in the field of sustainable development will be the outcome of a compromise elaborated in accordance with the procedural requirements of sustainable development.

Finally, Appendix 1 contains a graphic presentation of the hierarchical structure of sustainable development and its application to space law.

## A. THE CURRENT INTERNATIONAL LEGAL FRAMEWORK FOR USE AND EXPLORATON OF OUTER SPACE: IS THERE SPACE FOR SUSTAINABLE DEVELOPMENT IN OUTER SPACE?

### 1. General remarks

Outer space is extraordinary in many ways and also unique from a legal perspective. Humans were not present in this environment until very recently, when developments in knowledge and technology made this possible. The cognisance of outer space has been a gradual process and scientific progress in its understanding has been accompanied by questions and doubts concerning its nature. Due to this specific cognisance process and the always incompletely understood nature of outer space, the extension of international law to this domain has been gradual, evolutionary and cautious. New treaties have tended to concentrate on known, and hence on earth-centric issues linked to outer space. Insofar as questions relating to outer space *per se* have often not been fully grasped, they have been barely touched or have otherwise necessarily been formulated in a very general way in order to encompass future developments. This approach has created a flexible legal system enabling peaceful space exploration and providing a structural basis for later advancements in space law[27] that are expected to accompany scientific progress.

Space law is therefore 'particulate law', developed to deal with practical problems concerning the use and exploration of outer space.[28] As so far developed, space law is earth-bound in its nature and purpose,[29] and forms an integral part of the general legal system. International space law is more than just a dimension of space law. It is a cradle

[27] This is especially the case of the Outer Space Treaty (OST). The OST 'could be viewed as furnishing a general legal basis for the peaceful uses of outer space and providing a framework for the developing law of outer space' [ibid., vi].

[28] Francis Lyall and Pal B. Larsen, *Space Law: A Treatise* (Ashgate 2009), p.2. For an overview of space law see: Carl Q. Christol, *Space Law: Past, Present and Future* (1991), Nandasiri Jasentuliyana (ed) *Space Law: Development and Scope* (Praeger Publishers 1992), Bin Cheng, *Studies in International Space Law* (Clarendon Press 1997), Marietta Benkö and Kai-Uwe Schrogl (eds), *Space Law: Current Problems and Perspectives for Future Regulation*, vol 2 (Eleven International Publishing 2005), Isabella Henrietta Philepina Diederiks-Verschoor and Vladimír Kopal, *An Introduction to Space Law* (Kluwer Law International 2008), Francis Lyall and Pal B. Larsen, *Space Law: A Treatise*, Luca Codignola and others (eds), *Humans in Outer Space - Interdisciplinary Odysseys* (Springer 2009), Frans G. von der Dunk and Fabio Tronchetti (eds), *Handbook of Space Law* (Elgar Publishing 2015).

[29] 'Space adventure begins on Earth' [Jacques Arnould, *Icarus' Second Chance: The Basis and Perspectives of Space Ethics* (Springer-Verlag/Wien 2011), 39].

of space law. Space law was born as international law and it is international law that draws the primary boundaries for activities that unfold in outer space and for relevant domestic regulations.

Space law is as much about the substance as the process of its creation since the way in which space law was 'made' has to a large extent determined its content. International space law was drafted under the auspices of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS). The 'golden era' of space law-making with its swift consensus-based adoption of the treaties enabled the creation of a body of law focused on common goals and values, which are quite well aligned with the main objectives of sustainable development embodied in inter- and intragenerational equity. On the other hand, the current difficulties in law-making result, impact further developments in space law, including the extension of the concept of sustainable development to outer space.

For the time being, space law remains a fundamental yet general framework that needs to be filled out with particular norms that can be operationalised. This is a crucial step for future peaceful developments in the use and exploration of space.

## 2. The emergence of space law

Needless to say, an interest in space has been intrinsic to humanity since its beginnings. Nevertheless, the development of space law came much later, and only as the technological advancements of the 20th century[30] allowed for the physical presence of humans in space.

The notion of 'space law' first appeared in a journal article in 1910, but it remained a concept 'without shape or substance for more than two decades.'[31] Later, the looming possibility of reaching outer space triggered a doctrinal response. In 1932 Mandl wrote the first monograph[32], in which he signalled that reaching outer space by rocket would raise questions not addressed by air law, necessitating the creation of new body of

[30] See Luboš Perek, 'Interaction Between Space Technology and Space Law' (1990) 18 1 *Journal of Space Law* 19 See also Gottlieb, *The impact of technology on the development of contemporary international law*, RdC, 1981, 242 ff.

[31] S. E. Doyle (2010), 'A Concise History of Space Law', IAC-10.E7.1.1., 1.

[32] Vladimir Mandl, *Das Weltraum-Recht: Ein Problem der Raumfahrt* (J. Bensheimer 1932), 48 ff. See also Vladimír Kopal, 'Vladimir Mandl: Founding Writer on Space Law' in James Durant (ed), *First Steps Toward Space* (Smithsonian Institution Press 1974), 87-90.

'space law' based on specific legal instruments and governed by different principles.[33] In the monograph he addressed fundamental principles and concepts of space law[34] and provided many ideas, which have not lost their relevance despite the passage of time.

Before the end of World War II, rocketry technology capable of reaching outer space had been already developed.[35] Further technological advancements in rocketry[36] coupled with military rivalry during the beginnings of the Cold War were important drivers for a growing number of legal writers in the field[37] drawing on basic rules that could govern outer space. The principles governing the status of outer space started to emerge out of the doctrinal discussion during the 1940's and the early 1950's:

> "Beyond the airspace, as already noted, we would apply a system similar to that followed on the high seas; outer space and the celestial bodies would be the common property of all mankind, over which no nation will be permitted to exercise domination. A legal order would be developed on the principle of free and equal use, with the object of furthering scientific research and investigation. It seems to me that a development of this kind would dramatically emphasize the common heritage of humanity and serve, perhaps significantly,

[33] Stephen E. Doyle, *Origins of Space Law and the International Institute of Space Law* (Univelt Inc. 2002), 8; V. Mandl (1932), ibid.

[34] Before proposing the substance of space law by Mandl, there were only few references in legal literature to the law of space, including two papers. The first paper was by a Belgian lawyer, Emile Laude (1910). The second paper appeared in the USSR by V. A. Zarzar (1926). References to the space over the airspace in the legal context were made by Fauchille (1900), Mérignhac (1914). [See Stephan Hobe (ed) *Pioneers of Space Law: a Publication of the International Institute of Space Law* (Martinus Nijhoff 2013)].

[35] At the time, Germany had the most advanced rocketry system. The USSR was advanced in the research. The US was conducting seminal experiments in the field. [Stephen E. Doyle, 'The Emergence of Space Law' <http://www.lacba.org/Files/Main%20Folder/Sections/International%20Law/InternationalLawNewsletter/files/Doyle.pdf> accessed 05 March 2015, 3]. See also S. E. Doyle and A. Ingemar Skoog eds., 'The International Geophysical Year: Initiating International Scientific Space Cooperation', (International Astronautical Federation, Paris, 2012), available online: <http://www.iislweb.org/docs/2012_IGY.pdf>. For the historical background see W. Ley, *Rockets, Missiles, and Space Travel*, (The Viking Press, rev. ed. 1958) and A. J. Zaehringer, *Soviet Space Technology* (Harper & Brothers 1961).

[36] In the latter 1940s and 1950s, the national military uses of rocketry were advanced rapidly in the USSR and the United States [Stephen E. Doyle, 'The Emergence of Space Law',4], especially after the recovery of the German rocket programme and personnel. See Stephen E. Doyle and Ingemar Skoog (eds), *The International Geophysical Year: Initiating International Scientific Space Cooperation* (International Astronautical Federation 2012).

[37] Important early writers after the Mandl's publication and before the IGY include: Y. A. Korovin (1933), Arthur. C. Clarke (1946), John Cobb Cooper (1948), O. Schachter (1952), A. Meyer (1959). For the early space law writers and concepts in space law see Doyle (2002), Doyle (2010).

to strengthen the sense of international community which is so vital to the development of a peaceful and secure world order." [38]

In the mid 1950's, preparations for the International Geophysical Year (IGY)[39], including preparations for the launch of a satellite,[40] contributed to the growth in awareness of the capabilities of space-based systems. This provided a stimulus for increased international cooperation within space-related fields.

Nevertheless, the most important single event that triggered the law-making process in the field of outer space was the launch of Sputnik 1 in October 1957. As J. Gabrynowicz put it, 'the Soviet Union launched the world's first artificial satellite, Sputnik 1, into a physical as well as a legal vacuum.'[41]

The excitement over the launch of Sputnik1 into space was widely shared, since in the popular imagination the opening of this new horizon suggested bright prospects for humanity. This sentiment is echoed in the opening line of the Preamble of the Outer Space Treaty (OST), which refers to 'the great prospects opening up before mankind as a result of man's entry into outer space'.[42]

On the other hand, Sputnik 1 incited widespread fears of opening a new field for military competition and possible cold war confrontation between the US and the

[38] This quote by Oscar Schachter (1952) reflects the contemporary main-stream legal thought on the issue of space law. 'Legal Aspects of Space Travel', Vol. 11, No.1, *JBIS* 14 –16, Jan., 1952, quoted in Nandasiri Jasentuliyana, *Space Law: Development and Scope*, 20.

[39] The IGY was an international scientific project that lasted from 1 July 1957 to 31 December 1958. It marked the end of a period during the Cold War when scientific interchange between East and West had been seriously interrupted. The IGY was not an initiator of astronautical activity but an important forum promoting space science and demonstrating capabilities of space systems. Prior to the IGY there were nine countries that had developed space related programs: Australia, Canada, China, Federal Republic of Germany, France, Japan, The USSR, The UK, and The US (in some cases there were only international cooperative programs for launching facilities). Shortly after the IGY there were thirty countries active in space programmes. See Stephen E. Doyle and Ingemar Skoog, *The International Geophysical Year: Initiating International Scientific Space Cooperation*.

[40] 'The IGY was the reason for announcements in July 1955 by the US the USSR that man-made satellites would be built and launched into orbit around Earth' [Stephen E. Doyle, *Origins of Space Law and the International Institute of Space Law*, Stephen E. Doyle, 'Origins Of International Space Law And The International Institute of Space Law Of The International Astronautical Federation' (Univelt 2002), 4].

[41] J. Gabrynowicz: http://spacenews.com/space-law-101-helping-fill-a-legal-vacuum/?utm_content=buffer2c25c&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer. For the origins of space law see: Stephen E. Doyle, *Origins of Space Law and the International Institute of Space Law*; Stephan Hobe, *Pioneers of Space Law: a Publication of the International Institute of Space Law*.

[42] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (27 January 1967; in force 10 October 1967) ('Outer Space Treaty' (OST)).

USSR,[43] the only space powers at that time. With the conquest of space, the fear of star wars – of placing nuclear weapons in orbit or attacking from space – became quite real. The launch of the first satellite mobilised the international community to take steps towards the creation of an institutional framework that would set out general principles facilitating the future peaceful use and exploration of outer space. As a consequence, enabling exploration of outer space in a peaceful way became a focal point of the emerging domain of space law.[44] The common threads running throughout five fundamental international treaties on space law are therefore peaceful and collaborative exploration of space in the interest of all countries, and promotion of friendly relations among States.[45] To this end the Outer Space Treaty focuses on drawing general principles on the friendly exploration of outer space, while other treaties elaborate them within the scope of international liability (the Liability Convention)[46], the management of launched objects (the Registration Convention),[47] astronauts (the Rescue Agreement),[48] and exploitation of celestial bodies (the Moon Agreement).[49]

## 3. Institutional framework

### 3.1. The UNCOPUOS – the golden era of space law making

The Ad Hoc UNCOPUOS was established by the United Nations General Assembly (UNGA) at its thirteenth session in 1958[50] and replaced a year later by a permanent

[43] Frans G. von der Dunk and Fabio Tronchetti, *Handbook of Space Law*, p.3-4.

[44] On the legal aspects of 'peaceful exploration of outer space' see for example: Marko G. Markoff, 'Disarmament and "Peaceful Purposes" Provisions in the 1967 Outer Space Treaty ' (1976) 4 1 *Journal of Space Law* 3.

[45] See for example: The OST: Preamble, Articles I, III, IV, IX, XI; The Rescue Agreement, Preamble; The Liability Convention, Preamble; The Registration Convention, Preamble; The Moon Agreement: Preamble, Articles 2, 3, 4.

[46] Convention on International Liability for Damages Caused by Space Objects (29 March 1972; in force 1 September 1972) ('Liability Convention').

[47] Convention on Registration of Objects Launched into Outer Space (14 January 1975; in force 15 September 1976) ('Registration Convention').

[48] Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (22 April 1968; in force 3 December 1968) ('Rescue Agreement').

[49] Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (18 December 1979; in force 11 July 1984) ('Moon Agreement').

[50] UNGA, 'Question of the Peaceful Use of Outer Space', A/RES/1348(XIII), (13 December 1958). On the accomplishments of the UN Ad Hoc Committee, see E. Galloway, 'The United Nations Ad Hoc Committee on the Peaceful Uses of Outer Space: Accomplishments and Applications for Legal Problems' (2nd Colloquium on the Law of Outer Space, London, 1959).

body.[51] As highlighted by the UNGA, the creation of the UNCOPUOS was 'to avoid the extension of present national rivalries into this new field [outer space]'.[52] The New Committee's main goal was to foster international cooperation in the exploration of outer space for the betterment of mankind, and to study the nature of legal problems which might arise in the carrying out of programmes to explore outer space.[53] This UNGA Resolution reflected the strong support of the international community for the common status of outer space and its peaceful use.

The period of preliminary work of the UNCOPUOS is known as the 'golden era' of space law-making where rapidly developing space activities[54] were accompanied by the swift adoption of a series of international binding instruments dealing exclusively with outer space.[55] These treaties form the *corpus iuris spatialis*, the legal fundament of human activity in outer space.

As Gabrynowicz points out, with the adoption of these treaties 'international space law has completed its first phase. Important general principles, some of them historic, were articulated and agreed upon by a majority of nations.'[56]

### 3.2. Other negotiating forums

Although the UNCOPUOS remains the only international body dealing exclusively with legal issues linked to outer space, these issues have never been the exclusive

[51] UNGA, 'International Co-operation in the Peaceful Uses of Outer Space', A/RES/1472(XIV) (12 December 1959). Composed of 70 Member States and 29 permanent observers, the UNCOPUOS today is the premier international forum for working out issues of space governance. Matters that come before UNCOPUOS are discussed first in working groups within its subcommittees and when resolution is reached, the matter is presented to the full committee. After additional discussion, the UNCOPUOS prepares a report and possibly a resolution for presentation to the General Assembly for its approval as a UN resolution. Matters presented to the UNCOPUOS concern civil use of outer space. See alsoSergio Marchisio, 'The Evolutionary Stages of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS)' (2005) 31 1 *Journal of Space Law* 219, 219.

[52] Ibid, Preamble.

[53] Ibid, Point1 (a) and (b). On the role of the UN and UNCOPUOS in space law see Vladimir Kopal, 'Origins of Space Law and the Role of the United Nations' in Christian Brünner and Alexander Soucek (eds), *Outer Space in Society, Politics and Law* (Springer 2011).

[54] 'Space activities' for the purposes of this article will be considered space activities *stricto sensu*. Space activities *stricto sensu* can be described as activities 'comprehensively taking place in outer space' [Dunk, von der Frans G., Private Enterprise and Public Interest in the European Space International Institute of Air and Space Law, Faculty of Law, Leiden University, 1998, 15], therefore outside the territorial jurisdiction of States.

[55] See G. M. Danilenko, *Law-Making in the International Community* (Martinus Nijhoff Publishers 1993).2.

[56] Joanne Irene Gabrynowicz, 'Space Law: Its Cold War Origins and Challenges in the Era of Globalization' (2004) 37 *Suffolk University Law Review* 1041. 1043.

province of UNCOPUOS. They have also been discussed in different, matter-relevant fora, whose number has grown with the widening diversity of space-related activities.[57]

The Conference on Disarmament (CD),[58] which belongs to the UN structure, is a forum in which are discussed matters concerning the prevention of arms races, including in outer space.

Questions relating to the use of satellites for direct television broadcasting have also been dealt within the framework of the United Nations Educational, Scientific and Cultural Organization (UNESCO).[59] In 1972 UNESCO adopted a Declaration of Guiding Principles on the Use of Satellite Broadcasting for the Free Flow of Information, the Spread of Education and Greater Cultural Exchange.[60]

The International Telecommunication Union (ITU) [61] – the UN specialised agency – despite being a technical body, has become a major forum for the development of international space law on space telecommunication. Its Constitution is a source of regulations on the allocation of bands in the radio-frequency spectrum, the allotment of radio frequencies, and the registration of radiofrequency assignments and, for space services, of any associated position in the geostationary-satellite orbit or of any

[57] See G. M. Danilenko, 'Outer Space and the Multilateral Treaty-Making Process' (1990) 4 *High Technology Law Journal*, .13. See also G. M. Danilenko, *Law-Making in the International Community*, 227.

[58] The Conference on Disarmament (CD), established in 1979 as the single multilateral disarmament negotiating forum of the international community, was a result of the first Special Session on Disarmament of the United Nations General Assembly held in 1978. The CD is the successor to the Ten-Nation Committee on Disarmament (1960); the Eighteen-Nation Committee on Disarmament (1962-68); and the Conference of the Committee on Disarmament (1969-78) [online: <https://www.un.org/disarmament/geneva/cd/an-introduction-to-the-conference>]. Since concluding its negotiations on the Chemical Weapons Convention (CWC) in 1992 and negotiating the Comprehensive Nuclear Test Ban Treaty (CTBT) in 1994-96, the CD has experienced a situation of continuous stalemate [see for example Statement by Ambassador Patricia O'Brien Permanent Representative of Ireland, online:<https://www.dfa.ie/media/dfa/alldfawebsitemedia/ourrolesandpolicies/int-priorities/womenpeaceandsecurity/Plenary-Statement-POB-7-March-2017.pdf > .

[59] UNESCO, The Constitution of UNESCO, 16 November 1945, in force 4 November 1946].

[60] In 1972 UNESCO adopted a Declaration of Guiding Principles on the Use of Satellite Broadcasting for the Free Flow of Information, the Spread of Education and Greater Cultural Exchange, A/AC.105/109 (15 November 1972)].

[61] The ITU is the 'principle international institution for achieving agreement among nations on the use of telecommunications' [Rice, Regulation of Direct Broadcast Satellites: International Constraints and Domestic Options, 25 N. Y. L. Sch. Rev. 813, 814 (1980)]. The 1973 ITU Convention has been ratified by all countries and binds them with treaty force [Carl Q. Christol, *The Modern International Law of Outer Space* (Pergamon 1982), 612]. In addition to the general principles laid out in the Convention, communications satellites are regulated by the ITU Radio Regulations. See the Constitution and Convention of the International Telecommunication Union (with annexes and optional protocol) (22 December 1992, in force 1 July 1994, entry into force of the latest amendments 1 January 2004) ('ITU Constitution and Convention').

associated characteristics of satellites in other orbits.[62] The importance of this international organisation is due to the fact that telecommunications are the primary commercial use of outer space.

The norms governing the early notification of nuclear accidents on space objects have also been discussed within the General Conference of the International Atomic Energy Agency (IAEA).[63]

The UN International Law Commission has dealt with issues relating to international liability for damage caused by space objects.

Another important forum from the perspective of international space law making is the European Union (EU). With the adoption of the Lisbon Treaty in 2009[64] the EU has been attributed a shared competence to address issues relating to outer space.[65]

Other fora contributing to the development of space law include specialised national space agencies,[66] intergovernmental agencies like the ESA, international organisations[67] and academic research institutes.[68] Before a law-making process reaches the broad State-negotiating level, many preliminary discussions take place in the framework of these institutions.

## 4. *Corpus iuris spatialis* – an overview

Space law can be depicted as a bucket,[69] the contents of which constitute various binding and soft international, regional and national laws, guidelines and

[62] ITU Constitution and Convention, Article 1, point 2(a).

[63] The Statute of the IAEA (23 October 1956, in force 29 July 1957).

[64] Treaty of Lisbon Amending the Treaty on European Union and the Treaty Establishing the European Community (13 December 2007, in force 1 December 2009) (OJ 2007/C 306/01).

[65] Consolidated Version of the Treaty on the Functioning of the European Union (2010), OJ C83/47 ('TFEU'). Article 4.3 TFEU states: '[i]n the areas of research, technological development and *space*, the Union shall have competence to carry out activities, in particular to define and implement programmes; however, the exercise of that competence shall not result in Member States being prevented from exercising theirs (emphasis added)'.

[66] Examples: NASA (the US), Roscosmos (Russia), Jaxa (Japan), CSA (Canada), CNES (France), COSPAR (France), DLR (Germany), UKSA (the UK), FAA (the US), INTA (Spain), AEB (Brazil).

[67] For example: the UNOOSA, the ITU.

[68] For example: the Institute of Air and Space Law (University of Cologne), the International Institute of Air and Space Law (Leiden Law School), European Centre for Space Law, Institute of Air and Space law (McGill University, Canada), and the National Center for Remote Sensing, Air, and Space Law, University of Mississippi School of Law (the US), University of London, School of International Law, China University of Political Science and Law.

[69] The description of space law as a bucket was for the first time used by Lyall and Larsen. They compare space law *largu senso* to 'a label ached to a bucket that contains many different types of rules and regulations rather than as denoting a conceptually coherent single form of law' Francis Lyall and Pal B. Larsen, *Space Law: A Treatise*, 2.

recommendations. At the bottom of the bucket one finds international space treaties that constitute the legal basis for any activity in space. The rest of the content is the mixture of various legal instruments that eventually overflows the bucket, appearing to blend on various levels with other branches of law, such as administrative law, intellectual property rights, arms control, insurance law, environmental law, criminal or commercial law.[70]

The core of space law constitutes public international law and when referring to space law one would primarily refer to international regulations. In fact, space law emerged as public international law.[71] Since its outset there has been a common understanding among States that there has to be some sort of international entente facilitating peaceful use and exploration of outer space. Ultimately, the collaboration among States has given rise to the current system of basic principles governing activities in outer space, which is expressed in the form of instruments of public international law that are fully integrated into the general legal structure.[72]

*Corpus iuris spatialis* consists of five international treaties. The five treaties, and notably the OST that is regarded as the *Magna Carta* of space law, constitute the fundamental source of rights and obligations for anyone venturing into outer space.

### 4.1. The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space

The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space (commonly referred to as the Outer Space Treaty (OST)) was

[70] J. Gabrynowicz indicates that the fields of law involved in space activities include administrative law, intellectual property law, arms control law, insurance law, environmental law, criminal law, and commercial law, as well as international treaties and domestic legislation written specifically for space [Joanne Irene Gabrynowicz, 'Space Law: Its Cold War Origins and Challenges in the Era of Globalization', 1041]. Even before the creation of space law, and as early as in 1932, V. Mandl highlighted the relevance of other branches of law to the new domain by drawing on relevancies form the field of civil, public and international law [Nandasiri Jasentuliyana, *Space Law: Development and Scope*, 18-19. See Vladimir Mandl, *Das Weltraum-Recht: Ein Problem der Raumfahrt*, 48 ff.].

[71] Prior to its emergence, there were few domestic regulations linked to outer space, but they would rather facilitate development of technologies for future space exploration and not deal with legal problems of space exploration. See Vladimir Kopal, 'Origins of Space Law and the Role of the United Nations'. Cf. Stephen E. Doyle, *Origins of Space Law and the International Institute of Space Law*.

[72] Since the beginning, the intention of the community of nations was to create law that would be fully integrated into the system of general international law [Stephen E. Doyle, 'The Emergence of Space Law', 4-5.].

adopted within the UNCOPUOS framework in 1967. It is widely regarded as a constitution of outer space.[73] Kopal, for example, confirms its status as single 'most important space law instruments of our times'[74] and underlines that it enjoys the widest international adherence from among all the international space treaties.[75]

The treaty laid down legal fundaments for any human activity in outer space and determines the nature of international space law in its entirety. It notably establishes the status of outer space as the province of mankind,[76] protecting it from national appropriation.[77] It prohibits the placement of weapons of mass destruction in space or on celestial bodies[78] and makes States responsible for all space activities conducted under their jurisdiction.[79] It establishes a regime of international cooperation for the benefit of all States as a guiding principle of peaceful use and exploration of outer space.[80] The signing and entry into force of the OST 'signified the creation of an entirely new branch of public international law, the law of outer space'.[81]

The OST served as a foundation for the other four major international conventions on space law: the Rescue Agreement, the Liability Convention, the Registration Convention and the Moon Agreement, which elaborate the issues generally stated in the OST. Together, these five treaties constitute the governing authority for human activities in outer space.[82]

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[73] Francis Lyall and Pal B. Larsen, *Space Law: A Treatise*, at 53. The OST enjoys a status of a quasi-constitutional treaty, which means that it functions like a constitution for space. See Joanne Irene Gabrynowicz, 'The Outer Space Treaty and Enhancing Space Security' in *Building the Architecture for Sustainable Space Security—Conference Report, 30–31 March 2006* (United Nations Institute for Disarmament Research (UNIDIR) 2006), 113-114. J.I. Gabrynowicz, 'The Outer Space Treaty and Enhancing Space Security', in: United Nations Institute for Disarmament Research (UNIDIR), *Building the Architecture for Sustainable Space Security – Conference Report, 30-31 March 2006* (UNIDIR, 2006), 113, 114.

[74] 'Proceedings of the Workshop on Space Law in the Twenty-first Century' (UNOOSA, Third United Nations Conference on the Exploration and Peaceful Uses o f Outer Space (UNISPACE III): The Workshop on Space Law in the 21st Century, Vienna, 1999), 13.

[75] 'Proceedings of the Workshop on Space Law in the Twenty-first Century' (UNOOSA, Third United Nations Conference on the Exploration and Peaceful Uses o f Outer Space (UNISPACE III): The Workshop on Space Law in the 21st Century), 13.

[76] OST, Article I.

[77] Ibid, Article II.

[78] Ibid, Article IV.

[79] Ibid, Article VI.

[80] Ibid, Article IX.

[81] Frans G. von der Dunk and Fabio Tronchetti, *Handbook of Space Law*, p.5.

[82] For an account of law-making in the United Nations from 1957 to 1982, see Carl Q. Christol, *The Modern International Law of Outer Space* (Pergamon Press 1982).

### 4.2. The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space

The Rescue Agreement sets out the legal framework for the circumstance of emergency assistance to astronauts. The Agreement elaborates on Article V of the OST that considers astronauts the envoys of mankind. It obliges States to 'take all possible steps to rescue them and render them all necessary assistance'[83] and to notify the launching authority and the UN Secretary-General about all undertaken steps.[84] It covers search and rescue operations as well as a guarantee of prompt return.[85]

The Agreement also regulates the issue of recovery and return of space objects or parts thereof that have returned to Earth in territory under jurisdiction of a State other than a State responsible for their launch (the launching authority), or on the high seas or in any other place not under the jurisdiction of any State.[86]

### 4.3. The Convention on International Liability for Damages Caused by Space Objects

The Convention on International Liability for Damages Caused by Space Objects elaborates on the liability regime established by Article VII of the OST that holds States liable for damage. It lays the foundation for international financial liability for the damages caused by space objects.

The Liability Convention establishes a twofold liability regime, depending on the location of the damage. The rules of absolute liability apply if the damage is caused on Earth. This rule is expressed in Article II, which states that '[a] launching State is absolutely liable to pay compensation for damage caused by its space object on the Earth or to aircraft in flight'.[87] Article III establishes a fault-based liability. It reads that

[83] The Rescue Agreement, Article 2.
[84] Ibid, Article 1.
[85] Ibid, Article 4.
[86] Ibid, Article 5.
[87] This provision was triggered once in 1978, after the Soviet nuclear-powered satellite Cosmos 954 disintegrated over Canada's Northwest Territories, contaminating it with radioactive debris. The dispute settlement offered by the Convention in Article XIV, namely the Claims Commission, was not activated. Nevertheless, the negotiations involved relevant provisions of both the Liability Convention and the Rescue Agreement. The Soviet Union paid CAD$3 million as compensation for the damage caused [See Joanne Irene Gabrynowicz, 'Space Law: Its Cold War Origins and Challenges in the Era of Globalization', 1042; see also Peter Malanczuk, *Akehurst's Modern Introduction to International Law* (Routledge 1997), 206.

'[i]n the event of damage being caused elsewhere than on the surface of the Earth ... [the State] shall be liable only if the damage is due to its fault'.

In the Liability Convention damage is defined as 'loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations.'[88] As for now the liability for damage does not cover liability for damage to the environment of outer space.

### 4.4. The Convention on Registration of Objects Launched into Outer Space

This convention was a necessary reinforcement to the evolving system of State responsibility and liability in outer space established in the OST. It lays down conditions enabling identification of the space object. It provides for the obligation of registration the information regarding space objects by the State of registry.[89] It also establishes a main and open Register maintained by the UN Secretary-General[90] that includes the necessary information, such as: the name of launching States(s), date and territory or location of launch, basic orbital parameters, and general information on the object, such as its purpose, etc.[91]

### 4.5. The Agreement Governing the Activities of States on the Moon and other Celestial Bodies

The Moon Agreement establishes a governing regime for the Moon and other celestial bodies in a solar system other than Earth's. The Agreement provides for the demilitarisation of the Moon and its orbits and other celestial bodies.[92] Under Article IV, the exploration and use of the Moon and other celestial bodies shall be the province of all mankind and should be carried out for the benefit of all. Article XI applies the concept of the common heritage of mankind (CHM) to the Moon and other celestial bodies and their natural resources and excludes their national or private appropriation by any means. That Article then emphasises that no private rights of ownership may be created over the Moon or any part of it or its natural resources in place, although all

[88] The Liability Convention, Article 1(a).
[89] The Registration Convention, Article II (1).
[90] Ibid, Article III.
[91] Ibid, Article IV.
[92] The Moon Agreement, Article III.

States have the right to exploration and use of the Moon on the basis of equality. States Parties also agree under Article XI (5) and (7) to establish an international regime to govern the exploitation of the resources of the Moon as such exploitation becomes feasible.

The Agreement also emphasises the aspect of international cooperation and elaborates on an instrument of consultation in order to resolve disputes.[93]

### 4.6. Resolutions of the United Nations General Assembly

In addition to the foregoing treaties, five major soft law instruments are accepted by the UNGA and considered a part of the basic international legal framework on space law.

Although created as soft law, many of the principles have been argued to already achieve a status of a customary international norms.[94]

#### 4.6.1. Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space

The 1963 Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space[95] has a special status among the soft law instruments adopted by the UNCOPUOS. The declaration was the first legal instrument setting out general principles on space exploration. It was a precursor of the evolving legal regime on outer space and eventually became the basis of the Outer Space Treaty.

[93] Ibid, Article 15.

[94] Principles of the 1963 Declaration (see *infra*) has hardened in the form of the OST. Many doctrinal authors consider the principles on nuclear power sources and remote sensing to achieve the status of customary rules. To this end some delegations even proposed to initiate a process of changing them into treaties [Gabriel Lafferranderie, 'Basic Principles Governing the Use of Outer Space in Future Perspective' in Marietta Benkö and Kai-Uwe Schrogl (eds), *Current Problems and Perspectives for Future Regulations* (Eleven International Publishing 2005), 8].

[95] Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, UNGA Resolution 1962 (XVIII) (13 December 1963).

### 4.6.2. Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting, Principles Relating to Remote Sensing of the Earth from Outer Space, and Principles Relevant to the Use of Nuclear Power Sources in Outer Space

Other soft law instruments set out the legal principles governing specific activities in outer space and issues relating to outer space that emerged with the progress offered by technological developments. These instruments are: Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting,[96] Principles Relating to Remote Sensing of the Earth from Outer Space,[97] Principles Relevant to the Use of Nuclear Power Sources in Outer Space.[98]

Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting were adopted to set up international rules for international satellite broadcasting. Broadcasting was one of the first technologically available activities based on space systems. Since then it has become the most practiced activity with direct global implications for the daily life of nearly all humans.[99] The adoption of the principles was a necessary step towards ensuring peaceful enjoyment of these space-derived benefits.[100] The principles assured that the activity of broadcasting should be carried out in a manner compatible with the sovereign rights of States, including the principle of non-intervention. The document sets out the purposes and objectives of such broadcasting,[101] and highlights the sovereign rights of States, acknowledging a right of developing States to non-intervention with respect of

[96] Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting (Resolution 37/92, 10 December 1982) ('Broadcasting Principles').

[97] Principles Relating to Remote Sensing of the Earth from Outer Space (Resolution 41/65, 3 December 1986) ('Remote Sensing Principles').

[98] Principles Relevant to the Use of Nuclear Power Sources in Outer Space (Resolution 47/68, 14 December 1992) ('NPS Principles').

[99] See Joseph N. Pelton, *The Basics of Satellite Communications*.

[100] For the overview of the legal aspects of satellite communications see Frans G. von der Dunk, 'Legal Aspects of Satellite Communications—A Mini Handbook' (2015) 4 *Journal of Telecommunication and Broadcasting Law* 1.

[101] Article 2 provides for the purposes of broadcasting: exchange of information and knowledge in cultural and scientific fields, assistance in educational, social and economic development, particularly in the developing countries, enhancement the qualities of life of all peoples and provision of recreation with due respect to the political and cultural integrity of States.

broadcasting. It also confirms that the ITU is the body regulating specific matters linked to broadcasting.[102]

Principles Relating to Remote Sensing of the Earth from Outer Space provides a general framework for the quite sensitive issue of collecting data from space. Although the document refers directly to the sensing of Earth in the context of protection of the Earth's natural environment[103] and the protection of mankind from natural disasters as its two main objectives, it does not preclude any other uses of the data, so long as they are collected in a manner that respects international law and that is not detrimental to the legitimate rights and interests of the sensed States.[104]

Principles Relevant to the Use of Nuclear Power Sources in Outer Space establishes guidelines and criteria for the safe use of nuclear power sources in outer space.[105] These safety measures are required to protect the Earth (individuals, populations and the biosphere) as well as outer space against radiological hazards.[106] According to the Principles, prior to the launch the launching State is obliged to conduct a thorough and comprehensive safety assessment[107] that is made publicly available.[108] Where a space object appears to malfunction with a risk of re-entry to the Earth of radioactive materials, the launching State is to inform States concerned and the UN Secretary-General and to respond promptly to requests for further information or consultations sought by other states.[109] The Principles confirm the position established by the OST that individual States bear an international responsibility for their national activities involving the use of nuclear power sources in outer space, whether such activities are carried out by governmental agencies or by non-governmental agencies.[110] In line with the Liability Convention, Principle 9 provides that each State which launches or procures the launching of a space object, and each State from whose territory or facility a space object is launched, shall be internationally liable for damage caused by such space object or its component parts.[111]

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[102] Broadcasting Principles, Principle III: 'Remote sensing activities shall be conducted in accordance with international law… and the relevant instruments of the International Telecommunication Union'.
[103] Remote Sensing Principles, Principle X.
[104] Ibid, Principle IV is the main guard of the rights of a sensed State.
[105] NPS Principles, Principle 3
[106] Ibid, Principle 3 (1) (a).
[107] Ibid, Principle 4 (1).
[108] Ibid, Principle 4 (3).
[109] Ibid, Principle 5.
[110] Ibid, Principle 8.
[111] Ibid, Principle 9.

### 4.6.3. 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

The 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[112] was adopted in order to stress the importance of the general 'beneficial clause'[113] contained in the OST. The adoption of the Principles on broadcasting and remote sensing was the harbinger of intensified commercial use of outer space. The countries without space technology, in particular developing countries, wanted to ensure that their right to benefit from space activities and the principle of international cooperation would be respected.[114]

The Declaration ensures that international cooperation will be conducted in accordance with international law, and carried out for the benefit and in the interest of all states, irrespective of their degree of economic, social or scientific and technological development, taking into particular account the needs of the developing countries.[115] It requires that all States, in particular those with space capabilities, contribute to promoting and fostering international cooperation on an equitable and mutually acceptable basis and that international cooperation be conducted in the most effective and appropriate way.[116] It also sets out a non-exhaustive list of goals to which international cooperation should aspire. These goals include: promotion of the development of space science and technology and of its applications, fostering the development of relevant and appropriate space capabilities in interested States and

[112] 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 (Resolution 51/122, 13 December 1996) ('Declaration on International Cooperation').

[113] OST, Article I: 'The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development...'

[114] Fabio Tronchetti, *The Exploitation of Natural Resources of the Moon and Other Celestial Bodies* (Martinus Nijhoff Publishers 2009), 65.

[115] Point 1.

[116] Point 3.

facilitating the exchange of expertise and technology among States on a mutually acceptable basis.[117]

### 4.6.4. Space Debris Mitigation Guidelines

The last soft law instrument accepted within the framework of the UNCOPUOS is the 2007 Space Debris Mitigation Guidelines.[118] Although the guidelines speak of 'a prudent and necessary step towards preserving the outer space environment for future generations',[119] their goal for the time being is to enable further use and exploration of space.

This instrument was adopted in response to the problem of space debris and comprises a set of practical rules focused on mitigating debris, which 'should be considered for the mission planning, design, manufacture and operational (launch, mission and disposal) phases of spacecraft and launch vehicle orbital stages'.[120] The guidelines were created as non-binding norms. However, it has been suggested that they are undergoing a process of transformation into binding customary rules.[121]

The guidelines are considered as non-binding rules comprising 'soft law',[122] although there is no clear consensus in the doctrine on their actual legal nature since 'soft law' may evolve into binding customary rules over time.[123] During the 2012 session of the UNCOPUOS Legal Subcommittee, Kopal – its former Chairman – pointed out that the guidelines, though important, are merely advisory technical standards.[124] Von der Dunk,

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[117] Declaration on International Cooperation, Para. 5.

[118] Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space (UNGA, UN Doc. A/62/20, 22 December 2007), Annex ('Space Debris Mitigation Guidelines').

[119] Ibid, Section 1, 1.

[120] Ibid, Section 4, 2.

[121] It is a debatable issue. As yet, the customary status of the Guidelines has not been confirmed by any court judgement.

[122] 'The guidelines are voluntary measures to be implemented through national mechanisms.' Ibid, preface, at iv, Section 3, at 2.

[123] Frans G. von der Dunk, 'Contradictio in terminis or Realpolitik? A Qualified Plea for a Role of 'Soft Law' in the Context of Space Activities' in Irmgard Marboe (ed), *Soft Law in Outer Space The Function of Non-binding Norms in International Space Law* (Elektronischer Sonderdruck 2012), 53.

[124] 'Although the Guidelines became an important step in the struggle for the mitigation of space debris, it is not possible to neglect that they remain only advisory technical standards to be implemented by States and international organizations on a voluntary basis through their own practices and procedures.' V. Kopal, 'General Exchange of Views', 51st Session of the Legal Subcommittee of the UNCOPUOS (Vienna, 2012), found at: <http://www.mzv.cz/mission.vienna/en/statement_by_vladimir_kopal.html>. The guidelines themselves, in Section 3, state that they are not legally binding under international law.

on the other hand, suggests that they are undergoing a process of transformation into binding rules, and are close to gaining binding status.[125] Although the guidelines lack the binding component and no State can be brought to court on their basis, they can have an interesting indirect legal effect which may be better appreciated by taking a long term perspective.

First, they may be considered as a code of conduct for a 'good launching State', raising the possibility that a State that did not apply them would be found at fault in case of damages.[126] As noted before, liability for damage caused in outer space is dependent on the existence of fault.[127] Since the mere fact of creating debris cannot be a premise for fault-based liability, establishing if a State's activity that resulted in creating space debris was performed in line with accepted standards and based on relevant scientific and technological knowledge will be crucial for this exercise. The guidelines are a reflection of such standards in the context of space debris mitigation. The endorsement by the General Assembly stipulates their recognition by the international community as a whole. Although non-compliance with the guidelines does not entail immediate State responsibility, in case of damage they can probably be used to establish a State's fault.

Second, and touching on the possible preventive effect of the guidelines, negligence of their provisions is not in line with the principle of 'due regard' introduced by Article IX of the OST. Non-compliance with the guidelines increases the risk of harmful incidents on orbits endangering the interests of other States, which can be seen as a breach of the aforementioned principle.

Although the guidelines turn out to be more general than expected,[128] non-binding and sometimes not closely followed,[129] they are an important step forward in the development of binding law on space debris mitigation. They help to move forward the

[125] See Frans G. von der Dunk, 'Contradictio in terminis or Realpolitik? A Qualified Plea for a Role of 'Soft Law' in the Context of Space Activities', 54-55.

[126] See Armel Kerrest, 'Space debris, remarks on current legal issues' (Proceedings of the Third European Conference on Space Debris, 2001), 872.

[127] Liability Convention, Article III.

[128] Generality seems to be a main disappointment amongst those who advocated adoption of the guidelines. This point was made by A. Kerrest during the workshop on The Protection of the Environment in International Spaces (Baeza, 7-9 November 2011).

[129] 'There are mixed signs about how well the UNCOPUOS guidelines work in practice, but there is evidence that standard practices are getting better, which is important given the increased level of space activity'. UNCOPUOS, Towards Long-term Sustainability Towards Long-term Sustainability, Section II, D.

question of establishing a *uniform* and *consistent* State practice[130] and, to some extent, may gradually become an expression of *opinio iuris.* Many argue that eventually, they should either contribute to establishing an international legal custom or be transformed into an international treaty.[131]

## 5. Issues and *lacunae* in international space law – general remarks

International outer space treaties are widely and rightly praised for providing a fundamental legal framework for any human activity in outer space. At the same time they are also criticised for being not clear enough, sometimes outdated, to be operationalised in order to handle specific issues relating to emerging space activities.

However much the generality of the norms may be inconvenient and call for the development of specific regulation, it is a necessary characteristic of fundamental legal instruments. More challenging issue relating to international space law constitutes the lack of consistency in the applied interpretations and the resulting discrepancy between State practice and the laudable wording of the treaties.

Finally, the difficulties surrounding the law-making processes can negatively impact any necessary legal developments aiming at addressing the flaws of international space law, including the extension of sustainable development to space law.

### 5.1. The issues related to the general character of norms

Although the general terms in which treaties are formulated, is problematic, this generality has its reasons. The treaties, and most notably the OST, were drafted in order to lay a foundation for space exploration. In the statement of principles, generality is a natural and necessary feature allowing for intertemporal validity. On the one hand, the space law norms and principles had to address the expectations and threats of the Cold War era; on the other hand, they needed to encompass uncertain future developments triggered by anticipated technological progress. The drafting parties therefore tried to

[130] The guidelines reflect existing practice of the main space-faring States and organizations with respect to space debris mitigation.

[131] Frans G. von der Dunk, 'Contradictio in terminis or Realpolitik? A Qualified Plea for a Role of 'Soft Law' in the Context of Space Activities'.

create a legal framework that could outlive the contemporary setting. And in this they were successful: by interpreting principles and terms through the lenses of current legal and doctrinal developments the principles have remained, and still remain, capable of encompassing new issues as they arise.

As an example, let us take the changed legal scope of the meaning of one of the basic terms in space law: 'space object'. This term has evolved to include space debris. The change in the legal scope of this term stems directly neither from the definition of 'space object' contained in The Liability and Registration Conventions[132] nor from the intentions of the Negotiating Parties, but rather from the wide doctrine consensus that followed the emergence of the problem of littering of geocentric orbits with space debris. Another example is Article IX of the OST, which can be regarded as a legal basis for the environmental protection of outer space[133] but only in light of general international environmental law. Manifestly, such an interpretation of Article IX was not a goal of the Negotiating Parties, nor was the environmental protection of outer space included in the original scope of the article. Nonetheless, from the perspective of present day environmental consciousness, the protection of outer space is quite consistent with the purpose and object of the treaty.

Even so, it is clear that there remains a need for the development of particular norms. New developments raise many practical issues that need particular legal handling. As much as the recognition of 'space debris' as a form of 'space object' is important for the purposes of attributing/establishing liability, this recognition falls well short of the legal framework required to address active space debris removal, since this activity raises many new legal questions.[134] Furthermore, the operationalisation of Article IX as the legal basis for the environmental protection of outer space will still present an issue without agreeing on more specific norms.

New developments challenge current standards of international law, stretch the interpretational boundaries of existing norms, expose *lacunae* in their ability to handle

[132] Article I (d) of the Liability Convention, Article I (b) of the Registration Convention: 'The term "space object" includes component parts of a space object as well as its launch vehicle and parts thereof.'

[133] OST, Article IX: 'States Parties to the Treaty shall pursue studies of outer space, including the Moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter and, where necessary, shall adopt appropriate measures for this purpose.'

[134] For analysis of arising legal questions around the active space debris removal see for example Joyeeta Chatterjee, 'Legal Issues Relating To Unauthorised Space Debris Remediation' (65th International Astronautical Congress, Toronto, Canada, 2014).

changing realities and exert pressure to resolve long-standing questions in space law. For example, technological developments in the area of sub-orbital flight call for the adoption of a legal definition of a suborbital flight.[135] They have also revived the old question of the delimitation of outer space. Are such flights to be administered by air or space law, or both? What should be the status of space tourists?[136] Another example concerns the far more contentious issue of the future mineral mining of celestial bodies. Although foreseen by the space treaties, mineral mining challenges the basic established principles of space law. The fundamental principle of non-appropriation[137] has been contested in order to serve particular economic, exposing old divisions between the space powers who own the technology and developing nations. Unsurprisingly, neither side's interpretation of the non-appropriation principle brings us any closer to its clarification; on the contrary, the conflicting interpretations of this principle expose the need to agree on its specific legal meaning in light of current technological and legal developments.

The existing legal structures of space law are strongly influenced by external forces, most notably by fast technological progress. For that reason treaty space law, as a general set of norms, has been and will continue to be dependent for its interpretation on accordance with the current reality. But interpretational stretching of normative scope has its limits. In many cases the need for agreeing on specific norms is of paramount importance.

### 5.2. Issues of coherence between the letter of the law and legal practice

Another problematic issue relating to the space law treaty regime is the continuing divergence between the letter of the law, which is formulated with an eye to catering for future contingencies and ideals, and day-to-day State practice.

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[135] 'A sub-orbital flight is a flight up to a very high altitude which does not involve sending the vehicle into orbit' [Concept of Suborbital Flights: Information from the International Civil Aviation Organization (ICAO), paper A/AC.105/C.2/2010/CRP.9, presented at the 49th session of the Legal Subcommittee of UNCOPUOS, 19 March 2010]. However, this definition has been used only as a reference, but has not been accepted in any legally binding document or in international and national legislation. On the general legal issues linked to suborbital flight see for example: Stephan Hobe 'Second Report on Suborbital Flights', ILA Johannesburg Conference 2016, 12].

[136] The status of persons undertaking a commercial space adventure does not quite fit the status of an astronaut as an envoy of mankind recognised in space law.

[137] Non-appropriation principle is often regarded as a fundament of space law. See for example …

The OST is a legal instrument that in many respects reflects a long-term perspective on the use and exploration of outer space. To this end, it introduced many innovative legal concepts, such as the term 'mankind', which encompasses the interests of current and future generations, and the bold principles of common benefit, equality and non-appropriation. Cocca has praised space law and the OST in particular as the *ius humanitatis* that truly reflects the interests of humanity.[138] Nevertheless, realists have often charged that these innovative concepts and the norms on which they are based express lofty ideals,[139] rather than a practicable framework for coping with current realities. While the wording of the OST obviously helped the Negotiating Parties approach the unknown future, articulate bold goals and somehow curb the unclear far-reaching vison of future space exploration, it is true that the functioning of the OST has been somewhat subordinated to the current political situation, and oriented towards the future and deep sky rather than to the present and currently reachable space which form the primary concerns of practice. Hence, from the outset practice has remained to some extent discordant with the letter of the law. In fact, since the beginning of space exploration outer space policy has tended to abide by the dictum of 'first come, first served', and the OST does not appeared to alter this practice, despite quite different wording.[140] Although many works show that the intentions were up to the words used, the day to day business was accepted, and allowed to develop in its own way.[141]

The divergence of practice from the aspirations expressed in the OST continues to this day and is fuelled by the technological progress that transforms visions into reality. When reality catches up with the vision the perception of some norms changes significantly. In reality, actors must confront issues of security, economic benefits and the jostling for political domination. In the face of reality *ius humanitatis* transforms into the 'law of the strongest'. Now, when feasibility of mineral mining of celestial

[138] Aldo Armando Cocca, 'The Advances of International Law Through the Law of Outer Space' (1981) 9 *Journal of Space Law* 13, 13.

[139] Ibid. See also Fabio Tronchetti, *The Exploitation of Natural Resources of the Moon and Other Celestial Bodies* .

[140] See for example of the use of geostationary orbit: 'While the execution of the freedom principle applied to the GSO [geostationary orbit] facilitated the 'first come, first served' concept, which which has been practiced for many years within the ITU, at present the majority of states do recognize the disadvantages of such a practice for the less developed countries for the near future' [H.L. van Traa-Engelman, *Commercial Utilization of Outer Space* (Martinus Nijhoff 1993), 106.

[141] For example the 'peaceful uses of outer space' already permitted its militarisation. Some argue that in the future outer space may also be weaponised. See Johannes M. Wolff, *'Peaceful uses' of outer space has permitted its militarization—does it also mean its weaponization?* (UNIDIR 2003).

bodies start presenting real economic dimension, the principles of non-appropriation and common benefit, once regarded as an absolute foundation of the legal regime for space, are more often than not perceived as an obstacle to the development of commercial activities in outer space. Moreover, nearly fifty years after the drafting of space law, the legal conceptualisation of the term 'mankind' has evolved in a direction that seems congruent with the spirit of the space treaties. However, the clearer it becomes, the more voices arise suggesting that it be dismissed as aspirational or abandoned altogether. Legal practice seems to be striving towards solutions different to those explicitly highlighted in space treaties. It is subordinated to values driven by economic interest rather than by the principles of 'benefit of all countries', 'equality', 'international cooperation and understanding' or non-appropriation of outer space.[142]

### 5.3. The issues in the current law-making processes

The issues faced by space law inevitably point to the necessity for new developments in space law. Nevertheless law-making processes are themselves problematic.

The first four treaties forming the corpus juris spatialis were drafted, ratified, and entered into force with considerable speed between 1967 and 1974. States taking part in the law-making processes within the framework of the UNCOPUOS were determined to adopt laws that could guide international cooperation in the peaceful use and exploration of outer space. Cold war military rivalries were to be not allowed in outer space. The conflictual international relations between East and West on Earth were replaced by cooperation and a sense of human unity in outer space. However, this initial approach, reflected in the swift adoption of space law treaties, started to unravel in the last of the five foundational space law treaties, namely the Moon Agreement. This treaty has received only a handful of ratifications, of which none has been made by a space power.[143]

[142] There are already signs that practice and domestic regulations will strive towards enabling private ownership in space and benefits for the technology owners. An example is the US Space Act that allows for appropriation of the mined resources by private entities. The Space Act 'promotes the right of United States commercial entities to explore outer space and utilize space resources, in accordance with the existing international obligations of the United States, free from harmful interference, and to transfer or sell such resources' [Para. 51302 (a)(3)].

[143] Joanne Irene Gabrynowicz, 'Space Law: Its Cold War Origins and Challenges in the Era of Globalization', p.1043

The ineffective ratification of the Moon Treaty was the harbinger of difficulties that would characterise the law-making processes of the next generation of space law, i.e. the generation of specific norms.[144] Over the years, space exploration acquired more links to everyday life and was therefore easily translated into economic, strategic and political benefits. As the ideological principles came to be seen through the lenses of frequently conflicting interests, it became more difficult to agree on specific norms. The consensus, which have previously been adopted by the UNCOPUS as a tool to reach agreement,[145] became ineffective. In the absence of political will, any effort aimed at the creation of a binding norm could easily be suppressed by a single voice of opposition to (i.e. a 'veto' of) the whole process.[146]

Nowadays, there is in general a discernible reluctance of States, especially space-faring States, to agree on new binding rules or on the adoption of existing international standards to outer space law. The top-down approach to rule creation in space law has lost its initial appeal.[147]Apart from echoing the more general tendencies taking place in international law, there are reasons for this reluctance that are directly linked to space law. In particular, space powers often justify their reluctance on the grounds that the space sector is still immature. That is, they argue that at this stage specific norms can only be anticipatory, and that as a result they may fail to accommodate future developments, thus hampering space exploration.[148] There is also a political calculus on the distribution of future benefits that may be derived from the use of space, for

[144] 'The next generation of space law involves agreeing on specific norms' [Gabrynowicz, ibid, 1043]. Gabrynowicz gives examples of such specific issues: 'Is sovereignty necessary to establish property rights? Are space resources, as well as space itself, the province of all humankind? If so, how are they to be allocated? If not, why? How can non –space-faring nations be assured use of outer space? How will the investments of space-faring nations be honored? What is the appropriate relationship between the public and private sectors in space? How will private space activities be regulated? These questions, and more, are yet to be answered'.

[145] Consensus as a way of negotiations better suits the needs of space powers since these are in a quantitative minority but represent a qualitative majority reflecting real distribution of power. Formally, it does not allow for drawing up rules by States in quantitative majority but representing qualitative minority (developing and space-faring States), what makes space powers to stick to the universal law making processes instead of opting for creating rules through, for example, bilateral agreements. Adoption of consensus also raises the participation in the treaty regime in a different way. It requires more elaborative negotiations raising the level of ownership of the worked out rules. The drawback of consensus is that it allows blocking any norm-creation through a simple opposition. For law-making processes see G. M. Danilenko, *Law-Making in the International Community*.

[146] See Bin Cheng, *Studies in International Space Law*, 163

[148] On the anticipatory character of norms of space law see for example Gérardine Goh, *Dispute Settlement in International Space Law: A Multi-Door Courthouse for Outer Space* (Martinus Nijjhoff Publishers 2007), 345-346.

example from mining, using and governing lunar resources. The law-making problems reflect the terrestrial conflict regarding wealth distribution between the technologically advanced world's haves and the disadvantaged world's have-nots. As J. Gabrynowicz points out: '[t]he East-West adversarialism of the Cold War has given way to North-South resource disparity as the centrepiece of space law dialectic'. In contrast to the beginnings of the space era, where the common interest of humanity was one of the main factors shaping space law, presently it is national and private/commercial interests that are being highlighted. These tensions between private and common interests are vividly reflected in the dispute over property rights in space.[149]

Still, as mentioned in previous chapters, space law provides a framework of basic principles that is capable of accommodating much needed changes. Space law should involve constant law-making in order to address needs linked to technological developments, the gradual commercialisation of space and space security issues. Nevertheless, in practice conflicting interests render the task of agreeing on binding international rules unachievable.

Gradually, domestic law-making processes seem to be taking over the creation of binding rules for space law. Toward the end of the 20th century, new international laws and regulations appeared less frequently, and they were more limited in scope or created as non-binding sets of rules and principles. In the meantime, national laws began to emerge with greater frequency[150], addressing issues not anticipated by international space law. According to the United Nations Office for Outer Space Affairs (UNOOSA),

[149] On the issue of property rights in outer space see for example J. H. Huebert and Walter Block, 'Space Environmentalism, Property Rights, and the Law' (2007) 37 *The University of Memphis Law Review* 281. The issue is contentious. On one hand there are voices arguing for the common status of outer space that excludes property rights [e.g. Aldo Armando Cocca, 'The Advances of International Law Through the Law of Outer Space']; on the other hand there are voices arguing for the property rights as important regulation for developments in commercialisation of outer space. With this respect there are different approaches to the issue. Most scholars argue for recognition of the private movable property rights (in contrast to immovable), for example a right of a private entity to own extracted resources [for an overview see Fabio Tronchetti, *The Exploitation of Natural Resources of the Moon and Other Celestial Bodies* , Ram Jakhu, 'Common interest of all the countries, global interests, 'global commons'' (2006) 32 1 *Journal of Space Law*, Ram S. Jakhu, Joseph N. Pelton and Yaw Otu Mankata Nyampong, *Space Mining and Its Regulation* (Springer 2017). See also Jonathan Babcock 'Encouraging private investment in space: does the current space law regime have to be changed?' The Space Review (2015), online: < http://www.thespacereview.com/article/2669/1>, accessed 28 April 2017.] Some argue for real property rights: Wayne N White, 'Real Property Rights in Outer Space', Proceedings, 40th Colloquium on the Law of Outer Space, p.370 (IISL 1998).

[150] Stephen E. Doyle and Ingemar Skoog, *The International Geophysical Year: Initiating International Scientific Space Cooperation*, online: https://www.lacba.org/docs/default-source/section-documents/international-law-section/newsletter-files/vol1-no1/doyle-article.pdf,>.4.

there are now more than twenty nations with substantial bodies of domestic law regulating activities in outer space.[151]

Within the scope of space law, domestic legal regimes now play a much more important role than before. Traditionally, space law has relied on domestic rules for its national operationalisation and domestic space law has been an important complement of the international regime. For obvious reasons the space treaties deal with the legal effects of private space activities only if these have international consequences.[152] Since certain elements of those activities have effects only within national borders, it is necessary to establish national space legislation governing relations between State and private entities.[153] For example, the Liability Convention only deals with cases of international liability that is liability for damage caused by the space object of a launching State or its citizens or entities to another State or its citizens or entities.[154] Yet, such a space object may obviously cause damage to citizens and entities of the launching State itself. In such a case national law should step in to fill the gap. It has been concluded within many doctrinal writings that 'a fundamental duty exists under Article VI of the Outer Space Treaty to provide for authorisation and continuing supervision of private space activities, the form of which was in principle left to the State concerned, and that a strong recommendation arose therefrom for such authorisation and continuing supervision to be incorporated into a broader licensing regime as part of a national (framework) law in view of the comprehensiveness and transparency of such an approach.'[155] Article VI expressly subordinates non-State actors to State supervision and control,[156] calling for national regulation in this regard. This

[151] For a list of and the content of the existing domestic space law *see* United Nations Office for Outer Space Affairs, National Space Law Database, http://www.unoosa.org/oosa/en/SpaceLaw/national/stateindex.html (last visited Sept. 6, 2012). [Doyle (2012), p.4].

[152] von der Dunk, Frans, "Current and Future Development of National Space Law and Policy" (2005). University of Nebraska, Space and Telecommunications Law Program Faculty Publications. Paper 12, 27.

[153] See for example the US Space Act.

[154] Liability Convention, Article 1(a).

[155] Second United Nations Workshop on Space Law, held in Daejon, Republic of Korea, 3-6 November 2003; for more information, see the website of the United ' Nations Office for Outer Space Affairs, at http://www.oosa.unvienna.org/index.html [cited in von der Dunk, Frans, "Current and Future Development of National Space Law and Policy" (2005). University of Nebraska, Space and Telecommunications Law Program Faculty Publications. Paper 12, 26].

[156] Article VI of the OST provides for the general rule here: 'States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty.'

duty coupled with the rising number of States involved in exploration and use of outer space and the proliferation of private actors in the space sector obviously contributed to the intensification of law-making processes within domestic space law.

Nevertheless, a novel development in space-law-making processes is that domestic regimes are taking over the regulation of issues not foreseen by the space treaties. This national handling of the creation of norms that are of inherently global interest raises issues of legitimacy. Unilateral solutions are unlikely to provide for the common interest of the global community and are bound to raise many objections. A case in point is the adoption of The US Space Act. This Act unilaterally regulates some key aspects of the contentious issue of property rights in outer space and 'promotes the right of United States commercial entities to explore outer space and utilize space resources, in accordance with the existing international obligations of the United States, free from harmful interference, and to transfer or sell such resources'.[157]

The realities of current law-making processes in space law are probably best presented within the framework of the pluralist approach to international law.[158] Whereas the use of outer space was previously the province of an exclusive club of a few States and governed predominantly by international agreements, it has now transformed into a widespread activity of governmental and private entities with multifarious national rules that enable the functioning of a variety of subjects within individual domestic legal regimes.[159] By the end of the twentieth century, the space sector had become an expanding worldwide multi-billion dollar industry[160] attended by

[157] The US Space Act, Para. 51302 (a)(3).

[158] 'The international legal system today appears to be at the center of two opposing sets of forces—one set pushing toward fragmentation, the other toward interconnection and coherence. As these forces interact, a new type of international legal system is emerging—one that is neither fully fragmented nor completely unitary. The emerging system may be best described as pluralist' [William W. Burke-White, 'International Legal Pluralism' (2004) 25 *Michigan Journal of International Law* 953, 997]. Cf. Sally Folk Moore, 'Legal Systems of the World: An Introductory Guide to Classification, Typological Interpretations, and Bibliographical Resources, ' in Leon Lipson and S. Wheeler (eds), *Law And The Social Sciences* (1986), Martti Koskenniemi, *Fragmentation of International Law: Difficulties Arising From the Diversification and Expansion of International Law (Report of the Study Group of the International Law Commission, A/CN.4/L.682)* (2006), Margaret Davies, *Legal Pluralism* (Oxrord Handbooks Online 2012), online: < http://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199542475.001.0001/oxfordhb-9780199542475-e-34>, accessed 12 May 2017>.

[159] On the general topic of the role of State in the international legal order and sovereignty of States see for example: Joaquin Alcaide Fernandez, 'Los estados sobreanos' in *Lecciones de Derecho Internacional Público* (Madrid, Tecnos 2015).

[160] See OECD, *The Space Economy at a Glance* (OECD Publishing 2011).

a vast number of international organisations and educational and research institutes.[161] The era of binding rules created through top-down processes instigated by a few space power States operating within the framework of international institutions had drawn to a close. Many new subjects, not only States, now influence the shape and origin of law-making processes in space law. Legal doctrine has clearly taken notice of this situation and has spoken widely about the next stage of space law development and the new generation of space law. The character of this new generation of international space law is mainly 'soft' and the process of its creation is best reflected by the pluralist doctrine.

The pluralist approach to international law inevitably expanded the state-focused perspective of both the realists and the positivists by drawing attention to ongoing interactions among variously situated institutional actors. Currently, the scope of subjects to the law-making processes has widened even further, as international law scholars increasingly recognise the existence of multiple normative communities, some of which impose their norms through officially sanctioned force and formal legal processes. The resulting norms have varying degrees of impact, of course, but cannot be ignored.[162]

Given the changes in the law-making processes that are now being initiated on different levels and within a wide spectrum of organisations, the common interest may be easily overlooked. There is a clear need for a common framework that is capable, on the one hand of accommodating different needs, and on the other hand of providing the tools required to establish common goals. The paradigm of sustainable development is well suited for such a role.

[161] See *supra* note 68.

[162] Paul Schiff Berman, 'A Pluralist Approach to International Law ' (2014) 32 *The Yale Journal of International Law*, 302.

## B. SUSTAINABILITY OF OUTER SPACE AND USE OF OUTER SPACE TOWARDS SUSTAINABLE DEVLOPMENT ON EARTH

### 1. General remarks

The topic of extension of the legal concept of sustainable development to the conduct of space activities has not enjoyed much attention of legal doctrine.[163] What has been addressed are both issues that are important also from the perspective of sustainable development[164] and some specific principles that can advance the issue of sustainability in general.[165] As for the principles, legal doctrine has not approached them in the light of the principle of integration enabling inter- and intragenerational equity, hence not as tools to achieve sustainable development. The present study considers the principle of integration an axis of the legal concept of sustainable development that on one hand points into inter- and intragenerational equity and on the other hand triggers enabling principles.[166]

The concept of sustainable development has also struggled to gain sufficient support within the ambit of the UNCOPUOS and other international fora concerned with outer space.[167] Current legal initiatives and regulations relating to outer space promote sustainable patterns outside the legal framework of sustainable development. Space governance and space law refer to sustainable development only in the context of sustainable development on Earth. In the context of outer space one uses the expression 'sustainability of outer space', distancing it from the legal concept of sustainable development.

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[163] The two more widely available studies are: Motoko Uchitomi, Sustainable Development in Outer Space—applicability of the concept of sustainable development to space debris problems, *Proceedings of the 43rd Colloquium on the Law of Outer Space, IISL, 2–6 October 2000 (Rio de Janeiro),* AIAA. (2001), 71–80; Lotta Viikari, *The Environmental Element in Space Law. Assessing the Present and Charting the Future* (Martinus Nijhoff Publishers 2008), 129-176.

[164] For example the issues of militarisation of outer space, cooperation and space ethics are running threads of the general legal discourse in outer space law.

[165] Principles such as the precautionary principle, due regard, common but differentiated responsibilities and polluter-pays principle all can be used as tools of sustainable development. On the legal assessment of these principles in outer space see Lotta Viikari, *The Environmental Element in Space Law. Assessing the Present and Charting the Future*, 157-202.

[166] On the conceptualisation of sustainable development see *infra*, Chapter D.

[167] In June 2011, the UNCOPUOS adopted terms of reference and methods of work of the Working Group on the Long-term Sustainability of Outer Space Activities, in which it suggested extension of the concept of sustainable development to the domain of outer space as a topic for examination [A/AC.105/L.281/Add.4 (2011), 14-17] only to abandon the idea in the later course.

## 2. Outer space and sustainable development on Earth

The regulatory regime for outer space activities invokes sustainable development in the context of contribution of space-based systems to sustainable development on Earth. Outer space, therefore, is primarily instrumental to the achievement of goals linked to sustainable development on Earth.[168]

### 2.1.UNISPACE conferences

Outer space has been contributing to the achievement of the goals of sustainable developments on Earth. The immense benefits provided by space activities were anticipated at the beginning of the space age. From the outset it was also recognised that the best way to reap these benefits is through international cooperation in the peaceful use of outer space. In order to promote the benefits generated by the use of outer space and to foster international cooperation, the UN organised three unique global Conferences on the Exploration and Peaceful Uses of Outer Space – the UNISPACE Conferences. These conferences provided a platform for a global dialogue on key issues relating to space exploration and exploitation.

UNISPACE I (1968)[169] focused on promoting collaboration in outer space. One of the objectives of the conference was to explore the possibility of engaging non-space powers in space activities. The conference recognised that space powers have a responsibility to help get non-space States involved.

The main focus of UNISPACE II (1982)[170] was applications of space science and technology. It also addressed the concerns of how to maintain outer space for peaceful purposes and prevent an arms race in outer space. It further highlighted the importance of international cooperation and explored international cooperation within the

[168] Notwithstanding the practice, there are voices advocating the preservation of outer space as a natural resource. In 2011 French delegation highlighted in its comment that 'the Group's priority goal *is not to place space in the service of sustainable development but to work towards the preservation of space as a resource that has become essential to sustainable development*, notably thanks to the development of space tools'. It also mentioned […]international cooperation focused on *preserving the space environment* and enhancing the sustainability of use of space by all nations as well as their public and private entities (emphasis added) (France comment on the Long-term sustainability of outer space activities [1A/AC.105/C.1/2011/CRP.9 (2011)].

[169] Report of the Committee on the Peaceful Uses of Outer Space, document (1968), A/7285, 65.

[170] Report of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space UNISPACE II (1982), A/CONF.101/10, 145-312.

framework of some international institutions and organisations.[171] The Conference also focused on strengthening the UN's commitment to promoting international cooperation to enable developing countries to benefit from the peaceful uses of space technology. UNISPACE II also led to the establishment of regional centres for space science and technology education. It also focused on building human and institutional capacities for exploiting the immense potential utility of space technology for socio-economic development.

UNISPACE III (1999), was the most significant conference in terms of the recognition it provided for the contribution of space-based services for human development and the environment. This contribution was clearly stated and for the first time translated into a broader international context. The adopted resolution, 'The Space Millennium: Vienna Declaration on Space and Human Development'[172], provided a strategy for using space science, space technology and space-based applications to address global challenges linked to sustainable development.

Space science and the data obtained through space-based systems and their applications are important for the advancement of issues relating to sustainable development, such as education, health, environmental monitoring, management of natural resources, disaster management, meteorological forecasting, climate modelling, navigation and communications.[173] To this end, even some legal tools introduced by

[171] Ibid., 313-438

[172] 'Space Millennium: Vienna Declaration on Space and Human Development' in Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (18 October 1999), Doc A/CONF.184/6, 6; see also UNOOSA, Solutions for the World's Problems (UNOOSA 2006).

[173] Let's take an example of the sea environment and the maritime sector to illustrate how space-based systems and data gathered through the Earth observation programme 'Copernicus' [Copernicus Regulation: COM (2013) 312 final/2] are an integral part of management of the seas and contributes to sustainability and security of the maritime sector. Within the framework of the European 'Copernicus' a considerable amount of information is gathered about the physical, chemical and biological conditions of the Earth's waters. The data includes, *inter alia*, radar images of sea-ice conditions, data on wind, waves, currents, the Earth's gravity, ice and land surface topography, temperature, ocean and land surface radiance/reflectance, measurements of the state of the oceans' ecosystems, water quality, pollution monitoring, salinity and much more. The high-accuracy, near real-time data is then used in applications enhancing marine safety (e.g. marine operations, oil spill containment, ship routing, search and rescue applications), marine resource management (e.g. fish stock management), climate and seasonal forecasting (e.g. climate change monitoring, ice sea seasonal forecasting), and monitoring marine and coastal environments (e.g. ice sheet surveys, water quality, coastal activities, pollution control, coastal erosion ['Copernicus' is a programme developed by the EC in cooperation with the ESA. For the mission details see: ESA Copernicus: <www.esa.int/Our_Activities/Observing_the_Earth/Copernicus/Marine_services> accessed 21 May 2015. For other ESA maritime relevant missions see: Gravity Field and Steady-State Ocean Circulation Explorer <www.esa.int/Our_Activities/Observing_the_Earth/The_Living_Planet_Programme/Earth_Explorers/GO

international law rely on outer space for their implementation. For example, in environmental impact assessment, the precautionary principle can be effectively implemented when Earth-observing satellites provide scientific data on the given environment.

In June 2018, UNOOSA is going to organise UNISPACE+50 to mark the fiftieth anniversary of UNISPACE I.[174] As was the case with previous conferences, UNISPACE+50 will serve as a platform for the international community to meet and consider the future of space. Its goal is to build, together with all stakeholders, a new concept of space governance within a new framework strategy called Space2030.

Space2030 will support the use of space as a tool for the achievement of the Sustainable Development Goals[175] It aims to ensure that space technology and its applications are used to bring concrete benefits to all humankind, paying special attention to the future space-faring and developing countries while also carefully considering the long-term sustainability of outer space activities for current and future generations.

In preparation for UNISPACE+50 and Space2030, UNOOSA has been organising a series of High Level Forums. The aim is to promote dialogue between the whole range of stakeholders – governments, international organisations, industry, the private sector, academia and civil society – with a view to identifying ways of harnessing space technology and its applications for socio-economic human development. The most recent Forum was held in Dubai in November 2016. The Report highlighted that '[w]ith the adoption of the three global agendas (the 2030 Agenda for Sustainable Development, the Sendai Framework for Disaster Risk Reduction 2015-2030 and the

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CE/Objectives, Soil Moisture and Ocean Salinity <www.esa.int/Our_Activities/Observing_the_Earth/The_Living_Planet_Programme/Earth_Explorers/SMOS/Objectives> accessed 21 May 2015, Cryosat <www.esa.int/Our_Activities/Observing_the_Earth/CryoSat> accessed 21 May 2015]. Apart from remote sensing satellites, there are also navigation satellites. The positioning services provided by them result in improved ship navigation, traffic management, seaport operations, offshore exploration and fish finding [See, eg, Galileo Mission (agreed upon officially on 26 May 2003 by the EU and the ESA <www.esa.int> accessed 25 July 2015), Galileo fact sheet <http://download.esa.int/docs/Galileo_IOV_Launch/Galileo_factsheet_2012.pdf> accessed 14 April 2015]. Telecommunication satellites also play an important role in maritime security. An example is ESA's SAT-AIS initiative (Satellite Automatic Identification System) [the ESA ATRES Programme: From Satcom products to services, <http://esamultimedia.esa.int/multimedia/publications/BR-305/> <http://telecom.esa.int/telecom/www/object/index.cfm?fobjectid=30922> accessed 21 May 2015].

[174] A/AC.105/L.297 (2015) (a roadmap endorsed by UNCOPUOS).

[175] Simonetta Di Pippo, 'To Space2030 and beyond: space as a driver for sustainable development', UNOOSA, online: < http://europesworld.org/2017/01/31/space2030-beyond-space-driver-sustainable-development/#.WMMZ81Xyu70>.

Paris Agreement on climate change), which will stimulate action in the next few years in an integrated way, balancing the three dimensions of sustainable development (economic, social and environmental), the enhanced use of space tools has become even more critical.'[176] To this end the Forum recognised four pillars of the discourse on space as drivers of socioeconomic development: 1) space economy, 2) space society, 3) space accessibility, and 4) space diplomacy.[177]

Space economy is defined as 'the full range of activities and use of resources that create and provide value and benefits to human beings in the course of exploring, understanding and utilizing space'. It is driven by technology and innovation.[178] Space society refers to a 'society, which carries out its core functions while making the best use of space technologies and space-based services and applications'.[179] Space accessibility refers to 'all user communities and decision-makers being able, on an equal basis, to benefit from and use space technologies and space-based data'.[180] Space diplomacy is defined as 'cooperation among nations in using space technologies and applications to address common challenges facing humanity and to build constructive, knowledge-based partnerships'.[181]

## 3. Sustainability of outer space

### 3.1. Notion of 'sustainability'

Sustainability is a central concept in the domain of environmental protection. Yet no universally agreed definition of sustainability exists.[182]

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[176] Report on the United Nations/United Arab Emirates High-level Forum: Space as a Driver for Socioeconomic Sustainable Development, A/AC.105/1129

[177] Dubai Declaration 2016 [Report on the United Nations/United Arab Emirates High-level Forum: Space as a Driver for Socioeconomic Sustainable Development, A/AC.105/1129].

[178] Report on the United Nations/United Arab Emirates High-level Forum: Space as a Driver for Socioeconomic Sustainable Development, A/AC.105/1129, 2.

[179] Ibid.

[180] Ibid.

[181] Ibid.

[182] When it comes to defining sustainability and sustainable development however, and possible differentiation of terms, there is a great flexibility depending on the domain and context. Therefore Kidd states that the key to avoiding controversy is for all who use the term to describe clearly what they mean by sustainability in the context of the specific problem being dealt with [Charles V. Kidd, The Evolution of Sustainability, *Journal of Agriculture and Environmental Ethics* 5:1 (2010): 1–26]. Bell and Morse, for example, conclude that there is no wrong definition and that the search for the "proper" definition of sustainability is futile [Simon Bell and Stephen Morse, Sustainability Indicators: Measuring the Immeasurable, 2nd ed. (London: EarthScan, 2008), 6.].

The broad common definition of 'sustainability' provided by the Cambridge Dictionary online is 'the ability to continue at a particular level for a period of time'. However, when used in the environmental context sustainability has a more nuanced meaning: it represents 'the idea, the concept, that the resource can be used in a way that does not deplete or permanently damage the resource and does not damage the environment.'[183] Basing his views on Gaia theory, Decleris argues that a deeper meaning of sustainability is systemicity. [184] He argues that according to the systemic view, sustainability is the self-evident term for the dynamic equilibrium between man and nature and their co-evolution within the 'Gaia mega-system.' At the conceptual level, sustainability is regarded as a 'system quality.' The Gaia theory states that system is a compound of the geosphere and biosphere. The theory proposes that all organisms and their inorganic surroundings on Earth are closely integrated to form a single and self-regulating complex system, maintaining the conditions for life on the planet. On a practical note, this can be translated to 'harmonization of all public policies and social practices and their convergence towards ensuring the co-evolution of manmade systems and ecosystems.'[185]

The ecological concept of sustainability does not directly deal with the social context.[186] Its focus is on the equilibrium between man and nature and not on justice or the equilibrium among people. But the use of resources can be environmentally sustainable, yet unjust.[187] In order to acknowledge the importance of the social context, sustainability has acquired a more qualified meaning within the context of sustainable development, where it may be understood as a form of justice: inter- and intragenerational equity.

### 3.2. Sustainability of outer space

Sustainability of outer space relies neither on ecology nor on justice for its conceptualisation. The notion of sustainability in the context of current practice relates

[183] Cambridge Dictionary, online: < http://dictionary.cambridge.org/>.

[184] Micheal Decleris, The Law of Sustainable Development: General Principles (Luxembourg: Office for Official Publications of the European Communities, 2000), 6.3 and 6.4.

[185] Micheal Decleris, 76–77

[186] Although there are scholars that include justice within the scope of sustainability, merging it de facto with sustainable development understood as an objective of intra- and intergenerational equity.

[187] Peter Marcuse, Sustainability is not enough, *Environment and Urbanization* 10:2 (1998), 103.

to the durability of outer space activities. The Secure World Foundation defines space sustainability as 'the ability of all humanity to continue to use outer space for peaceful purposes and socioeconomic benefit over the long term'[188]. Sustainability of outer space, therefore, means sustainability of space activities.

As mentioned above, space-based activities are vital for the achievement of sustainable development on the Earth. At the same time, the exploitation of outer space is encumbered by a combination of factors, namely the escalation of human presence in the orbital space around Earth, the rudimentary international legal regime (especially with respect to new and emerging activities) and the frequent lack of national legislation. Sustainability of outer space activities as a coordinated initiative emerged as a reply to this issue.[189] This initiative refers to a comprehensive and coordinated effort aimed at ensuring the peaceful long-term use of outer space. As currently conceived, the concept of sustainability of outer space is a problem-focused and action-oriented initiative that focuses both on the technicalities of the issues that present risks to the usability of outer space and on the development of necessary tools of governance. It also provides legislative guidance, especially with respect to emerging national legal regimes concerning outer space.

Sustainability of outer space activities is a concept in framework that addresses urgent risks to space activities or to humans in the context of space activities. These risks cluster around three central topics addressed under the rubric of sustainability of outer space.[190] 'Space security' pertains to threats triggered by voluntary or aggressive behaviour.[191] They would include for example purposeful interference, such as satellite

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[188] See Secure World Foundation, "Space Sustainability: A Practical Guide," http://swfound.org/media/1808/space_sustainability_booklet.pdf (accessed January 2016). The concept of 'space sustainability' is often used interchangeably with 'space security', 'space stability', 'space safety', to large extent depending on the forum of discussion.

[189] UNGA called for sustainability and safety of outer space specifically in resolutions 61/75 (2006) and 62/43 (2007).

[190] The concept of 'space sustainability' as such is actually often used interchangeably with 'space security', 'space stability', 'space safety', to large extent depending on the forum of discussion [Timiebi Aganaba-Jeanty, 'Space Sustainability and the Freedom of Outer Space' (2016) 14 1 *The International Journal of Space Politics & Policy* 1, 6.

[191] Tommas Sgobba, Statement on the International Code of Conduct. 'Security' and 'safety' as defined by the IAASS, see: http://www.spacesafetymagazine.com/news/iaass-statement-on-the-international-code-of-conduct-for-outer-space-operations/. There are other definitions, scope of which not necessarily is the same as proposed by the IAASS. The Space Security Index Report merges notions of security and safety of space (as presented in this study) defining space security in broader terms, as 'the secure and sustainable access to, and use of, space and freedom from space-based threats' Space Security Index, online: Space Security <http://www.spacesecurity.org/executive.summary.2011.PDF>. Similar is a European perspective on the notion of security of space [see, Xavier Pasco, A European Approach to

jamming, anti-satellite weapons (ASAT) tests as well as weaponisation of outer space.[192] 'Space safety' deals with threats that are involuntary and due to such things as human error and lack of capacity, such as unwanted collisions, failures, uncontrolled re-entries, etc.[193] The final set of risks addressed within the framework can be classified as issues of 'space stability'. This topic relates to space situational awareness, including *inter alia* space debris management, space weather and radiation.[194]

In order to ensure the usability of outer space, guides for model behaviour have been promoted through many international fora and initiatives.

### 3.2.1. The Working Group on Long-Term Sustainability of Space Activities

The Working Group on Long-Term Sustainability of Space Activities (LTSSA) is a flagship international initiative dealing with the sustainability of space activities. The LTSSA was established within the framework of the Scientific and Technical Subcommittee of the UNCOPUOS in 2010, after several years of discussion.[195] Within the Working Group, four expert groups were created to discuss specific topics and develop draft guidelines. Inputs were invited from other UN bodies as well as from international organisations and the private sector.[196] The Working Group's terms of

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Space Security, (Cambridge: American Academy of Arts and Sciences, 2009), online: < https://www.amacad.org/publications/spaceEurope.pdf > The United Nations Institute for Disarmament Research (Conference on Disarmament) has a narrower conception of space security as it is more focused on arms control and confidence building measures necessary for space security.

[192] For a table presenting a list of intentional threats to space systems and services see: ISS Report 29, 23, online: < http://www.iss.europa.eu/uploads/media/Report_29_Space_and_Security_online.pdf>.

[193] Tommas Sgobba, Statement on the International Code of Conduct. 'Security' and 'safety' as defined by the IAASS, online: http://www.spacesafetymagazine.com/news/iaass-statement-on-the-international-code-of-conduct-for-outer-space-operations/.

[194] For a table presenting a list of unintentional threats (hazards) to space systems and services linked to stability of space see: ISS Report 29, 24, online: < http://www.iss.europa.eu/uploads/media/Report_29_Space_and_Security_online.pdf>.

[195] The issue of sustainability of outer space has been debated within the UNCOPUOS framework since 2005 when Karl Doetsch delivered a speech on the topic. In 2007, Gérard Brachet presented a white paper titled "Future role and activities of the Committee on the Peaceful Uses of Outer Space"[ A/AC.105/L.268 and Corr. 1]; On February 2009, the French delegation submitted a working paper 'Long-term sustainability of outer space activities' [A/AC.105/C.1/L.303] where it advocated establishing of the working group concerned with the sustainability of activities in space within the Scientific and Technical Subcommittee of the UNCOPUOS.

[196] The Working Group received contributions from States members of the Committee, as well as from the International Telecommunication Union, the United Nations Educational, Scientific and Cultural

reference, and the scope and methods of their work, were agreed in 2011.[197] The objectives were to 'identify areas of concern for the long-term sustainability of outer space activities, examine and propose measures that could enhance sustainability in all its aspects, including the safe and sustainable use of outer space for peaceful purposes'.[198]

Through its four Expert Groups, the LTSSA has targeted the following civil aspects of outer space: (a) Sustainable space utilization supporting sustainable development on Earth; (b) Space debris, space operations and tools for supporting the sharing of space situational awareness; (c) Space weather; and (d) Regulatory regimes and guidance for new actors in the space arena. The resulting set of guidelines is directed at governments undertaking the task of creating national legal frameworks as well as at international organisations authorising or conducting space operations. The guidelines are grouped into four categories: A. Policy and regulatory framework for space activities; B. Safety of space operations; C. International cooperation, capacity-building and awareness; D. Scientific and technical research and development. As of March 2017, the set of Guidelines consists of the Agreed Guidelines, the working version of the preambular part, and guidelines under discussion.[199]

The agreed guidelines do not deal with the issues that are pivotal from the perspective of sustainable development, namely the incorporation of inter- and intragenerational equity within the concepts of environmental preservation and protection and social justice. However, it is interesting to note that the draft contextual part referring to the scope and implementation of the guidelines provides a definition of the sustainability of outer space that is much broader than 'sustainability of space activities'. It reads that

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Organization, the Office for Disarmament Affairs of the Secretariat, the Economic and Social Commission for Asia and the Pacific, the Asia-Pacific Space Cooperation Organization, the Committee on Space Research, the International Astronautical Federation, the Secure World Foundation, the Space Generation Advisory Council, the Consultative Committee for Space Data Systems, the European Organisation for the Exploitation of Meteorological Satellites and the secretariat of the Group on Earth Observations. Inputs of national non-governmental organizations and private sector entities were also obtained through relevant States members of the Committee [A/AC.105/C.1/L.357].

[197] (A/66/20, annex II)

[198] The Report from the 54th session of UNCOPUOS to the 66th session of the UN General Assembly, Supplement No. 20 (A/66/20), 2011, at 52.

[199] A/AC.105/C.1/L.354/Rev.1

'The long-term sustainability of outer space activities is defined as the conduct of space activities in a manner that balances the objectives of access to the exploration and use of outer space by all States and governmental and non-governmental entities only for peaceful purposes with the need to preserve the outer space environment in such a manner that takes into account the needs of current and future generations'.[200]

Surprisingly, this definition accords well with the objectives of sustainable development and its key principle of integration understood as a balancing of different interests. Moreover, in the opinion of the present author, the definition rightly treats the competing requirements of human and nature as the primary balancing axis. If accepted, this definition would be a 'de facto' recognition of sustainable development within the domain of outer space activities.

### 3.2.2. Chinese-Russian draft Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects

Militarisation and weaponisation are widely perceived as risks to the sustainability of outer space. While militarisation is a fact, often due to the dual civil and military functions of satellites, so far outer space has remained free of weapons in the sense of objects designed as such. However, the fear of 'star wars' and more general concerns about a possible expansion in the use of space based weapons against humans and assets in space and on Earth, have prompted efforts to prevent an arms race in outer space (PAROS) addressed within the framework of the CD.[201] Unfortunately, the CD has been far from successful in its efforts to adopt a binding instrument banning arms races in space. The most recent initiative in this respect is a Russian-Chinese proposal. The draft Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects (PPWT)[202] was

[200] A/AC.105/2016/CRP.17, 14.

[201] For the CD see *supra* note 58. The debate on PAROS started following the US President R. Reagan decision to launch in 1985 the Missile Defense Program (a.k.a. **Star Wars**), which encountered major technological difficulties and was later restarted in a diminutive form (a.k.a. **Son of Star Wars**) by U.S. President G. W. Bush after September 11 2001. For a short history of PAROS see UNDIR, online: < http://www.unidir.org/files/publications/pdfs/the-conference-on-disarmament-and-the-prevention-of-an-arms-race-in-outer-space-370.pdf>.

[202]Conference on Disarmament, 'Letter Dated 12 February 2008 from the Permanent Representative of the Russian Federation and The Permanent Representative of China to the Conference On

submitted jointly by Russia and China on 12 February 2008. From a legal perspective the proposal makes few important points. It calls for outer space to be free of any military confrontation and stipulates that outer space shall only be used and explored for peaceful purposes that benefit all humankind[203]. The PPWT also defines 'space weapon', which is a long-overdue definition.[204] The most visible drawbacks of the proposal include: a) it does not address the issue of weapons developed for purposes of destroying satellites but not placed in space, such as rockets used in the Chinese or the US ASAT tests; b) it does not expressly prohibit weapon testing in space; c) for obvious political reasons it does not address the issue of militarisation of space, what means that space assets will still be used in military conflicts on Earth; and d) last but not least, it does not provide for any verification and deterrence tools against space weaponisation.

Notwithstanding the drawbacks mentioned above, the obstacles to concluding a binding instrument seem to be political rather than legal in nature. The Bush administration dismissed the PPWT, characterising it as a diplomatic ploy by the Russians and the Chinese to gain a military advantage.[205] The US is generally opposed to signing another treaty and would prefer setting up norms through non-binding international instruments inclined toward domestic solutions. As a result, the PPWT has not made much progress since it was introduced.[206]

### 3.2.3. The UNGA Group of Governmental Experts

In the absence of immediate prospects for the signature of an international treaty on militarisation and weaponisation of outer space, attention has turned to transparency and confidence building measures (TCBMs). The TCBMs are nonbinding 'actions and

Disarmament Addressed to the Secretary-General of the Conference Transmitting the Russian and Chinese Texts of the Draft "Treaty On Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force Against Outer Space Objects (PPWT)" Introduced by the Russian Federation and China' (2008), CD/1839.

[203] http://daccess-dds-ny.un.org/doc/UNDOC/GEN/G08/604/02/PDF/G0860402.pdf?OpenElement.

[204] 'The term "weapon in outer space" means any device placed in outer space, based on any physical principle, which has been specially produced or converted to destroy, damage or disrupt the normal functioning of objects in outer space, on the Earth or in the Earth's atmosphere, or to eliminate a population or components of the biosphere which are important to human existence or inflict damage on them' [PPWT, Article 1(c)].

[205] Nayef R. F. Al-Rodhan, *Meta-Geopolitics of Outer Space: An Analysis of Space Power, Security and Governance* (Palgrave Macmillan 2012), 187.

[206] 'The option of negotiating a legally binding treaty for space security purposes seems to be stagnant at best and dead at worst'. [Ram Jakhu, 'Transparency and Confidence-Building Measures for Space Security' in A Lele (ed), *Decoding the International Code of Conduct for Outer Space Activities* (Pentagon Press 2012), 42].

procedures undertaken within the context of policy, legal and/or institutional framework(s) for the purpose of enhancing openness and transparency, assuring mutual understanding and reducing misunderstandings, threats and tensions among States'.[207]

In 2006 the UNGA invited all Member States to submit concrete proposals on international outer space transparency and confidence-building measures, in the interest of maintaining international peace and security and promoting international cooperation and the prevention of an arms race in outer space.[208] Four years later the UNGA adopted a resolution that established a group of governmental experts (GGE) to conduct a study on the TCBMs in outer space without prejudice to the ongoing discussions on PAROS. [209] The Russian Federation was the main advocate of the group. Despite an initial reluctance, the US has nominated its expert to participate in the works of the GGE.[210] In 2013 the GGE adopted the 'Report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities'.[211] The study reaffirmed that international cooperation focused on the strengthening the capacities to benefit from space is at the core of the prevention of an arms race and weaponisation of outer space.[212]

### 3.2.4. European Draft of the International Code of Conduct for Outer Space Activities

The International Code of Conduct for Outer Space Activities (ICoC or the Code)[213] is one of the central proposals for a voluntary international agreement to enhance space safety, security and sustainability. Unlike other initiatives, it aims to handle both civilian and military aspects of outer space sustainability. The ICoC was formally launched in 2008 in the Council of the EU and has been Europe's most

[207] Ibid, 36. 'Transparency and confidence-building measures can reduce, or even eliminate, misunderstandings, mistrust and miscalculations with regard to the activities and intentions of States in outer space.' [Report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities, A/68/189, 2]

[208] UNGA, A/RES/61/75 (2006)

[209] UNGA, A/RES/65/68 (2010)

[210] Jakhu (2012), 40. The resolution establishing the GGE was adopted by a vote of 183 in favour to none against, with 1 abstention (the US).

[211] Report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities, A/68/189

[212] Ibid, 4.

[213] International Code of Conduct, Council of the European Union, 14455/10, PESC 1234, CODUN 34, ESPACE 2, COMPET 284.

meaningful space diplomacy initiative to date.[214] Initially promoted as a European initiative under the name of Draft Code of Conduct for Outer Space Activities it was revised in 2010 after receiving lukewarm feedback, both from the main space-faring states and from the space-aspiring States.[215] In order to get support of the international community, the EU launched in the UNCOPUOS, an open-ended process of multilateral consultations on the International Code of Conduct based on the EU draft.

The latest draft of the Code is dated 31 March 2014. It was intended to be the subject of negotiations at the UN in July 2015. Eventually the meetings were recast as mere consultations, requiring the EU to find an alternative diplomatic forum through which to finalise the code.

The Code focuses on enhancing the security, safety and sustainability of all outer space activities, encompassing civilian and military uses of space.[216] It is regarded as complementary to the existing legal framework and initiatives regulating outer space activities. Many argue that its very broad scope addresses too many disputable issues, and that this may delay or even preclude its adoption.[217] Regardless of its ultimate success, the process of developing the Code has been part of a larger/ movement addressing issues of sustainability of outer space. If nothing else, one may hope that the process of engaging in consultations and negotiations contributes in and of itself to enhanced confidence building and transparency.

## 4. Sustainable development vs. space sustainability

According to the above analysis, the current concept of sustainability of outer space is an ad-hoc remedy to the threats of today. It accords neither with the logic of

[214] J. Robinson, 'Europe's Space Diplomacy Initiative: The International Code of Conduct', in A. Lele (ed.), Decoding the International Code of Conduct for Outer Space Activities (Pentagon Press, 2012), at Jana Robinson, 'Europe's Space Diplomacy Initiative: The International Code of Conduct' in *Decoding the International Code of Conduct for Outer Space Activities* (Pentagon Press 2012), 27.

[215] Being structured outside of the traditional multilateral institutions like the UN, the Code faced the accusations concerning its legitimacy, especially from space-aspiring States such as India and Brazil, who were peripheral to its drafting and consultation process. Also the US was hesitant to the idea of joining it. Nevertheless, in 2012, the U.S. expressed its readiness to support negotiations on an international code of conduct based on the EU draft [The U.S. Department of State: http://www.state.gov/secretary/rm/2012/01/180969.htm].

[216] ICoC, note 48 above, Section I, para.1.1.

[217] See, for example, the IAASS Statement on International Code of Conduct for Outer Space Operations presented at the UN during the meeting on 27 - 31 July 2015.

ecological sustainability nor with the understanding of sustainability as a desire for justice. Although important issues are approached under the umbrella of this concept, other important questions remain open. What is the direction and objective of activities in outer space? Who is to benefit from them? Are there any reasons to protect outer space *per se*?

In recent years, the long-term sustainability of outer space has attracted growing interest from of a wide variety of actors in the private sector. However, their motivation is presumably to assure their own economic, political and military futures. In contrast, sustainable development clearly implies inter- and intragenerational equity as an objective: this objective is in alignment with the provisions of space law, which designate humankind in its entirety as the ultimate beneficiary of space exploration. Unlike space law and the concept of sustainability of outer space, sustainable development has developed tools to address the issue of equity. It provides a sound and durable legal framework for pursuing justice in both environmental and social dimensions.

## C. SUSTAINABLE DEVELOPEMNT IN THE CURRENT LEGAL DISCOURSE

### 1. General remarks

The literature includes many alternative theoretical and applied definitions of sustainable development. The theoretical work spans hundreds of studies that are based on legal theory, complex systems approaches, ecological science, economic approaches and others. There is a general realisation that the single disciplinary science is unable to deal effectively with the complex and cross-disciplinary challenges of sustainable development.[218]

### 2. Literal meaning of sustainable development in international law

The term 'sustainable development' consists of two components: 'development' and 'sustainable'. 'The term 'development' appears in the Charter of the United Nations.[219] Article 55 calls on the UN to promote 'higher standards of living, full employment, and conditions of economic and social progress and development'. For the generation that

[218] For Legal conceptualisation of sustainable development see for example: Philippe Sands, 'International Law in the Field of Sustainable Development' (1994) 65 1 *British Yeabook of International Law* 303, Philippe Sands, 'International Law in the Field of Sustainable Development: Emerging Legal Principles' in W. Lang (ed), *Sustainable Development and Interntional Law* (Graham & Trotman / Martinus Nijhoff 1995), Nico J. Schrijver, *The Evolution of Sustainable Development in International Law: Inception, Meaning and Status* (Martinus Nijhoff Publishers 2008), Nico J. Schrijver and Friedl Weiss (eds), *International Law And Sustainable Development: Principles And Practice* (Martinus Nijhoff Publishers 2004), Marie-Claire Cordonier Segger and Ashfaq Khalfan, *Sustainable Development Law: Principles, Practicies and Prospects* (Oxford University Press 2004), Dire Tladi, *Sustainable Development in International Law: An Analysis of Key Enviro-Economic Instruments* (Pretoria University Law Press 2007), Christina Voight, *Sustainable Development as a Principle of International Law: Resolving Conflicts between Climate Measures and WTO Law* (Martinus Nijhoff Publishers 2009), Alan Boyle and David Freestone (eds), *International Law and Sustainable Development: Past Achievements and Future Challenges* (Oxford University Press 2001). For sustainable development in the light of human rights see for example: José Juste Ruiz, 'El desarrollo sostenible y los derechos humanos' in Juan Antonio Carrillo Salcedo and others (eds), *Sobreanía del Estado y Derecho Internacional* (Universidad de Cordoba, Univesidad de Sevilla, Univesidad De Malaga 2005) 157-778. For the general interdisciplinary overview of sustainable development see for example: J. K. Boyce, Inequality as a cause of environmental degradation, *Ecological Economics* (1994), 11(3), 169–178; Derk Loorbach and Jan Rotmans, 'Managing Transitions for Sustainable Development' in Xander Olsthoorn and Anna J. Wieczorek (eds), *Understanding Industrial Transformation*, vol 44 (Springer 2006); Artur Pawlowski, *Sustainable Development as a Civilizational Revolution: A Multidisciplinary Approach to the Challenges of the 21st Century* (Taylor & Francis Group 2011), B. Campbell, *Human Ecology: The Story of Our Place in Nature from Prehistory to the Present* (Aldine Transaction 1995); J.M. Harris and others (eds), *A Survey of Sustainable Development. Social and Economic Dimensions. Frontier Issues in Economic Thought* (Island Press 2001).

[219] The Charter of the United Nations (26 June 1945, in force 24 October 1945) ('The UN Charter').

witnessed major economic crises and two World Wars, development probably was perceived as a crucial component in a process of building peace and security.[220] The 1986 UNGA Resolution entitled 'Declaration on the Right to Development' stated that 'the human person is the central subject of development and should be the active participant and beneficiary of the right to development'.[221] The Declaration described the 'right to development' as 'a comprehensive economic, social, cultural and political process, which aims at the constant improvement of the well-being of the entire population and of all individuals on the basis of their active, free and meaningful participation in development and in the fair distribution of benefits resulting therefrom.'[222] The primary focus of 'development', according to the Declaration on the Right to Development, is the 'constant improvement of the well-being of the human person.' Development, therefore, is a broader term than the purely economic development or economic growth often measured at the State level. It means an ongoing collective change that is intrinsically linked to overall human activity.

Another component of the expression 'sustainable development' is 'sustainable'. The word 'sustainable' means 'able to be maintained or continued'.[223] The term 'sustainability' was taken up in the UN's Third Development Strategy of 1980.[224] It stated that 'there is a need to ensure an economic development process which is *environmentally sustainable* over the long run and which protects the ecological balance'.[225] In international law the term 'sustainability' has roots in the ecological domain, where it signifies ensuring the ability of the earth's ecological systems to sustain life, including humanity. Hence, sustainable development is about the reconciliation of conflicting environmental and developmental issues.

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[220] See Bruno Simma and others (eds), *The Charter of the United Nations: A Commentary* (3 edn, Oxford University Press 2012).

[221] UNGA Declaration on the Right to Development, U.N. Doc. A/Res/41/128 (1986), Article 2(1).

[222] Ibid, Article 1(1).

[223] Cambridge Dictionary, online: < http://dictionary.cambridge.org/dictionary/english/sustainable>, accessed 12 June 2014>.

[224] International Development Strategy for the Third United Nations Development Decade, G.A. Res. 35/56, U.N. GAOR 35th Sess., 83rd Plen. mtg., U.N. Doc. A/Res/35/36 (1980), reprinted in 20 I.L.M. 480 (1981).

[225] Id. [Emphasis added].

## 3. Sustainable development as reconciliation of economic and environmental issues

The history of reconciliation of the interlocked but conflicting economic issues with environmental conservation, which are at the core of the concept of sustainable development, can be traced to the *Fur Seals* Arbitration.[226] This sought to resolve a conflict between efforts to protect fur seals and economic interests backed by legal rights to navigate and fish. The conflict between economic activity on the one hand and environmental preservation on the other was also reflected in the arbitration on the *Trail Smelter* case.[227]

The necessity for simultaneous consideration of developmental and environmental issues was clearly communicated at the United Nations Conference on the Human Environment (UNCHE) in Stockholm, Sweden in 1972 and then presented in the Stockholm Declaration[228] that contained twenty-six principles. The single biggest achievement of the Stockholm Declaration is that it acknowledged the strong relation between environmental protection and economic development. Principle 13 of the Stockholm Declaration states that 'States should adopt an integrated and coordinated approach to their development planning so as to ensure that development is compatible with the need to protect and improve the environment for the benefit of their population'.[229]

As the international recognition of environmental concerns started to become more pronounced, countries that were striving for economic independence after the collapse of the colonial order felt that environmental issues should not override their rights to the economic progress.[230] At the Sixth Special Session in 1974, the United Nations General Assembly (UNGA) adopted the Declaration and an Action Programme on the

[226] *Fur Seals Arbitration* (*US v. UK*), Decision, Bering Sea Tribunal of Arbitration (15 August 1893), *UN Reports of International Arbitral Awards*, vol. XXVIII, 263-276. The case related to the rights of jurisdiction of US in the Bering's sea and the preservation of fur seals.

[227] *Trail Smelter Case (US v. Canada)*, Decision, Trail Smelter Arbitral Tribunal (16 April 1938 and 11 March 1941), *UN Reports of International Arbitral Awards,* vol. III, 1905-1982. The case concerned transboundary pollution at the border with the US by an overwhelming amount of sulphur dioxide from a smelter of lead and zinc in Trail, British Columbia.

[228] Declaration of the United Nations Conference on the Human Environment, A/Conf.48/14/Rev.1 (16 June 1972) ('Stockholm Declaration').

[229] Ibid., Principle 13.

[230] Peter Malanczuk, *Akehurst's Modern Introduction to International Law*, 233-234.

Establishment of a New International Economic Order (NIEO).[231] Within the ambit of the NIEO the States agreed that environmental protection, while a responsibility of all States, should not jeopardise any development endeavours among developing countries.[232] In 1987, the World Commission on Environment and Development (WCED), headed by Norway's former Prime Minister, Gro Harlem Brundtland, produced 'Our Common Future' report, which defined sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs.'[233] Since the publication of the report sustainable development is identified with justice (intra- and intergenerational equity).

In 1992, states throughout the world convened in Rio de Janeiro, Brazil, for the United Nations Conference on Environment and Development (UNCED), better known as the Rio Conference or Earth Summit. While the WCED and the Stockholm Declaration had rather a large philosophical and political impact on the conceptualisation of sustainable development, it was the adopted by the Earth Summit Rio Declaration[234] that consolidated the meaning of sustainable development and provided the impetus for developments in the scope of international law.[235] The Rio Declaration does not offer any definition of sustainable development. The meaning of sustainable development is consolidated through the 27 principles that represent its formative elements, both substantive and procedural.[236] With the Rio Declaration and the accompanying Agenda 21,[237] a system of values, goals and tools emerged enabling

[231] UNGA, Declaration on the Establishment of a New International Economic Order, A/RES/S-6/3201, (1 May 1974).

[232] Nico J. Schrijver, *The Evolution of Sustainable Development in International Law: Inception, Meaning and Status*, 49.

[233] United Nations World Commission on Environment and Development, Report of the World Commission on Environment and Development: Our Common Future, A/42/427(Annex) (1987) ('Brundtland Report').

[234] The Rio Declaration on Environment and Development, Report of the United Nations Conference on Environment and Development, A/CONF.151/26/Rev.1, Annex I, (Vol. 1) (Rio de Janeiro 1992) ('Rio Declaration').

[235] Dire Tladi, *Sustainable Development in International Law: An Analysis of Key Enviro-Economic Instruments*, 11-37.

[236] UNGA referred to the Rio Declaration as 'containing fundamental principles for the achievement of sustainable development, based on a new and equitable global partnership' [UNGA, Dissemination of the principles of the Rio Declaration on Environment and Development, A/RES/48/190 (21 December 1993)].

[237] Agenda 21: A Programme for Action for Sustainable Development, Report of the United Nations Conference on Environment and Development, Annex II, A/Conf.151/26 (Vol. II) (Rio de Janeiro 1992) ('Agenda 21').

integration of the economic, environmental and social aspects of human development (the three-pillar approach to the conceptualisation of sustainable development).

Among the principles of the Rio Declaration that enable transformation towards the objective of sustainable development, Principle 4, which enshrines the principle of integration is regarded as key; other principles enable the process of integration.

In 1993 the General Assembly of the United Nations established the Commission on Sustainable Development (CSD) to monitor and promote implementation of the Rio outcomes, including Agenda 21. In 1994, the United Nations Division for Sustainable Development produced the Report of the Expert Group Meeting on Identification of Principles of International Law for Sustainable Development.[238] This Report contained nineteen principles and concepts related to the international law of sustainable development taken from the Rio Declaration, Agenda 21, and other environmental agreements.[239]

In 2002, the World Summit on Sustainable Development (WSSD) convened in Johannesburg, South Africa, and the Plan of Implementation of the WSSD reaffirmed the role of governments in 'undertaking concrete actions and measures at all levels and […] enhancing international cooperation, taking into account the Rio Principles.'[240] The Summit called for the promotion of the three components of sustainable development—economic development, social development, and environmental protection—as interdependent and mutually reinforcing pillars.[241] Ten years later in Rio de Janeiro, Brazil, the UN Conference on Sustainable Development once again convened in what is commonly known as Rio + 20.[242] Rio +20 reaffirmed the principles of the Rio Declaration as the basic foundation for international environmental law and sanctioned the importance of Agenda 21, the Johannesburg Plan of Implementation of the WSSD and the Johannesburg Declaration for the process towards sustainable development.[243] All of these international conferences and their resulting documents

[238] CSD, Report of the Expert Group Meeting on Identification of Principles of International Law for Sustainable Development, Background paper, vol. 3 (3 May 1996). See also M Goepel, 'Formulating Future Just Policies: Applying the Delhi Sustainable Development Law Principles' (2010) 2 *Sustainability* 1694. 1694.

[239] M Goepel, 'Formulating Future Just Policies: Applying the Delhi Sustainable Development Law Principles'.

[240] United Nations Commission on Sustainable Development. Plan of Implementation of the World Summit on Sustainable Development, A/CONF.199/20 (Johannesburg 2002) ('Plan of Implementation').

[241] Ibid.

[242] UNGA, The Future We Want, A/RES/66/288 (11 September 2012).

[243] Ibid.

have contributed to the legal conceptualisation of sustainable development as a legal concept.

## 4. Weak and strong conceptualisations of sustainable development

There are two main conceptualisations of sustainable development. One of these is an ecologically weak concept, where the three pillars, namely environmental, economic and social carry equal weight. In this conceptualisation environmental limits are not safeguarded since the sum of developmental processes (social and economic) can be greater than the environmental component. In this case, the imbalance theoretically allows for abuse of the environment.

The second conceptualisation portrays sustainable development as a strong concept. It follows that sustainable development means a type of social and economic progress that respects the limits of the natural environment. In this case a balance needs be struck between the developmental side that encompasses social and economic aspects, and the environmental needs. This approach assumes that development in the long term hinges on sustainability (understood in ecological terms) and depends on it. This necessarily means that the environmental dimension of sustainable development is of fundamental importance and sets limits on the expansion of the other two pillars. It stipulates that sustainability can only be achieved by respecting environmental limits.[244]

In the opinion of the author the strong concept better reflects the long-term aspect of human development. Human economic and social well-being are secondary to human existence. The strong concept acknowledges that health and even the existence of the human race depend on the state of the environment and for these reasons development must respect environmental limits. On the other side the issues of social injustice, inequality and poverty need to be properly handled since, along with uncontrolled economic progress, they remain main factors contributing towards unsustainable development.[245] Strong conceptualisation, while recognising these issues, does not allow their rectification at the expense of the environment. It suggests that the needs of

[244] For the conceptualisation of sustainable development as a weak or strong concept see for example Dire Tladi, *Sustainable Development in International Law: An Analysis of Key Enviro-Economic Instruments*, 77 ff.

the underdeveloped world should rather be addressed at the expense of the rich and privileged.

Despite many flaws in its conceptualisation, it is widely recognised that sustainable development requires integrated and long-term oriented policy-making.[246] The transition from mere development to sustainable development entails the implementation of a process capable of placing development on a sustainable track. Sustainable development is as much about the process as the goal.

## 5. Divergences in attempts to determine the legal status of sustainable development as a derivative of its complexity and evolutiveness

The concept of sustainable development also enjoys recognition in the legal field and hence can be conceptualised in legal terms. Sustainable development it is one of the most debated terms in the area of international law[247] and its legal expression is susceptible to criticism, the roots of which can be usually traced back either to its complexity or evolutiveness.

The complex character of sustainable development is determined by the complexity of change it requires in order to achieve sustainability. The transition to sustainable development is inherently a cross-sectoral, multi-disciplinary task. It is basically a change in the way global society functions: deconstruction of existing priority structures and their reconstruction within holistic paradigm. The complexity of such change inevitably determines the legal expression of sustainable development, and to some extent justifies the confusion and divergences in the legal doctrine.

Evolutiveness further exacerbates the problem of legal determination of sustainable development. According to Barral, sustainable development is an evolutive concept, i.e. its substance necessarily varies *ratione temporis*, *personae*, *materiae and loci.*[248] This approach is consistent with the Brundtland Report which states: 'sustainable development is not a fixed state of harmony, but rather a process of change'.[249] Its substantive and procedural elements have to change in order to effectively respond to

[246] Pierre-Marie Dupuy, 'Où en est le droit international de l'environnement à la fin du siècle?' (1997) 101 *Revué Générale de Droit International Public* 873, 900.

[247] Annemarie van Zeijl-Rozema and others, 'Governance for sustainable development: a framework' (2008) 16 6 *Sustainable Development* 410, 410.

[248] Virginie Barral, 'Sustainable Development in International Law: Nature and Operation of an Evolutive Legal Norm' (2012) 23 2 *European Journal of International Law* 377, 392.

[249] The Brundtland Report, 17.

the challenges of changing reality. Because sustainable development is complex and intrinsically evolutive, its content is difficult to identify and is a cause of quite striking doctrinal divergences aimed at determination of the legal status of sustainable development.

Analysis of the notion of sustainable development within the field of international law reveals it is subject to many different legal manifestations and interpretations. Sustainable development is viewed sometimes as concept, at other times as an objective; it is often understood as the principle of integration and explained through integration. It is also treated as a separate branch of international law on sustainable development and ultimately some have concluded that sustainable development is empty of legal substance or incapable of legal classification.[250]

The most recognised definition of sustainable development – the one provided by the Brundtland Report – defines sustainable development as development 'that meets the needs of the present without compromising the ability of future generations to meet their own needs.'[251] Sustainable development is described as a goal, an objective, or a desired situation, in which development is able to last. On this definition, sustainable development reflects the desirability for 'justice'[252] within the present generation and among generations (intra- and intergenerational equity).[253]

Nevertheless, as a formal legal proposition, sustainable development was introduced in the Rio Declaration that is not a binding tool *per se*. Many argue that the Rio Declaration – since it enjoys worldwide acceptance, is formulated in terms of rights and obligations and uses prescriptive language with the aim of modifying the conduct of various subjects – gives the concept of sustainable development a legally binding character. Nevertheless, since the concept was introduced via a declaration and not in a

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[250] Barral (n 50) 382ff.

[251] The Brundtland Report, para 27. A more recent and more expansive definition can be found in the preamble to the ILA New Delhi Declaration: 'the objective of sustainable development involves a comprehensive and integrated approach to economic, social and political processes, which aims at the sustainable use of natural resources of the Earth and the protection of the environment on which nature and human life as well as social and economic development depend and which seeks to realize the right of all human beings to an adequate living standard on the basis of their active, free and meaningful participation in development and in the fair distribution of benefits resulting therefrom, with due regard to the needs and interests of future generations' [ILA, New Delhi Declaration of Principles of International Law Relating to Sustainable Development, (New Delhi Conference 2002) ('New Delhi Declaration')].

[252] Klaus Bosselmann, *The Principle of Sustainability: Transforming Law and Governance* (2008), 9.

[253] Judge Weeramantry describes sustainable development as a concept 'with long tradition in law, which makes it one of the most ancient of ideas in the human heritage' [*Case Concerning the Gabčikovo-Nagymaros Project (Hungary v. Slovakia),* Judgment, ICJ Reports 1997, Separate Opinion, 107].

treaty, the most reliable way of ensuring its binding status as a general norm of international law would be to establish that the concept meets the conditions set out in Article 38 of the International Court of Justice Statute providing for the sources of international law. In 1997, the ICJ approached the issue of defining the legal status of sustainable development in the *Gabčikovo-Nagymaros Project* case. In its judgement, however, the ICJ invoked '*the concept* of sustainable development', stating that it reconciles economic development with protection of the environment.[254] The reliance of the Court's judgement on the concept of sustainable development has invested sustainable development with a legal function that is capable of influencing the decisions of the Court, while lacking the binding status primarily directed towards determining the conduct of States.[255]

The judgement of the ICJ provides for a formal recognition of sustainable development in the area of international law. Although it avoids classifying sustainable development as a general norm of law, it sheds light on its content and above all fortifies its credentials in international law, primarily as a concept. The court recognised a legal facet of sustainable development but kept it out of range of Article 38 of the ICJ Statute. Hence, the decision leaves wide open the question whether sustainable development is a binding norm of international law in light of Article 38 of the ICJ Statute.

There is a vast number of doctrine writings on this issue, but no consensus. For many scholars the answer to the question of the legal status of sustainable development is quite straightforward: sustainable development is an important philosophical or political objective, but it is not a legal one.[256] Many highlight that the connection of sustainable development with law is mainly restricted to the fact that as a political objective, it impacts international negotiations; hence, it contributes to law formation while remaining separate from it.[257] At the other extreme, however, there are voices that

[254] *Gabčikovo-Nagymaros Project*, 7.

[255] The Separate Opinion of the Vice-President of the Court, Judge Weeramantry, describes sustainable development as 'more than just a concept' and as 'a principle with normative value' [Judge Weeramantry *Gabčikovo-Nagymaros Project*, Separate Opinion, paras 88, 95].

[256] SeeGilles Fievet, 'Réflexions sur le concept de développement durable: prétentions économiques, principes stratégiques et protection des droits fondamentaux' (2001) 128 *Revue Belge de Droit International*, 143 [cited in Virginie Barral, 'Sustainable Development in International Law: Nature and Operation of an Evolutive Legal Norm', 378].

[257] See Virginie Barral, 'Sustainable Development in International Law: Nature and Operation of an Evolutive Legal Norm', 378.

support legal recognition of sustainable development as a binding norm of international law embodied in the principle of integration.[258]

There are also voices in the doctrine that suggest that instead of focusing on the legal status of sustainable development itself, a more relevant approach would be to focus on the principles essential to its realisation. To this end, Dupuy coined the expression 'conceptual matrix' to describe sustainable development as an aggregation of norms and principles essential for its achievement.[259]

An increasing number of scholars perceive sustainable development as a notion with normative value, whereas this value is not to be determined in the light of Article 38. Lowe, for example, recognises a significant role of sustainable development in law. He perceives sustainable development as an interstitial norm that can become a potent tool in the hands of judges.[260] At the same time he argues that sustainable development as such is inherently incapable of attaining the status of a legal obligation[261] as defined by Article 38 of the ICJ Statute.

The noticeable inability to clearly acknowledge sustainable development as a traditional kind of norm has led to the situation where it is often considered not a general legal norm – a custom or principle – but as an 'area of international law in its own right'.[262] International Sustainable Development Law (ISDL) as defined by Segger and Khalfan consists of rules from the intersection between the three fields of international environmental, economic, and social law.[263] Also, many legal regulations call for the further development of law in the field of sustainable development, suggesting the existence of a body of law on sustainable development.

Despite the controversies, two unequivocal points can be made. First, sustainable development has acquired an international legal dimension. Since the Rio Declaration

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[258] See *infra* Chapter D (2.2.6).

[259] Pierre-Marie Dupuy, 'Où en est le droit international de l'environnement à la fin du siècle?', 886]. For the principles-oriented approach to sustainable development see for example Philippe Sands, 'International Law in the Field of Sustainable Development' (1994) 64 *British Yeabook of International Law* 303, 338–348.

[260] Vaughan Lowe, 'Sustainable Development and Unsustainable Arguments' in Alan Boyle and David Freestone (eds), *International Law and Sustainable Development: Past Achievements and Future Challenges* (Oxford University Press 2001), 19. Lowe argues that the legal relevance of sustainable development is to be found in the pull it exerts on the judicial reasoning process.

[261] Vaughan Lowe, 'Sustainable Development and Unsustainable Arguments', 23.

[262] Marie-Claire Cordonier Segger and Ashfaq Khalfan, *Sustainable Development Law: Principles, Practicies and Prospects*, 368. See also Nico J. Schrijver, *The Evolution of Sustainable Development in International Law: Inception, Meaning and Status*, 162.

[263] Marie-Claire Cordonier Segger and Ashfaq Khalfan, *Sustainable Development Law: Principles, Practicies and Prospects*.

the references to sustainable development in international law have greatly proliferated. Promoted by the UN[264], sustainable development is central to a vast number of Resolutions, Declarations, Conventions, and international judicial decisions. Second, regardless of its unestablished legal status, the normative impact of sustainable development remains significant. The great influence sustainable development exercises over international law at least legitimises the view that this is a notion with important legal characteristics.

[264] The UNCED called to 'clarify and strengthen the relationship between existing international instruments and agreements in the field of environment and relevant social and economic agreements or instruments, taking into account the special needs of developing countries.'[Agenda 21, para. 39.2.]. Principle 27 of the Rio Declaration calls for 'the further development of international law in the field of sustainable development,' and Agenda 21 expresses a need for the review and development of international law in order "to evaluate and to promote the efficacy of that law and to promote the integration of environment and development policies through effective international agreements or instruments'. The need to continue to develop international law in the field of sustainable development was highlighted by the UN General Assembly in 1997, which stated that 'it is necessary to continue the progressive development and, as and when appropriate, codification of international law related to sustainable development.'

## D. HIERARCHICAL STRUCTURE OF THE LEGAL CONCEPT OF SUSTAINABLE DEVELOPMENT AS VIEWED IN THE LIGHT OF THE HIERARCHY THEORY

### 1. General remarks

Analysis of the legal doctrine relating to sustainable development reveals a heterogeneous picture of the concept and discrepancies in its legal assessment. The doctrinal attempts to describe sustainable development are filled with adjectives such as 'unclear', 'ambiguous', and 'complicated.' This suggests the presence of a complex underlying theoretical construction.

### 2. Introduction of the hierarchy theory for the purpose of re-conceptualisation of sustainable development in international law

The hierarchy theory as a variant of the systems theory which deals with complexity, has the potential to provide a fresh cognitive approach to sustainable development in general and to shed light on its legal characteristics within the scope of public international law.

The systems theory[265] has emerged as part of a movement toward a general science of complexity[266], which deals with dynamic, multi-dimensional systems exhibiting unpredictable behaviour.[267] The advantages of applying the systems theory to the

[265] For examples of studies in System Theory see Ervin Laszlo, *Introduction to Systems Philosophy: Toward a New Paradigm of Contemporary Thought* (Gordon & Breach 1972) (describing the methodological and conceptual foundations of systems philosophy); John G. Burch, *Systems Analysis, Design and Implementation* (Boyd & Fraser 1992) (describing the process of creating systems models); Michael L. Gibson and Cary T. Hughes, *Sytems Analysis and Design: A Comprehensive Methodology with Case* (Boyd & Fraser 1994) (describing how to establish a framework for systems analysis); Ervin Laszlo, *Introduction to Systems Philosophy: Toward a New Paradigm of Contemporary Thought* (describing the methodological and conceptual foundations of systems philosophy); Gerald M. Weinberg, *An Introduction to General Systems Thinking* (Dorset House Publishing Company 1975).

[266] As an emerging approach to research, complexity science is the study of a system. It is not a single theory, but a collection of theories and conceptual tools from an array of disciplines. For example, complexity science has been taken up in both natural (mathematics) and social sciences (ecology), and has become increasingly popular in health care literature, see for example: Marge Benham-Hutchins and Thomas R. Clancy, 'Social networks as embedded complex adaptive systems' (2010) 40 5 *Journal of Nursing Administration*, 352-356; John Paley and Gail Eva, 'Complexity theory as an approach to explanation in healthcare: A critical discussion' (2010) 48 2 *International journal of nursing studies* 269, 269–279.] For example, complexity science has been taken up in both natural (mathematics) and social sciences (ecology), and has become increasingly popular in health care literature.

[267] See for example Miles, A. (2009). Complexity in medicine and healthcare: People and systems, theory and practice, *Journal of Evaluation in Clinical Practice*, 15, 409-410.

transition to sustainability as it is generally understood has already been noted in the literature. According to Loorbach and Rotmans[268] complexity theory, such as systems theory, occupies a central role in understanding and acting upon transitions to sustainable development.[269]

The notion of a 'system' is central for the systems theory.[270] Can sustainable development be seen as a system? The theory holds that systems are autopoietic, i.e. self-creating. 'Systems "shake into place" as their components and environment interact. Numerous changes, some intended and some not, contribute to the whole. Changes that are successful from the standpoint of the system survive; unsuccessful ones are overwritten. The system evolves toward a state in which no one who has the power to impose changes on the system would choose to do so.'[271] This characterises sustainable development rather well. The general concept of sustainable development was originally articulated to tackle the issues of international inequity and environmental degradation. Nevertheless, the exact shape of the current notion of sustainable development and issues arising around it could have not been presaged since sustainable development is a dynamic system where the more specific the level the greater the observed dynamism. Although some initiatives towards sustainability fail, others thrive and gain more support. Currently, no country would openly reject sustainable development. It remains an important objective of many projects and initiatives on the local and international level.

The theory holds that systems are composed of subsystems. Subsystems are themselves systems, which in turn can have their own subsystems.[272] Sustainable development as a concept of international law can be approached as a subsystem of a larger system called sustainable development. Within this larger structure it constitutes a system in itself, whose boundaries are drawn by the rules of international law.

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[268] Derk Loorbach and Jan Rotmans, 'Managing Transitions for Sustainable Development', 187–206.

[269] To this end they emphasise that the complex systems approach 'should not be regarded as a straightjacket, however, but as an over-arching way of thinking (i.e., 'umbrella') within which other research approaches can fit'. [Derk Loorbach and Jan Rotmans, 'Managing Transitions for Sustainable Development'].

[270] A common definition of the system is: 'a regularly interacting or interdependent group of items forming a unified whole.' [Merriam Webster Dictionary, online: <https://www.merriam-webster.com/dictionary/system>, accessed 10 October 2016)]. A systems analysis defines a system as 'a set of interrelated and interactive elements that work together to accomplish specific purposes' [Michael L. Gibson and Cary T. Hughes, *Sytems Analysis and Design: A Comprehensive Methodology with Case*, 5.

[271] Lynn M. LoPucki, 'The Systems Approach to Law' (1997) 83 3 *Cornell Law Rewiev* 479, 487

[272] Ibid.

Legal concept of sustainable development as a system in its own right allows for the application of one of the system theories in order to describe it. The complexity and evolutivity of the legal concept of sustainable development justify its re-conceptualisation in terms of hierarchy theory. The hierarchy theory is a variant of systems theory.[273] The term 'hierarchy' typically denotes the pyramidal authority structure in human organizations, and also has a sense in discourse on legal sources. However, 'hierarchy' as applied to complex systems has a somewhat different meaning. Hierarchy theory is a cognitive method of dealing with complexity. On one hand it is concerned with the analytical process based on the decomposition of a system into subsystems forming a hierarchical structure; and on the other hand it deals with the effect of such an analysis, i.e. the complex whole that consists of interrelated elements.[274] Although not rooted in legal discipline, the theory of hierarchy is believed to be a promising analytical tool for approaching complexity in general, including in the legal domain.[275]

The complexity of the legal concept of sustainable development is manifested in the divergences in the legal formulations of sustainable development and different doctrinal interpretations. These formulations and interpretations present different levels of generality and multiplicity of focal points leading to different legal conclusions, which

[273] The hierarchy theory is rooted in the work of economist Herbert Simon, chemist Ilya Prigogine, and psychologist Jean Piaget. The theory was elaborated by Valerie Ahl and Timothy Allen as an interdisciplinary concept and a variant of the systems theory [Valerie Ahl and Timothy F.H. Allen, *Hierarchy Theory: A Vision, Vocabulary, and Epistemology* (Columbia University Press 1996)]. See also Gerald M. Weinberg, *An Introduction to General Systems Thinking* , 51-86 (describing systems theory).

[274] The 'hierarchy' in hierarchy theory relates to a partial ordering relationship and interaction between the levels within the complex whole (Simon 1973: 5) cited in Suzanne Joseph, 'Hierarchy Theory: A Vision, Vocabulary, and Epistemology by Valerie Ahl and T. F. H. Allen - Revision' (1999) 3 *Georgia Journal of Ecological Anthropology* 85, 85. 'Hierarchy theory is a means of studying systems in which the relationship between all of the components is of great complexity. Hierarchy theory focuses on levels of organization and issues of scale, with a specific focus on the role of the observer in the definition of the system. Complexity in this context does not refer to an intrinsic property of the system but to the possibility of representing the systems in a plurality of non-equivalent ways depending on the pre-analytical choices of the observer. Instead of analysing the whole structure [as a flat concept], hierarchy theory refers to the analysis of hierarchical levels, and the interactions between them.'

[275] The hierarchy theory is believed to be common to all complex systems–whether physical, chemical, biological, social or artificial. Joseph describes it as 'a product of the cross-fertilization of several disciplines, including economics, physics, chemistry, psychology, philosophy and ecology' [Suzanne Joseph, 'Hierarchy Theory: A Vision, Vocabulary, and Epistemology by Valerie Ahl and T. F. H. Allen - Revision']. 'The theory is applicable to systems with a natural hierarchical structure or whose dimensionality is high. It is not only used in biology, sociology and computer science but in public and societal systems problems' [N.J. Smith and A.P. Sage, 'An introduction to hierarchical systems theory' (1973) 1 1 *Computers & Electrical Engineering* 55, 55]. The theory, to the knowledge of the author, has never been applied to describe legal structures, including the legal structure of the concept of sustainable development.

implicates a heterogeneous and multi-layered structure, rather than a flat one. This justifies the application of the hierarchy theory in order to re-conceptualise a legal notion of sustainable development.

From the perspective of the systems theory divergences in legal conceptualisation of sustainable development suggests the presence of a complex underlying theoretical construction that can be analysed in a sequence of steps, by breaking it down into its constituent parts, determining the nature and identity of its subsystems, explaining their interrelationships, and finally explaining how they contribute to the functioning of the whole.[276] Hence, the emphasis in systems analysis is not only on the component parts themselves but also, and more particularly, on the relationship between them. The analysis of the legal concept of sustainable development from the systems perspective does not assume an *a priori* legal vision of sustainable development. It aims to 'take into account' all of the most visible developments in the conceptualisation of sustainable development in international law, but instead of arguing for one of many possible legal statuses it tries to accommodate them all by applying the lens of the systems theory. The various legal interpretations of sustainable development are treated not as competing visions but as different theoretical components of the system, their interrelationship and the way they contribute to the functioning of the whole. The varying legal conceptualisations of sustainable development are approached as indications of a multi-layered structure. Thus, depending on the level of conceptualisation, sustainable development can be regarded an objective, a principle of integration, the aggregation of tools directly enabling integration, or the set of sectorial rules arising in the intersection of environmental, social and economic regulations. Sustainable development can be characterised on each of these levels. Hence, from the perspective of the hierarchy theory what are often seen as doctrinal divergences, are not divergences at all, but rather reflections of different levels of conceptualisation.

To this end, the present thesis departs from the understanding of sustainable development as Dupuy's 'conceptual matrix'.[277] First, the study decomposes the so far legal conceptualisations of sustainable development in international law. Relevant

[276] Lynn M. LoPucki, 'The Systems Approach to Law', 487, Ervin Laszlo, *Introduction to Systems Philosophy: Toward a New Paradigm of Contemporary Thought*, 25-30.

[277] Dupuy's conceptual matrix is 'an aggregation of norms and principles essential for achievement of sustainable development' [Pierre-Marie Dupuy, 'Où en est le droit international de l'environnement à la fin du siècle?', 886].

instruments of international law, case law and doctrine writings will guide the determination and description of the elements of sustainable development, i.e. paradigms, principles and norms essential for the achievement of sustainable development. Second, the hierarchy theory will be applied to introduce order among those elements, creating a multileveled hierarchical structure of sustainable development. The hierarchy theory will also be used as a tool to assimilate, arrange and describe relationship between the particular levels and elements of sustainable development. In order to legally assess particular levels of the hierarchical structure of sustainable development, the rules of the subsystem, i.e. international law will be respected.

## 3. Hierarchical multileveled structure of the legal concept of sustainable development

The rationale for the application of the hierarchical structure to the concept of sustainable development emerged when analysis of the notion of sustainable development revealed many quite different definitions, perceptions and regulations. Sustainable development is often seen as an objective. It is notable that sustainable development as defined in the Brundtland Report is the broadest possible articulation of the concept. As such it has been widely accepted. This broad understanding of sustainable development can be linked to the status of objective in international law as confirmed by the ICJ in the *Pulp Mills* case.[278] Since the objective of sustainable development as enunciated in the Brundtland report remains the most general manifestation of sustainable development in international law, it can be considered the first level of the concept of sustainable development.

The level of objective in analysing sustainable development is directly followed by the principle of integration embodied in Principle 4 of the Rio Declaration. Since the principle of integration is pivotal for the achievement of sustainable development, it constitutes the second level of the hierarchy.

The principle of integration triggers other cross-sectoral principles of sustainable development articulated in the Rio Declaration. These principles are components of the third level of sustainable development.

[278] *Case Concerning Pulp Mills on the River Uruguay (Argentina v Uruguay),* Judgement, ICJ Reports 2010, 14.

The final level comprises components representing sectoral principles: these advance the issue of sustainability in specific sectors of international law.

Sustainable development can be described and expressed on each of these levels, since components of each level cover the whole spectrum of sustainable development, albeit on different planes of conceptualisation. The above-mentioned list of objectives, principles and norms, which is by no means exhaustive, forms a hierarchy: a complex and dynamic structure of the concept of sustainable development.

This hierarchical conceptualisation of sustainable development entails the replacement of the assessment of the legal status of sustainable development as a whole by the assessment of the principles and objectives constituting different levels of the concept. The application of hierarchical structure to the concept of sustainable development also has the potential to alleviate existing divergences in the legal doctrine on the subject.

### 3.1. First level: sustainable development as an objective

The recognition of sustainable development in international law has been assured in *Gabčikovo-Nagymaros Project* case where ICJ that the 'need to reconcile economic development with protection of the environment is aptly expressed in the concept of sustainable development.'[279] Further the ICJ confirmed the status of sustainable development as an objective within the field of international law in the In *Pulp Mills* case where the judges referred to the 'objective of sustainable development'.[280] Sustainable development as an objective has a broad meaning that is defined in the Brundtland Report as development 'that meets the needs of the present without compromising the ability of future generations to meet their own needs.'[281] This definition does not point the way to such development. It simply describes a desired situation, where development understood as a collective process of change is sustainable, i.e. able to last. Such a broad meaning of sustainable development can be regarded as a policy in the Dworkinian sense, i.e. it may be understood as a 'kind of standard that sets out a goal to be reached, generally an improvement in some economic,

[279] *Gabčikovo-Nagymaros Project,* 162

[280] Judge Trindade, however, describes sustainable development as one of the principles of international environmental law [Judge Cançado Trindade, *Pulp Mills*, Separate Opinion, para 177]. See also ibid. para 132ff.

[281] Brundtland Report, para 27.

political or social feature of the community (though some goals are negative, in that they stipulate that some present feature is to be protected from adverse change).'[282]

The classification of sustainable development as a legal objective gives it a normative status conferring the ability to exercise a legal pull as an interpretative tool, in particular in the hands of judges. It cannot however directly determine the conduct of States. An example for such a function of sustainable development is the *Pulp Mills* case where the judges were able to assign a desired State conduct relying on the legal classification of sustainable development as a legal objective.

The construal of sustainable development as an objective has therefore been accepted as an element of judicial reasoning and relied upon by the Courts in their decisions. To that end, Lowe argues that 'sustainable development is a meta-principle, acting upon other legal rules and principles – a legal concept exercising normativity, pushing and pulling the boundaries of true primary norms when they threaten to overlap or conflict with each other.'[283] He sees such normative status of sustainable development as a component of judicial reasoning that acquires a normative value through decisions of the courts, not as a primary rule of the conduct of states.[284]

Moreover, once accepted by a treaty, the objective of sustainable development can influence the interpretation of a given treaty. Since the 1992 Rio de Janeiro Earth Summit, most international treaties and other instruments relating to environmental, social and economic issues have mentioned sustainable development as an objective, or included it in their preamble.[285] For example, the World Trade Organisation (WTO) recognised sustainable development among its objectives in the 1994 Marrakesh Agreement.[286] The recognition was later confirmed in the 2001 Doha Declaration: 'We

[282] Ronald Dworkin, *Taking Rights Seriously* (Harvard University Press 1977), 22.

[283] Vaughan Lowe, 'Sustainable Development and Unsustainable Arguments', 31. This characteristic of sustainable development also seems to be reaffirmed by Sands see Philippe Sands, 'Treaty, Custom and Coss-fertilization of International Law, in International Law' in Alan Boyle and David Freestone (eds), *Law and Sustainable Development: Past Achievements and Future Challenges* (Oxford University Press 2001), 49.

[284] ibid.

[285] [Marie-Claire Cordonier Segger and Ashfaq Khalfan, *Sustainable Development Law: Principles, Practicies and Prospects*, 281-94].

[286] The Preamble of the 1994 Marrakesh Agreement states: "Recognizing that their relations in the field of trade and economic endeavour should be conducted with a view to raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, and expanding the production of and trade in goods and services, while allowing for the optimal use of the world's resources in accordance with the *objective of sustainable development*, seeking both to protect and preserve the environment and to enhance the means for doing so in a manner consistent with their respective needs and concerns at different levels of economic development..." (Emphasis added)."

strongly reaffirm our commitment to the objective of sustainable development, as stated in the Preamble to the Marrakesh Agreement.'

As an objective, sustainable development has been also accepted by the Treaty on the Functioning of the European Union (TFEU).[287] The TFEU specifically imposes an obligation on European countries to 'work for the sustainable development of Europe'.[288]

As an objective adopted by a treaty, sustainable development can therefore be considered a part of the treaty's 'object and purpose', as defined by the Vienna Convention on the Law of Treaties (VCLT),[289] and as directly relevant to the interpretation of treaty provisions, hence indirectly binding on State Parties. According to Cordonier Segger and Khalfan, sustainable development can be considered part of the object and purpose of many international treaties.[290] To some extent, the objective of sustainable development as part of a treaty's 'object and purpose' is consonant with Lowe's interstitial norm, *de facto* functioning as an interpretative tool (although Lowe sees it rather as a tool in the hands of judges). To this end sustainable development as an interpretative tool could be applied in cases of conflict between primary norms with the effect of modifying their boundaries. This approach does not seem to allow for the introduction of a new quality or a profound change into primary norms. Sustainable development would have to operate within their accumulated scope.

The function of sustainable development as a lens for the interpretation of norms, whether this be as a tool in the hands of judges or as an 'object and purpose' of a particular treaty by the Parties to the treaty, constitutes the first layer of the concept. However, as such this layer lacks content that might directly and effectively guide the conduct of States, since it does not communicate what should be done in order to

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[Marrakesh Agreement Establishing the World Trade Organization, Apr. 15, 1994, 1867 U.N.T.S. 154, 33 I.L.M. 1144 (1994), online: < http://www.wto.org/english/docs_e/legal_e/legal_e.htm>].

[287] Consolidated Version of the Treaty on the Functioning of the European Union (2010), OJ C83/47 ('TFEU').

[288] TFEU, Article 3(3).

[289] VCLT, Articles 31 and 33.

[290] Sustainable development can be considered part of the object and purpose of the following international treaties: the 1992 UN Convention on Biological Diversity and its 2000 Cartagena Protocol, the 1992 UN Framework Convention on Climate Change and its 1997 Kyoto Protocol, the 1994 UN Convention to Combat Desertification and Drought, the 1994 North American Free Trade Agreement, the 1995 Straddling Fish Stocks Agreement of the 1982 UN Convention on the Law of the Sea, the 2000 Cotonou Partnership Agreement between the European Union and the African Caribbean and Pacific countries, the 2001 International Treaty on Plant Genetic Resources for Food and Agriculture, and many others [Marie-Claire Cordonier Segger and Ashfaq Khalfan, *Sustainable Development Law: Principles, Practicies and Prospects*, 281-94].

transform mere development into a sustainable process. It neither provides solutions nor imposes stringent legal obligations. It simply points to a desirable effect that should be borne in mind while interpreting specific norms. Although it does not propose any concrete measures for achieving sustainability, the important legal result of the acceptance of this outermost layer is that it directly refers to more specific levels of the hierarchical structure that in turn, provide more specific principles, norms and tools. It refers directly to the principle of integration as the heart of sustainable development and the key procedural principle for its achievement.[291]

### 3.2. Second level: the principle of integration

#### 3.2.1. Brief history of integration in international law

The idea of integration is not new in the international law.[292] The notion of integrating environmental considerations into economic planning came principally to the international fora in the early 1970s, not only as a consequence of environmental awareness, but also as a result of the search for processes and procedures that might ameliorate some of the harmful consequences of human development on the environment.[293]

At the international level, one of the first attempts to approach the idea of integration was contained within the 1972 Stockholm Declaration on the Human Environment. As Principles 13 and 14 of that declaration state, 'States should adopt an integrated and coordinated approach to their development planning' and '[r]ational planning

[291] 'If there is one principle that is pivotal to both the further clarification and implementation of sustainable development, it is the principle of integration.'[Letter from Professor Nico Schrijver (chair) and Drs. Duncan French and Ximena Fuentes (corapporteurs) to members of the ILA International Committee on International Law on Sustainable Development (23/01/06) in preparation for the 2006 ILA Conference [ILA, Report (Toronto Conference 2006) ('ILA Report 2006'), Annex I, 24].

[292] The idea of integrating separate areas of international law has its own history. Article 1 of the UN Charter is fundamentally integrative and its objective is: "[t]o achieve international cooperation in solving international problems of an economic, social, cultural, or humanitarian character." It considers the UN as "a centre for harmonizing the actions of nations in the attainment of these common ends". Besides the UN Charter, Article 31(3) (c) of the Vienna Convention on the Law of Treaties [32] reiterates the need for a treaty to be interpreted in light "of any relevant rules of international law applicable between the parties." This article provides for a principle of systemic integration of international law. This would mean that different branches of international law should not function disparately on their own. These branches of law should not be 'self-contained islands of international law, de-linked from other branches of international law' [J Pauwelyn, 'Bridging Fragmentation and Unity: International Law as a Universe of Inter-Connected Islands' (2004) 25 *Michigan Journal of International Law*, 903–904].

[293] The idea of integration can be tracked back to the early 1970's [Jorge E. Viñuales (ed) *The Rio Declaration on Environment and Development: A Commentary* (OUP Oxford 2015), 158].

constitutes an essential tool for reconciling any conflict between economic development and environmental protection'. Similar wording can be found in almost all subsequent international policy documents on the issue, including the World Charter for Nature,[294] the Brundtland Report, [295] as well as the Rio Declaration and Agenda 21.[296]

Principle 4 of the Rio Declaration is recognised as the internationally agreed legal reference-point on the issue of integration.[297] Since Rio more intensive thought has been given to this issue in a range of treaties as well as in official and unofficial texts.[298] A vast number of binding treaties have included provision for integrative decision-making as an intrinsic feature of the treaty regime itself and as an obligation for Parties to adopt domestically.[299] Finally, the Sustainable Development Goals seek to ensure a more integrated approach to their objectives.[300]

### 3.2.2. The principle of integration

The principle of integration constitutes the second, more specific layer of the concept of sustainable development. It is enshrined in Principle 4 of the Rio Deceleration[301] that reads: '[i]n order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it'. The principle of integration is widely accepted as pivotal for the achievement of sustainable development:

If there is one principle that is pivotal to both the further clarification and implementation of sustainable development, it is the principle of integration. As both a procedural tool and a substantive characteristic of the international law-making process in the field of sustainable development, the principle of integration must be at the core of any attempt to further operationalize sustainable development. If, ultimately, sustainable development is concerned

[294] 'In the planning and implementation of social and economic development activities, due account shall be taken of the fact that the conservation of nature is an integral part of those activities' [World Charter for Nature, A/RES/37/7 (28 October 1982), Principle 7].

[295] 'Environment and development are not separate challenges; they are inexorably linked' [Brundtland Report, 62-65].

[296] See, in particular, Chapter 8: Integrating Environment and Development in Decision-Making.

[297] ILA Report 2006, 3.

[298] Ibid.

[299] Ibid.

[300] UNGA, Transforming our world: the 2030 Agenda for Sustainable Development, A/RES/70/1 (25 September 2015).

[301] Rio Declaration, Principle 4.

with the bringing together and in some way reconciling environmental, developmental and social considerations, the principle of integration must be fundamental.[302]

The positioning of the principle of integration on a separate layer directly following the 'layer of the objective' is justified by fact that the doctrine widely accepts the pivotal role of the principle of integration for sustainable development. Although the principle is sometimes introduced as one among other principles on sustainable development, and as such is also provided for in the Rio Declaration, closer analysis of the relations among the principles reveals its superior and overarching character.

### 3.2.3. The relationship between the objective of sustainable development and the principle of integration

#### *3.2.3.1. Three main approaches in the current legal discourse*

The International Law Association (ILA) 2006 Report states that 'integration is a much more nuanced notion than Principle 4 might suggest', and that there is very little in the way of 'a systematic and "principled" understanding of the relationship between the principle of integration and sustainable development'.[303] The relation between sustainable development and the principle of integration in the field of international law remains debatable. At least three main approaches to the issue are discernible: a) sustainable development is explained through the principle of integration, allowing for the interchangeable use of both notions; b) the integration principle is often portrayed as a backbone of sustainable development; c) the third approach, tightly linked to the second, is that the principle of integration can be instrumental for the achievement of sustainable development.

a) Sustainable development as the principle of integration

In the doctrine and in post-Rio legal instruments, doctrine and jurisprudence, the integration principle is often used interchangeably with sustainable development – in other words, sustainable development is defined or explained through the principle of

[302] Letter from Professor Nico Schrijver (chair) and Drs. Duncan French and Ximena Fuentes (corapporteurs) to members of the ILA International Committee on International Law on Sustainable Development (23/01/06) in preparation for the 2006 ILA Conference [ILA Report 2006, Annex I, 24].

[303] ILA 2006 Report, 3.

integration. Thus, Cordonier-Segger and Kaflan describe the concept of sustainable by stating that in international law, sustainable development requires accommodation, reconciliation and integration between economic growth, social justice (including human rights) and environmental protection objectives.[304] This description of sustainable development does not differentiate between sustainable development and integration but rather explains sustainable development through integration. For Fitzmaurice, for example, the principle of integration is nothing other than sustainable development itself.[305] For the ILA, sustainable development is 'an enlightened form of integration.'[306]

In practice, also international courts view sustainable development through the principle of integration. The ILA has stated that 'the principle of integration and interrelationship is the primary means by which courts and tribunals provide an overarching conceptual framework for sustainable development'[307] In *Gabčikovo-Nagymaros Project* case the ICJ stated that the 'need to reconcile economic development with protection of the environment is aptly expressed in the concept of sustainable development.'[308] In the *US – Shrimp* case, the WTO Appellate Body found that sustainable development 'has been generally accepted as integrating economic and social development and environmental protection.'[309] This approach was later confirmed in the *China – Raw Materials* case. The Panel's acknowledgement of the objective of sustainable development, i.e. the challenge of using and managing resources in a sustainable manner meant that it ensures the protection and conservation of the environment while promoting economic development.[310] It therefore explained

[304] Marie-Claire Cordonier Segger and Ashfaq Khalfan, *Sustainable Development Law: Principles, Practicies and Prospects* Marie-Claire Cordonier Segger and Ashfaq Khalfan, *Sustainable Development Law: Principles, Practicies and Prospects* [cited in CISDL Concept Paper (Montreal 2005), 1].

[305] Malgosia Fitzmaurice, 'International Protection of the Environment' (2001) 293 *Recueil des Cours*, 52.

[306] 'Sustainable development is unattainable without understanding the central role that the principle of integration plays in the broader endeavour. Moreover, one might go even further and argue that if sustainable development is actually about process rather than substance, sustainable development is not only achievable via integration but that sustainable development is no more than simply the *mot juste* for a new enlightened form of integration' [ILA Report 2006, 2]

[307] ILA, Final Report (Sofia Conference 2012), 37.

[308] *Gabčikovo-Nagymaros Project,* 162

[309] *United States – Import Prohibition of Certain Shrimp and Shrimp Products*, WT/DS58/AB/R, AB Report 1998 ('*US-Shrimp'*), note 107.

[310] 'Thus, a proper reading of Article XX(g) in the context of the GATT 1994 should take into account the challenge of using and managing resources in a sustainable manner that ensures the protection and conservation of the environment while promoting economic development' [*China – Measures Related to*

sustainable development through the principle of integration. In the *Iron Rhine* case the Permanent Arbitration Tribunal stated that 'both international and EC law require the integration of appropriate environmental measures in the design and implementation of economic development activities', and that this integration requirement means that 'where development may cause significant harm to the environment there is a duty to prevent, or at least mitigate, such harm', which 'has now become a principle of general international law.'[311] Although this arbitration directly refers to the principle of integration, it is widely regarded by doctrine as recognition of sustainable development.[312]

The conceptual comparison between sustainable development and the principle of integration may also lead to the conclusion that the two notions mean the same thing. The widely accepted and most cited definition of sustainable development found in the Brundtland Report provides that sustainable development is a development 'that meets the needs of the present without compromising the ability of future generations to meet their own needs.'[313] Its first part refers to the 'needs of the present.' In the international dimension the 'needs of the present' represent the needs of the present international community, also understood as needs of each country that must be met in the process of development to make it sustainable. This part is therefore recognised as an affirmation of intragenerational equity, i.e. equity within the current generation in the ongoing process of socio-economic development. The second part refers to the 'needs of the future generations' and states that the socio-economic development of the present generation cannot compromise the right of future generations to develop. That is, there must be equity among generations, (intergenerational equity). This second part implies that development is to be sustained not only within the lifespan of one generation, but

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*the Exportation of Various Raw Materials*, WT/DS394/R WT/DS395/R WT/DS398/R, Reports of the Panel (2011) ('*China – Raw Materials'*), 7.375.

[311] Award in the Arbitration regarding the Iron Rhine ("Ijzeren Rijn") Railway (Belgium v. Netherlands), Decision, PCA, RIAA XXVII, 24 May 2005 ('Iron Rhine'), 59, 114.

[312] Virginie Barral, 'Sustainable Development in International Law: Nature and Operation of an Evolutive Legal Norm'.

[313] Brundtland Report, para 27. A more recent and more expansive definition can be found in the preamble to the ILA New Delhi Declaration: 'the objective of sustainable development involves a comprehensive and integrated approach to economic, social and political processes, which aims at the sustainable use of natural resources of the Earth and the protection of the environment on which nature and human life as well as social and economic development depend and which seeks to realize the right of all human beings to an adequate living standard on the basis of their active, free and meaningful participation in development and in the fair distribution of benefits resulting therefrom, with due regard to the needs and interests of future generations' [New Delhi Declaration, Preamble].

ideally indefinitely. Intragenerational equity, therefore, clearly presumes environmental preservation that is necessary to ensure equity between generations, in other words to ensure the sustainability of development.

The above definition, therefore, contains the two basic pillars of sustainable development: socio-economic development and environmental protection. These two elements can also be easily identified in Principle 4 of the Rio Declaration. This principle states that: '[i]n order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it'. Although the principle differs somewhat from the definition expressed in the Brundtland Report, the difference is rather subtle. The Brundtland Report approaches sustainable development through the description of a desired outcome while Principle 4 highlights a way of placing sustainable development on track, namely via a process of integration. Viewed in this light it can also be argued that the two definitions convey the same message: while one (Brundtland) highlights the substance, the other highlights a process towards attaining that goal. It is hard to see how the Brundtland definition can be implemented in any other way (than by integration), since both elements (intra- and intergenerational equity) must be taken into account during the developmental process. On the other hand, while Principle 4 highlights a form of procedural integration (as elaborated in Agenda 21), it is hard to argue that the Principle has no substance, since the process it advocates is aimed at the achievement of sustainable development. Hence, these two notions constitute inextricably intertwined strands of a single whole. On the one hand, the achievement of sustainable development has to happen through the principle of integration, and on the other hand the principle of integration cannot lead towards an objective other than sustainable development. Sustainable development can therefore rightly be identified with the principle of integration. However, differences in the legal qualification of the two notions call for their separate treatment.

b) The integration principle as a backbone of sustainable development

Another very common approach to the relation between the principle of integration and sustainable development is that the principle of integration, while remaining separate from sustainable development, constitutes the single most important principle enabling its attainment. Sands recognises the central position of the principle of

integration stating that: 'in many ways it is the most important.'[314] The ILA Committee on the Law of Sustainable Development notes that the principle of integration is not only pivotal to sustainable development but also 'forms' the backbone of sustainable development'.[315] Voight elevates the principle above the others by stating that '[i]t is within the context of integration that all other aspects of sustainable development come into play, e.g. the precautionary principle; polluter pays principle; the principle of common but differentiated responsibility.'[316]

b) The principle of integration as an instrumental principle

The third approach is to some extent the procedural facet of the second approach. It highlights the function of the principle of integration as a means for achieving sustainable development. To this end, many have suggested that the principle of integration provides an 'action-oriented approach' to sustainable development.[317] This approach is directly based on Principle 4 of the Rio Declaration, which can also be interpreted in a way that suggests such a relation. To this end, Barral and Dupuy argue that integration is a key effort to sustainable development. They interpret sustainable development as a goal and integration as a means for its achievement.[318]

#### *3.2.3.2. The application of the theory of hierarchy to explain the relationship*

Sustainable development is primarily recognised by the ICJ as a concept. The application of the theory of hierarchy to the concept of sustainable development helps to clear up many the revolving conceptual ambiguities, including the relationship between the notion of sustainable development and the principle of integration.

When the two notions are observed from the perspective of a hierarchical structure, the objective of sustainable development and the principle of integration can be seen as

[314] Philippe Sands, *Principles of International Environmenal Law* (Cambridge University Press 2003) [ Christina Voight, *Sustainable Development as a Principle of International Law: Resolving Conflicts between Climate Measures and WTO Law*, 36].

[315] ILA, Report (Berlin Conference 2004), 13.

[316] Christina Voight, *Sustainable Development as a Principle of International Law: Resolving Conflicts between Climate Measures and WTO Law*, 37.

[317] Jeffrey D Kovar, 'A Short Guide to the Rio Declaration' (1993) 4 *Colo J Int'l Envtl L & Pol'y* 119, 127.

[318] Barral Dupy refer to the substantive element of the Principle 4, Virginie Barral and Pierre-Marie Dupuy, 'Sustainable Development through Integration' in Jorge E. Viñuales (ed), *The Rio Declaration on Environment and Development: A Commentary* (Oxford University Press 2015), 163-164.

two levels or layers of the same concept. Because they are different conceptual levels of the same whole each can be described and explained through the other. This justifies their interchangeable use in the doctrine and in jurisprudence. On the other hand, the fact that they form two separate layers explains why the doctrine is able to construe the relationship as separate notions.

In the light of the theory of hierarchy, the above ambiguities concerning the relation between two notions can be seen as deriving from the general characteristics of hierarchical structures and the way a particular level 'works'. The divergences in the perception of the relationship between sustainable development and the principle of integration can be explained in terms of dualities within the conceptual hierarchy that correspond to complementarities such as: observer-observed, process-structure, rate-dependent versus rate-independent, and part-whole.[319] Koestler referred to the notion of 'holon', which means an entity in a hierarchy that is at once a whole and at the same time a part.[320] Thus, a holon at once operates as a whole that integrates its parts, while working to integrate itself into an upper level purpose or role. The lower level answers the question "How?" and the upper level answers the question, 'So what?' Since a given level is the upper level for the lower one but at the same time the lower level for the upper one, the answer to the above questions would depend on the level of observation. Hence, the principle of integration provides an answer to the question 'How?' with respect to the objective of sustainable development. Integration is a key to achieving intra- and intergenerational equity. But it also answers the question 'So what' with respect to the lower-level principles that provide tools enabling the integration.

While the relationship between the objective of sustainable development and the principle of integration can be clearer when observed from the perspective of hierarchical structure, the evaluation of each level must respect the rules of the subsystem, i.e. international law in this case.

There is a further important characteristic of the level of the principle of integration with respect to the sustainable development understood as an objective and as the outermost layer of the concept of sustainable development. The layer of integration is

[319] Timothy F. Allen, 'The summary of the theory', International Society for the System Sciences, online: <http:// http://www.isss.org/hierarchy.htm>, accessed 9 September 2016. Timothy F. Allen is a co-founder of the hierarchy theory, see also Valerie Ahl and Timothy F.H. Allen, *Hierarchy Theory: A Vision, Vocabulary, and Epistemology*.

[320] Ibid.

where fundamental *legal expression* of the concept of sustainable development is able directly to guide the conduct of States and as such attain the status of a binding norm of international law. Sustainable development as an objective is a Lowe's interstitial norm: it can be used as an interpretative tool in the hands of judges but does not have the clear procedural scope that would enable it to determine the conduct of States, particularly in cases where a more profound systemic change is required, that goes beyond the capabilities of an interpretative tool.

Therefore, in the field of sustainable development it is primarily in the principle of integration that one should seek the binding force of sustainable development. It is an axis of the legal concept of sustainable development that ensures its applications.

### 3.2.4. Principle of integration: substantial scope

The principle of integration requires that '[i]n order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it'.[321]

The principle indicates two main elements that require integration in order to achieve sustainable development: a developmental process and environmental protection. The principle does not grant any priority to the environmental requirements over the process of development; nor vice versa. With respect to the fine balance struck by the principle, Sands states that:

> The principle might mean that development decisions which failed to take any, or adequate account of the environmental consequences could not contribute to sustainable development. Or it might mean that environmental decisions should not be used to limit developmental decisions which aim to address fundamental human needs, such as the provision of clean water or adequate housing.[322]

Although the principle of integration calls primarily for a balance between development and environmental protection, it has been widely accepted that there are three elements of the concept of sustainable development that need to be integrated and

[321] Rio Declaration, Principle 4.
[322] Philippe Sands, 'International Law in the Field of Sustainable Development', 338.

balanced, namely its environmental, economic and societal aspects. It has also been widely accepted that these three elements are equally important for the achievement of sustainable development and that they stand in a triangular relation.[323]

The depiction of sustainable development as triangular relationship is correct from the perspective of equal recognition of the importance of economic, societal and environmental needs for the process of transition towards sustainability, in particular in cases such as integrative decision-making, the necessity of engaging stakeholders from the three sides, etc. Nevertheless, the relation between the three elements is not always symmetrical therefore they should not be balanced at the same level, especially when it comes to the assessment of environmental cost. The Rio Declaration has been criticised by environmentalists for conveying an anthropocentric vision of sustainable development, in contrast to the more eco-centric vision set out in the Brundtland Report. However, the present author believes that the Rio Declaration does not necessarily prioritise development over the environment. In general all its principles rightly place greater stress on societal and economic aspects of the developmental process, but according to the hierarchy theory they need to be viewed through the lens of the principle of integration. The principles of the Rio Declaration, although highlight the anthropocentric aspect of sustainable development, are therefore correctly understood when considered in the light of the principle of integration, since this principle constitutes from their perspective an upper level of the hierarchical structure of sustainable development. While it is the integration principle that sets constraints on the lower-level principles, the lower-level components in the hierarchy provide for the limits of possibility.[324] Since the principle of integration clearly points to the fact that in order to achieve sustainable development the overall human endeavour needs to be balanced against environmental aspects, other principles, as situated on the lower lever, need to respect this constraint. Principle 4 does not promote the potentially unsustainable triangular relation between the environmental, societal and economic aspects. The principle of integration guards the primary balance between natural and man-made systems recognising natural limits on human activity.

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[323] Christina Voight, *Sustainable Development as a Principle of International Law: Resolving Conflicts between Climate Measures and WTO Law*, 36. See also Philippe Sands, 'International Law in the Field of Sustainable Development: Emerging Legal Principles', 53.

[324] Timothy F. Allen, 'The summary of the theory', International Society for the System Sciences, online:<http:// http://www.isss.org/hierarchy.htm>, accessed 10 September 2016. See also Valerie Ahl and Timothy F.H. Allen, *Hierarchy Theory: A Vision, Vocabulary, and Epistemology*.

The tensions between environmental and socioeconomic development constitute a primary field for reconciliation. Since societal and economic aspects both carry an environmental cost it is the sum of both – the overall impact of these two elements, and not their separate impacts – that needs to be balanced against the environmental issues in order to make development sustainable. The economic and societal elements need to be balanced internally within the developmental element. Here the balancing of the interests of developing and developed countries forms a crux of the international dimension of sustainable development.[325] Hence, their integration can be seen as a two-level process. These levels correspond to the two equally important aspects of sustainable development expressly enunciated in the Brundtland definition, namely inter- and intragenerational equity. However, the intragenerational equity must not be achieved at the expense of future generations – which is allowed if one assumes asymmetrical triangular relation – but rather at the cost of the present rich and privileged.

### 3.2.5. Principle of integration: procedural aspects

The procedural scope of the principle of integration as pursued by the doctrine depends on its conceptualisation. Nollkaemper notes that there are three conceptions of the principle of integration: a) the integration principle as an objective, b) as a rule of reference, and c) as an autonomous principle.[326] These conceptions articulate three different roles that the principle of integration may play in international and European environmental law. In the light of the hierarchy theory, these roles can be seen as derivatives as the hierarchical multileveled structure.

a) The principle of integration as an objective

One the one hand, its first role as an objective directly derives from its being a part of the hierarchical system, where each level may be considered an objective from the perspective of the subordinate level. On the other hand, its role as an objective is also a

[325] The Rio Declaration and Agenda 21 call for taking into account the special needs of developing states. Principle 6 of the Rio Declaration states that '[t]he special situation and needs of developing countries, particularly the least developed and those most environmentally vulnerable, shall be given special priority.'

[326] André Nollkaemper, 'Three Conceptions of the Integration Principle in International Environmental Law' in Andrea Lenschow (ed), *Environmental Policy Integration: Greening Sectoral Policies in Europe* (Earthscan Publications 2002), 23-29.

result of being identified or confused with sustainable development as such. This lack of clarity in the relation between the integration principle and sustainable development can be seen, *inter alia*, as a characteristically problematic feature of flat and complex concepts. Hierarchy does not remove complexity, yet it better describes the interaction among elements allowing for clarity.[327] By regarding the objective of sustainable development and the principle of integration as two separate layers of the same concept, their interrelation becomes far clearer.

b) The principle of integration as a norm of reference

The role of the principle of integration as a norm of reference can also be pictured as deriving from its role as a level in the hierarchical concept. Whereas it can be considered an objective when observed from the perspective of the lower level it also functions as a rule of reference from the perspective of its own level, since it relies on the lower enabling principles to be operationalised. The principle of integration simply triggers lower-level principles.

b) The principle of integration as an autonomous normative principle

The conception of the principle of integration as an autonomous normative principle can be seen as resulting from the fact that a separate level, although operating within the context of other levels, carries its own normative (in our case) meaning. While the first two conceptions may be seen, to some extent, as deriving automatically from the way hierarchical systems work and the way their levels interrelate, the third conception recognises the principle of integration as a separate level and provides for its legal description. As such the principle of integration bears its own independent normative meaning. Normative integration and integrative decision-making and are the two most

[327] Howard Pattee has identified that 'as a system becomes more elaborately hierarchical its behaviour becomes simpler. The reason is that, with the emergence of intermediate levels, the lowest level entities become constrained to be far from equilibrium. As a result, the lowest level entities lose degrees of freedom and are held against the upper level constraint to give constant behaviour. Deep hierarchical structure indicates elaborate organization, and deep hierarchies are often considered as complex systems by virtue of hierarchical depth'. [Howard Hunt Pattee, *Hierarchy Theory; The Challenge of Complex Systems.* (George Braziller 1973), cited in Timothy F. Allen, 'The summary of the theory', International Society for the System Sciences, online: <http:// http://www.isss.org/hierarchy.htm>, accessed 12 September 2016]. Allen adds that a hierarchical structure with a large number of lowest level entities, but with simple organization, offers a low flat hierarchy that is complicated rather than complex. The behaviour of structurally complicated systems is behaviourally elaborate and so complicated, whereas the behaviour of deep hierarchically complex systems is simple.

visible functions or manifestations of the principle of integration as an autonomous principle in the domain of international law.[328]

#### *3.2.5.1. The normative integration*

The normative integration of the principle manifests itself in impact the principle exercises over law. The principle presupposes the way of creation of norms and policies and the relations between them, in other words it is able to determine the way the normative system operates.[329] It first serves as a base for seeing sectoral norms of international law in the broad systemic context and then calls for reconciliation and balancing of competing or conflicting legal norms from economic, societal and environmental sectors. The function of normative integration is therefore similar to the systemic coherence articulated in Vienna Convention on the Law of Treaties (VCLT) 31(3)(c).

The issue of fragmentation of international law has gained much doctrinal attention after the publication of the Report by the ILC.[330] In the face of growing concern with respect to this topic, the principles of normative integration are promoted in order to counter it.[331] The normative integration can be understood as 'legal methods deliberately aimed at the reconciliation of formally disparate elements of international law through normative hierarchy, inter-institutional comity, margins of appreciation, *lex posterior*, *lex specialis*, subsidiarity, interpretation and other such doctrines, and conceivable tools.'[332] Both, Article 31(3)(c) VCLT and Principle 4 of the Rio Declaration provide are principles enabling normative integration. First, to 'integrate the norms of another system is to acknowledge the authority of that other system to produce

[328] Virginie Barral and Pierre-Marie Dupuy, 'Sustainable Development through Integration', 165-166.

[329] As a 1995 Report notes, '[s]ustainable development will be enhanced if competing legal rules strive as a first step towards compatibility and as a second step towards mutual support [...] Interrelationship as a principle contributing to the achievement of sustainable development depends on the respect of each legal domain for the scope and content of adjacent bodies of law.' reference

[330] Martti Koskenniemi, *Fragmentation of International Law: Difficulties Arising From the Diversification and Expansion of International Law (Report of the Study Group of the International Law Commission, A/CN.4/L.682)*.

[331] For a critical view of systemic integration see for example Adamantia Rachovitsa, 'The Principle of Systemic Integration in Human Rights Law - A Critical Appraisal' (2017) *Forthcoming at International & Comparative Law Quarterly*, online:< http://www.rug.nl/research/portal/files/39713480/Systemic_Integration.pdf>.

[332] Tomer Broude, 'Principles Of Normative Integration and the Allocation of International Authority: The Wto, the Vienna Convention on the Law of Treaties, and the Rio Declaration' (2008) 6 1 *Loyola University Chicago International Law Review* 173, 173.

pertinent norms'.[333] For this reason there is the appreciable reluctance to accept international normative integration despite its obvious juridical advantages.[334] Nevertheless, the integration as proposed by the Rio Declaration seems not to entail the consolidation of international authority associated with unpopular ideas of centralised 'global government' instead of governance, as opposed to the more intrusive normative integration stemming from the VCLT.[335] The normative integration as proposed in the Rio Declaration seems to be formally rather neutral with respect to the *locus* of decision-making authority, as long as environmental protection is considered in substance and sustainable development is achieved.[336] The orientation of the Principle 4 of the Rio Declaration towards equity constitutes a substantial difference between the two integrative tools. Moreover the VCLT is clearly aimed at the horizontal systemic integration of international law, while the Principle 4 Rio Declaration calls for the integration of economic, social and environmental factors across sectors and at different

[333] Tomer Broude, 'Principles Of Normative Integration and the Allocation of International Authority: The Wto, the Vienna Convention on the Law of Treaties, and the Rio Declaration', 186.

[334] It 'is an innate result of the structure of international law, in which substantive norms are inextricably intertwined with the allocation of authority. In any fabric, but especially in a fragmented one, one cannot pull at any of the threads of the warp without unravelling some of the weft. The integration of norms necessarily has implications for the integration of authority, and at different levels decision-makers will resist the former to the extent that the latter deters them.'Tomer Broude, 'Principles Of Normative Integration and the Allocation of International Authority: The Wto, the Vienna Convention on the Law of Treaties, and the Rio Declaration', 195.

[335] It is well reflected in the jurisprudence of the WTO. The WTO dispute settlement has so far narrowly construed Article 31(3)(c) VCLT to the point of disutility. The EC-Biotech Panel interpreted Article 31(3)(c) VCLT as engaging only non-WTO treaties to which all WTO Members [European Communities-Measures Affecting the Approval and Marketing of Biotech Products, Panel Report, WTO, WT/DS291/R, WT/DS292/R, WT/DS293/R, 2006) ('EC-Biotech')]. The *EC-Biotech* Panel's practical rejection of Article 31(3)(c) VCLT as an effective norm-integrating tool is consonant with this provision's indirect yet intrusive authority-integrating implications[Tomer Broude, 'Principles Of Normative Integration and the Allocation of International Authority: The Wto, the Vienna Convention on the Law of Treaties, and the Rio Declaration', 198]. Broude argues that a comparative discussion of WTO jurisprudence related to Article 31(3)(c) of the VCLT, reveal that the article is a method of normative integration that is relatively aggressive in its potential impact on authority; and the principle of integration as vested in the Rio Declaration presents a method of normative integration that is less intrusive in the area of authority integration [Tomer Broude, 'Principles Of Normative Integration and the Allocation of International Authority: The Wto, the Vienna Convention on the Law of Treaties, and the Rio Declaration', 176]. He highlights that there is 'the analytical distinction between the consistency-focused trends of normative fragmentation/ integration, on one hand, and power-related questions of authority fragmentation/integration, on the other'[Tomer Broude, 'Principles Of Normative Integration and the Allocation of International Authority: The Wto, the Vienna Convention on the Law of Treaties, and the Rio Declaration',174].The Panel's findings were criticised by the ILC Study Group [Martti Koskenniemi, *Fragmentation of International Law: Difficulties Arising From the Diversification and Expansion of International Law (Report of the Study Group of the International Law Commission, A/CN.4/L.682)*, 450]. For discussion *see* Margaret A. Young, 'The WTO'S Use of Relevant Rules of International Law: An Analysis of the Biotech Case' (2007) 56 4 *International and Comparative Law Quarterly* 907.

[336] Tomer Broude, 'Principles Of Normative Integration and the Allocation of International Authority: The Wto, the Vienna Convention on the Law of Treaties, and the Rio Declaration', 202.

levels of the developmental process: on the decision-making level, policy planning, norm-creation and finally implementation and management levels. With respect to normative integration, it allows also for vertical integration across different law-making levels serving as a guide for national law-making. Because of its flexibility the principle of integration can be viewed as a more convenient tool to use.

#### *3.2.5.2. The integrative decision-making*

The integrative decision-making is another essential way in which the integration of environmental, social and economic aspects can happen.[337] The importance of integrative decision-making was highlighted by the ILA in the 2006 Toronto Report where it boldly stated that it is probably 'what Principle 4 of the Rio Declaration had principally in mind'.[338]

The integrative decision-making means that all relevant to a particular developmental endeavour actors must be involved and all the economic, societal and environmental factors at stake need to be taken into account, carefully considered and balanced.[339]

The *Gabčikovo-Nagymaros Project* case demonstrates the significance of the decision-making process as an element of sustainable development: the ICJ required the disputing parties to cooperate in the joint management of the project and to carry out a continuous environmental protection and monitoring process.[340]

Principle 13 of the Rio Declaration highlights two enabling aspects of effective decision-making: information (informed decision-making) and opportunity to participate (enablement and inclusiveness) in decision-making processes.[341]

c) The principle of integration as a rule of reference

Finally, the role of the principle of integration as a norm of reference can also be pictured as a derivative of its role as a level in the hierarchical concept. Whereas it can

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[337] See CSD, Report of the Secretary-General: Integrating environment and development in decision-making, E/CN.17/1996/11, (1996).

'To operationalize sustainable development, we need to recognize that one principle – integrated decisionmaking – holds the other principles together [John C Dernbach, 'Achieving Sustainable Development: The Centrality and Multiple Facets of Integrated Decisionmaking' (2003) 10 1 *Indiana Journal of Global Legal Studies*, 248].

[338] ILA Report 2006, 8.

[339] Ibid., 9.

[340] *Gabčikovo-Nagymaros Project.*

[341] Rio Declaration, Principle 13.

be considered an objective while observed from the perspective of the lower level it also functions as a rule of reference from the perspective of its own level, since it relies on the lower enabling principles to be operationalised. To this end the principle of integration simply triggers lower-level principles.

### 3.2.6. Legal nature of the principle of integration

The first step in the process of establishing the legal status of the principle of integration would be a question about its legal nature, namely whether it is justified to call it a legal principle rather than a goal, as an objective, or as a policy[342] as Dworkin would call it.[343] Many everyday policies pursue the integration of one thing into another. For example one can talk about integration of safety into transport policy, integration of minorities into housing policies, integration of disabled persons into the private sector, or integration of countries into the EU.[344] Yet, in order to be classified as a principle the level of abstraction cannot be too high if it is to have a practical reference.[345] Dworkin defines a principle as 'a standard that is to be observed.'[346] The level of abstraction therefore needs to allow for the determination of the behaviour of subjects. If a particular principle is to be called a principle of law, it must have an element of coercion. Dworkin describes a principle of law as a principle 'which officials *must* take into account, if it is relevant, as a consideration inclining in one direction or other [emphasis added].'[347] Principle 4 of the Rio Declaration has been widely recognised as a legal principle. As Sands points out, the language of Principle 4 'lends

[342] Less problematic here is the statement that the principle is not a rule or procedure. A generally accepted way to distinguish a rule from a principle boils down to the degree of precision of the provision in question. If its wording is sufficiently specific to apply it with well-defined consequences, then it may be qualified as a rule. Principles, on the other hand characterise with higher level of abstraction and the generality of their formulation. On the distinction of the principle from a rule or a procedure *see* for example Virginie Barral and Pierre-Marie Dupuy, 'Sustainable Development through Integration', 161-163.

[343] Ronald Dworkin, *Taking Rights Seriously*, 22 ff.

[344] André Nollkaemper, 'Three Conceptions of the Integration Principle in International Environmental Law', 25.

[345] Virginie Barral and Pierre-Marie Dupuy, 'Sustainable Development through Integration' 161-162. See also Pierre-Marie Dupuy and Yann Kerbrat, *Droit International Publique* (10th edn, Dalloz 2010), 376. On general principles of international law see for example Bin Cheng, *General Principles of Law as Applied by International Courts and Tribunals* (Cambridge University Press 1953).

[346] Ronald Dworkin, *Taking Rights Seriously*, 22.

[347] Ibid., 26.

itself to legal interpretation and practical application'.[348] The nature of Principle 4 as a legal principle was confirmed for example by the Tribunal in the *Iron Rhine Railway* arbitration.[349] Moreover aside from judiciary decisions, Principle 4 has been widely accepted as principle in the body of many legal instruments rather than as a goal in the preamble.[350] Although Principle 4 can rightly be viewed as a norm of reference for other enabling rules that are understood as more inner, specific layers of the concept of sustainable development, its status as a legal principle gives it an autonomous normative identity.[351]

#### *3.2.6.1. Binding or not: the principle of integration as an international custom*

The integration principle is laid down in the formally non-binding legal instrument. It is accepted, however, that this fact does not prevent a rule from becoming a binding norm of international law. The requirements for a rule to become a source of international law are set out in the Statute of ICJ. The Statute provides for four sources of international law: treaties, customs, general principles of law and doctrine writings.[352] With respect to customs, the ICJ Statute specifies that there is an international custom where there is 'evidence of a general practice accepted as law'[353], this being determined in practice by two elements: state practice (objective element) and *opinio iuris* (subjective element).[354] As far as *opinio iuris* is concerned, the Rio Declaration itself can be regarded as evidence of recognition of the principle of

[348] Philippe Sands, 'International Law in the Field of Sustainable Development', 338.

[349] *Iron Rhine*, 35 para. 58-59.

[350] *See* for example the Consolidated Versions of The Treaty on European Union and the Treaty on the Functioning of the European Union (2010/C 83/01), Title II, Art 11 and also Title I, Art 3(5), Title IV, Art 37; UNCLOS Part XII, Art. 193.

[351] Such characteristic of a legal principle is for example put forward by André Nollkaemper [André Nollkaemper, 'Three Conceptions of the Integration Principle in International Environmental Law', 28].

[352] The ICJ Statute, Article 38(1).

[353] Ibid, Art 38(b)

[354] In the North Sea Continental Shelf Case, the ICJ held that for a customary rule to emerge is needed: (1) the objective element or State practice, i.e. the actions or omissions by the State must support the custom, and (2) a general recognition of the rule of law or legal obligation (opinio juris), i.e. States when performing a custom must do so because they feel that they are legally bound to perform the custom [*North Sea Continental Shelf (Germany v. Denmark; Germany v. Netherlands*), Judgement, ICJ Reports 1969 *('North Sea Continental Shelf')*].

integration as law, since the Declaration has been accepted by the entire international community through consensus, without any State objection.[355]

The norm-creating capacity of the Declaration is primarily assured by the mandatory language it uses. The use of word 'shall' in the wording of Principle 4 stipulates that its intention is to place a legal obligation on its recipients. However, the Declaration also provides the mechanisms for monitoring the implementation of its provisions, including the principle of integration[356]. Since these are designed to assure compliance, the Declaration satisfies a second characteristic of a legal norm, namely that it be laid down with the intention of being complied with.

Besides the Rio Declaration, the principle of integration has been widely accepted as law in countless treaties and soft-law instruments, 'all reflecting a consolidation of the required *opinio iuris*'.[357]

State practice constitutes the other component of a customary status.[358] In order to be recognised as a building block in the formative process of a custom, practice has to be generally followed,[359] as well as virtually consistent and uniform.[360] Moreover, an absence of substantial dissent is necessary.[361] In the *North Sea Continental Shelf* cases the Court held that the passage of a considerable period of time was unnecessary to form a customary law.[362]

The principle of integration enjoys general recognition. Under the notion of sustainable development, it has often been incorporated into domestic actions by firms, communities and organizations. The widespread use of environmental impact assessment and public participation in decision-making are concrete examples of the principle of integration at work.[363] For instance, a number of European States have

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[355] On *opinio iuris* in the principle of integration see for example Virginie Barral and Pierre-Marie Dupuy, 'Sustainable Development through Integration', 168.

[356] Agenda 21 and Commission of SD.

[357] Virginie Barral and Pierre-Marie Dupuy, 'Sustainable Development through Integration', 168.

[358] ICJ Statute, Art 38 (b). State practice can be seen in the actual actions performed by the State (acts or omissions), statements made by authorized representatives in international fora or through national laws and judicial decisions that deal with international relations. See the ILA report on the formation of CIL paras. 7-11.

[359] Generality means a widespread and representative participation of States whose interests were specially affected [*North Sea Continental Shelf*, 42].

[360] *Ibid.*

[361] *Case Concerning the Military and Paramilitary Activities In and Against Nicaragua (Nicaragua v. US)*, Merits, ICJ Reports 1986 ('Nicaragua Case'), 98.

[362] *North Sea Continental Shelf*, 42.

[363] See for example Virginie Barral and Pierre-Marie Dupuy, 'Sustainable Development through Integration', 168.

adopted laws that require prior environmental assessment of many developmental projects. Building a wind power plant in Europe involves prior obligatory environmental analysis and assessment of the impact on local communities.[364] It means that environmental and social considerations have to be taken into account and then the development of the project has to be adjusted accordingly. In the international fora and judicial decisions it is hard to find opinions and statements that openly question the principle of integration. The World Bank has widely incorporated environmental considerations into its lending process. The renegotiations of the legal instruments that previously ignored environmental, economic or social considerations are also a token of the recognition of the principle of integration as a legal principle and evidence of practice relating to it.[365] Yet, despite many instances of the principle of integration at work, the most coherence attributed to practice can be found on the level of 'evidence of State practice' such as expression of will, international acts and paper work, but not on the level of actual practice. The problem of discrepancy between the evidence of State practice and the factual State practice is conspicuously manifested by the unsustainable effects in many cases. Some extreme legal views insist on the importance of understanding State practice as factual practice and all the paper work as *opinio iuris*. But even if a less rigid position is taken, it is hard to accept that overwhelming declarations of recognition of the legal status of the principle of integration constitute a basis for customary status when these declarations are so often accompanied by unsustainable developmental effects. The lack of uniformity and consistency can be explained and justified by the fact that sustainable development is an evolutive concept which recognises divergent practices as adaptive responses to varying situations or environments. The unsustainable effects could also be ignored in the process assessing customary status if the principle of integration was simply understood as a process, a norm of means,[366] as a simple 'taking into account' and detached from effects. Taking into account a procedure or putting it in place would be the determinant of state practice, not the effect. The unsustainable effect would not influence the legal assessment of the customary character of the principle but would simply mean there is a

[364] Directive 2014/52/EU of the European Parliament and of the Council (16 April 2014) amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment OJ L124/57.

[365] See Virginie Barral and Pierre-Marie Dupuy, 'Sustainable Development through Integration', 168.

[366] Ibid.

need for a change in the process, which is again presumed by sustainable development.[367] Nevertheless, in the light of Principle 4, which clearly links integration to sustainable development (by calling for sustainable effects), the doctrine finds it hard to accept the principle of integration as a custom in the case when there is no uniform and consistent practice or such practice yields unsustainable effects.[368] This brings us to the conclusion that it is hard or probably too early to accept the principle of integration as a formal source of international law based on international custom.

To date none of the judicial bodies have referred to the principle of integration as an international custom.

#### *3.2.6.2. Binding or not: the principle of integration as a general principle of law*

As established in the previous paragraph, the principle of integration enjoys a general and widespread recognition as a legal norm, namely as a legal principle. The present thesis argues that the principle of integration has already acquired the status of a general principle of law and is a source of international obligation.

General principles of law are one of three formal sources of international law. With respect to the two other sources, i.e. treaty and custom, they constitute basic rules whose content is more general and abstract. Art. 38 (1) (c) ICJ Statute requires a general principle of law to be 'recognized by civilized nations'. This introduces an issue concerning the origin of the principles. Historically, the general principles originated in domestic legal systems. Although the notion of integration is not a new idea and is known for many domestic legal orders, the legal principle of integration came into existence with the Rio Declaration and therefore has its origin in the international legal instrument and not in a domestic legal order. Nevertheless, a perusal of the preparatory work of the Permanent Court of International Justice (PCIJ) Statute shows that even its

[367] Sustainable development is process towards sustainability, continuous endeavour that rather assumes that the general trend is towards sustainability than the particular actions. It assumes for bad decisions, wrong procedures or wrong implementation as a part of the process. To this end it puts a procedure in place that deals with the introduction of change if given actions yield unsustainable effects. Constant reassessment against the indicators being one of the tools. Brundtland Report states that 'sustainable development is not a fixed state of harmony, but rather a process of change', 17.

[368] There are many complex reasons for the unsustainable effects of the processes that were designed to put actions on the track of sustainability. First of all the discrepancies reveal the difficulties in balancing of different, usually competitive interests, where the economic element is quite strong and the environmental protection and social issues are altogether much weaker.

drafters were leaning towards the view that the existence of general principles on an international level is not determined by their existence on a municipal level.[369]

Another issue related to general principles is the issue of their autonomy as a source of international law. Since an international judicial body usually refer to principles when the reference to treaty or custom is not legitimate, the general principles of law are often regarded as subsidiary sources. Nevertheless there is nothing in international law that precludes their autonomous status as a source of international law. To some extent, the treatment of general principles as subsidiary source of law is partially due to their apparent indeterminacy. This is the argument introduced by the realists to demonstrate that the application of the principles of deductive reasoning to the set of legal materials does not and could not uniquely determine the outcome of particular cases.[370] Despite these drawbacks, the ICJ Statute ascertains the binding status of a general principle of law as a source of law.

In the case of the principle of integration the problem of indeterminacy seems not to be an issue. It is actually quite easy to determine if the developmental process intends to integrate environmental and social policies in order to achieve sustainable development, i.e. if the specific principles, norms and procedures – located at the lower level in the hierarchy – were put in place and the process of their selection proceeded in accordance with procedural requirements, especially those of integrative decision-making.[371] The determination of whether the principle of integration has been adopted do not need be based on the results. Unfavourable results may point to the need for some change in the integrative process without undermining the principle itself. The principle of integration was created as a tool for ensuring the general trend towards sustainable development and allows for wrong decisions and the possibility of being off the track, in other words it accepts there will be fluctuations around the general trend. The principle nonetheless calls for constant reassessment of the factual process of integration. Being oriented towards the view of sustainable development as an objective, it requires constant reassessment of effects in the form of indices of sustainable development, scientific

[369] Advisory Committee of Jurists Procès-verbaux of the Proceedings of the Committee, PCIJ, 1920 with Annexes, 306-344.

[370] See John Hasnas, 'Back to the Future: From Critical Legal Studies Forward to Legal Realism, Or How Not to Miss the Point of the Indeterminacy Argument' (1995) 45 1 *Duke Law Journal* 84, 84.

[371] There are many recognised legal tools enabling such integration that are well known for the international community and are widely accepted by many international instruments, primarily in the Rio Declaration.

data, etc. The principle of integration has just the right level of generality and abstractness required, on the one hand to clearly convey its intentions, and on the other hand to accommodate a necessarily wide range of possible actions. This fine balance is a great strength of this principle.

Because of the difficulties in establishing the binding nature of a norm, the international community relies heavily on judicial pronouncements on the issue.[372] These pronouncements are quite consistent in imposing a duty to integrate environmental values into the socioeconomic development. Wherever the conflicting interests have arisen between the environment and economic growth, the courts have pointed to the integration principle as a starting point for finding a solution.

*The Iron Rhine Arbitration*

With respect to the principle of integration, the findings in the *Iron Rhine* case are particularly important. This case is regarded a clearest example of the use of the principle of integration as a legal basis for the settlement of a dispute. In its Arbitration, the Tribunal assured that 'both international and European Commission (EC) law *require* the integration of appropriate environmental measures in the design and implementation of economic development activities'[373] and added that this is reflected in Principle 4 of the Rio Declaration. The Arbitration clearly refers to the principle of integration as part of a binding legal system. As Barral states '[t]his statement stands for the proposition that the principle of integration is vested with binding nature in international law.'

The Tribunal later specified that:

> Environmental law and the law on development stand not as alternatives but as mutually reinforcing, integral concepts, which require that where development may cause significant harm to the environment there is a duty to prevent, or at least mitigate such harm. This duty, in the opinion of the Tribunal, has now become *a principle of general international law.*[374]

[372] See Robert Jennings, 'What is international law and how do we tell it when we see it?' (1981) 37 *Swiss Yearbook of International Law* 59, 74.
[373] *Iron Rhine*, para 59.
[374] Ibid.

Then the Tribunal immediately recalled the observations of the International Court of Justice in the *Gabčikovo-Nagymaros Project* case, that "[t]his need to reconcile economic development with protection of the environment is aptly expressed in the concept of sustainable development"[375] and that "new norms have to be taken into consideration, and […] new standards given proper weight."[376] Barral argues that the use of language suggesting a legal novelty clearly points to the interpretation that the Tribunal actually recognised the principle of integration as a general principle of law, despite a direct reference to the duty to prevent and mitigate.[377]

Indeed, when placed in the context that 'international and EC law *require* the integration of appropriate environmental measures…' the 'duty to prevent, or at least mitigate such harm' strongly suggests that the Tribunal referred to the principle of integration as a general principle of law, with the 'duty to prevent and mitigate' being a principle enabling such integration. This situation reflects the multi-levelled nature of sustainable development where reference to one layer redirects one to the lower one for purposes of understanding its operationalisation. The multi-levelled face of sustainable development constantly reveals itself in various and divergent opinions on what is a tool and what an objective. The Rio Declaration itself makes integration the key to sustainable development. Then, for example, the CSD speaks about sustainable development's goals what means that sustainable development, an objective immediately translates to more specific goals. Others clearly make sustainable development a key to sustainability. The recognition of the existence of norms (even if not stated) enabling the principle of integration can be detected in the following statement of the Tribunal:

> economic development is to be reconciled with the protection of the environment, and, in so doing, *new norms* have to be taken into consideration, including when activities begun in the past are now expanded and upgraded.[emphasis added][378]

[375] *Gabčikovo-Nagymaros Project*, 78, para. 140.
[376] Ibid.
[377] She points to the fact that the principle of prevention had already been recognised as a part of customary law in the *Legality of the Threat or use of Nuclear Weapons* [Advisory Opinion, ICJ Reports 226, 1996], which fact was acknowledged by the Tribunal. She doubts that the Tribunal, therefore would use the language indicating judicial novelty with respect to the established status of the principle of prevention.
[378] *Iron Rhine*, para 59

What is even most important with respect to the Iron Railway Arbitration is that the subsequent settlement of the dispute is founded on the principle of integration. Through its pure application the Tribunal recognises as legitimate both Belgium's economic interests to reactivate the Iron Railway and the Netherlands' environmental preoccupations[379] and then calls for their reconciliation and careful balancing.[380] The Tribunal later states that:

The reactivation of the Iron Rhine railway cannot be viewed in isolation from the environmental protection measures necessitated by the intended use of the railway line. These measures are to be *fully integrated* into the project and its costs.[381]

*The WTO Dispute Settlement Body*

The findings of the WTO Appellate Body highlight the legal nature of the principle of integration. The Court averred that sustainable development, understood as integration of economic and social development and environmental protection[382], constitutes an integral part of the WTO system, which is recognised in the Preamble of the WTO Agreement. The findings of the Appellate Body were grounded in the recognition of sustainable development through the lens of the principle of integration. The court incorporated a definition of natural resources based on environmental instruments, which integrated environmental considerations into the primarily economic system of the WTO.[383]

In the *Raw Materials* case the Panel again acknowledged the importance of sustainable development. It stated that

a proper reading of Article XX(g) in the context of the GATT 1994 should take into account the challenge of using and managing resources in a sustainable manner that ensures the protection and conservation of the environment while promoting economic development.[384]

[379] *Iron Rhine*, para 220-221.
[380] Ibid.
[381] Ibid. para 223.
[382] The Court recognised that sustainable development has been generally accepted as integrating economic and social development and environmental protection [Report of the Appellate Body, 48]. See e.g., Günther Handl, 'Sustainable Development: General Rules versus Specific Obligations' in Winfried Lang (ed), *Sustainable Development and International Law* (1995), 43.
[383] Barral Virginie Barral, 'Sustainable Development in International Law: Nature and Operation of an Evolutive Legal Norm', 174.
[384] *Raw Materials*, para 7.375.

The Panel clearly pointed to an obligation to integrate environmental protection into economic development as they constitute 'related facets of an integrated whole.'[385] This statement highlights a very important characteristic of the integration principle, namely its ability to adjust (integrate) a fragmented legal system in order to better reflect and handle the integrated reality.

Later in the same case the Appellate Body assured that the WTO Agreement should be seen as a balance struck between trade- and non-trade related concerns,[386] which accounts for the necessity of balancing conflicting interests and values.

Finally in the Rare Earth case the Panel confirmed that Principle 4 of the Rio Declaration needs to be taken into account when interpreting Article XX(g) and the notion of conservation. The Panel established that in the light of this principle, conservation cannot be limited to the mere preservation of natural resources but also requires their sustainable use.[387] As highlighted by the Panel, such an understanding of conservation strikes a balance between trade liberalisation, sovereignty over natural resources and the right to sustainable development.[388]

### 3.2.7. Normative impact of the principle of integration - SD and integration principle in EU Law

The principle of integration has greatly influenced the whole body of international law. It has been adopted in a vast number of international treaties and is aptly reflected in jurisprudence.

Through the adoption of the Lisbon Treaty, the EU has bound itself to 'work for the sustainable development of Europe'. In doing so, it has created one of the most explicit legal commitments to a sustainable future. Article 3 of the Treaty on European Union ('TEU') clearly points to sustainable development as a way for European progress. It states that

[385] Ibid. para 7.376.
[386] *Raw Materials*, para 306.
[387] *China – Measures Related to the Exportation of Rare Earths, Tungsten, and Molybdenum*, WTO Panel Report, para 7.267.
[388] Ibidem, para 7.277.

'[t]he Union shall establish an internal market. It shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment. It shall promote scientific and technological advance.'

The Article clearly recognises sustainable development as a one of the specific policy goals of the EU in its internal relations. Moreover, when coupled with paragraph 5 of the Article, the scope of the implementation of sustainable development broadens beyond the jurisdictional boundaries of Europe to encompass the entire world. Paragraph 5 of Article 3 states:

'In its relations with the wider world, the Union shall uphold and promote its values and interests and contribute to the protection of its citizens. It shall contribute to peace, security, the sustainable development of the Earth […] as well as to the strict observance and the development of international law, including respect for the principles of the United Nations Charter.'

The single most explicit article of the Lisbon Treaty recognising the principle of integration is Article 11 of the TFEU that introduces *a legal obligation* of integration into post-Lisbon EU law. It reads that '[e]nvironmental protection requirements must be integrated into the definition and implementation of the Union policies and activities, in particular with a view to promoting sustainable development.'[389] Subsequently, the binding status of the principle of integration in EU law was established in *Greece v Council.*[390] The principle of integration as a binding norm of EU law applies to all EU policies and activities including space policy.

[389] Consolidated Version of the Treaty on the Functioning of the European Union art. 34, 2008 O.J. C 115, art. 11 at 53.

[390] *Greece v Council*, case 62/88, at para 20

### 3.3. Third level: cross-sectoral enabling tools

This is the level that contains a set of legal tools enabling integration and the eventual achievement of sustainable development.[391] This layer is a compound of recognised norms and principles enabling the realisation of integration in its substantial and procedural scope. These norms also hold a status independent from the concept of sustainable development. They are considered as tools within the framework of the legal concept of sustainable development only if used to enable integration with the ultimate goal to achieve inter- and intragenerational equity.

As stated in the ILA 2006 Report, 'integration is a much more nuanced notion than Principle 4 might suggest.'[392] It is the third layer that provides the nuances. This layer contains cross-sectoral principles relating to sustainable development that need to be considered in order to integrate the three pillars. These are principles extracted from several global-scale processes spanning over decades, inter alia, the 1987 WCED Principles on Environmental Protection and Sustainable Development; the 1995 UN CSD Principles of International Law of Sustainable Development; and the 2000 International Union for Conservation of Nature (IUCN) International Covenant on Environment and Development, just to mention the most important.

The 2002 ILA New Delhi Declaration identifies seven principles 'distilled' from the abovementioned processes.[393] It 'considers that the application and, where relevant, consolidation and further development of the following principles of international law relevant to the activities of all actors involved would be instrumental in pursuing the objective of sustainable development in an effective way'. The principles include:

1. The duty of States to ensure sustainable use of natural resources;
2. The principle of equity and the eradication of poverty;

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[391] The position of these principles in the hierarchical structure of the legal concept of sustainable development was determined by the analysis of the legal doctrine and judicial cases dealing with the subject. The summary or reassessment of the legal status of the individual principles is well beyond the scope and aim of the study. For the study of the principles see for example REF

[392] ILA Report, 3.

[393] The most important international policy-making processes leading up to the New Delhi Declaration include: the Stockholm Declaration of the United Nations Conference on Human Environment of 1972 (hereinafter referred to as the Stockholm Declaration); the Brundtland Report; and the Rio Declaration on Environment and Development of 1992 (hereinafter referred to as the Rio Declaration), which also contains Agenda 21. The Brundtland Report contains 22 legal principles which were echoed in the 27 principles contained in the Rio Declaration. The Rio Declaration was followed by the Report of the Expert Group Meeting on Identification of Principles of International Law for Sustainable Development, released by the UN Commission on Sustainable Development in 1995. This Report led to the drafting of the New Delhi Declaration in 2002.

3. The principle of common but differentiated responsibilities;
4. The principle of the precautionary approach to human health, natural resources and ecosystems;
5. The principle of public participation and access to information and justice;
6. The principle of good governance;
7. The principle of integration and interrelationship, in particular in relation to human rights and social, economic and environmental objectives.

The list of principles also includes the integration principle. Although it is listed as one of the set of principles, in the New Delhi Declaration it functions rather as 'a conceptual framework for 'integrated thinking' in international law relating to sustainable development, which can guide consideration of other principles'.[394]

### 3.4. Fourth level: sectoral norms enabling sustainable development

The fourth level contains sectoral legal norms enabling integration towards sustainable development. These norms are usually embodied in specific legal instruments capable of guiding State practice. They are rules governing the intersection between the three fields of international environmental, economic, and social law development, and can be associated with what the legal doctrine calls the body of Centre for International Sustainable Development Law (ISDL). This is defined by Segger and Khalfan as an 'intersection between the three fields of international economic, environmental, and social law'.[395] Sands stresses that international law in the field of sustainable development 'points to a body of principles and rules drawn from traditional approaches, evolutionary rather than revolutionary, contributing incrementally to the law and legal process'.[396]

Each branch of international law within the ambit of ISDL covers its own category of issues and regulations on related international organisations. International environmental law aims to manage natural resources and environmental quality. It

[394] Jodoin, S. The Principle of Integration and Interrelationship in Relation to Human Rights and Social, Economic and Environmental Objectives; Legal Working Paper in the CISDL "Recent Developments in International Law Related to Sustainable Development" Series; Centre of International Sustainable Development Law: Montreal, QC, Canada, 2005, 4.

[395] Segger and Khalfan (p. 103)

[396] [28] (pp. 336–347).

includes such areas as air and water pollution, forests and wildlife, hazardous waste, agricultural practices, wetlands, and land use planning. In the area of international economic law, ISDL would include some norms on trade in goods and services, financial law, economic integration, international investment law, development law and business regulation.[397] Another branch of law contributing to ISDL is international social law. Issues under international social law would include international human rights law, international humanitarian law, international health law, international labour law, gender, population, food security, and social development.[398]

The specific sector-related norms of the fourth level are not directly transferable to other domains such as space law for example. However, they may serve as a useful example for handling similar issues.

[397] The relevant international organisations will be World Trade Organization (WTO), Organization of Economic Cooperation and Development (OECD), International Monetary Fund (IMF), the United Nations Conference on Trade and Development (UNCTAD), and the World Bank [34] (p. 54).

[398] [34] (p. 70).

## E. APPLICABILITY OF THE CONCEPT OF SUSTAINABLE DEVELOPMENT TO SPACE LAW

### *1. General remarks*

At the time of its creation space law was in many ways ahead of its time. From the perspective of extending sustainable development to space law, it was very progressive in one respect: from the very beginning, it embraced the ideas of intra- and intergenerational equity. Its concepts of mankind, common benefit, equality and cooperation were ahead of the rest of an international legal framework still deeply immersed in the Westphalian model of a legal order based on the sovereignty of states.[399] Cocca argues that space law was actually created as *ius humanitatis* - law of, and for, mankind.[400] Indeed, there is no mismatch between the objectives and values promoted on one side by sustainable development and on the other side by space law. In fact the spirit of space law, generally outlined in the principles relating to common benefit, mankind, equality, non-appropriation and cooperation is consonant with the ideas linked to sustainable development.

However, these principles are plagued by ambiguities of legal interpretation, and their meaning, clarification, specification and translation into practice rely heavily on space-related soft law instruments, general legal developments in international law, and doctrinal writings. There are no foreseeable treaty developments that could clarify them.

The application of sustainable development at the level of objective would strengthen the interpretation of the principles and other provisions of space law towards equity ends. The application of the principle of integration as a recognised principle of general law would require systemic incorporation of environmental concerns in the socio-economic development of space law. To this end, it would introduce a clear obligation to incorporate in entrepreneurial activities in outer space the environmental and social aspects. It would also presuppose the relevance of the principles of sustainable development in outer space and introduce an obligation to translate them into the regime of outer space.

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[399] 'Westphalian model – term used to explain the fundamental juristic basis of the world organisation founded on the principle of the sovereign equality of states, in which traditionally international law and international relations are rooted.

[400] Aldo Armando Cocca, 'The Advances of International Law Through the Law of Outer Space', 13.

## 2. Applicability of the concept to outer space: reference to outer space in the legal instruments concerning sustainable development

The Stockholm Declaration does not expressly mention outer space. However its Principle 21 provides that 'States have, in accordance with the Charter of the United Nations and the principles of international law, […] the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment or areas beyond the limits of national jurisdiction.' Pursuant to Articles I and II of the OST, outer space constitutes an area beyond the national jurisdiction, even though national airspace limits are not clearly defined.[401]

The Brundtland Report, unlike later documents concerned with the conceptualisation of sustainable development, approached some key aspects linked to outer space in the context of sustainable development. First of all, following the OST, the Report stresses that outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means. Then it goes a step further, and in the spirit of the Moon Agreement declares outer space 'a global commons and part of the common heritage of mankind'.[402]

The Report recognises the importance of space-based systems to the monitoring of the environment of the planet and the protection of human health.[403] It recognises two specific types of threat to these systems: space debris and the proliferation of arms and nuclear weapons in particular, in outer space. The Report considers the latter a fundamental threat not merely to human progress, but to the very survival of the human species.[404]

The Report then turns to the issue of managing orbital space as a key to the mitigation of the aforementioned threats. According to the Report, traditional forms of national sovereignty raise particular problems in managing the 'global commons' and

[401] Two years after the adoption of the Rio Declaration, the ILA explicitly proclaimed that the duty to protect the areas beyond the national jurisdiction should be extended to Earth orbital space [ILA (1994). International Instrument on the Protection of the Environment from Damage Caused by Space Debris. Final Report to the Sixty-Sixth ILA Conference, Buenos Aires. In Lyall, F. & Larsen P.B. (2009). Note 24 above, p303].

[402] The Brundtland Report, Chapter 10, para. 56. The OST qualifies outer space as 'province of all mankind' underpinned by the freedom of use, exploration and scientific investigation in outer space [Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, Article I].

[403] The Brundtland Report, Chapter 10, para 56

[404] The Brundtland Report, Chapter 1, para. 33.

their shared ecosystems - the oceans, outer space, and Antarctica[405]. In the common spaces, sustainable development can be secured only through international cooperation and agreed regimes for surveillance, development, and management in the common interest. To this end, the Report proposes that the international community should seek to design and implement a space regime that ensures peaceful use of outer space for the benefit of all.[406] It suggests creating a regime to control space debris and to regulate the issue of nuclear materials in orbit; just like the issue of the electromagnetic spectrum that had been effectively regulated by international agreement giving a beginning to a space regime for geosynchronous orbital space.[407] The advocated by the Report regime was indeed soon developed. The UNGA adopted the Resolution on Principles Relevant to the Use of Nuclear Power Sources in Outer Space[408] (in 1992) and the Space Debris Mitigation Guidelines (in 2007).[409]

The Report made a few general remarks that are important from the perspective of emerging space activities. First, it stated that 'the future of the space as a resource will depend not so much on technology as on the slow and difficult struggle to create sound international institutions to manage this resource'[410]; second, that in creating 'rules of the road' there is a need to ensure that the activities of some do not degrade the resource for all[411]; and finally, that a 'fine balance must be struck between regulating activities too late and regulating non-existent activities too soon.'[412]

The 1992 Rio Declaration does not mention outer space. But nor does it mention air, forests, seas or any other specific ecosystem. It deals with the generally understood environment and provides for cross-sectoral principles underpinning protection of the environment.[413] Principle 2 of the Rio Declaration reiterates Principle 21 of the Stockholm Declaration and stipulates that States bear the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of

[405] The Brundtland Report, An Overview, para. 82.
[406] The Brundtland Report, Chapter 10, para. 77.
[407] The Brundtland Report, Chapter 10, para. 79.
[408] UNGA, Principles Relevant to the Use of Nuclear Power Sources in Outer Space, A/RES/47/68 (1992).
[409] UNGA, Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space, Doc. A/AC.105/c.1/l.260 (22 December 2007).
[410] The Brundtland Report, Chapter 10, para. 57.
[411] The Brundtland Report, Chapter 10, para. 76.
[412] The Brundtland Report, Chapter 10, para. 80.
[413] The Declaration does not provide for any legal definition of the environment. It uses terms environment, environmental, nature, the Earth's ecosystem, the global environment, natural resources [Rio Declaration].

areas beyond the limits of national jurisdiction. Two years after the adoption of the Rio Declaration, the ILA explicitly proclaimed that the duty to protect areas beyond the national jurisdiction should be explicitly extended to the Earth's orbital space.[414]

Agenda 21 does not includes outer space within its 'environmental scope'. The environment itself is the subject of chapters 9 through 22 of Agenda 21[415], which deal with the conservation and management of resources for development. These chapters recognise environmental issues and topics such as protection of the atmosphere, land sustainability, deforestation, desertification and drought, needs of mountain ecosystems, agriculture, biological diversity, biotechnology, protection of oceans and fresh water, use of toxic chemicals, waste and sewage and radioactive waste. Although in reality some of these issues – such as pollution, toxic chemicals and radioactive waste – also concern outer space, Agenda 21 deals with them specifically within the terrestrial context.

Agenda 21 refers to outer space twice: once in regard to the use of space-derived data to enrich knowledge of the Earth's carrying capacity in order to enhance scientific understanding in promoting sustainable development; and on a second occasion, in regards to promoting the global use of indicators of sustainable development relating to areas outside of national jurisdiction. Thus, Agenda 21 adopts an instrumental approach to outer space as a means to achieving sustainable development on Earth. It does not expressly recognise outer space as part of the environment to which the instruments launched within the framework of sustainable development apply.

The Johannesburg Declaration and the Implementation Plan do not mention outer space. Neither does the Rio +20 Conference Declaration.[416]

Although the Declarations on sustainable development and the accompanying implementation instruments do not deal with the environment of outer space, neither do they exclude it from their scope. They provide general tools to handle tensions arising at the intersection of developmental and environment aspects of a given activity, irrespective of its location. Space is a part of the terrestrial system in the sense that many issues arising in connection with outer space, such as the generation of pollution

[414] [ILA (1994). International Instrument on the Protection of the Environment from Damage Caused by Space Debris. Final Report to the Sixty-Sixth ILA Conference, Buenos Aires. In Lyall, F. & Larsen P.B. (2009). Note 24 above, p303].

[415] Agenda 21,

[416]

in space or tensions between States over the use of space resources, are inherent in human development and not specific to outer space. These issues are obviously another manifestation of a broad and abstract problem linked to the dynamics of the functioning of States and the international community in general. Yet outer space law tends to be treated as a self-contained regime[417] and its integration into the larger ensemble of general international law is rather difficult.

### 3. Applicability of the concept to outer space: reference to sustainable development in outer space law

The concept of sustainable development does not appear in space law. The lack of reference to sustainable development in the founding treaties of space law is clearly an issue of timing: the five space law treaties entered into force between 1967 and 1984, several years before the first conceptualisation of sustainable development in the Brundtland Report (1987).

Space law, as a part of the general legal order, needs to observe international law. The applicability of rules of general international law to space law was confirmed by the first formal Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space[418] and subsequently confirmed by Article III of the Outer Space Treaty.[419] Article III of the OST states 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'.[420] The article expressly requires that States Parties to the Treaty observe international law and the Charter of the UN[421], and thereby integrates norms of space law into the system of standards of general international law. Sustainable development has been expressly recognised by the ICJ as a legal objective, and the principle of integration has been recognised as a general principle of law by the Appellate Body and as a principle of environmental law by the ICJ. This systemic recognition opens the door for its legal application to

[417] See chapter x

[418] Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, G.A. Res. 1962 (XVIII), at 1-4 (Dec. 13, 1963), Point 4.

[419] Article III: '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 […].'[The OST].

[420] OST, Art III.

[421] United Nations, *Charter of the United Nations*, 26 June 1945, in force since 24 October 1945, 1 UNTS XVI, https://treaties.un.org/doc/Publication/CTC/uncharter-all-lang.pdf [accessed 23 April 2015].

international space law. Sustainable development can therefore be applied *mutatis mutandis* to outer space. From a legal standpoint there is nothing that precludes such an application.

### 4. Space law as self-contained regime

The applicability of the concept of sustainable development to outer space can be also viewed as a derivative of the ongoing discussion in international law on fragmentation of international law and self-contained regimes. With this respect there is quite often explored topic of space law as a self-contained regime. Recognition of space law as a self-contained regime could potentially explain lack of acceptance of sustainable development in outer space.

The issue of the self-contained regimes is a topic widely discussed by the scholars. On the one hand, they highlight the unity of international law; on the other hand, they underline its fragmentation characterised by the emergence and spreading of special legal systems marked by the development of special rules and verification mechanisms that differ from those of the general international law. The topic of the self-contained regimes appeared in several cases in international jurisprudence and it was discussed by the ILC during the works on the Draft articles on the responsibility of States for internationally wrongful acts.[422]

Eventually in more detail the ILC Working group on the Fragmentation of international law chaired by Martti Koskenniemi analysed the topic. According to Koskenniemi a self-contained regime covers the case where 'a set of primary rules relating to a particular subject matter is connected with a special set of secondary rules, that claims priority to the secondary rules provided by general law'.[423] Nevertheless, he came to the conclusion that no regime is fully self-contained, taking into consideration

[422] The Commentary to article 55 (*lex specialis*) of the Commission's draft articles on responsibility of States for internationally wrongful acts makes a distinction between 'weaker forms of *lex specialis*, such as specific treaty provisions on a single point' and 'strong forms of *lex specialis,* including what are often referred to as self-contained regimes' [Martti Koskenniemi, *Fragmentation of International Law: Difficulties Arising From the Diversification and Expansion of International Law (Report of the Study Group of the International Law Commission, A/CN.4/L.682)*, 65].

[423] Martti Koskenniemi, *Fragmentation of International Law: Topic (a): The function and scope of the lex specialis rule and the question of 'self-contained regimes': An outline* (2006), 8, Online: < http://legal.un.org/ilc/sessions/55/pdfs/fragmentation_outline.pdf>, accessed 13 May 2017. See also Martti Koskenniemi, *Fragmentation of International Law: Difficulties Arising From the Diversification and Expansion of International Law (Report of the Study Group of the International Law Commission, A/CN.4/L.682)*.

that general international law at least provides a normative background and serves as a fall back option in case a special regime fails.[424] Similar, and even more pragmatic conclusion was emphasised by Simma and Pullowsky according to whom scholars should not concentrate that much on this issue. On the contrary, in order to determine whether a certain regime claims to some extent to have priority over general international law it should rather be decisive 'whether [...] a fall back in general international law is expedient to serve the purposes of the special regime'.[425]

The concept of self-contained regime does not seem to be convincing even though in modern international law it is possible to find legal systems governed by special rules where primary and secondary norms exclude once and for all the application of norms of general international law.[426] For instance, the international telecommunications regime, governed by the Constitution and Convention of the ITU and its related Administrative Regulations, constitutes a special legal system, but not a self-contained regime. The ITU specialised legal setting enforce strong institutional framework and an ability to set new international norms. However, the capacity to create special rules do not exclude that Parties have a chance to return to rules of general international law if they choose so.[427]

Even with regard to general space law the thesis of self-contained regime is not convincing because in face of obviously existing *lacunae* general international law is able to at least provide an interpretative aid and in many cases fill the *lacunae*.[428] The extension of the concept of sustainable development is a great example of such a function of general international law. In addition, the case law of the ICJ and of other international tribunals suggests that where possible an integrated conception of

[424] Martti Koskenniemi, *Fragmentation of International Law: Topic (a): The function and scope of the lex specialis rule and the question of 'self-contained regimes': An outline*, 10.

[425] B. Simma, D. Pullkowski, Of Planets and the Universe: Self-contained Regimes in International Law, European Journal of International Law, Vol.17, No.3, 2006, p. 491.

[426] Sergio Marchiso, 'The ITU Regulatory System: a Self-Contained Regime or a Part of International Law?' in G. Penet (ed), *Governing the Geostationary Orbit Orbital Slots and Spectrum Use in an Era of Interference* (IFRI 2014),73-78.

[427] Sergio Marchiso, 'The ITU Regulatory System: a Self-Contained Regime or a Part of International Law?'.

[428] Stephan Hobe and Erik Pellander, 'Space Law: a "Self-Contained Regime"?' in Stephan Hobe and Steven Freeland (eds), *In Heaven as on Earth? The Interaction of Public International Law on the Legal Regulation of Outer Space: 1/2 June 2012, Bonn - Oberkassel* (Institute of Air and Space Law of the University of Cologne / Deutsches Zentrum für Luft- und Raumfahrt e.V. German Aerospace Center 2012), 7-11.

international law is better to a fragmented one.[429] Therefore one should avoid considering any part of international law in isolation from the whole, even if it is a *lex specialis*. Space law, therefore, should not to be considered a self-contained regime, '[…] rather a part of contemporary international law. Accordingly, general international law and other branches of international law should be applicable as long as they serve the purpose to promote the rule of law "in heaven as on earth"'.[430]

[429] Alan E. Boyle and Christine Chinkin, *The making of international law* (Oxford University Press 2007), 211.

[430] Stephan Hobe and Erik Pellander, 'Space Law: a "Self-Contained Regime"?', 12.

## F. APPLICATION OF THE CONCEPT OF SUSTAINABLE DEVELOPMENT TO OUTER SPACE ON THE FIRST LEVEL OF CONCEPTUALISATION – SUSTAINABLE DEVELOPMENT AS AN OBJECTIVE

### 1. Legal applicability of SD as an interpretative tool in space law

The Vienna Convention on the Law of Treaties (VCLT) specifies how international treaties should be interpreted. The primary rule articulated in Article 31.1 of the VCLT states that '[a] treaty shall be interpreted in good faith in accordance with the ordinary meaning given to the terms of the treaty in their context and in the light of its object and purpose.' However, as previously discussed, there are many issues for which the general wording of space treaties does not provide clear guidance, due to their non-existence at the time the treaties were adopted. Therefore, the interpretation of the norms of space treaties often cannot rely on the supplementary means of interpretation stated in Article 32, i.e. the preparatory work of the treaty or the circumstances of its conclusion. Space law rules should not be limited by the principle of contemporaneity,[431] according to which a treaty must be interpreted in the context of the law applicable at the time of its conclusion. In the case of space law treaties, the negotiating Parties decided to allow the interpretation of the treaty to follow modern legal developments and they used general, framing provisions capable of encompassing future developments.[432] In order to clarify some norms the interpretations could resort to contemporary developments in general international law.[433]

The applicability of sustainable development is based on Article 31(3)(c) of the VCLT, which provides that norms should not be considered in isolation of relevant 'rules of international law'. Although the issue of relevance is a complex question (and the running thread of this study), it is secondary to the question whether sustainable development is a 'rule of international law'. The expression 'rules of international law' may suggest that for the purposes of this norm sustainable development must have a

[431] See *Island of Palmas Case (Netherlands, USA)* II RIAA (1928) 829, 845 and 839].

[432] Nandasiri Jasentuliyana, 'Space debris and Internationl Law' (1998) 26 2 *Journal of Space Law* 139, 139, 141.

[433] The ILC in the Commentaries to the Draft Articles on the Law of Treaties states that the principle of contemporaneity applies unless Parties agreed otherwise and decide to allow the interpretation of the treaty to follow modern legal developments [See ILC Commentaries to the Draft Articles on the Law of Treaties [1966] ILC Yrbk 187, paras 16, 242].

binding nature. Nevertheless, the ICJ's view on this point is that 'current standards must be taken into consideration' in the interpretation of treaties.[434] The Court referred to a 'standard', not a legal norm, which is believed to encompass also non-binding norms, principles and other instruments.

The ILA expressly proposes that '[t]reaties and rules of customary international law should be interpreted in the light of principles of sustainable development'.[435] Lowe adds that sustainable development functions as an interstitial norm that is, as a norm operating in the interstices of primary norms when they overlap or conflict.[436]

Therefore, the application of sustainable development to outer space on the level of objective stipulates its function as interpretative tool. It could be applied to space law norms with the effect of stretching the boundaries of primary norms of international space law. The approach suggested by Lowe seems not to allow for the introduction of any qualitative changes in the primary norms of space law, because as a 'concept' or 'objective' and not an independent source of international law sustainable development must respect the normative scope of the current treaty regime and rules of interpretation, without any substantial changes. Treated as an interpretative tool, sustainable development would have to operate within the scope of the existing norms of space law.[437]

Sustainable development does not need to be recognised as a binding norm of international law in order to be used as an interpretative tool. For that reason this interpretative function pertains to the outermost layer of the hierarchical structure of sustainable development – its recognition as an objective of international law.

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[434] *Gabčikovo-Nagymaros Project.*

[435] ILA 2012 Sofia Guiding Statements on the Judicial Elaboration of the 2002 New Delhi Declaration of Principles of International Law Relating to Sustainable Development adopted in RESOLUTION No. 7/2012, para 2.

[436] Vaughan Lowe, 'The Politics of Law-Making: Are the Method and Character of Norm Creation Changing?' in Michael Byers (ed), *The Role of Law in International Politics: Essays in International Relation and International Law* (Oxford University Press 2000), 31. This characteristic of sustainable development also seems to be reaffirmed by Sands [Philippe Sands, 'Treaty, Custom and Coss-fertilization of International Law, in International Law', 49].

[437] Such an approach to the issue of interpretation was confirmed by the Human Rights Committee, Atasoy and Sarkut v Turkey, Communication Nos 1853/2008 and 1854/2008, UN Doc CCPR/C/104/D/1854-1854/2008, 29 March 2012 [7.13] The Court decided that most international human rights treaties are able to accommodate change through time due to their vaguely drafted text, affording considerable leeway to the interpreter. The interpreter cannot pursue a construal of the treaty that qualifies as a revision of the text

## 2. Key principles of space law interpreted in the light of sustainable development

Sustainable development obliges States to 'look afresh'[438] at treaty norms regulating the use and exploration of outer space. To this end, the interpretation of the current norms in the light of inter- and intragenerational equity would be the most immediate consequence of the application of sustainable development. 'The sweeping language and broad scope of many Articles have been often seen as merely stating generalities of such breadth that until specific operative principles are established, any peaceful use of outer space is acceptable.'[439] Sustainable development offers a more specific interpretation of the existing norms and guidance for future developments.

Upon the application of sustainable development different norm will be affected to different degree. The present thesis focuses on a few principles and concepts that are pivotal from the perspective of sustainable development in outer space. The principle of peaceful use and demilitarisation is a precondition for sustainable development in outer space. Freedom of outer space is a key principle that requires reinterpretation in the light of intra- and intergenerational equity. Non-appropriation is a key systemic limitation of the principle of freedom of space, on which the current construction of space law hinges. Equality interpreted in the light of sustainable development could become its important substantive element. The principle of international cooperation and liability would constitute the foundation for the core procedural elements of sustainable development in outer space.

### 2.1.Peaceful use and demilitarisation

Article III of the OST 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 the interest of maintaining international peace and security and promoting international cooperation and understanding'. The subsequent Article establishes the rules on demilitarisation of outer space. It prohibits 'to place in orbit

[438] Sands, P. (2001). Sustainable Development: Treaty, Custom and Coss-fertilization of International Law, in International Law and Sustainable Development: Past Achievements and Future Challenges. In Boyle A. & Freestone D., eds. (2001). *International Law and Sustainable Development: Past Achievements and Future Challenges*. Oxford University Press: New York, 49.

[439] James Edwin Bailey III, 'Current and Future Legal Uses of Direct Broadchast Satellites in International Law' (1985) 45 3 *Louisiana Law Review* 701, 706.

around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, to install such weapons on celestial bodies, or station such weapons in outer space in any other manner.' Although Article IV stipulates that outer space shall be free of nuclear weapons and weapon of mass destruction, it falls short of envisioning its complete demilitarisation. With respect to the Moon and other celestial bodies the same Article forbids 'the establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres'. In addition, Article III of the Moon Agreement provides that '[a]ny threat or use of force or any other hostile act in the moon is prohibited. It is likewise prohibited to use the moon in order to commit any such act or to engage in any such threat in relation to the Earth, the Moon, spacecraft, the personnel of spacecraft or man-made space objects'.

The application of sustainable development will not greatly affect this basic principle of space law. It is important to note that peaceful co-existence is a *conditione sine qua non* of sustainable development in general and of sustainable development in outer space in particular.

### 2.2.Freedom of space

Article I (2) of the OST reads that "[o]uter space, including the Moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies' and '[t]here shall be freedom of scientific investigation ...'.

First of all, the Treaty doesn't define outer space, nor does it even specify its delimitation. Although airspace and outer space are governed by dramatically different legal regimes, namely the regimes of sovereignty and freedom respectively, the boundary between the two has not been clearly defined.

As broadly understood, freedom of space amounts to a set of four specific freedoms relating to space activities: freedom of exploration, freedom of use, freedom of access to all areas of celestial bodies, and freedom of scientific investigation.[440] However, the recognition of these freedoms entails certain obligations and limitations, which are most

[440] OST, Article I.

clearly set out in the principles of non-appropriation, cooperation, equality and provisions for humankind.

From an economic standpoint the freedom principle best secures the competitive advantage of States in possession of technology capable of space use and exploration. But the principle serves them best only as long as few States possess the technology. Once the number of space actors increases, restrictions to the freedom are a desired option, because 'freedom of use' arbitrarily exercised by many can greatly deteriorate the resource. On the other hand, regulations limiting the 'free use of space' at such a late stage, when the space powers have already reaped the benefits of their unrestrained use of space, is likely to meet with the defiance of newcomers who perceive them as a method used by the 'big players' to hinder the competition in outer space, hence as an unjust restraint to their freedoms and rights. Partially for that reason there is a great reluctance to extend the concept of sustainable development to activities taking place in outer space. The interpretation of the space freedoms in the light of sustainable development would have to account for the interests of space powers and space-aspiring States as well as environmental aspects. Sustainable development would strengthen constraints on the freedoms of space, since these constrains reflect the core understanding of sustainable development in outer space and are a key to the viability of outer space as a common resource. More specific aspects of these limitations would have to be worked out through international cooperation. The possibility to exercise the space freedoms by all lies in the limitations of that right. The lack of such limitations engenders equity among nations and among generations.

### 2.3.Equality

The principle of equality is vested in Article 1.2 along with the principle of freedom and constitutes an immediate limitation on the free use of space. The provision of equality seeks to protect the interests of all States and reads that use of outer space shall be conducted on a basis of equality and in accordance with international law.[441] Each State is bound to respect the rights and interests of other States, and this constitutes an important limitation on freedom in outer space. During the drafting process of the OST one of the delegates stated that this provision, along with others,

[441] Ibid., Article I.2.

make[s] clear the intent of the Treaty that outer space and celestial bodies are open not just to the big powers ... but shall be available to all, both now and in the future. This principle is a strong safeguard for the interests of those states which have, at the present time, little or no active space program of their own.[442]

This statement accords well with the interpretation of the equality principle in the light of sustainable development, according to which not only States within the current political configuration are taken into account, but also future generations. The provision for the rights of future generations accounts for the environmental relevance of Article I. Thus, Hacket has argued that when 'space activities result in negative ecological effects directed against the benefit and interest of other States, the State engaged in such an activity will be considered in violation of its obligation under Article I'.[443] The provision clearly seeks to protect human interest in space. But possible environmental damage to the outer space environment can be considered illegal in the context of damage to the interests of other States, also those States who will want to exercise their rights in the future.[444]

### 2.4.Non-appropriation

Another important limitation on the freedom of exploration is embodied in the principle of non-appropriation established in Article II of the OST. The Article reads; 'outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other

[442] Statement by Ambassador Arthur J. Goldberg before General Assembly Committee I, 17 December 1966, quoted in: Paul G. Dembling and Daniel M. Arons, 'The Evolution of The Outer Space Treaty' (1967) 33 *Journal of Air Law and Commerce* 419, 430.

[443] George T. Hacket, *Space Debris and the Corpus Iuris Spatialis* (Marietta Benkö ed, Editions Frontieres 1994), 73.

[444] In the light of this provision, space debris mitigation can be regarded as a precondition for guaranteeing equal opportunities in the exploration and use of outer space in the long term. The increasing amount of space debris not only jeopardises the current interests of space-faring States but may eventually preclude future space exploration and scientific research by underdeveloped States.

means'.[445] Some argue that this principle is the most important legal construction, upon which the whole system of space law hinges.[446]

It is widely accepted that the incorporation of the non-appropriation principle within the system of space law has contributed to peaceful exploration and use of outer space. By prohibiting States from acquiring territorial sovereignty rights over outer space or any of its parts, this principle has prevented outer space from becoming an arena of international conflict. Moreover, its existence has constituted the best guarantee for the realisation of one of the fundamental principles of space law, namely that the exploration and use of outer space should be carried out for the benefit and in the interest of all States, irrespective of their stage of development.[447] Tronchetti regards the non-appropriation principle as a structural norm upon which current space law is built,[448] and states that the system of space law works only if the non-appropriation principle is applied and properly respected; otherwise, the system is likely to collapse with unforeseeable consequences. As a result of these factors, the non-appropriation principle has a legal value and implications that are unique not only in the context of space law but also in the context of public international law proper.[449]

The non-appropriation principle means that no State can unilaterally claim or exercise sovereignty over a part of outer space or a celestial body.[450] There is a wide consensus on this rule. The doctrine, therefore, agrees that the non-appropriation principle forecloses the status of outer space as *res* or *terra nullius* – an unclaimed

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[445] OST, Article II.

[446] See Fabio Tronchetti, 'The Non-Appropriation Principle as a Structural Norm of International Law: A New Way of Interpreting Article II of the Outer Space Treaty' (2008) 33 3 *Air and Space Law*.

[447] Fabio Tronchetti, 'The Non-Appropriation Principle under Attack: Using Article II of the Outer Space Treaty in Its Defence ' IAC-07-E6513 <http://www.iislweb.org/docs/Diederiks2007.pdf> Fabio Tronchetti, 'The Non-Appropriation Principle under Attack: Using Article II of the Outer Space Treaty in Its Defence '

[448] Tronchetti associates the adverb structural with being essential to functioning, and poses the structural norm in between regular customary rule and jus cogens. He proposes the following prerequisites for the structural norm: 1) it must represent the basis of the legal framework, 2) its presence ensures that the other principles constituting such legal framework can operate and fulfil the purpose for which they are set out, 3) there must be a historical and present evidence of the special status of the norm in question, 4) if the structural norm is abolished, the legal system of which such norm constitutes the basis will collapse, 5) its violation generates a special regime of responsibility for the State involved [Fabio Tronchetti, 'The Non-Appropriation Principle under Attack: Using Article II of the Outer Space Treaty in Its Defence '; Fabio Tronchetti, 'The Non-Appropriation Principle as a Structural Norm of International Law: A New Way of Interpreting Article II of the Outer Space Treaty'].

[449] Fabio Tronchetti, 'The Non-Appropriation Principle under Attack: Using Article II of the Outer Space Treaty in Its Defence ', 2.

[450] See Manfred Lachs, *The Law of Outer Space: an experience in contemporary law making*, vol 86 (Sijthoff Publisher 1972)p. 43.

land/space open to acquisition by any State.[451] The principle rather qualifies space as *res* or *terra communis omnium* – a common land/space managed by all States and in the interest of all States. Alternatively, in conjunction with Article VI[452], the principle may be argued to qualify space as *res extra commercium* – a land/space that may not be the object of private rights and which is therefore not susceptible to being traded.[453] Nevertheless there is an ongoing debate on the issue of the possibility of attaining property rights in space.

Unlike the Moon Agreement, where the principle of non-appropriation is directly followed by a principle that clearly prevents the establishment of property rights to the surface or subsurface of the Moon, or to natural resources in place,[454] the non-appropriation principle as vested in the OST makes no direct reference to property rights, and is not followed by a ban on the possibility of their establishment.

As a general norm, the non-appropriation principle is subject to different interpretations. One interpretation of the non-appropriation principle is that it bans State and private appropriation. While Article II OST expressly bans only national appropriation, it is argued that in conjunction with Article VI OST, which introduces State responsibility for its nationals venturing into outer space, it precludes private appropriation, which includes property rights. Article VI obliges States to authorise and supervise activities of all non-governmental entities in outer space. Therefore, following the rule that if the superior entity is banned from the acquisition of the property rights, so is the subordinating entity, which cannot enjoy more rights than the superior one.[455]

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[451] See Fabio Tronchetti, 'The Non-Appropriation Principle under Attack: Using Article II of the Outer Space Treaty in Its Defence '.

[452] Article VI of the OST: 'States Parties to the Treaty shall bear international responsibility for national activities in outer space[…]The activities of non-governmental entities in outer space [...] shall require authorization and continuing supervision by the appropriate State Party to the Treaty'.

[453] The legal status of outer space is debatable. See for example Atsuyo Ito, *Legal Aspects of Satellite Remote Sensing* (Martinus Nijhoff Publishers 2011), p. See *infra* for more details of the debate.

[454] The Moon Agreement, Article 11.3: 'Neither the surface nor the subsurface of the Moon, nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person'.

[455] For example Sters and Tennen affirm that Article II applies to private entities even if they are not expressly mentioned in Article II. According to Article VI of the OST, private entities need State authorization to conduct activities in outer space. Therefore if the State is prohibited from engaging in certain conduct, then it lacks the authority to license its nationals or other entities subject to its jurisdiction to engage in that prohibited activity. [Sters and Tennen, Preliminary jurisprudential observation concerning property rights on the moon and other celestial bodies in the commercial space age, Proceedings of the Colloquium on the Law of Outer Space, 50 (1996)]; Jenks argues that since States bear international responsibility for national activities in space then what is forbidden to a State is not permitted to a chartered company created by a State or to one of its nationals acting as a private

Another interpretation is that the OST non-appropriation refers only to the States and not to private entities. This would enable private enterprise to acquire property rights over excavated resources, and might even license its acquisition of ownership of the excavated territory.[456]

The final approach to the non-appropriation principle stipulates that the OST, while banning national appropriation of space/territory, simply does not regulate the issue of property rights in space. States only retain jurisdiction and control over objects or personnel launched into outer space that are on their registry or constructed on a celestial body.[457] Therefore, while everyone is granted the right to access space and to cooperate in its use and exploration, space as such belongs to no one.

Because the non-appropriation principle is considered to be an obstacle to the exploitation of extraterrestrial resources and an anti-economic barrier to the application of free-market principles, there are many legal proposals arguing the need for amending or abolishing the non-appropriation principle in order to encourage the commercial development of outer space.[458] .[459] There seems to be an incompatibility between the

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adventurer'. There are also historic arguments for inclusion of private entities within the scope of Article II. During the negotiations of the OST, the Delegate of Belgium affirmed that his delegation "had taken note of the interpretation of the non-appropriation advanced by several delegations-apparently without contradiction-as covering both the establishment of sovereignty and the creation of titles to property in private law.' The French Delegate stated that: '…there was reason to be satisfied that three basic principles were affirmed, namely: the prohibition of any claim of sovereignty or property rights in space…' [cited in Fabio Tronchetti, 'The Non-Appropriation Principle under Attack: Using Article II of the Outer Space Treaty in Its Defence ', 3].

[456] Some authors have argued that the private appropriation of outer space and celestial bodies is allowed. For instance, in 1968 Gorove wrote: "Thus, at present an individual acting on his own behalf or on behalf of another individual or private association or an international organisation could lawfully appropriate any parts of outer space…" Nevertheless, now there seems to be an academic consensus on prohibition of private appropriation.

[457] OST, Article VII.

[458] See Baca, Property Rights in Outer Space, 59 J. Air L & Com. 1041 (1993); Reynolds, International Space Law: Into the Twenty-First Century, 25 Vand. J. Transnational Law. 225 (1992); Dasch, Smith & Pierce, Conference on Space Property Rights: Next Steps, in Proceedings of the 42th Colloquium on the Law ff Outer Space, 174 (2000); Smith, Matching Space-Related Intellectual Rights to Industrial Needs, ISU International Symposium, Retrospective of the 1996 Symposium (November 7, 1996). Add more

[459] There is an increasing number of websites where it is possible to buy acres of the lunar and other celestial bodies' surface, with The Lunar Embassy website being the most recognised. However trivial it may look the legal argument supporting these sales is that the OST prohibition on national appropriation in outer space does not apply to individuals. [Lunar Embassy Website at: http://www.lunarembassy]. In 1955 Robert R. Coles, a former chairman of New York's "Hayden Planetarium", started selling lots on the Moon for one dollar per acre - because no one else had claimed the Moon. By June 2000, there were more than 60,000 people holding real estate certificates from the Lunar Embassy, including Hollywood celebrities like Tom Cruise and Harisson Ford and, apparently, two former US presidents - Ronald Reagan and Jimmy Carter [See Virgiliu Pop, 'Lunar Real Estate: Buyer, Beware!' Space Future <http://www.spacefuture.com/archive/lunar_real_estate_buyer_beware.shtml>

workings of national economics (in which property rights occupy a central position) and the aspirational legal regime introduced by the OST.[460]

On the other hand, the non-appropriation principle is widely seen as a condition for the functioning of common spaces and is also stipulated as a requirement within the broader concept of the Common Heritage of Mankind (CHM). From the perspective of sustainable development, the application of the CHM to outer space would probably be the most relevant and desirable tool for achieving inter- and intragenerational equity. Nevertheless, the extension of the CHM to outer space, as well as the ban on property rights in outer space vested in the Moon Agreement, has attracted strong international opposition, not only from the space powers but also from the developing parts of the world. For this reason, the interpretation of the non-appropriation principle as a ban on property rights in outer space could not be an immediate effect of sustainable development in outer space: this would go against the integrative decision-making promoted by the principle of integration. Nevertheless, since sustainable development requires the non-appropriation principle to be interpreted in such a way as to achieve intra- and intergenerational equity, the balancing of interests could for example be addressed outside the scope of the principle of non-appropriation. Since property rights tend to serve the accumulation of wealth that deepens the socioeconomic divide, the international community could agree on the introduction of some other redistributive mechanisms that would help to balance the interests of States actively taking part in space use against the interests of those lacking that capacity. The issue could for example be addressed within the concept of common benefit.[461]

However the non-appropriation principle is ultimately interpreted, the process of change should be carefully handled and allowed to undergo a gradual evolution to prevent a structural collapse of the system.[462]

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[460] Some argue that a solution to the issue of property rights in outer space would be a licensing system based on one functioning for the GEO orbit. The licensing system, although do not allow for rights to orbital slots works. Nevertheless this sector does not need the property rights since the main profit derives from the services. The situation is different with mining for example. Mining resource means that primary benefit for the mining company derives from selling these minerals. With this respect the property right are perceived by business as crucial. To some extent it is understood because the change.

[461] See Chapter I (3.3).

[462] See Fabio Tronchetti, 'The Non-Appropriation Principle as a Structural Norm of International Law: A New Way of Interpreting Article II of the Outer Space Treaty'.

### 2.5.International cooperation

Article IX of the OST provides legal basis for international cooperation in outer space. It specifies the rules of international cooperation and provides that: 'In the exploration and use of outer space, including the Moon and other celestial bodies, States Parties to the Treaty shall be guided by the principle of cooperation and mutual assistance and shall conduct all their activities in outer space […] with due regard to the corresponding interests of all other States Parties to the Treaty.

The term 'international cooperation' is also a running thread of the OST and the space treaties that are its offshoots. It facilitates many activities that take place in outer space. In regard to scientific investigation, Article I, paragraph 3 of the OST establishes that 'States shall facilitate and encourage cooperation in such investigation.' Article III states that States Parties 'shall carry on activities […] promoting international cooperation and understanding'. Articles X and XI start with the phrase 'in order to promote international cooperation.'

Article IX of the OST further protects the interests of all States in outer space. It creates an obligation for States to cooperate and assist each other while undertaking space activities. It also requires that parties pursue all activities in outer space with due regard to the corresponding interests of other States. Furthermore, it provides for a procedural instrument – the duty to consult – that gives a State whose interests may be harmed the possibility of legal intervention against the otherwise sovereign activities of another State.

International cooperation is crucial for the achievement of sustainable development. It represents core procedural aspect of sustainable development in outer space. The application of sustainable development would force an interpretation of the principle of cooperation that includes not only States currently engaged in the exploration and use of space but also States that may attain the technological capacity to do so in the future. Since such cooperation would be directed towards the use and exploration of outer space, the duty to cooperate between States that are technology holders and those that are not would have to link cooperation to capacity building of space-aspiring States, for example by means of technology transfer, technological assistance or sharing of know-how.

### 2.6.International Responsibility and liability

Pursuant to Article VI of the OST, States bear international responsibility for all national activities in outer space. States not only have to comply with the existing rules while conducting their own activities, but they also need to ensure, authorise and control all national activities, including those performed by the private sector. Hence, in regard to the attribution of conduct to a State, the regime of international responsibility stipulated by the OST is more stringent than the general rules proposed by the International Law Commission.[463]

State responsibility is directly linked to liability for damages. The Liability Convention elaborates on the liability regime established by Article VII of the OST that holds States liable for damage. From the perspective of sustainable development an important change in space law, including the Liability Convention, was the emergence of a wide consensus that exclusion of the issue of space debris – the single most significant human-made direct threat to space-based systems – from the legal scope of the treaties would run against their stated object and purpose of enabling peaceful use and exploration of outer space. The inclusion of space debris within the scope of the term 'space object'[464] allowed States to be held liable for damage caused by space debris. However, despite being an important change, this had little effect on the proliferation of space debris, since the Liability Convention operates on the assumption that it is possible to identify a launching State, whereas in reality that is not the case. First, the probability of damage caused by space debris on the surface of the Earth is very low. Second, while damage in outer space is much more common / probable, it is more likely to be caused by debris that is too small to be tracked than by a catalogued object.[465] Even if the launching state were identified, proving fault under the Liability Convention would be very challenging. Collisions in outer space are driven by the laws of physics but involve a degree of randomness due to (largely) unpredictable space

[463] Draft Articles on Responsibility of States for Internationally Wrongful Acts (International Law Commission, 2001), found at: <http://untreaty.un.org/ilc/texts/instruments/english/commentaries/9_6_2001.pdf>, Chapter II.

[464] Liability Convention, Article I(d), provides: 'the term "space object" includes component parts of a space object as well as its launch vehicle and parts thereof.' After years of debate on the subject a consensus seems to have been reached that 'space debris, by nature, constitutes space objects and space law therefore applies to it [European Centre for Space Law, 'Analysis of Legal Aspects of Space Debris', in: K.-H. Böckstiegel, M. Benkö and S. Hobe (eds.), *Space Law: Basic Legal Documents,* vol. 1 (Eleven International Publishing, 2002), 4].

[465] On the size of space debris population size, see Chapter G(2.1.1).

weather phenomena and other factors. As a result, years after a launch it might be nearly impossible to establish who is at fault. The upshot is that the Liability Convention has no deterrent effect against excessive space debris creation. For the time being, it seems that States simply assume the financial risks are tolerable.[466]

A more efficient way to address the issue of space debris would be to include damage to the space environment under the liability regime.[467] However, this cannot be performed on the level of objective, since the interpretation of the norms in the light of sustainable development needs to respect the scope of primary norms, and the introduction of tools linked to the environment clearly overstep the boundaries. On the level of objective, the issue of space debris would rather be addressed through the sustainable-development-oriented interpretation of the principles of equality, common benefit, and mankind provisions, or through a similarly oriented definition of 'purpose and object of a treaty'. In such a case irresponsible proliferation of space debris would need to be viewed as contrary to those principles and concepts.

### 2.7.Protection of outer space - Article IX of the OST

Article IX provides a general basis for any legal debate concerning protection of the outer space environment. It reads that States 'shall pursue studies of outer space, including the Moon and other celestial bodies, and conduct exploration *of them* so as to avoid *their* harmful contamination and also adverse changes in the environment of the Earth' (emphasis added).[468] On a literal interpretation of the provision, a reasonable inference is that harmful contamination of outer space must be avoided. However, according to legal doctrine this inference is not necessarily warranted. First, the provision refers to contamination of the Earth's environment (historical interpretation); second, it does not refer to the protection of the space environment *per se* but to contamination linked to the protection of the interests of States; and finally, that it is not possible to assume that space debris constitutes 'harmful contamination' when both

[466] 'Every one intervenes at his own risk. This risk is accepted as a consequence of space activity' [Armel Kerrest, 'Space debris, remarks on current legal issues', 871].

[467] Henri A. Wassenbergh, *Principles of Outer Space Law in Hindsight* (Kluwer Academic Publishers 1991), 68.

[468] OST, Article IX.

components of the concept, i.e. 'contamination' and 'harmfulness' are not clearly defined.[469]

The first shortcoming appears when due to general wording one resorts to supplementary means of interpretation as provided by the VCLT[470] Tools provided by Article 32, i.e. the 'preparatory work' and 'the circumstances of conclusion'[471] that allow for the historical context of treaty conclusions to be taken into account in clarifying ambiguities. However, as previously argued, in the case of the body of space law, which is directed towards future developments, this historical kind of interpretation is clearly not relevant,[472] since it tends to stiffen the rules and strip the provisions of their important anticipatory role. As Cheng put it, 'international law is a truly living law which can shift in content from day to day in order to meet ... the challenge arising from man's venture into new frontiers'.[473]

The second shortcoming refers to the interpretation that Article IX's primarily role is to protect the interest of States, not the space environment. It has long been argued that the purpose of the provision was never to protect the outer space environment for its own sake but rather to preserve space for scientific experimentation.[474] On this point, sustainable development would allow for the redefinition of the 'interest of State' so that it includes environmental aspects of outer space from the anthropocentric perspective. For example the pollution of Earth's orbital space with space debris is clearly an environmental issue. It is often argued, however, that space debris as such is not included in the scope of Article IX. What is included, however, is the threat to human activity in outer space posed by the proliferation of space debris. For example, if a low Earth orbit came to be cluttered with space debris, space venturing might become

[469] Claudia Cinelli and Katarzyna Pogorzelska, 'The Current International Legal Setting for the Protection of the Outer Space Environment: The Precautionary Principle Avant la Lettre' (2013) 22 2 *Review of European Community & International Environmental Law* 186, 192.

[470] VCLT, Article 32.

[471] Ibid.

[472] The intensions of the negotiating Parties were to use general, framing provisions capable of encompassing future developments [Nandasiri Jasentuliyana, 'Space debris and Internationl Law', 141]. It should also be noted that '[a] treaty, as a source of international law, can be used as an instrument of anticipatory legal regulation of future types of activities or future situations which do not exist at the moment of the conclusion of a treaty' [Vladlen S. Vereshchetin and Gennady M. Danilenko, 'Custom as a source of International Law of Outer Space' (1985) 13 1ibid. 22, 23].

[473] Bin Cheng, *Studies in International Space Law*, 680.

[474] Cf. Howard A. Baker, *Space Debris: Legal and Policy Implications* (Martinus Nijhoff 1989). He argues however that environmental approach should be a priority [Howard A. Baker, 'Protection of the Outer Space Environment: history and analysis of Article IX of the Outer Space Treaty' (1987) XII *Annals of Air and Space Law* 143, 163].

impossible.[475] This could be inconsistent with the object and purpose of existing law on outer space, which is to enable space activities. The application of sustainable development would strengthen this line of argument, especially with respect to States that are not presently capable of space exploration. The inclusion of the interests of future actors in the space domain would be an immediate interpretative benefit of the application of sustainable development. A more environmental approach to Article IX OST would be rather allowed on the level of the principle of integration since an environmental protection detached from interest of States goes beyond the scope of the norm.

[475] See Chapter G(2.1.1).

## G. APPLICATION OF SUSTAINABLE DEVELOPMENT TO OUTER SPACE ON THE SECOND LEVEL OF CONCEPTUALISATION – SUSTAINABLE DEVELOPMENT AS A BINDING NORM AS ASSURED BY THE PRINCIPLE OF INTEGRATION

### 1. General remarks

The reconciliation of the norms of space law with other relevant instruments of international law upon the application of the principle of integration goes step further than the interpretative role of sustainable development. While interpretation cannot pursue a construal of the treaty that qualifies as a revision of the text[476], but rather stretch the boundaries of the primary norms towards inter- and intragenerational equity, the principle of integration would allow for substantive and procedural changes that stay in accordance with the purpose and object of space treaties.

This because in the light of the proposed hierarchical approach to sustainable development the binding character of sustainable development is assured by the principle of integration that constitutes a legal source as a general principle of international law. Therefore new legal quality carried by sustainable development can be absorbed by space law in light of the principle of integration.

### 2. Substantive scope of the principle of integration in outer space

The principle of integration requires that '[i]n order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it'.[477]

The primary consequence of the principle of integration in outer space would be an obligation to take into account carefully consider and balance environmental concerns while venturing into space in order to address the intergenerational aspect of sustainable development. The aspect of intragenerational equity presupposes that the process of environmental integration needs to be done in a just way that takes into account special

[476] The Human Rights Committee, Atasoy and Sarkut v Turkey, Communication Nos 1853/2008 and 1854/2008, UN Doc CCPR/C/104/D/1854-1854/2008, 29 March 2012 [7.13]

[477] Rio Declaration, Principle IV.

developmental needs of poor countries.[478] Therefore, inter- and intragenerational equity are two objectives that outline substantive scope of the principle of integration.

### 2.1. Intergenerational equity

The intergenerational equity is inherent to sustainable development presupposes protection of the environment so future generations could 'meet their own needs'.[479] Protection of outer space in order to allow future generations to benefit from space constitutes substantive scope of the principle of integration in outer space. The challenge, in terms of integration of the protection of the space environment into a process of space use and exploration, is to engineer a balance between unrestrained exploitation and overbearing protection.[480]

Despite looking far-fetched, environmental protection of outer space *per se* allows for more just utilisation of space and more equitable sharing of space benefits especially from the intergenerational perspective. Even an approach directed purely towards the environmental ends will ultimately benefit humans, not only the idealistic environment. But unlike the approach directed towards the protection of interests, it automatically takes into account intergenerational aspect of space utilisation therefore interests of those who, currently do not own technology to exercise their right to utilise outer space.

There are two general issues that need to be taken into account when one considers protection of outer space: proliferation of space debris in Earth orbital space and planetary protection[481] with space debris constituting already single most significant environmental problem in outer space. Nevertheless, currently those two issues are not treated as environmental issues by the international space law and are largely overlooked by the general environmental law. Space debris are not approached as environmental pollution but as a threat/damage to the technology and is potentially handled within the context of a damage to the property under the Liability Convention.

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[478] 'The special situation and needs of developing countries, particularly the least developed and those most environmentally vulnerable, shall be given special priority. International actions in the field of environment and development should also address the interests and needs of all countries' [Princile 6 Rio Declaration].

[479] The Brundtland Report, para 27.

[480] Mark Williamson, 'Space ethics and protection of the space environment' (2003) 19 *Space Policy* 47, 48.

[481] There are other aspects linked to the environment of outer space, for example those gathered under the umbrella of 'space weather'. Space weather however does not regard the protection of the environment of outer space but protection of space assets against the harsh environment of outer space.

As for planetary protection, the concept does not refer to environmental protection of other celestial bodies but to the preservation of celestial bodies for the scientific purposes and preservation of scientific areas.[482]

### 2.1.1. Problem of space debris in the Earth's orbital space

#### *2.1.1.1.Proliferation of space debris*

On 4 October 1957 the first satellite Sputnik 1 was launched.[483] Along with it in orbit remained the final stage of the rocket that launched it, protective shroud enclosing the satellite during the ascent through the atmosphere, the mating adaptor releasing the satellite and probably other small debris being a result of the pyrotechnic release stages.[484] And so was born the first space debris. Space debris can be defined as 'all man-made objects, including fragments and elements thereof, in Earth orbit or re-entering the atmosphere, that are non-functional.'[485] Since the dawn of space era the space-faring states operated under what is called the 'theory of big sky'. The theory assumes that space is so vast that leaving there mission waste cannot cause any harm due to the negligible likelihood of collision with it. Moreover, all the pieces of waste will eventually burn up upon re-entering Earth's atmosphere. Therefore a *laissez-faire* approach to space use and exploration became widely accepted.[486] As it turned out, everything that humans have launched high enough into space above the last traces of Earth's atmosphere, has stayed in orbit, and probably will stay there for thousands or

[482] For the analysis of planetary protection in space law see for example John D. Rummel, 'Planetary protection policy overview and application to future missions' (1989) 9 6 *Advances in Space Research* 181. For possible further developments including ethical considerations for planetary protection see for example John D. Rummel, M.S. Race and G. Horneck, 'Ethical Considerations for Planetary Protection in Space Exploration: A Workshop' (2012) 12 11 *Astrobiology* 1017.

[483] Sputnik 1 was a steel, bowl-shaped satellite of 58 cm in diameter and 83.6 kg. The satellite travelled at about 29,000 km per hour, taking 96.2 minutes to complete each orbit. For 22 days it transmitted a "beep" signal. It burned up on 4 January 1958 upon reentering Earth's atmosphere, after travelling about 60 million km ((*Enciclopaedia Britannica Online: Academic Edition*) <http://www.britannica.co.uk/> accessed 19 July 2012).

[484] See SpaceAcademy, 'A Guide to Orbital Space Debris' (*Space Academy*) <http://www.spaceacademy.net.au> . More on satellite installation and launch vehicles see Gérard Maral and Michael Bousquet, *Satellite Communication Systems. Systems, Techniques and Technologies* (5th edn, John Wiley & Sons Ltd. 2009), p. 607.

[485] United Nations General Assembly, Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space (UN Doc. A/62/20, 22 December 2007), Annex ('Space Debris Mitigation Guidelines'), at Section 1.

[486] Mark Williamson, 'A pragmatic Approach to the 'Harmful Contamination' Concept in Art. IX of the Outer Space Treaty' (5th Eilene M Galloway Symposium on Critical Issues in Space Law Art IX of the Outer Space Treaty and Peaceful Purposes: Issues and Implementation, 2010), 7.

maybe millions of years. Eventually, whether a month or a millennium after launch, a space object, either a satellite or debris, will hit one of the millions of other objects orbiting Earth generating new debris. Such a scenario was predicted by Donald Kessler who in 1979 provide an analysis suggesting that before decaying, space objects would likely collide on orbit creating more debris eventually resulting in a belt of debris encircling the Earth. Such a situation would lead to cluttering or even clogging of space, preventing its further use (known as the 'Kessler syndrome').[487] The destructive potential of even the smallest debris particle derives from the fact that relative impact velocities in orbits are very high. In low Earth orbit, the average impact speed of orbital debris with another space object will be approximately 10 km/s and will involve enormous energy.[488]

Outer space may seem to be infinite from the present human perspective, but the part of near-Earth orbital space that is actually used is a scarce good; highly valuable and very crowded. The most useful Earth orbits include low Earth orbits (LEO),[489] and the geostationary orbit (GEO).[490] Some satellites require low orbits in order to provide services. For example Earth observation and reconnaissance services depend on high-resolution images of the Earth therefore the satellites providing for them must be close to the surface of the Earth. LEO is also used for personal communication services and intelligence satellites. A special type of LEO is a polar orbit. It allows a satellite for flying twice a day over any single point of the Earth. Appropriately inclined polar orbit can be Sun-synchronous, which characteristic is important for imaginary satellites since

[487] Cf. David J. Kessler and Burton G. Cour-Palais, 'Collision frequency of artificial satellites: the creation of a debris belt' (1978) 83 *Journal of Geophysical Research* 2637, 2637. The authors demonstrated a direct correlation between the growing number of objects in orbit and the number of collisions between such objects. Through mathematical modelling, they portended that 'the debris flux will increase exponentially with time' even without any new launches. Ibid., 2645.

[488] See NASA, 'Chinese Anti-satellite Test'. For the physics of orbital speed, see D. Wright, L. Grego and L. Gronlund, *The Physics of Space Security: A Reference Manual* (American Academy of Arts and Sciences, 2005), found at: <http://www.amacad.org/publications/Physics_of_Space_Security.pdf>, 20.

[489] LEO stretch from around 100 km above the surface of Earth till 2,000 km but the operable zone is practically between 200 and 1,000 km. Below 200 km the air drag is too forceful and above 1,000 there is large amount of radiation (the inner Van Allen belt). For the characteristics of the LEO s*ee* David Wright, Laura Grego and Lisbeth Gronlund, 'The Physics of Space Security: A Reference Manual' <http://www.amacad.org/publications/Physics_of_Space_Security.pdf> accessed 15 May 2010, at 40 et seq.

[490] The geostationary orbit has a period equal to the Earth's rotation period. It is a circular orbit at an altitude of 35,786 km in the equatorial plane. See David Wright, Laura Grego and Lisbeth Gronlund, 'The Physics of Space Security: A Reference Manual', 43.

it allows for the same angle of incidence of sunlight over a given point on the Earth.[491] The GEO orbit is widely used by communications satellites because a satellite there stays in a fixed position relative to a reference point on the ground. It allows for constant, real-time data transfer from a satellite over a wide geographical area with no necessity of using tracking equipment to receive signals.[492] The aforementioned obits are already polluted with space debris. There are five main sources of space debris: fragmentation debris,[493] non-functional spacecraft (payloads),[494] mission-related debris,[495] rocket bodies and debris of unknown origin.

[491] David Wright, Laura Grego and Lisbeth Gronlund, 'The Physics of Space Security: A Reference Manual', 44.

[492] David Wright, Laura Grego and Lisbeth Gronlund, 'The Physics of Space Security: A Reference Manual', 43.

[493] Fragmentation debris, which accounts for nearly 60% of all catalogued space debris, originates from intentional or accidental on-orbit break-ups, which include collisions, explosions or product deterioration (spacecraft degradation). **Breakups** are destructive events that generate clouds of smaller pieces with a wide range of initial velocities, therefore various orbital parameters [National Research Council, Committee on Space Debris, *Orbital Debris: A Technical Assessment* (National Academy Press, 1995), 25]. The first wake-up call after the Kessler's publication was the accidental collision between debris from an Ariane rocket stage and the Cerise microsatellite on 24 July 1996 [See NASA, 'First Natural Collision Of Cataloged Earth Satellites'' (1996) 1 2 *Orbital Debris Quarterly News*]. The next accidental collision occurred over a decade later. On 10 February 2009 Iridium 33, a US operational communications satellite collided with Cosmos 2251, a Russian decommissioned communications satellite accidental hypervelocity collision of two intact spacecraft that occurred on 10 February 2009 mobilised the international community to undertake regulatory contributing heavily to long-lived space debris population. The two satellites collided over Siberia at altitude of 790km contributing heavily to long-lived space debris population [see NASA JSC, 'Satellite Collision Leaves Significant Debris Clouds' (2009) 13ibid.]. As for 27 July 2012, there are 1 883 pieces of debris generated by this collision remaining on the orbits (318 decayed) [Celestrak, 'Satellite Catalog (SATCAT)' (*Celestrak*) <http://celestrak.com/satcat/search.asp> accessed 19 July 2012].

**Intentional collisions** refer mostly to anti-satellite tests (ASAT). Single Chinese anti-satellite test on 11 January 2007 created so far the biggest amount of space debris. The target of the test was an old Chinese meteorological spacecraft, Fengyun-1C [NASA JSC, 'Chinese Anti-satellite Test Creates Most Severe Orbital Debris Cloud in History' (2007) 11 2 *Orbital Debris Quarterly News*]. The Chinese ASAT test took place at the altitude of ~850km. It is responsible for 3 059 catalogued debris (269 decayed) [Celestrak, 'Satellite Catalog (SATCAT)'Celestrak, 'Satellite Catalog (SATCAT)'Celestrak, 'Satellite Catalog (SATCAT)'Celestrak, 'Satellite Catalog (SATCAT)'Celestrak, 'Satellite Catalog (SATCAT)'Celestrak, 'Satellite Catalog (SATCAT)'Celestrak, 'Satellite Catalog (SATCAT)'Celestrak, 'Satellite Catalog (SATCAT)'Celestrak, 'Satellite Catalog (SATCAT)'Celestrak, 'Satellite Catalog (SATCAT)'Celestrak, 'Satellite Catalog (SATCAT)'Celestrak, 'Satellite Catalog (SATCAT)'Celestrak, 'Satellite Catalog (SATCAT)'Celestrak, 'Satellite Catalog (SATCAT)'Celestrak, 'Satellite Catalog (SATCAT)'CelestrakCelestrakCelestrakCelestrakCelestrakCelestrakCelestrakCelestrak, 'Satellite Catalog (SATCAT)', http://celestrak.com/satcat/search.asp].

**Explosions** usually involve upper stages of the launching vehicles or their components that operated successfully but were abandoned after completing a delivery mission. Accidental explosions can also be caused by malfunctioning propulsion systems, overcharged batteries or explosive charges [UNCOPUOS, A Technical Report on Space Debris, A/AC.105/720 (1999). Recently reported large explosion in orbit happened on the 3 February 2015. A 20-year-old military weather satellite apparently exploded in orbit Feb. 3 following what the U.S. Air Force described as a sudden temperature spike. It produced 43 pieces of space debris, according to Air Force Space Command [http://www.space.com/28709-military-weather-satellite-explodes-photo.html?cmpid=514630_20150303_41390856&adbid=10152671429011466&adbpl=fb&adbpr=17610706465].

Presently, space debris constitutes about 93% of the catalogued space objects. NASA indicates that there are 1,149 active satellites on orbits as of 21 January 2013.[496] At the same time there is ~22,000 orbital debris larger than 10 cm known to exist, out of which ~16,000 are catalogued pieces. The estimated population of particles between 1 and 10 cm in diameter is ~500,000. The number of particles between 1 mm and 1 cm is bigger than 100,000,000.[497]

The problem was recognised by the international community after publishing by the UNCOPUOS of the Technical Report on Space Debris in 1999.[498] However, seriousness of the problem was realised only after few wake-up calls taking form of on-orbit collisions, especially the one in 2009 between Cosmos and Iridium satellites.[499] The collisions exposed human dependence on space-based systems on one hand and

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**Product deterioration** is another source of fragmentation debris. Parts of the spacecraft are detaching from it and become space debris. Examples are thermal blankets, protective shields, parts of solar panels and paint flakes. Deterioration of spacecraft is mostly the result of the harsh space environment, especially the phenomena such as thermal cycling, atomic oxygen, energetic plasma beam or solar radiation [

[494] These are the spacecraft that are intact structures, which have completed their mission, or due to non-destructive malfunction discontinued operating [The 1.47-kg Vanguard 1 remains the oldest non-functional spacecraft in orbit. It was launched by the U.S. in 1958, and stopped working in 1964. It resides in an elliptical orbit of 650 km by 3,865 km with decay of ~ 240 years [ Committee on Space Debris National Research Council, (Orbital Debris: A Technical Assessment, 1995) 22].

[495] Mission related debris is objects related to the functional operation of the satellite itself. This sub-section encompasses, for example, explosive bolts, vehicle shrouds and lids that covered telescopes or other fragile equipment. This debris was satellite parts, which were necessary to perform the satellite mission, and to operate the instruments on the satellite. It also comprises all other man-made objects and equipment resulting from a space flight. Examples are exhaust products from solid rocket motors, leaking fuel or coolant droplets. The amount of released mission-related debris can be quite large. For example, 200 pieces of mission related space debris were linked to the Russian space station Mir during its first eight years of operation. Most of the mission related debris was dumped intentionally, but there are also examples of astronauts who lost items during Extra-Vehicular Activity (EVA). The sub-section "mission related debris" is accountable for over 14 percent of the total traceable space debris population [Belk et al., 1997]

Specific example of mission-related debris are *Westford needles. Westford Project* was a project of the U.S. Department of Defense with three launches between 1962 and 1963 480 million of tiny copper needles were deliberately released in an attempt to lay a radio-reflective ring around the Earth in order to ensure far-distance communication in case when the two possible at the time ways of communication failed, i.e. when the undersea communication cables were destroyed and unpredictable natural ionosphere could not "bounce off" a signal. Despite its technical success, the ultimate goal behind the *Westford Project* was never attained due to upcoming development of communication systems. The experiment was greatly criticized by astronomers who feared optical and radio pollution. Now the needles contribute to the space debris problem with still new needle populations being discovered.

[496] See <http://celestrak.com/satcat/boxscore.asp>.

[497] See NASA, 'Orbital Debris Program Office', found at: <http://orbitaldebris.jsc.nasa.gov/faqs.html>. For the number of the catalogued debris, see <http://celestrak.com/satcat/boxscore.asp>.

[498] A Technical Report on Space Debris of the Committee on the Peaceful Uses of outer space (UNCOPUOS, UN A/AC.105/720, 1999). An important publication preceding the Report was C.A. Belk *et al*., *Meteoroids and Orbital Debris: Effects on Spacecraft* (NASA Reference Publication 1408, 1997).

[499] Most important being a collision from 2009: cosmos-iridium and ASAT test 2007[see infra, n.x]

vulnerability of these systems to the increasing population of space debris, on the other one.

*2.1.1.2.Space debris and damage to the environment*

The growing population of space debris translates into the growing threat of collision with functional satellites, the International Space Station or an astronaut[500], as well as people and property on Earth upon re-entry. Apart from civil damage the harmful impact of space debris can be viewed from the perspective of damage to the terrestrial environment or the environment of outer space. With respect to the terrestrial environment damage can be indirect and direct. The indirect impact encompasses the harm to the space-based systems that are vital for environmental management on the Earth. The axis of the problem here is that the proliferation of pace debris translates into the exponentially rising risk of collision with the functioning satellites.[501] In this case damage to the systems translates into the potential damage to the terrestrial environment resulting from ineffective environmental management.

The direct damage to the terrestrial environment can occur upon the re-entry of debris into the Earth's atmosphere, especially with respect to the debris with nuclear power sources. There is also a possibility that aluminium slag and aluminium oxide dust generated as combustion products by motors integrated in spacecrafts, can have harmful impact on the near-Earth environment of outer space. In this case the IAA pointed to the fact that it is possible that such alternations to the environment of outer space can have harmful impact on the environment of Earth.[502]

Space debris, however, while remaining an indirect and potential threat to the terrestrial environment already constitute *de facto* damage to outer space.

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[500] United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS), A Technical Report on Space Debris (UN Doc. A/AC.105/720, 1999) ('UNCOPUOS, Technical Report'), at 14-17; UNCOPUOS, Towards Long-term Sustainability of Space Activities: Overcoming the Challenges of Space Debris. A Report of the International Interdisciplinary Congress on Space Debris, (UN Doc. A/AC.105/C.I/2011/CRP.14, 3 February 2011) ('UNCOPUOS, Towards Long-term Sustainability'), at 20-21; C.A. Belk *et al.*, *Meteoroids and Orbital Debris: Effects on Spacecraft* (NASA, 1997).

[501] United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS), A Technical Report on Space Debris (UN Doc. A/AC.105/720, 1999) ('UNCOPUOS, Technical Report'), at 14-17; UNCOPUOS, Towards Long-term Sustainability of Space Activities: Overcoming the Challenges of Space Debris. A Report of the International Interdisciplinary Congress on Space Debris, (UN Doc. A/AC.105/C.I/2011/CRP.14, 3 February 2011) ('UNCOPUOS, Towards Long-term Sustainability'), at 20-21; C.A. Belk *et al.*, *Meteoroids and Orbital Debris: Effects on Spacecraft* (NASA, 1997).

[502] IAA, (Position Paper on Space Debris Mitigation: Implementing Zero Debris Creation Zones, 2006), p. 13.

### 2.1.2. Planetary Protection

Planetary protection is grounded in Article IX OST[503] that seeks to protect the environment of the Earth and celestial bodies from contamination with non-indigenous matter. It has been accepted that Article IX OST obliges States to avoid contamination of planetary environments by biological contaminants or terrestrial microbes that could compromise current or future scientific investigations particularly those searching for indigenous life (forward contamination); second to avoid contamination of the Earth's biosphere by introducing, for example, unknown forms of life which could possibly be toxic or infectious for life on Earth (backward contamination).[504] The following Planetary Protection Policy (PPP) of the Committee on Space Research (COSPAR) promulgated and specified the issue in order to guide compliance with the wording of the OST and other relevant international agreements.[505] NASA, ESA and other space agencies have accepted their own policies and procedures based on the COSPAR PPP.[506]

The Moon Agreement elaborates further on the issue of balance of the extra-terrestrial environments. It stipulates that States 'shall take measures to prevent the disruption of the existing balance […], whether by introducing adverse changes in that environment, by its harmful contamination through the introduction of extra-

[503] 'Treaty. States Parties to the Treaty shall pursue studies of outer space, including the Moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter and, where necessary, shall adopt appropriate measures for this purpose.'

[504] G.S. Robinson, 'Article IX of the Outer Space Treaty: Extraterrestrial Back Contamination, the U.S. Constitution, and the "Politics" of U.S. Regulatory Authority' (5th Eilene M Galloway Symposium on Critical Issues in Space Law Art IX of the Outer Space Treaty and Peaceful Purposes: Issues and Implementation, Washington, D.C., 2010), at 3ff. On forward and backward contamination see, for example, H. Qizhi, 'Space Law and the Environment', in: N. Jasentuliyana (ed.), *Space Law: Development and Scope* (Praeger Publishers, 1992), 158, at 161.

[505] COSPAR Planetary Protection Policy (20 October 2002; amended 24 March 2005), online: < https:// cosparhq.cnes.fr/sites/default/files/pppolicy.pdf>. Internationally, technical aspects of planetary protection are developed through deliberations by COSPAR, part of the International Council for Science (ICSU), which consults with the UN in this area. The COSPAR Panel on Planetary Protection develops and makes recommendations on planetary protection policy to COSPAR, which may adopt them as part of the official COSPAR Planetary Protection Policy.

[506] **NASA** documents related to planetary protection: Policy Directive 8020.7: 'Biological Contamination Control for Outbound and Inbound Planetary Spacecraft', Procedural Requirements 8020.12: 'Planetary Protection Provisions for Robotic Extraterrestrial Missions'. **ESA** related documents: ESSB-ST-U-001 (Issue 1): 'ESA planetary protection requirements', ECSS-Q-ST-70-53C: 'Material and hardware compatibility tests for sterilization processes', ECSS-Q-ST-70-55C: 'Microbial examination of flight hardware and cleanrooms', ECSS-Q-ST-70-56C: 'Vapour phase bioburden reduction for flight hardware', ECSS-Q-ST-70-57C: 'Dry heat bioburden reduction for flight hardware', ECSS-Q-ST-70-58C: 'Bioburden control of cleanrooms'.

environmental matter or otherwise. States Parties shall also take measures to avoid harmfully affecting the environment of the Earth through the introduction of extraterrestrial matter or otherwise.'

The planetary protection procedures, as followed now, do not reflect environmental values and motivation but rather the unknown nature of the space environment and the desire of the scientific community to preserve the pristine nature of celestial bodies for the scientific purposes.[507]

### 2.2. Intragenerational equity in outer space

Intragenerational equity, i.e. equity among nations, constitutes another substantive element of the principle of integration and accounts for second level of balancing presupposed by the principle of integration. Intragenerational equity in outer space is a part of a larger international picture. In general, the growing dependence on new space technologies became problematic for underdeveloped States. Their economies have neither the capital nor the industrial infrastructure to support their own satellite systems or take active role in emerging new type of space activities. Such a situation leaves the countries without space technology vulnerable to spacefaring States' economic and political power, and raises questions about the developing countries ability to maintain any semblance of political and economic sovereignty or cultural integrity.[508] Häusler and Simonis signal that Third World countries' failure to adjust to new space technologies will continue the cycle of underdevelopment and political and economic subservience.[509] Soroos adds that the growing legal, political and economic challenges generated for the global community by new space technologies cannot be solved by the usual policy approaches based purely on technical or engineering models of economics.[510]

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[507] The sole reason for the protection of the environments of other celestial bodies was the preservation of scientific opportunities Luca Codignola and others, *Humans in Outer Space - Interdisciplinary Odysseys*, 188.

[508] Kim Alaine Rathman, 'Sharing the harvest of the skies: outer space commercialization and third world development' (1998) 3 4 *Society for Philosophy and Technology*.

[509] See Jurgen Häusler and Georg Simonis., 'Underdevelopment via satellite: The interests of the German space industry in developing countries and their consequences' in James Katz (ed), *People in space: Policy perspectives for a "Star Wars" century,* (Transaction Books 1985),

[510] Marvin S. Soroos, 'Global commons, telecommunications, and international space policy' in Daniel Papp and John McIntyre (eds), *International space policy: Legal, economic, and strategic options for the twentieth century and beyond* (Quorum Books 1987), 111.

On the legal grounds the necessity of the inclusion of ethics and moral paradigms to this issue has been signalled by many. Although theoretically equal, States vary with degree of capacity and capability to take part in use of space. Space law does not acknowledge for this fact what eventually strongly favours spacefaring States with technology.

Yet Cocca argues that space law was created as *jus humanitatis.*[511] Indeed, space law goes a step further in its general rhetoric than promoting ideological Westphalian equality of sovereign States. It draws a general framework capable to guide the necessary development of space law towards intragenerational equity. Mankind provisions along with the non-appropriation principle, equality, and international cooperation conceptually and legally enable the use of outer space as a common space by the community of States and for the common benefit.[512] Especially in the light of the mankind provisions the provisions of space law constitute coherent theoretical unity directed towards intra- and intergenerational equity.

Nevertheless the mankind provisions has often been argued to be aspirational without real legal weight. Neither practice has seemed to stand up to the words used in the OST. The policy of 'first come, first served' had been accepted and followed since the beginning of space exploration. The application of the principle of integration to space law could fill the gap between the laid down general rules and practice in a way to direct the practice towards intragenerational equity.

### 2.2.1. Benefit sharing: conflicting perspectives

In many aspects, therefore, the notion of common benefit is central to the issue of intragenerational equity in outer space. Nevertheless there are conflicting understandings of fairness and equity in the distribution of property and entitlement to benefits sharing in outer space that have their origins in the differing cultural values of the underdeveloped and developed nations. The problem of sharing benefits derived from common spaces is a part of a bigger issue dealt within the framework of sustainable development. The debate has been a long one. Underdeveloped countries demand for equitable sharing and access to a common resource whereas developed

[511] Aldo Armando Cocca, 'The Advances of International Law Through the Law of Outer Space', 13-20.

[512] For the analyses of mankind provisions see *infra* chapter x

States argue for efficient usage that may at first restrict access to the most qualified States or private entities but which will eventually bring greater benefits to everyone. Developed countries support private property rights and acquisition as the fairest form of entitlement and distribution whereas poor countries insist on the equitable sharing of goods and services and access to commonly held resource in order to meet the basic needs of their populations. Spacefaring States are concerned for national security in relation to space technology transfers and their misuse whereas space-aspiring and emerging States desire greater autonomy, both technically and economically.

Both spacefaring States and emerging space actors ground their rights in Article I OST. Article I OST provides that '[t]he exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind […]shall be free for exploration and use by all States without discrimination of any kind.'

What the above conflicting rights claims and controversies demonstrate is that the international legal system governing outer space is not adequate for the new ethical and economic dilemmas that space commercialisation presents. Law cannot solely resolve the issue since the basis for these conflicts is to be found in different ethical and moral priorities of the various space actors. Those instruments have been worked out within the framework of sustainable development that on one hand acknowledges the differences, and on the other one looks for a common ground in the process of more just benefits sharing.

### 2.2.2. Towards a common ground

There is a great need for innovative, consensus-based approaches to the development of outer space law and policy that combine ethical values and new understandings of the common good with the market-oriented approaches. The application of ethics, however, needs to be internalised into outer space regime through worked-out legal instruments that ensure common understanding. Sustainable development understood as the principle of integration provides for a framework and tools to integrate these extremes in order to carefully reconsider them and balance in order to find a middle ground.

To this end, Timiebi argues that in order to find a middle ground the approach to Article I OST in international discourse needs to change first. She notices that currently the international debate is ill fated due to the negative tones underlying the international discourse on the notion of common benefit in the light of Article I OST.[513] She proposes the shift from the negative conception of the freedom of outer space to a positive one. The negative conception sees the spread of benefits from space activities as a *limitation* on the freedom to explore. The positive conception implies that that rather than being seen as a limitation, the obligation of common benefit should be seen as a *condition* of freedom. She argues that in this case semantics is important because when the literal rule of interpretation is pressed into service, a limitation is understood as a *restriction* on something, and condition as a noun refers to a *state of affairs* that must exist or be brought about before something else is possible or permitted. A limitation is therefore something that one seeks to *avoid* while a condition is something that one seeks to *fulfill*, words which themselves imply strong connotations of negativity and positivity.[514]

The application of the principle of integration would entail balancing of the extreme approaches based on the positive interpretation of Article I. The effect of such balancing would have to be centrist position that allow for the inclusion of all interested States upon the fulfilment of agreed conditions. The acquisition of the right to benefit need to be reciprocal and need to acknowledge the different capacities and capabilities of States. Moreover, to benefit from space would mean something different for a space power and for an underdeveloped State, what would suggest a setting up a hierarchy of possible levels of benefits depending on the level of so far engagement and needs of a given State. Different levels of benefits should be coupled with different conditions that need to be fulfilled in order to benefit. Eventually, benefits will need to be linked to corresponding responsibilities. The recourse to the lower level of sustainable development such as the principle of common but differentiated responsibilities or internalisation of pollution as well as integrative decision-making will have to be applied in order to guide the process of conceptualisation of common benefit in outer space.

[513] Timiebi Aganaba-Jeanty, 'Space Sustainability and the Freedom of Outer Space'.
[514] Timiebi Aganaba-Jeanty, 'Space Sustainability and the Freedom of Outer Space'.

## 3. Procedural aspects of the principle of integration

### 3.1. The principle of integration as an autonomous normative principle

The principle of integration carries its own and independent normative meaning.[515] As an autonomous principle of international law it creates a legal obligation to integrate environmental aspects into space exploration in a way to ensure intra- and intergenerational equity. It obliges States to (1) take into account the environmental aspects of space exploration, (2) carefully consider them, (3) and balance with economic goals, in a way to account for the special situation and needs of developing countries. This process is enabled through the normative integration and integrative decision-making, which are two most visible functions of the principle of integration.[516]

#### 3.1.1. The normative integration

The normative integration role of the principle of integration in space law could manifest itself in few ways:

1. It would reconcile the existing norms of space law with relevant environmental and developmental norms allowing for better integration of space law in accordance with the goals of sustainable development.
2. Since the principle carries a specific legal weight it can be considered as having a 'reinforcing effect' on the agreed norms of soft law that handle issues form the intersection of developmental and environmental domains.
3. The principle would also presuppose the way of creation of future norms and policies and the relations between them allowing for better systemic horizontal integration of space law with other norms of international. It would also allow for better vertical integration between domestic norms, on one hand, and international norms, on the other.

[515] See also Chapter D (2.3.5.1).
[516] Virginie Barral and Pierre-Marie Dupuy, 'Sustainable Development through Integration', 165-166.

*3.1.1.1.The normative integration and pollution of outer space*

In order to illustrate this function of the principle of integration let us consider the issue of space debris.[517] Pollution of orbits with space debris is currently the most significant environmental problem in outer space. The normative integration would account for the application of environmental approach to the issue of space debris, introducing clear obligation to prevent, mitigate and in the future remediate space debris. As environmental harm caused by space activities is particularly difficult to remedy after the fact, the focus should clearly be on prevention.[518] To this end, the normative integration would warrant the reinforcement of the Space Debris Mitigation Guidelines. The function of normative integration would also account for the broadening of the legal scope of both Article IX OST in a way to include space debris as harmful contamination (pollution). The normative integration would also result in an obligation to work towards creation of the liability regime that takes into account environmental damage caused by space debris.

The clear recognition of outer space as the environment would precondition the normative integration of relevant space law provisions within general environmental law.

*3.1.1.1.1. The notion of 'the environment' in the context of outer space*

Does outer space qualify as the environment? Dictionary definitions of the term 'the environment' vary from the general notions such as 'surroundings', 'something that environs' to more complex descriptions, such as 'the complex of physical, chemical,

[517] For legal aspects of space debris see: Howard A. Baker, *Space Debris: Legal and Policy Implications* , Irene Atney-Yurdin, 'Space Debris Legal Research Guide' (1991) 3 1 *Pace International Law Review*, George T. Hacket, *Space Debris and the Corpus Iuris Spatialis*, Juan Manuel de Faramíñan Gilbert, *Space Debris: Technical and Legal Aspects* (Kluwer Law International 1997), Nandasiri Jasentuliyana, 'Space debris and Internationl Law', , Kay-Uwe Hörl, 'Legal and Technical Consideration of Space Debris' (Institute of Air and Space Law. McGill University
2000), Marietta Benkö and Kai-Uwe Schrogl, 'The 1999 UNCOPUOS "Technical Report on Space Debris" and the New Work Plan on Space debris (2002-2005): Perspectives and Legal Consequences' <http://articles.adsabs.harvard.edu/cgi-bin/nph-iarticle_query?bibcode=2001ESASP.473..857B&db_key=AST&page_ind=0&plate_select=NO&data_type=GIF&type=SCREEN_GIF&classic=YES> accessed 13 April 2012, Armel Kerrest, 'Space debris, remarks on current legal issues', ECSL, 'Analysis of Legal Aspects of Space Debris' in Karl-Heinz Böckstiegel, Marietta Benkö and Stephan Hobe (eds), *Space Law: Basic Legal Documents*, vol 1 (Eleven International Publishing 2002), Michael W. Taylor, 'Orbital Debris: Technical and Legal Issues and Solutions' (McGill University 2006).

[518] Lotta Viikari, *The Environmental Element in Space Law. Assessing the Present and Charting the Future*, 157.

and biotic factors (as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival'[519] or 'the natural world, as a whole or in a particular geographical area, especially as affected by human activity.'[520]

International law does not provide any definition of the term, in its broad sense. Birnie and Boyle suggest that drawing legal boundaries around so voluminous and ambiguous term would involve identification and restriction of its scope.[521] Although it is not has to be the case, as will be shown below, the legal regime finds it difficult to deal with the term. It rather concentrates on specific types of the environment or some of its aspects, usually in order to address a specific environmental issue. Legal instruments, included both hard and soft law, make countless references to the environment understood in such a specific way.[522] The Rio Declaration uses both 'nature'[523] and 'environment'. Both terms refer to natural surroundings, yet in different contexts. The term nature is used when the general reference to natural surroundings is made, like in Principle 1 stating that humans are 'entitled to a healthy and productive life in harmony with nature'. The Declaration refers to the environment in the context of protection,[524] policy[525], environmental issues[526] environmental standards and environmental legislation.[527] The list is by no means exhaustive yet it reveals that the term 'environment' is rather used in the context of specific issues relating to nature or specific parts of nature. Outer space definitely is part of nature, and it constitutes a specific environment affected by human activity. And this is precisely what environmental law addresses: harmful impact of humans on their natural surroundings. Environmental law provides for systemic tools to handle issues arising with this regard.

Mayence argues, however, that although the concept of 'space environment' is very convenient for the purpose of encompassing a number of issues related to the negative effects of human activities in outer space these issues cannot be qualified as

[519] Merriam Webster Dictionary, online: <http://www.merriam-webster.com/dictionary/environment>.
[520] Oxford Dictionary, online: <http://oxforddictionaries.com/definition/english/environment>.
[521] See Patricia W. Birnie and Alan Boyle, *International Law and the Environment* (2 edn, Oxford University Press 2002), p. 3.
[522] Ibid.
[523] Rio Declaration, principle 1
[524] Principle 2.
[525] Principle 2.
[526] Principle 10.
[527] Principle 11.

'environmental issues'. Planetary Protection is about preservation of scientific areas, whereas orbital space systems protection against space debris is about safeguarding economic interests of space operators. Such a perception, however, is to some extent a function of the prevailing, in many aspects reductionist approach that any reason for the mitigation of space debris or protection of outer space locates in the interest of operators of space systems. While it is obvious that limitation of space debris is in the interest of the satellite operators, it does not mean, that the issue doesn't have any environmental dimension and as such cannot be a subject to the environmental provisions. It is neither the argument against the recognition of outer space as the environment and space debris as an environmental issue. But Mayence arguments reflect well the current state of the affairs as mostly private-venture-driven development of the space sector. While the commercialisation of outer space is not objectionable *per se* – to the contrary, it actually can give a boost to the long stagnant situation in space exploration[528] – is should be driven by a far-reaching perspective aimed at equity, which entails the respect to the international standards, including environmental.

#### *3.1.1.1.2. Space debris as harmful contamination under Article IX*

The notions of pollution and contamination are often used interchangeably. Yet contamination can be used to describe the state of impurity that is not harmful, while pollution refers to contamination that is harmful.[529] Although there is no agreed general legal definition of environmental pollution,[530] it is generally accepted that this notion indicates a harmful despoiling of the natural environment and 'can also be caused by leaving or creating trash, junk, debris'.[531] The Training Manual on International Environmental Law provides that environmental damage may take the form of contamination.[532] The harmfulness of contamination needs to be associated with the

[528] Jean Francois Mayence, 'Article IX of the Outer Space Treaty and the Concept of Planetary Protection: Toward a Space Environment Law ?' (http://wwwspacelawolemissedu/events/pdfs/2010/galloway-mayence-paperpdf, 2010).

[529] Therefore for the purposes of this work pollution and harmful contamination will be used as interchangeable notions.

[530] Instead, the law focuses rather on different kinds of pollution, such as chemical, nuclear or biological, or on the various ecosystems that can be polluted. [H.A. Wassenbergh, n. 467 above, 63]. One can notice that later instruments rather refer to even more broad notions such 'harm', 'damage', 'effect', or 'impact' in order to denote despoiling of the natural environment.

[531] Ibid.

[532] United Nations Environment Programme (UNEP), *Training Manual on International Environmental Law* (UNEP, 2006), at 58.

threshold above which it introduces adverse changes to the environment. Adverse change to the orbital space around the Earth manifests itself in the cumulative effect of space debris proliferated to the point that it endangers use of outer space. Space debris is non-functional litter which constitutes about 93% of the catalogued and tracked space objects (not to mention the much bigger untraceable mass of space junk).[533] "Space is no longer the sanctuary it was thirty years ago; it is becoming increasingly congested, contested and competitive."[534] This situation directly translates to the lowered usefulness of the most important orbits.

Space debris can be considered a form of environmental pollution and as such could be included under Article IX OST. States, than, would be obliged to avoid harmful contamination of outer space irrespectively from the original scientific motivations of the protection under Article IX.[535] At present, all space activity involves the creation of space debris. Moreover, every space object will, sooner or later, become debris. It seems that any illegality lies in the unnecessary and, to some extent, *avoidable* creation of space debris or above the agreed threshold. Notwithstanding the effect, a State's fault in regards to space debris creation can be assessed based on its behaviour[536] and in light of existing scientific knowledge on mitigation against space debris.

Article IX OST is a natural candidate upon which the obligation to act against space pollution could be based and many doctrine studies argue for such a solution.[537] The legal argument for the inclusion of space debris within the scope of harmful contamination could be further enforced in the light of the principle of integration.

#### *3.1.1.1.3. Outer space liability regime – environmental perspective*

One way to consider the impact of space debris on the environment is to look at it from the perspective of damage to the terrestrial environment or the environment of

[533] See Chapter G (2.1.1).

[534] Words attributed to Air Force Lt. Gen. John "Jay" Raymond, commander of the 14th Air Force and the Joint Functional Component Command for Space, within the U.S. Strategic Command

[535] ILA Final Report 2014: (1) Space activities shall not cause environmental damage to the Earth and outer space or parts thereof, either directly or indirectly; (2) An environmental impact assessment is required before the beginning of a space activity; (3) Details of the environmental impact assessment shall be laid down in an implementing decree/regulation.

[536] See Armel Kerrest, 'Space debris, remarks on current legal issues', 871.

[537] See Mark Williamson, 'A pragmatic Approach to the 'Harmful Contamination' Concept in Art. IX of the Outer Space Treaty'.

outer space. With respect to the terrestrial environment damage can be direct and indirect.

The direct damage to the terrestrial environment can obviously occur upon the re-entry of debris into the Earth's atmosphere, especially with respect to the debris with nuclear power sources.[538] In general, the quickly developing outer space sector is a polluting one. Even during properly running launch the negative impact on the environment is present due to the types of fuels used to launch a rocket. The chemicals released during the launch include toxic for humans hydrochloric acid, aluminium oxide, hazardous for human pulmonary system due to its dust state, or aluminium ions, toxic for plants. Ariane 5 launcher in French Guyana was a subject to the criticism from ecologists because of pollution with alumina. Recurring tensions between Russia and Ukraine over Baikonur often concern the problem of pollution of the surrounding environment.[539]

The indirect impact on Earth environment encompasses the harm to the space-based systems that are vital for environmental management on the Earth. The proliferation of pace debris translates into the exponentially rising risk of collision with the functioning satellites.[540] In this case damage to the systems translates into the potential damage to the terrestrial environment resulting from ineffective environmental management.

Space debris, however, while remaining a potential threat to the terrestrial environment constitute *de facto* pollution of outer space that can be considered an environmental damage of outer space and as such could potentially be dealt within the liability regimes. There are three most highlighted aspects of liability regimes beneficial from the perspective of the environmental protection. First, the regimes can help internalise costs of pollution. Second, they can act as an economic incentive for compliance with environmental protection standards, helping to prevent environmental

[538] The process of rocket launching, due to the possible failure or destruction of the launch vehicle is the part of space activity that presents the biggest risk of pollution to the Earth environment and a hazard for human health like for example in case of the nuclear contamination resulting from the spillover of nuclear debris established in case of debris containing nuclear power sources that reach nuclear debris not well established with respect to its impact on the terrestrial environment. case Russia-Canada

[539] Jacques Arnould, *Icarus' Second Chance: The Basis and Perspectives of Space Ethics*, p. 40-42.

[540] UNCOPUOS, A Technical Report on Space Debris (UN Doc. A/AC.105/720, 1999) ('UNCOPUOS, Technical Report'), at 14-17; UNCOPUOS, Towards Long-term Sustainability of Space Activities: Overcoming the Challenges of Space Debris. A Report of the International Interdisciplinary Congress on Space Debris, (UN Doc. A/AC.105/C.I/2011/CRP.14, 3 February 2011) ('UNCOPUOS, Towards Long-term Sustainability'), at 20-21; C.A. Belk *et al.*, *Meteoroids and Orbital Debris: Effects on Spacecraft* (NASA, 1997).

harm from occurring in the first place. Third, they provide a back-up system should environmental harm occur notwithstanding the protective ends of the regime.[541] Despite the benefits, the development of general international liability regime relating to environment has proved very difficult to develop. Instead, specific sectoral liability regimes have been established.[542]

The international instrument on general environmental liability can be found on the regional level. In 2004 the EU has adopted the Directive on environmental liability with regard to the prevention and remedying of environmental damage: Environmental Liability Directive (ELD).[543] It establishes a framework based on the polluter pays principle to prevent and remedy environmental damage.[544] The Directive defines 'environmental damage' as damage to protected species and natural habitats, damage to water and damage to soil.[545] As the ELD deals with the 'ecological damage', liability is linked to the powers and duties as distinct from a civil liability system linked to damage to property, economic loss or personal injury. The legal base for the liability is the establishment of a causal link between the activity and the damage.

Operators carrying out dangerous activities listed in Annex III of the Directive fall under strict liability (no need to proof fault).[546] Operators carrying out other occupational activities than those listed in Annex III are liable for fault-based damage to protected species or natural habitats.[547]

The environmental damage to the environment of outer space does not fall under the scope of environmental damage as defined in the EDL,[548] while the sectoral liability instrument, namely the Liability Convention does not deal with environmental damage.[549] Notwithstanding, the recognition of the pollution of Earth orbital space with

[541] Jutta Brunee, 'Of Sense and Sensibility: Reflections on International Liability Regimes as Tools for Environmental Protection ' (2004) 53 3 *International Comparative Law Journal* 351, 365.

[542] Ibid.

[543] Directive 2004/35/CE of The European Parliament and of The Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage (OJ L 143, 30.4.2004, p. 56)

[544] Article 1 ELD. The polluter pays-principle is set out in the TFEU, Article 191(2).

[545] ELD, Article 2(1). '[E]nvironmental damage means: damage to protected species and natural habitats, which is any damage that has significant adverse effects on reaching or maintaining the favourable conservation status of such habitats or species.'

[546] ELD, Article 3(1)(a)

[547] Ibid., Article 3(1)(b)

[548] The definition of a 'natural resource' does not account for outer space. Article 2(12) reads that '"natural resource" means protected species and natural habitats, water and land'.

[549] For the analysis of the 'damage' in space law see Elena Carpanelli and Brendan Cohen, 'Interpreting "Damage Caused by Space Objects" under the 1972 Liability Convention (IAC-

space debris as environmental damage is an often explored way of the legal protection of outer space. The ILA Draft Convention on Space Debris from 1994 includes references to damage to the space environment. It declares that States are liable for environmental damage, i.e., damage to the environment of outer space and the Earth, 'within or beyond national jurisdiction',[550] caused by space debris which is created by their activities.[551] The definition of damage in the draft convention includes 'any adverse modification of the environment of areas within or beyond national jurisdiction or control'.[552]

The normative integration will not automatically account for the inclusion of environmental damage under the Liability Convention, since there are no clear general liability norms that would presuppose it. The normative integration, however, requires that the general legal concepts and principles conveyed by the Rio Declaration are taken into account and applied *mutatis mutandis* to outer space. The Earth's orbital space constitutes space beyond national jurisdiction[553] and as such is covered by the scope of Principle 2 of the Rio Declaration that obliges States 'to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.'[554] Moreover, the Rio Declaration obliges States 'to develop national law regarding liability and compensation for the victims of pollution and other environmental damage' and '[…] to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control to areas beyond their jurisdiction.'[555] It therefore obliges States to develop liability norms that address the issue of space pollution.

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13,E7,1,5,x18256)' (International Astronautical Congress, 2013), online:< https://iislweb.org/docs/Diederiks2013.pdf>.

[550] ILA Draft Convention on Space Debris (1994), Art. 1.d.

[551] Ibid., Arts. 2, 8.

[552] Ibid.

[553] The Principle of non-appropriation [Article II OST] guarantees outer space the status of a space beyond national jurisdiction.

[554] The Rio Declaration, Principle 2.

[555] The Rio Declaration, Principle 13. For example the extension of the substantive definition of the term 'space object' to space debris can be viewed as a development towards environmental ends, yet clearly not as strong as the potential inclusion of the environmental damage caused by space debris under the Liability Convention. It has been accepted that space debris constitutes a 'space object' in the light of the Liability Convention, therefore States are liable for damages caused by it. After years of debate on the subject a consensus seems to have been reached that 'space debris, by nature, constitutes space objects and space law therefore applies to it' [ECSL, 'Analysis of Legal Aspects of Space Debris', 4]. The recognition of space debris as a space object, although potentially effective in terms of environmental

#### *3.1.1.1.4. The normative integration and the Space Debris Mitigation Guidelines*

Another effect of the normative integration aspect of the principle of integration would be reinforcement of the existing technological standards and guidelines relating to space pollution. The Space Debris Mitigation Guidelines[556] are a set of non-binding practical and technical rules that were created as an ad-hoc response to the issue of space debris. They are a legal effect of the down-top approach applying current scientific and technological knowledge pertinent to the mitigation against space debris. As not binding,[557] they are not always followed by the States.[558] Since the principle of integration obliges States to integrate environmental values into space law, the Space Debris Mitigation Guidelines, as the key legal instrument addressing the issue, could be considered a legal step towards fulfilling this obligation. Therefore, the principle of integration would account for a binding status of the Space Debris Mitigation Guidelines.[559]

### 3.1.2. Integrative decision-making

The integrative decision-making is an essential procedural way in which the integration of environmental and socio-economic aspects in space law can happen.[560] The integrated decision-making presupposes a specific approach to subject-matter of a given decision as well as to the stakeholders (States, organisations, private entities, institutions) involved.

The integrative decision-making with respect to the subject-matter of a given issue means that before taking a decision, all relevant environmental factors as well as social

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damage compensation caused by space debris on Earth does not deter against irresponsible behaviour in space neither does provide for incentives to take more preventive measures against proliferation of space debris. Moreover, the recognition of space debris as space object complicates the potential issue of cleaning [Frans G. von der Dunk and Fabio Tronchetti, *Handbook of Space Law*, 758]. States retain jurisdiction and control over their space objects [OST, Article VIII]. With this respect there is a clear need for the further legal development relating to distinguishing of functional space object from non-functional object or parts thereof.

[556] Un Doc. A/AC.105/c.1/l.260. See chaprer x

[557] The Guidelines, para. 3

[558] It has been analysed that they are followed in about 40%.

[559] Notwithstanding the possible parallel attainment of customary status.

[560] 'To operationalize sustainable development, we need to recognize that one principle – integrated decisionmaking – holds the other principles together [See J. Dernbach, 'Achieving Sustainable Development: The Centrality and Multiple Facets of Integrated Decisionmaking' 10 *Indiana Journal of Global Legal Studies* (2003) 248.].

and economic, need to be considered and carefully assessed.[561] To this end, the decision-making needs to be based on the information, which can be obtained via the process of environmental impact assessment.

As for the stakeholder aspect, the integrative decision-making implies a process based on the inclusiveness and enablement of all the parties. To this end the process of integrative decision-making has to be based on the cooperation,[562] understood as an obligation which conditions the lawfulness of space activities.[563] The enablement and inclusiveness call for the assessment of range of potential partners, their development level, what can be enabled through relationships and how.[564] To this end capacity-building of the relevant stakeholders is another prerequisite for the integrated decision-making.[565] This aspect directly contributes towards intragenerational equity in outer space. The informed decision-making that rests on the environmental impact assessment and enablement that rests on the capacity-building are particularly important from the perspective of the States aspiring do develop their space programs and those who emerge as space actors.

### 3.2. The principle of integration as a rule of reference

The function of the principle of integration as a rule of reference means that the principle relies on lower level norms to be operationalised. This function of the principle of integration translates into the obligation for States to consider norms and principles on lower level of the concept of sustainable development and their contextual translation into the legal regime of outer space.

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[561] Barral Dupuy, 165-166.

[562] OST, Article IX.

[563] Such an understanding of the principle of cooperation was recognised during CNJEUNESCO Seminar: 'La Ensenanza del Derecho Imernacional aplicado al espacio y a las communicaciones espaciales' (Buenos Aires August 1972), 81.

OST, Article IX.

[564] Timiebi Aganaba-Jeanty, 'Space Sustainability and the Freedom of Outer Space'.

[565] CSD, Report of the Secretary-General: Integrating environment and development in decision-making (1996), E/CN.17/1996/11, para 14. Chapter 8 of Agenda 21 on Integrating environment and development in decision-making further elaborates on four interrelated issues relating to integrative decision-making: (a) integrating environment and development at the policy, planning and management levels; (b) providing an effective legal and regulatory framework; (c) making effective use of economic instruments and market and other incentives; and (d) establishing systems for integrated environmental and economic accounting [Agenda 21, Chapter 8].

## H. APPLICATION OF SUSTAINABLE DEVELOPMENT TO OUTER SPACE ON THE THIRD LEVEL OF CONCEPTUALISATION – SUSTAINABLE DEVELOPMENT AS A COLLECTION OF CROSS-SECTORAL NORMS AND PRINCIPLES ENABLING SUSTAINABLE DEVELOPMENT

### 1. General remarks

Third level of the application of sustainable development to outer space provides substance for the procedural aspect of the principle of integration working as a rule of reference. In other words, the principle of integration is a source of procedural obligation to carefully consider and translate the enabling principles into the legal context of outer space because it relies on the enabling principles for its substantive realisation. The most important enabling principles are the precautionary principle, the common but differentiated responsibilities and the polluter-pays principle.

### 2. Precautionary principle

In accordance with the preventive ideology, there is an increasing emphasis on the general duty of States to take preventive measures to protect the environment of outer space.[566]

The precautionary principle is enshrined in Principle 15 of the Rio Declaration:

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.[567]

From this definition the concept of precaution can be seen to establish an independent obligation to prevent environmental damage when there is no consensus within the scientific community concerning the risks and consequences of a certain

[566] Lotta Viikari, *The Environmental Element in Space Law. Assessing the Present and Charting the Future*, 157. Also see Ibid. on the detailed analysis of the precautionary principle in outer space. For a detailed analysis of the principle of prevention, see, e.g., Nicolas de Sadeleer, *Environmental Principles: from political slogans to legal rules* (Oxford University Press 2002)61–90.

[567] Rio Declaration, Principle 15 (emphases added).

action (or inaction).[568] Preventive action is already required for those risks which can be defined with certainty in light of the latest scientific findings and techniques under the principle of prevention.[569] There are, however, circumstances where science is not able to provide full certainty – that is when the precautionary principle comes into play. The legal relevance of precaution finds its rationale in avoiding the indefinite postponing of effective anticipatory measures in the face of gross – i.e. serious or (/and) irreversible – environmental damage.[570]

On the current stage of technological development, there is scientific certainty on the irreversibility and seriousness of the damage caused by space debris to space environment as such.[571] Moreover the causal link between space debris and severe risk to human interest in space is also well established.[572] These may suggest that the use of preventive measures regarding space debris should be rather guided by the principle of prevention, and not the precautionary principle, since space debris is a problem for which there exists plausible scientific evidence.[573] Either it is precautionary or

[568] Claudia Cinelli and Katarzyna Pogorzelska, 'The Current International Legal Setting for the Protection of the Outer Space Environment: The Precautionary Principle Avant la Lettre', 196. Cf. P.J. Sands, Principles of International Environmental Law 2nd ed (Cambridge University Press, 2003), 268 ('[t]he core of the principle, which is still evolving, is reflected in Principle 15 of the Rio Declaration').

[569] The obligation of prevention has been specifically affirmed in the *Trail Smelter Arbitration* (*United States v Canada*), [11 March 1941] 3 RIAA 1907.

[570] Formally, the reference to seriousness and irreversibility has been created in Principle 15 of the Rio Declaration in a disjointed fashion. Principle 15 arguably leaves the choice as to whether to refer to either or both of them [Claudia Cinelli and Katarzyna Pogorzelska, 'The Current International Legal Setting for the Protection of the Outer Space Environment: The Precautionary Principle Avant la Lettre']. As for the threshold above which the precautionary principle should applied it is usually understood that risks of minor or insignificant harm cannot trigger this obligation. The *Trail Smelter* case referred to the high threshold of 'actual' and 'serious' Damage [*Trail Smelter Arbitration* (*United States v Canada*), [11 March 1941] 3 RIAA 1907]. More recently, the ITLOS required a risk of 'serious' harm [ *Southern Bluefin Tuna* cases in 1999, Order of 27 August 1999, para. 77]. In the ILC Draft Articles on Prevention of Transboundary Harm From Hazardous Activities the significance and probability of harm are considered equally relevant when making the assessment. More on the threshold see Lotta Viikari, *The Environmental Element in Space Law. Assessing the Present and Charting the Future*, 161-163.

[571] As argued in chapter x the recognition of environmental damage with respect to space debris would refer to the pollution of space environment as such notwithstanding damage as defined in Article I Liability Convention.

[572] The problem of the harmful effect of the growing debris population is widely recognised [United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS), A Technical Report on Space Debris (UN Doc. A/AC.105/720, 1999) ('UNCOPUOS, Technical Report'), at 14-17; UNCOPUOS, Towards Long-term Sustainability of Space Activities: Overcoming the Challenges of Space Debris. A Report of the International Interdisciplinary Congress on Space Debris, (UN Doc. A/AC.105/C.I/2011/CRP.14, 3 February 2011) ('UNCOPUOS, Towards Long-term Sustainability'), at 20-21; C.A. Belk *et al.*, *Meteoroids and Orbital Debris: Effects on Spacecraft* (NASA, 1997)] and supported by actual examples of on-orbit collisions [See chapter x above].

[573] Viikari points to possible ways of application of the precautionary principle as well, but suggests that a preventive approach is more adequate. See L. Viikari, n. 5 above, at 173. There is lack of scientific certainty with respect to some specific kind of space debris, such as aluminum slag (see chapter x)

preventive approach the State response will probably be the same. The issue rather relates to what circumstances triggers the use of preventive measures. Nevertheless, not all the legal interpretations support a clear separation between preventive and precautionary approaches. Trouwborst, for example, argues that in international environmental law the precautionary principle must be regarded as having absorbed the principle of prevention or, alternatively, should be considered as its most developed form.[574] In reality

> [s]tates do not focus on demarcating the respective scopes of application of the preventative and precautionary principles and, for that matter, rarely cite the preventative principle at all. They tend to rely on the precautionary principle as the flag that covers the entire cargo of preventative measures, whether taken under scientific uncertainty or not.[575]

Another issue with respect to the application of the precautionary principle is that the creation of space debris as such cannot be avoided, hence considered illegal because every space activity involves creation of some level of space debris. However, what can be considered preventable is the excessive or avoidable creation of space debris. Distinguishing between excessive and non-excessive or avoidable and non-avoidable space debris creation would not be a straightforward task, to the contrary. For that reason, the key test for the assessing a legality of a State conduct could be linked not to an effect, but to the way how activities are conducted. States therefore can agree on certain international minimum standards that guarantee the legality of their activities with respect to the obligation of undertaking preventive or precautionary steps.[576] Depending on the risk-assessment, for most of the activities adhering to the UN Space Debris Mitigation Guidelines or other codes of conduct could be considered a right way to tackle the risk of excessive creation of space debris. Nevertheless, in some cases, such as ASAT tests, the application of precautionary criteria should result in a moratorium on the given activity, even without specific norms banning such an activity.

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[574] A. Trouwborst, 'Prevention, Precaution, Logic and Law', 2:2 *Erasmus Law Review* (2009), 105, at 124.

[575] Ibid.

[576] Patricia W. Birnie and Alan E. Boyle, *International Law and the Environment* (Oxford University Press 2002), 113, Lotta Viikari, *The Environmental Element in Space Law. Assessing the Present and Charting the Future*, 165.

Among the different aspects of the precautionary principle, one that is important for space activities is the possible shift in the burden of proof. It is usually the case that States or other entities planning the potentially harmful activity in outer space are also is in the best position to produce the most relevant information on its impacts. Due to technological and knowledge gap, which is very often in space sector, other countries are not in the position to prove harmfulness of the activities planned by other party. A reversal of the burden of proof would mean that a State that undertakes a given activity would have to prove not only that its activity does not interfere with the activities of other States, but also that it does not heavily contribute to space debris creation or cause any other damage to the environment of outer space.

In general the application of the precautionary principle to space activities is even more adequate when one considers the issue of future not even well identified forms of possible damage to space environment. The crux of the principle is that it requires caution already when identifying relevant risks, not only in responding to them thereby contributing significantly to risk reduction: '[t]he question is no longer merely how to prevent assessable, calculable, and certain risks, but rather how to anticipate risks suggested by possibility, contingency, plausibility, probability'.[577] Therefore, precaution is a common sense way to approach issues which are new or not well understood, the situation which often is the case with respect to space activities. To this end the precautionary approach would also help to shape further developments in the legal field of outer space, obliging States to regular revisions of their operating methods in line with scientific progress in the field.

### 3. Common but differentiated responsibilities

The principle of common but differentiated is enshrined in Principle 7 Rio Declaration:

States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit to

[577] Nicolas de Sadeleer, *Environmental Principles: from political slogans to legal rules*, 91.

sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.[578]

The principle of common but differentiated responsibilities is a direct manifestation of the intragenerational equity.[579] It builds on the common responsibility of all States to protect the environment but, at the same time, takes into account the differences in their ability to do so. The principle also recognises that environmental degradation today mostly originates in activities of industrialised countries and that they should thus bear the main burden of the international effort to counteract the environmental problems.[580] The principle manifests itself in different standards, delayed compliance timetables or less stringent commitments.[581]

The application of the principle to outer space can actually be seen as a natural prolongation of the running thread in space law treaties calling for 'special consideration to the needs of the developing countries.'[582] Therefore when all the countries are potentially responsible for the protection of the environment of outer space in reality only few have such technological capabilities. Moreover those who have such capabilities are also the States who exclusively contributed to space pollution. The same countries also are those who benefit most from variety of services.[583]

However, thanks to the commercialisation of space-based services all countries to different extent benefit from outer space, even without undertaking any active steps relating to building one's launching capabilities or creating and constructing

[578] Rio Declaration, Principle 7. For a more detailed assessment of Rio Principle 7, *see Patricia W. Birnie and Alan E. Boyle, International Law and the Environment,* 103– 104; Lotta Viikari, *The Environmental Element in Space Law. Assessing the Present and Charting the Future*, 178-183.

[579] Philippe Sands, *Principles of International Environmenal Law*, 285.

[580] See Karin Mickelson, 'South, North, International Environmental Law, and International Environmental Lawyers' (2000) II *Yearbook of International Environmental Law* 52, 69–77.

[581] Lotta Viikari, *The Environmental Element in Space Law. Assessing the Present and Charting the Future*, 178.

[582] Principles Governing the Use by States of Artificial Earth satellites for International Direct Television Broadcasting, para 2, 6, 11; Principles Relating to Remote Sensing of the Earth from Outer Space, Principle II, Principle IX, Principle XII, Principle XIII, Principles Relevant to the Use of Nuclear Power Sources in Outer Space, Principle 7, 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.

[583] As of 2017 only eight countries and one intergovernmental agency – ESA have a proven orbital launch capability are the most visible in the active space use and exploration. Out of them, the US, China and Russia as well as ESA are the most visible in the active space use and exploration. The US, China and Russia have contributed the most to the numbers of space debris.

satellites.[584] For that reason, unlike in the case of the terrestrial environment, all countries are vitally interested in the protection of outer space from space debris. Emerging and potential space actors insist on the environmental protection against space pollution because their future active participation depend on it. Yet means to effectively respond to environmental degradation of outer space[585] are in hands of space-faring States, therefore they are expected to take a lead.[586] Other countries, in order to approach environmental issues linked to the environment of outer space would need access to resources and technologies as well as assistance of those actively present in space.[587]

The application of the principle of the common but differentiated responsibilities do not seem to be a desired step with respect to the mitigation of space debris, at least if simply understood as less stringent 'environmental rules' for the new-comers because the environmental situation in the Earth's orbital space is already at its tipping point. In the face of growing interest relating to active use of space the addressing of the environmental aspects of space debris and space in general becomes more urgent. The application of the principle could result in the obligation to provide assistance for the space-aspiring States in developing their technological ability to follow the rules addressing the environmental aspects of space debris such as the Space Debris Mitigation Guidelines.

### 4. Polluter-pays principle

The polluter-pays principle, as the name indicates, requires that the costs of pollution to the environment should be borne by a polluter.[588] This principle is incorporated in Principle 16 of the Rio Declaration:

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[584] Take for example the GPS system. All States can use it for free, i.e. without commission payed to the government of the US. The US, however, can derive from the GPS other benefits like those related to military use and advantages of being 'in charge'. For that reason China, Russia and the ESA are working on/using their own navigation systems with respect to chosen activities. reference

[585] For example Luxembourg. It is not very active in space exploration yet has been working on development of technology to clean space debris and investing in future space resource mining capabilities.

[586] See, e.g., Report of the Scientific and Technical Subcommittee on its 42nd session 2005, para. 99.

[587] An example of common but differentiated responsibilities in international law is the 1992 United Nations Framework Convention on Climate Change, which commits industrialised countries to take stricter measures than those required of less developed countries.

[588] The polluter pays principle was first mentioned in the recommendation of the OECD of 26th May 1972 and reaffirmed in the recommendation of 14th November 1974. The polluter-pays principle was conceived as an economic concept Since 1987 the principle has also been enshrined in the Treaty of the

National authorities should endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment.[589]

The polluter-pays principle is often endorsed as a principle for liability. The straightforward application of the principle to the space sector would require that a launching State internalises the costs of pollution to the environment of outer space. This may look unfeasible for few reasons. First, according the current fault-based liability for damage caused in outer space, it would be a challenge to identify an entity liable for damage due to a complex causation and cumulative effects of damaging events.[590] Second the actual financial level of reparations exceeds the capacity of any single State or other entity. Furthermore, the fact that all the States in some way benefit from outer space renders the issue of cost allocation solely to the entity undertaking space activities (that is ultra-hazardous by its nature) not entirely just.[591] One of proposed solution to these issues would be an international 'space damage fund' or

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European Communities (Article 191(2)TFEU) and in numerous national legislations world-wide. 1972 Recommendation of the Council of OECD C(72)128. The OECD Council referred to the polluter-pays principle as a "fundamental principle" (para. I.1). *See also* the more recent 1989 Recommendation on the Application of the Polluter-Pays Principle to Accidental Pollution C(89)88/Final and the 1991 Recommendation on the Uses of Economic Instruments in Environmental Policy C(90)177/Final. The OECD polluter-pays principle has been examined in more detail in Bugge 1996, pp. 75–79. For an assessment of the OECD recommendations, particularly of the development of their approach to the polluter-pays principle, *see also* Nicolas de Sadeleer, *Environmental Principles: from political slogans to legal rules*, 26–27; Lotta Viikari, *The Environmental Element in Space Law. Assessing the Present and Charting the Future*, 184-202.

[589] The Rio Declaration, Principle 16. Unlike most of the Rio other principles, this particular one is not expressed in obligatory terms. While most of the Rio principles use the wording 'States shall', Principle 16 uses more aspirational expressions such as 'States should' or 'should, in general'. Rio Principle 16 has in fact been considered less progressive than the provisions in the earlier OECD and EC documents concerning the polluter-pays principle. The reference to 'public interest' allows for exceptions [Patricia W. Birnie and Alan E. Boyle, *International Law and the Environment*, 93]. In addition, suggestion that it is national authorities who should apply the principle, further limits its application in the international context [Nicolas de Sadeleer, *Environmental Principles: from political slogans to legal rules*, 25.] Nevertheless, the inclusion of the principle of polluter pays in the Rio Declaration enhances its significance in general [Lotta Viikari, *The Environmental Element in Space Law. Assessing the Present and Charting the Future*, 187].

[590] Frans G. von der Dunk and Fabio Tronchetti, *Handbook of Space Law*, 764.

[591] For example Brunee argues that operators of activities that are deemed necessary (or at least socially beneficial) yet entail high risks should be shielded from excessive claims [Jutta Brunnée, Of Sense and Sensibility: reflections on international liability regimes as tools for environmental protection. *International and Comparative Law Quarterly*, Vol. 53, April 2004. Jutta Brunee, 'Of Sense and Sensibility: Reflections on International Liability Regimes as Tools for Environmental Protection ', 351–368].

similar instrument that takes into account combination of few aspects such as the extent of space activities, economic situation, contribution to the proliferation of space debris and economic benefits, just to name a few.[592]

The application of the polluter-pays principle triggered by the extension of sustainable development to outer space would have to account for the legal nature of outer space as global commons, which is not the case under the Liability Convention since the Convention focuses on reciprocal relation between the States, where a State can claim compensation based on suffered damage.

[592] Lotta Viikari, *The Environmental Element in Space Law. Assessing the Present and Charting the Future*, 198; Uchitomi Motoko, 'SustainableDevelopment in Outer Space—applicability of the concept of sustainable development to space debris problems, Proceedings of the 43rd Colloquium on the Law of Outer Space, IISL, 2–6 October 2000, Rio de Janeiro' (2000), 71–80.

# I. APPLICATION OF SUSTAINABLE DEVELOPMENT TO OUTER SPACE ON THE FOURTH LEVEL OF CONCEPTUALISATION – GENERAL PROPOSITIONS ON SPACE LAW RELATING TO SUSTAINABLE DEVELOPMENT

## 1. General remarks

Fourth level is about what shape sustainable development will eventually take in outer space. First, the application of sustainable development would entail the reinterpretation of basic principles of space law in the light of sustainable development. The principle of integration would entail the applicability of cross sectoral principles enabling the integration of the three aspects into space activities. All this would eventually lead to the creation of the body of space law on sustainable development. Specifics of the body of space law on sustainable development – mankind provisions – would provide for a substantive fundament of norms relating to sustainable development in outer space. Upon the application of sustainable development the mankind provisions could 'operationalised' in accordance with procedural requirements of the principle of integration.

The approach to the creation of more specific rules enabling integration in space law should be careful and should avoid too many details and regulations that are unlikely to survive the times, it must be accepted that this sectoral level is inherently the most dynamic of the all four. It would fluctuate and change but always will be directed towards outer layers, ultimately towards inter- and intragenerational equity.

While law is a good tool for creating the frameworks in which different ethical perspectives and disciplines can operate with the guarantee of finding an adequate balance of their interests, a 'strong' interference of law in regulating all the issues concerning sustainable development in outer space can turn out to be counterproductive as it could have the negative effect of creating obstacles to some activities.[593]

The study postulates that the resulting sustainable development framework for space law should manifest few characteristics. Since sustainable development is a complex and evolutive concept, the legal approach to it as a framework for balancing interests in

[593] Silvia Salardi, 'Sustainable development: Definitions and Models of legal regulation. Some legal-theoretical outlines on the role of law' (2011) 1 *Rivista Quadrimestrale di Diritto dell'Ambiente* 77, 97-98.

outer space needs to be flexible, light, open, and sober.[594] A legal regulation is 'flexible', if it does not fix rules that pretend to last forever, but it can adapt to the evolution of different needs, for example new scientific discoveries. This is a crucial aspect for the fast developments in technology-driven space activities. A 'light' regulation is composed of rules, which deal with the procedural and technical aspects without imposing a particular viewpoint (ethical, political, social or economic). Besides these two aspects the model should be 'open', that is to say it should not prefer one point of view, but permit the confrontation among different positions (environmental, social, economic). It should therefore embrace cooperation as a basis not only for specific conduct in outer space but also for the development of a legal framework. 'Sober' indicates a regulation able to integrate the legal tools from outside legal domain, such as, the economic, social and scientific evaluations

## 2. Mankind provisions in space law – main substantive building block for the conceptualisation of sustainable development in space law

### 2.1. Subject of the provisions – a mankind

The term 'mankind' occupies a prominent place in space law.[595] The Preamble of the OST mentions 'great prospects opening up before mankind' and the 'common interest of all mankind in the progress of the exploration and use of outer space for peaceful purposes'.[596] The latter expression is also evoked in the Preambles of the Liability Convention and the Registration Convention. In the body of the OST the term 'mankind' appears twice: first in Article I stating that '[t]he exploration and use of outer space […] shall be the province of all mankind,'[597] second, in Article V describing astronauts as 'envoys of mankind.'[598] The term appears also in the body of the Moon Agreement, Article 4 of the Moon Agreement claims the exploration and use of the Moon as the 'province of all mankind' and Article 11 considers the Moon and its

[594] Silvia Salardi, 'Sustainable development: Definitions and Models of legal regulation. Some legal-theoretical outlines on the role of law', 97-98.

[595] See for example Stephen Gorove, 'The Concept of 'Common Heritage of Mankind': A Political, Moral or Legal Innovation' (1972) 9 *San Diego Law Review* 390, 393, Ernst Fasan, 'The Meaning of the Term 'Mankind in Space Legal Language'' (1974) 2 *Journal of Space Law*, 125.

[596] OST, Preamble.

[597] Ibid., Article I.

[598] Ibid., Article V. The issue of assistance to astronauts is developed in the Rescue Agreement.

natural resources the 'common heritage of mankind.' Mankind is also mentioned in the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space,[599] in the Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting[600] and in the 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.[601]

Moreover, the term 'mankind' occurs in several other international instruments. Among others in the Preamble of the U.N. Charter, Preamble of the North Atlantic Treaty (1959), in the preamble of The Antarctic Treaty (1959), the Treaty on the Non-Proliferation of Nuclear Weapons (1968) and especially in the, U.N. Convention on the Law of the Sea (1982). All treaties and declarations refrain from specifying its meaning.

For that reason for many scholars the legal meaning of 'mankind' remains unclear,[602] hence mankind provisions are seen as needing further clarification and possibly a development of particular law to give a precise meaning to the terms used.

The common feature of definitions in the legal literature today is that mankind is an abstract notion encompassing all humans wherever and whenever they live. It, therefore, comprises all of our contemporaries, all the future generations to come, and past generations. The ICJ in its judgement in *Gabčikovo-Nagymaros Project* confirmed that the meaning of mankind in international law is to be 'present and future generations'.[603]

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[599] Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space. Preamble refers to 'the great prospects opening up before mankind,' 'the common interest of all mankind in the progress of the exploration and use of outer space for peaceful purposes,' and states that the 'exploration and use of outer space should be carried on for the betterment of mankind.' Principle 1 reads that '[t]he exploration and use of outer space shall be carried on for the benefit and in the interests of all mankind.' Principle 9 considers astronauts 'envoys of mankind.'

[600] Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting. First sentence of Principle XI reads that '[r]emote sensing shall promote the protection of mankind from natural disasters.'

[601] 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. Preamble: 'the exploration and use of outer space […] shall be the province of all mankind,' Principle 1adds that also '[i]nternational cooperation in the exploration and use of outer space for peaceful purposes […] shall be the province of all mankind.'

[602] The conceptual ambiguity is reflected in Christol's approach who hesitates whether mankind means all States (particularly developing States), all nations, all leaving human beings or all human beings including future generations.

[603] *Gabčikovo-Nagymaros Project*, para 140. 'Throughout the ages, mankind has, for economic and other reasons, constantly interfered with nature. In the past, this was often done without consideration of the effects upon the environment. Owing to new scientific insights and to a growing awareness of the risks *for mankind – for present and future generations* – of pursuit of such interventions at an

In the doctrine, it is accepted that mankind is a trans-spatial and trans-temporal concept.[604] The trans-spatial aspect manifests itself in the fact that 'mankind' includes all people on the planet. It is also trans-temporal because it includes past, present and future generations. It can be seen as a Burke's partnership 'not only between those who are living but between those who are living, those who are dead, and those who are to be born.'[605] The reference in legal instruments to present and past generations does not exclude past generations from the general meaning of the mankind. It is rather an effect of distribution of rights and obligations between the generations, where past generations have already ceased to enjoy rights and bear duties.[606]

### 2.1.1. Inter-spatial aspect of mankind in space law

In space law the broad notion of mankind, is often translated, or rather narrowed down, to 'all States.'[607] It is partly due to the fact that the space regulations were deemed to open an opportunity of development for all countries, not only for the limited group of space powers.[608] In this historic context, many argue that the 'mankind' practically was used as a synonym of 'all States' and the choice of word 'mankind' was mainly for declaratory and symbolic reasons or, as some believe, to conceal under a flow of fine and lofty words the unsolved legal problems.[609] Shragga says that 'the right to the CHM is exclusively enjoyed by *States*… [T]he common interest allegedly vested

unconsidered and unabated pace, new norms and standards have been developed, set forth in a great number of instruments during the last two decades.'[emphasis added].

[604] René-Jean Dupuy, 'The Notion of Common Heritage of Mankind Applied to the Seabed' (1983) 13 *Annals of Air and Space Law* 347, 348; see also Kemal Baslar, *The Concept of the Common Heritage of Mankind in International Law* (Martinus Nijhoff Publishers 1998), 74-78; José Manuel Pureza, *El Partimonio Común de la Humanidad* (J. Alcaide Fernández tr, Trotta 2002), 234-246; Yoshifumi Tanaka, 'Protection of Community Interests in International Law: The Case of the Law of the Sea' (2011) 15 *Max Planck Yearbook of the United Nations Law* 329, 339-340.

[605] Edmnd Burke, *Reflections on the Revolution in France* (1790), cited in Edith Brown Weiss, 'Our Rights and Obligations to Future Generations for the Environment' (1990) 84 *American Journal of International Law* 198, 200.

[606] Since legal instruments are future-oriented and designed to shape behaviour of the present entities they tend to refer to present and future generations. See section on intertemporal aspect of mankind.

[607] Kemal Baslar, *The Concept of the Common Heritage of Mankind in International Law*, 72.

[608] Fabio Tronchetti, 'Legal Aspects of Space Resource Utilization' in Frans G. von der Dunk and Fabio Tronchetti (eds), *Handbook of Space Law* (Elgar Publishing 2015), 781.

[609] Adrian Bueckling, 'The Strategy of Semantics and the 'Mankind Provisions' of the Space Treaty' (1979) 7 *Journal of Space Law* 15, 18-20.

in humanity is nothing but the common denominator for the interests of States, identified after a long and tiring process of negotiation.'[610]

The State-centred meaning of mankind also has its roots in legal theory. The perception of international law as *jus inter gentes*, with unchallengeable role of States as international actors (and not as jus gentium) was very strong in the second half of XX century.[611] For that reason it is argued that the intention of the drafters was to reflect in space law the meaning of mankind as all States.[612] There also are tendencies to further narrow down the meaning of mankind. Since the OST enjoys a worldwide acceptation, some argue that practical meaning of the 'mankind' in space law is 'all States Parties to the Treaty'.[613] Although the State-centric semantics is not without merits as the OST is an international law instrument negotiated among States, the distinct notion of 'mankind' cannot be simply overlooked. The State-centred rhetoric makes a 'mankind' a function of the current political order and significantly strays away from what is 'the ordinary meaning of the term mankind.'[614] Probably for that reason the shift has been made towards using instead of 'all States' such expression as 'all peoples,'[615] 'all nations' or the 'whole international community.'[616]

In 1972 Grove suggested that a mankind as a concept

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[610] Daphna Shragga, 'The Common Heritage of Mankind: the Concept and its Application' (1986) 13 *Annales d'Etudes Internacionales* 45, 54-55.

[611] From the Grotius' era until the second half of the 20th century, only States were sole subjects of international law and international relations able to have rights and duties [Kemal Baslar, *The Concept of the Common Heritage of Mankind in International Law*, 71].

[612] It is reflected in the opinion of the Soviet delegation: 'The basic tenets of the Enlightenment, attributing rational powers to mankind and regarding it as endowed with a legal conscience, have become unreal since the objective spirit of international law has found its expression in the State ('*jus inter gentes*' instead of '*jus gentium*').' [cited in Adrian Bueckling, 'The Strategy of Semantics and the 'Mankind Provisions' of the Space Treaty', 19].

[613] '[T]he exploration and use of space (both void space and celestial bodies) is free to be explored and used by States Parties to the treaty'. [Henry R. Hertzfeld, Brian Weeden, Christopher D. Johnson, How Simple Terms Mislead Us: The Pitfalls of Thinking about Outer Space as a Commons, IAC-15 - E7.5.2 x 29369, p. 4 < http://swfound.org/media/205285/how-simple-terms-mislead-us-hertzfeld-johnson-weeden-iac-2015.pdf>].

[614] According to various vocabularies and etymological works mankind is the human species [eg. *H. Watson–F. G. Fowler*: The Concise Oxford Dictionary of Current English. 1974, p.518] or human race [eg. *Webster's* Dictionary of English Language. New York 1991, p.607. *Black's* Law Dictionary. VII.Ed. 1999 St.Pal Min., p.971 *Oxford* Student's Dictionary II.Ed, 388-389].

[615] Gorove, for example, suggested that the term 'mankind' refers to 'the collective body of people.' To that end he stresses the difference between the human fights that belong to individuals and not the collective identity, i.e. mankind

[616] Kemal Baslar, *The Concept of the Common Heritage of Mankind in International Law*, 73. See also David Tan, 'Towards a New Regime for the Protection of Outer Space as the 'Province of All Mankind'' (2000) 25 *Yale Journal of International Law*, 162; Ernst Fasan, 'The Meaning of the Term 'Mankind in Space Legal Language''; 131, Carl Q. Christol, *Space Law: Past, Present and Future*, 389.

should be distinguished from that of man in general. The former refers to a collective body of people, whereas the latter stand for individuals making up that body. Therefore, the rights of mankind should be distinguished, for instance, from the so-called human rights. Human rights are rights to which individuals are entitled on the basis of their belonging to the human race, whereas the rights of mankind relate to the rights of the collective entity and would not be analogous with the rights of the individuals making up that entity.[617]

Williams noted further that

A growing trend in the international community is to take into account of the positions and interests of medium and non-space powers in the exploitation of these new areas of human activity.

Combined definitions of both Gorove and Williams well highlight an interspatial aspect of the mankind as important component, independent of the current state of borders, or economic and technological development of States. Mankind logically has to encompass all people.[618] It is, therefore, the whole international community, rather than its nuclei, States, is often considered the expression of the mankind in in its interspatial aspect. As early as in 1965 Kuchenhoff considered a State acting in space as a trustee for a mankind[619] what clearly points to the difference between the two notions.

In terms of the obligations arising for a State towards the international community, the mankind regulations seem to be very alike obligations *erga omnes*, though their status as *erga omnes* has not been recognised. In the Barcelona Traction case, the ICJ stated: 'An essential distinction should be drawn between the obligations of a State towards the international community as a whole, and those arising vis-à-vis another State in the field of diplomatic protection. By their very nature the former are the concern of all States. In view of the importance of the rights involved, all States can be held to have a legal interest in their protection; they are obligations erga omnes.'[620]

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[617] Stephen Gorove, 'The Concept of 'Common Heritage of Mankind': A Political, Moral or Legal Innovation', 193.

[618] See Kemal Baslar, *The Concept of the Common Heritage of Mankind in International Law*, 73.

[619] Gunther Kuchenhoff, *Rechtsphilosophische Grundlagen des kosmischen Rechts, Archiv fur Rechts und Sozialphilosophie* (1965), 467; cited in Adrian Bueckling, 'The Strategy of Semantics and the 'Mankind Provisions' of the Space Treaty', 19].

[620] *Case Concerning Barcelona Traction, Light, and Power Company, L*td (Belg. v. Spain), Judgement, ICJ Reports, 1970.

Thus, the first criterion of an obligation rising to the level of *erga omnes* is, in the words of the ICJ, 'the obligations of a State towards the international community as a whole.'[621] The Court, despite going on giving examples of such obligations, does not define precisely what meaning it attaches to the phrase 'obligations of a state towards the international community as a whole.' *Erga omnes* is 'traditionally' considered with respect to human rights and international crimes. It involves not direct obligation towards international community. It seems to be an obligation towards values praised by the whole community.[622] On the other hand 'mankind' *per se* and directly implies an obligation *erga omnes*. *Erga omnes* in case of mankind is qualified, though. The Barcelona traction case pointed to the international community, which constitutes the interspatial aspect of mankind. Since the meaning of mankind also includes an intertemporal aspect, *erga omnes* in case of mankind are obligations not only towards present international community but also towards future generations.

### 2.1.2. Intertemporal aspect of 'mankind' in space law

Mankind, as used in space law, is entwined in a forward-looking vision of 'the great prospects opening up before mankind as a result of man's entry into outer space.[623] The use of 'mankind' by space treaties instead of 'States' or even people clearly emphasises the future-oriented approach of the drafters in many aspects of the issues raised in space treaties. 'Mankind' as used in space law is clearly intertemporal. It implies unity within the human race that expands beyond borders of States and extends in time.

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[621] Ibid.

[622] Mahmoud Cherif Bassiouni, 'International Crimes: *Jus Cogens* and *Obligatio Erga Omnes*' (1997) 59 4 *Law and Contemporary Problems* 63, 72-73. For *erga omens* see for example: Juan Antonio Carrillo Salcedo, 'Reflections on the Existence of a Hierarchy of Norms in International Law' (1997) 8 *European Journal of International Law* 583; Władysław Czapliński, 'Concepts of jus cogens and Obligations erga omnes in International Law in the Light of Recent Developments' (1997-1998) 23 *Polish Yearbook of International Law* 87; Ian Brownlie, *Principles of Public International Law* (Oxford University Press 2003), Malcolm N. Shaw, *International Law* (6th edn, Cambridge University Press 2008), 123-127; Karl Zemanek, 'New Trends in the Enforcement of erga omnes Obligations' (2000) 4 *Max Planck Yearbook of United Nations Law* 1; Christian J. Tams, *Enforcing Obligations Erga Omnes in International Law* (Cambridge University Press 2005); Eric A. Posner, 'Erga Omnes Norms, Instutionalization, And Constitutionalism in international law' (2008) Paper no. 224 *Public Law and Legal Theory Working Paper Series, The Law School of the University of Chicago*.

[623] OST, Preamble.

Such an approach to 'mankind' directly links to the issue of potential rights (and duties) of future generations and intergenerational justice (equity)[624] that hinges on the environmental protection and responsible use of resources. The great contribution to transfer the concept of intergenerational equity from philosophy to legal grounds, in any case from different perspective, was made, *inter alia*, by Rawls,[625] Sax,[626] and Vasak.[627] The issue was later elaborated by Brown Weiss, also with respect to sustainable development.[628]

The theory of intergenerational equity finds deep roots in international law.[629] The beginning of the Preamble to the Universal Declaration of Human Rights reads as follows: 'Whereas 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.'[630] The reference to all members of the human family has an intertemporal characteristic that brings together people of all generations.

The issue of rights of future generations in international law received legal recognition in the 1972 Stockholm Declaration.[631] It was later followed by the 1987

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[624] For the issue of intergenerational justice and good compilation of resources on the subject see for example: Lukas Meyer, 'Intergenerational Justice' in Edward N. Zalta (ed), *The Stanford Encyclopedia of Philosophy* (2015) <http://plato.stanford.edu/archives/fall2015/entries/justice-intergenerational/> .

[625] John Rawls, *A Theory of Justice* (1971), John Rawls, *A Theory of Justice* (Revised edn, The Belknap Press of Harvard University Press 1990). Rawls introduces a principle of 'just savings' as one that should guide our obligations vis-à-vis future generations.

[626] J. Sax [Joseph L. Sax, 'The Public Trust Doctrine in Natural Resource Law: Effective Judical Intervention' (1970) 68 471 *Michigan Law Review* 473. Sax's article ushered the major revival of the trusteeship doctrine to solve environmental problems.

[627] Karel Vasak, 'A 30-Year Struggle' in *UNESCO Courrier* (1977). Vasak characterised human rights in international law in terms of 'three generations'. The first generation, he wrote, concerns civil and political rights. The second generation, concerns economic, social and cultural rights. The third generation, which Vasak characterised as one that 'the international community is now embarking on', refers to what he called 'solidarity rights', which include the right to development, the right of self-determination, minority rights, the right to a healthy environment, the right to peace, and the right to ownership of the common heritage of mankind. The third generation rights include an intertemporal aspect of human rights.

[628] Brown Weiss developed the concept of rights and obligation of future generations in international law within the trusteeship doctrine. To this end she used the principles of Rawl's 'just saving' and introduced the principle of 'planetary rights.' See Edith Brown Weiss, *In Fairness to Future Generations: International law, Common Patrimony and Intergenerational Equity* (Dobbs-Ferry 1989), Edith Brown Weiss, 'Our Rights and Obligations to Future Generations for the Environment'; Edith Brown Weiss, 'In Fairness to Future Generations and Sustainable Development' (1992) 8 1 *American University Journal of International Law and Policy* 19.

[629] Edith Brown Weiss, *In Fairness to Future Generations: International law, Common Patrimony and Intergenerational Equity*, 25-26.

[630] The Preamble to the Universal Declaration of Human Rights, Ref

[631] Future generations appear also in other both soft law and hard law instruments: World Charter for Nature (GA Res 37/ 7 of 28 October 1982); Rio Declaration, UNCED, 1992; United Nations Millennium Declaration, A/RES/55/2 (18 September 2000); Johannesburg Declaration on Sustainable Development,

Brundtland Report, which situated those rights within a larger concept of sustainable development. The Stockholm Declaration that was issued only five years after the signature and entry into force of the Outer Space Treaty, stated that 'Man … bears solemn responsibility to protect and improve the environment for present and future generations.'[632] It linked the rights of future generations to environmental protection. Because the purpose of human society, including future generations, must be to realize and protect its welfare and well-being it would require sustaining the life-support systems of the planet, the ecological processes and the environmental conditions necessary for a healthy and decent human environment.[633]

Therefore, despite the fact that the 'province of mankind' clearly implies an anthropocentric vision of exploration and use of outer space, the intertemporal aspect of mankind must hinge on the environmental protection and responsible use of resources that is a base for respecting rights of future generations and intergenerational justice in general.

Rights of presents and future generations were expressly mentioned in the Moon Agreement. In Article 4.1 the sentence claiming the use and exploration of outer space as the province of all mankind is directly followed by statement that '[d]ue regard shall be paid to the interests of present and future generations.' However, as mentioned before, the Moon Agreement has met with very poor international acceptance and clear resistance from the space-faring States. Although this fact does not erase the intertemporal aspect of mankind and intergenerational equity from space law, one cannot really rely on the Moon Agreement as a base of their validity.

#### *2.1.2.1. The trusteeship doctrine in the intergenerational equity*

The issues involved in the relation between the generations, their right and duties seem to be well reflected in the trusteeship doctrine. The legal philosophical concept of the wealth of the Earth to be treated as borrowed from future and/or transmitted to

A/CONF.199/20 (4 September 2002); UNESCO Declaration on the Responsibilities of the Present Generations Towards Future Generations (1997); UN Charter (1945); International Convention for the Regulation of Whaling; 1992 UN Convention on Biological Diversity; and conventions dealing with Air and climate protection, Marine environment, International watercourses, General environmental issues; Cultural and architectural heritage (1992).

[632] Stockholm Declaration, Principle 1.

[633] Edith Brown Weiss, 'Our Rights and Obligations to Future Generations for the Environment', 200.

posterity was approached in legal doctrine among others by Rawls,[634] Partridge, Barry, Streeten, Stone, Sax,[635] and, Vasak.[636]

The great contribution in elaboration and systematization of the trusteeship doctrine was made by Brown Weiss. She argues that equity among generations provides for a minimum floor for all generations and ensures that each generation has at least that level of planetary resource base as its ancestors. The concept of intergenerational equity is consistent with the premises of trusteeship, stewardship and tenancy, in which the assets must be conserved, not dissipated, so that they are equally available to those who come after.[637] Brown Weiss states that 'we, the human species, hold the natural environment of our planet in common with all members of our species: past generations, the present generation, and future generations.'[638] She stresses that each generation is both a trustee for the planet with obligations to care for it and a beneficiary with rights to use it. She developed three basic principles for integrational equity. To this end she proposes three basic principles of intergenerational equity. First the 'conservation of options' principle. Each generation is required to conserve the diversity of natural and cultural resource base, so it does not restrict the options of future generations to meet their needs. Second, the principle of 'conservation of quality' which requires that each generation should be required to maintain the quality of the planet to be passed on in no worse condition than that in which it was received. Third principle is called the principle of 'conservation of access.' It requires that each generation provides its members with equitable rights of access to the legacy of past generations and should conserve this access for future generations.[639] These principles of intergenerational equity constitute intergenerational rights and obligations, or, as Brown Weiss rather call them planetary rights and

[634] John Rawls, *A Theory of Justice* , John Rawls, *A Theory of Justice* . Rawls introduces a principle of 'just savings' as one that should guide our obligations vis-à-vis future generations.

[635] J. Sax [Joseph L. Sax, 'The Public Trust Doctrine in Natural Resource Law: Effective Judical Intervention'. Sax's article ushered the major revival of the trusteeship doctrine to solve environmental problems.

[636] Karel Vasak, 'A 30-Year Struggle'. Vasak characterised human rights in international law in terms of 'three generations'. The first generation, he wrote, concerns civil and political rights. The second generation, concerns economic, social and cultural rights. The third generation, which Vasak characterised as one that 'the international community is now embarking on', refers to what he called 'solidarity rights', which include the right to development, the right of self-determination, minority rights, the right to a healthy environment, the right to peace, and the right to ownership of the common heritage of mankind. The third generation rights include an intertemporal aspect of human rights.

[637] Edith Brown Weiss, 'Our Rights and Obligations to Future Generations for the Environment', 200.

[638] Edith Brown Weiss, *In Fairness to Future Generations: International law, Common Patrimony and Intergenerational Equity*,

[639] Edith Brown Weiss, *In Fairness to Future Generations: International law, Common Patrimony and Intergenerational Equity*, 42.

obligations. They derive from each generation's position as part of the intertemporal entity called mankind.[640] In the intergenerational dimension, the generations to which the obligations are owed are future generations, while the generations with which the rights are linked are past generations. Thus, the rights of future generations are linked to the obligations of the present generation.[641] The intergenerational planetary rights should be considered the group rights, and are distinct from individual rights in the sense that a group hold these rights in relation to other generations.

### 3. Mankind as a subject of international space law

The consideration of 'mankind' as a bearer of rights and duties directly points to the issue of its legal personification.

The use of term 'mankind' as seen through the lenses of the modern legal doctrine is often deemed to have a normative weight but is also seen as problematic in many ways.

In space law it appears in the body, not only in the preamble of the treaties, what supports the thesis of its normative character in space law and not only mere declaratory facet. At the time of the introduction of the idea of the common heritage of mankind by Arvid Pardo in 1967[642] - that coincides with the entry into force of the OST - there were outstanding voices of pioneers of space law doctrine arguing for the attribution of legal personality to the term 'mankind.' Cocca, while prising the Outer Space Treaty, concluded that 'the international community from now on has recognized the existence of a new subject of international law namely Mankind itself, and has created a *jus commune humanitatis.*'[643] He theorized that law exists within a cycle of political dimensions of Man and it goes as follows: Man-Society-State-International Community-Mankind[644]

[640] Edith Brown Weiss, 'Our Rights and Obligations to Future Generations for the Environment', 202.
[641] Ibid.
[642] UN (Official Records, A/C.1/PV.1515), found at: < http://www.un.org/depts/los/convention_agreements/ texts/pardo_ga1967.pdf>.
[643] Aldo Armando Cocc (COPUOS Legal Subcomittee June 19, 1967) in The Common Heritage of Mankind Doctrine and Principle of Space Law – an Overview. IISL Coll. Proceedings 1986.
[644] Aldo Armando Cocca, 'The Advances of International Law Through the Law of Outer Space', 13.

He considers mankind as a culmination of a man-society concept[645] and therefore, it can be argued that *jus commune humanitatis* as created by space law is a qualified version of international law.

Also Marcoff clearly inclined towards a recognition of mankind in space law as a subject of international law.[646] Gorove[647] and Fasan[648] recognised a prominent place occupied by the term 'mankind' in the space treaties but at the same time underlined many crucial problems involved, in particular representative problems; however they seemed to allow for the possibility that mankind would eventually evolve into a new subject of international law. To this end Fasan deduces that because mankind is a legal beneficiary of right established under international law, the legal notion of mankind must have special international legal meaning. He concludes that mankind is undergoing the 'process of becoming a new legal subject of international law.'[649] The possibility, however, of accepting a mankind as a new subject of international law suffers greatly due to the lack of representation.[650] Górbiel states that 'every subject of international law must have an organ competent to represent it in the international relations. There does not exist any such organ representing the mankind as a whole.[651] Tatsuzawa adds that a state or group of states can't represent the will of all mankind. Mankind is not yet institutionalized as such. It remains only a philosophical concept in the actual stage of human progress.[652] Dekanozov clearly suggests that the term mankind is in fact strictly conventional. It is not an independent subject of international law with its rights and obligations.[653]

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[645] Aldo Armando Cocca, 'The Advances of International Law Through the Law of Outer Space'.

[646] Marco G. Marcoff, *Traité de droit international public de l'espace* (Éd. Univ. Fribourg Suisse 1973), cited in Adrian Bueckling, 'The Strategy of Semantics and the 'Mankind Provisions' of the Space Treaty', 19.

[647] Stephen Gorove, 'The Concept of 'Common Heritage of Mankind': A Political, Moral or Legal Innovation', 393.

[648] Ernst Fasan, 'The Meaning of the Term 'Mankind in Space Legal Language'', 125.

[649] Ibid., 131.

[650] On the issue of representation for mankind or future generations see xxxxxx.

[651] A. Górbiel: International Regulation of the Use of the Lunar Natural Resources and the CHM Doctrine, Acta Universitatis Lodziensis 1983 *Politiologia* 9, p.12.

[652] K. Tatsuzawa: *Political and Legal Meaning of the CHM* (IISL Collection Proceedings 1986), 86.

[653] R. V. Dekanozov: *The CHM in the 1979 Agreement Governing the Activities of the States on the Moon and Other Celestial Bodies* (IISL Coll. Proceedings 1981), 182.

The issue of legal personification of mankind became yet another battlefield, also in a classic conflict between naturalists and positivists.[654] Yet many scholars agree that 'mankind' in international law, and in space law in particular, can be considered to enjoy a 'passive legal personality', i.e. it may be a bearer of rights but without capacity to exercise them.[655] The lack of representation, although very problematic, does not affect the existence of the rights vested in mankind by space treaties or the obligations associated with mankind, as deducted based on the trusteeship doctrine.[656] This procedural lack of representation impairs, however, the capacity to enjoy full legal personality.

The interesting concept of the pathway towards legal personality of mankind in space law can be developed within the afore-described trusteeship doctrine. As Courteix stated: The human species named mankind (*ensemble du genre humain*) without an independent state-organization (*gouvernement supranational*) could act in outer space only by a "trustee" otherwise legal personality of mankind hardly would be accepted.[657]

### 3.1. Envoys of mankind

The "envoys of mankind" clause appears in Article 5 of the OST reading that "States Parties to the Treaty shall regard astronauts as envoys of mankind in outer space and shall render to them all possible assistance in the event of accident, distress, or emergency landing on the territory of another State Party or on the high seas." This provision is further elaborated in the Rescue Agreement. Both treaties oblige States to help astronauts in distress based on the fact that they are envoys of mankind. This is not

[654] For the conflict between naturalists and positivists with respect to jus cogens and mankind provisions see for example Gennady M. Danilenko, 'International Jus Cogens: Issues of Law-Making' (1991) 42 *European Journal of International Law* 42.

[655] Boldizsar Nagy, 'Common Heritage of Mankind: the Status of Future Generations' (IISL 31 Collection Proceedings, 1988), 319-325; Kemal Baslar, *The Concept of the Common Heritage of Mankind in International Law*, 78. With this respect one needs to notice that the Supreme Court of Philippines ruled that 'children and succeeding generations had standing claiming that the forestry practice was hurting their and the future generations' [The Philippines Supreme Court, 30 July 1993, The Minors Oposa v. The Secretary of the Department of Environment and Natural Resources, 30 July 1993].

[656] Edith Brown Weiss, 'Our Rights and Obligations to Future Generations for the Environment', 205. 'While the holder of the right may lack the capacity to bring grievances forward and hence depends upon the representative's decision to do so, this inability does not affect the existence of the right or the obligation associated with it.'

[657] S. Courteix: L'accord régissant les activités des États sur la lune et les autres corps célestes, *Annuaire Francais de Droit Public XXV*, 1979, 221.

the case where Article 14.1a of the Vienna Convention on Diplomatic Relations[658] applies. In case of the obligation to assist astronauts, the use of a word 'mankind' shifts the status of an astronaut from mere representative of other State to a representative of all people, including the assistant. Since astronaut acts as an envoy of mankind, which includes all people, the assistance to an astronaut is primarily grounded not in morality but in solidarity among all people and in certitude that such an assistance is for the benefit of all people, including the assistant.

By virtue of Article V, astronauts have been vested with the legal representation of mankind. As Cocca highlights no other former representation has ever been as wide.[659] Nevertheless, astronauts were not vested with procedural right to represent interests of mankind what would eventually allow for the undeniable development of mankind into a legal subject.

### 3.2. Province of mankind

Article I of the OST reads that '[t]he exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.' The same sentence is than repeated in the Article 4(1) of the Moon Agreement with respect to the Moon only: 'The exploration and use of the Moon shall be the province of all mankind and shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development.' The province of mankind is also mentioned in one of the declarations on space law that, apart from the treaties, are often seen as integral part of *corpus juris spatialis*. Article 1 of the 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 states that '[i]nternational cooperation in the exploration and use of outer space for peaceful purposes […] shall be carried out for the benefit and in the interest of

[658] The Vienna Convention on Diplomatic Relations ref
[659] Aldo Armando Cocca, 'The Advances of International Law Through the Law of Outer Space', 17.

all States, irrespective of their degree of economic, social or scientific and technological development, and shall be the province of all mankind.'[660]

The Treaties does not yield any further explanation on what the province of all mankind means. Many scholars argue that in general the meaning and practical implications of the 'province of all mankind' remain uncertain.[661] Some point to the moral value of the provision, others stress its binding character.[662] Despite the uncertain some points can clearly be made.

The OST and the Moon Agreement clearly point to the fact that a province of all mankind refers to the use and exploration of outer space, therefore it refers to the activities in outer space and not to the physical area of outer space beginning above airspace and extending infinitely outwards. Province of all mankind refers to the right to use and explore outer space by mankind, understood as all people within the past, present and future generations, or as present and future generations when it comes to the identification of rights and duties 'in progress' (although the behaviour of past generations obviously has impact on the present and future generations, their duties and rights basically belong to the past). Moreover, the Declaration further specifies that the province of mankind also includes international cooperation in the exploration and use of outer space. For that reason the overall meaning of the concept of the province of all mankind boils down to the equal rights to use and explore outer space and a right to be a cooperating party. These rights are born by entities within both current and future generations. The equal rights to use and explore outer space by people within present and future generations are directly linked to the duties arising from the Brown Weiss' planetary rights.[663] These are duties that oblige any generation to use and explore outer space in a way that preserves access, options and quality of the environment of space for future generations.

The notion of the 'province of all mankind' is also directly linked to the 'the benefit and the interests of all countries.'[664] Therefore the right to freely use and explore outer

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[660] The 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 states, Paragraph 1.

[661] See for example Fabio Tronchetti, 'Legal Aspects of Space Resource Utilization', 781.

[662] Ibid.

[663] For the planetary rights see section 'The trusteeship doctrine', Chapter I(2.1.2.1).

[664] 'The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.

space is explicitly limited by the beneficial clause that requires that such use is for the benefit of all States, not only the one conducting given activity.[665] While the province of mankind refers to the intertemporal and interspatial right to use and explore space, the requirement to do it for the 'benefit and in the interests of all countries' rather highlights the interspatial aspect of mankind with States being identified as benefit receivers within the present generation. With comparison to the 1963 Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, this norm has changed. The Declaration states that '[t]he exploration and use of outer space shall be carried on for the benefit and in the interests of all mankind.'[666] It does not use the expression 'province of mankind.' Unlike in the OST, the benefit clause as present in the Declaration, by reference to mankind, aims at equal sharing of the benefits by present and future generations. On the other hand, the 'beneficial clause' of the OST limits the benefit sharing to the present generation. Despite this weakening of the 'beneficial clause' by the OST, the change seems to have practical value allowing for interpretations beyond mere symbolic realm. The 'province of mankind' more accurately then the 'beneficial clause' reflects the overall rights of future generations. These rights do not exactly lie in sharing benefits but in use and exploration of outer space by present generation in a way that preserves access, options and quality of outer space for future generations.

### 3.3. Common heritage of mankind

Within framework of space law the common heritage of mankind appears in the Moon Agreement. Article 11 with conjunction with Article 1.1 describe the Moon and other celestial bodies within the solar system, other than the Earth and its natural resources as the common heritage of mankind and draws a general legal framework for future exploitation of these resources.

[665] The beneficial clause causes practical issues. For example if a State launches a mission to explore outer space it can be easily argued as being beneficial to all countries. Nevertheless, a launch of a national communication satellite for the benefit of all States sounds unrealistic if the benefit is supposed to be equally divided among all States. In practice, while the direct economic benefits go to the launcher, the services generated by the satellite are available to other entities, what can be considered a potential benefit. Moreover, since the word benefit presumes a positive result, simple abstaining from harming others' interests cannot be considered as acting for the benefit of all States.

[666] The Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, Principle 1.

The legal discussion on the CHM generally begun over a decade before conclusion of the Moon Agreement with the speech on new law of the sea of the Maltese ambassador Arvid Pardo (1914–1999) to the United Nations in 1967.[667] In 1970, the UN General Assembly adopted Resolution 2749 recognising the CHM as the principle governing the exploitation of the international seabed. The concept of the CHM was subsequently adopted by the United Nations Convention on the Law of the Sea (UNCLOS) to govern the 'Area'.[668] Under Article 136 UNCLOS, the 'Area' – which is the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction, and its resources – are the common heritage of mankind.

Although the CHM had been officially conceived slightly prior to the adoption of the OST in 1967, it was not incorporated into it. The novel notion of the 'the province of all mankind' was used instead.[669] The CHM found its way to space law through the norms of the Moon Agreement. Unlike the UNCLOS, the Moon Agreement does not establish any specific norms regarding exploitation of resources of celestial bodies. Article 11 provides only for very general rules that reflect the essential building blocks of the CHM in international law.[670] Moreover it obliges States to establish an international regime dealing with exploitation of resources of celestial bodies only as such exploitation is about to become feasible.[671] Nevertheless the norms are substantial enough to significantly limit the laissez-faire approach to the use and exploration of outer space. For that reason, Article 11 of the Moon Agreement remains a sole main cause of a very poor international recognition of the Moon Treaty with nearly all developed space-faring States permanently rejecting it. These States do not view the framework established by the Moon Treaty as a good foundation for the future business activity on the Moon.

Can therefore the CHM be applied to outer space regardless the poor ratification of the Moon Agreement? Borgese points to five principles underpinning the general concept of the CHM in international law: (a) the principle of non-appropriation linked

[667] In this speech he proposed that the seabed and ocean floor beyond national jurisdiction be considered the CHM. This was an important event that triggered the later negotiation of the 1982 Law of the Sea Convention and other legal developments that subsequently earned Arvid Pardo the title "father of the law of the sea." But CHM has a much longer history, and Pardo drew upon this in developing CHM as a legal concept for the oceans.

[668] UNCLOS, Part XI)

[669] 'Province of mankind' was not present in the 1963 Declaration that formed a base for the OST.

[670] See *infra*.

[671] The Moon Agreement, Article 11.5.

to the ban on establishing the property rights; (b) the principle of shared management; (c) the principle of a common benefit implying an equitable distribution of benefits; (d) the principle of use for exclusively peaceful purposes; and (e) the principle of conservation for future generations.[672] Out of these five principles two have been already accepted as basic principles of space law, notably in the OST. They also are running threads of the whole space regime, therefore the lack of acceptance of the Moon agreement do not affect them. These are the principle of non-appropriation[673] and the principle of use for exclusively peaceful purposes.[674]

As for the principle of non-appropriation, in the Moon Agreement the non-appropriation is directly followed by the principle that clearly prevents the establishment of the property rights with respect to the surface, subsurface of the Moon, or natural resources in place.[675] The non-appropriation principle as vested in the OST does not directly refers to the property rights neither is followed by a ban on a possibility of establishing them. It provides that '[o]uter space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means'.[676] Being a general norm, it is a subject to different, often contradicting interpretations.

One interpretation of the OST non-appropriation principle is that it bans State and private appropriation, since non-appropriation *per se* encompass the prevention of the establishment of the private property rights. Although Article II OST *expressis verbis* bans only national appropriation, it is predominantly argued that it also prevents establishing the private property rights. This interpretation directly results from Article VI OST that introduces State responsibility for its nationals adventuring in outer space. The Article obliges States to authorize and supervise activities of all non-governmental entities in outer space. Therefore following the rule that if the superior entity is banned from the acquisition of the property rights, so is the subordinating entity, which cannot

[672] Elisabeth Mann Borgese, 'The Common Heritage of Mankind: From Non-living to Living Resources and Beyond' (cited in Nisuke Ando and others (eds), *2 Liber Amicorum Judge Shigeru Oda* (2002) 1313). Other scholars also accept those five basic principles

[673] The Moon Agreement, Article 3.1, the OST, The OST, Article II.

[674] The Moon Agreement, Art. 3, The OST, Article III and IV.

[675] The Moon Agreement, Article 11.3: 'Neither the surface nor the subsurface of the Moon, nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person'.

[676] The OST, Article II.

enjoy more rights than the superior one.[677] This interpretation, as the most accepted, allows for the recognition of the principle of non-appropriation as building block of the CHM based on the OST and not the Moon Agreement.

Another two interpretations, although much less supported,[678] do not allow for the acceptance of the non-appropriation principle in a shape consistent with the CHM. One of them is that the OST non-appropriation, hence the ban on the establishment of the property rights, refers only to the States and not to private entities; therefore the private entrepreneurship can at least acquire property rights towards the minerals excavated, and at most is capable to gain ownership of the territory.[679] The other interpretation stipulates that the principle simply does not regulate the issue of the property rights in space. The latter interpretation is greatly supported by most of the developed space-faring States and private entities that invest in development of economic sector on mining space resources. The last interpretation basically leaves the carte blanche for the regulation of this subject matter in space law within the regime of international law.

Another building block of the CHM is the principle of conservation for future generations and pivotal for it environmental protection. The Moon Agreement is the only formally binding instrument that *experessis verbis* regulates these issues within the

[677] For example Sters and Tennen affirm that Article II applies to private entities even if they are not expressly mentioned in Article II. According to Article VI of the OST, private entities need State authorization to conduct activities in outer space. Therefore if the State is prohibited from engaging in certain conduct, then it lacks the authority to license its nationals or other entities subject to its jurisdiction to engage in that prohibited activity. [Sters and Tennen, Preliminary jurisprudential observation concerning property rights on the moon and other celestial bodies in the commercial space age, Proceedings of the Colloquium on The Law of Outer Space, 50 (1996)]; Jenks argues that since States bear international responsibility for national activities in space then what is forbidden to a State is not permitted to a chartered company created by a State or to one of its nationals acting as a private adventurer'[Jenks, Space Law, London, Stevens and Sons, 1965, 201]. There are also historic arguments for inclusion of private entities within the scope of Article II. During the negotiations of the OST, the Delegate of Belgium affirmed that his delegation "had taken note of the interpretation of the non-appropriation advanced by several delegations-apparently without contradiction-as covering both the establishment of sovereignty and the creation of titles to property in private law.' The French Delegate stated that: '…there was reason to be satisfied that three basic principles were affirmed, namely: the prohibition of any claim of sovereignty or property rights in space…' [cited in Fabio Tronchetti, 'The Non-Appropriation Principle under Attack: Using Article II of the Outer Space Treaty in Its Defence ', 3].

[678] 'However, it must be said, that nowadays there is a general consensus on the fact that both national appropriation and private property rights are denied under the Outer Space Treaty' [Tronchetti, Fabio Tronchetti, 'The Non-Appropriation Principle under Attack: Using Article II of the Outer Space Treaty in Its Defence ', 3].

[679] Some authors have argued that the private appropriation of outer space and celestial bodies is allowed. For instance, in 1968 Gorove wrote: "Thus, at present an individual acting on his own behalf or on behalf of another individual or private association or an international organisation could lawfully appropriate any parts of outer space…" Nevertheless, now there seems to be an academic consensus on prohibition of private appropriation [see Stephen Gorove, 'The Concept of 'Common Heritage of Mankind': A Political, Moral or Legal Innovation'].

outer space legal regime.[680] Nevertheless also outside the regime of the Moon Treaty the support for environmental protection is visible. There has been a steadily growing acceptance for the environmental regulations, in particular with respect to the proliferation of space debris. This international concern regarding the pollution of the near-Earth orbits prompted the change in interpretation of Article IX of the OST that gained recognition as a legal base for environmental protection of outer space.[681] Also the use of term 'mankind' by space treaties, in particular by the OST, implies general obligation of environmental protection. This interpretation can be deducted from the intertemporal aspect of the doctrinal definition of mankind. Moreover, the recognition of the necessity for legal regulation of environmental issues concerning outer space was also reflected in soft law instruments such as Space Debris Mitigation Guidelines and International Code of Conduct as well as within the initiative regarding long-term sustainability of outer space under auspices of the UNCOPUOS. Therefore, to great extent, the binding force of the conservation for future generations principle could also be assured by legal grounds outside the regime of the Moon Agreement.

The two remaining principles, i.e. the principle of shared management and the principle of a common benefit implying an equitable distribution of benefits, embodied respectively in Article 11.5 and Article 11.7 of the Moon Agreement face clear opposition. They remain a main reason for lack of acceptance of the CHM in outer space resulting in very poor ratification of the Moon Agreement by nearly all space-faring developed States. Therefore, although the Moon Agreement introduced the CHM as a legal norm, its binding status cannot be well established on the virtue of the Agreement.

The inability of international consensus on the commercial use and exploration of outer space has resulted in the situation that space sector observes the developments in the national regulations of the major space-faring powers rather than in international

[680] The Moon Agreement, Articles 4.1: 'Due regard shall be paid to the interests of present and future generations' and Article 7.1: 'In exploring and using the Moon, States Parties shall take measures to prevent the disruption of the existing balance of its environment, whether by introducing adverse changes in that environment, by its harmful contamination through the introduction of extra-environmental matter or otherwise.'

[681] The OST, Article IX: '[…]States Parties to the Treaty shall pursue studies of outer space, including the Moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination.' Historically the harmful contamination used to be interpreted in a very narrow sense insufficient to handle the environmental issues. Explain.

law.[682] As for now, the domestic law seems to be a more certain candidate for paving the legal way for the business activities in outer space and subsequent developments in international law.

### *3.3.1. Systemic propositions for acceptance of the CHM in outer space*

As mentioned above, the systemic attempts to apply the CHM to outer space do not gain much acceptance outside the academic debate. The lack of acceptance of the CHM within the space law regime is reflected in a very poor ratification of the Moon Agreement, the only instrument that *expressis verbis* introduces the CHM to outer space. Nevertheless there have been important attempts to justify the application of CHM to outer space based on the systemic approach. To this end the roots of the binding force of the CHM in outer space are looked for in the in the legal system itself rather than in the State consent.

#### *3.3.1.1. Application of the CHM to outer space as a general rule of international law*

Despite the persistent opposition towards legal qualification of the CHM outer space, along with other commons, i.e. the seabed, ocean floor and subsoil thereof, are often categorised in the legal doctrine as the CHM. This approach is reflected in the ILA Delhi Declaration that calls '[t]he resources of outer space and celestial bodies and of the sea-bed, ocean floor and subsoil thereof beyond the limits of national jurisdiction as "the common heritage of humankind".[683] The ILA Declaration stands for the proposition of accepting the CHM as a binding legal norm. The scope of the CHM as proposed by the ILA is even broader than one introduced in the Moon Agreement that

[682] For example the US Space Act.

[683] New Delhi Declaration (n 49). At the New Delhi Conference of ILA there were discussed proposals for the replacement of the CHM formula with "the province of all Mankind" (Von der Dunk) or "Common Concern of All Mankind" (Maureen Williams). Moreover there have been propositions to even further extend the scope of th CHM. During the recent discussions at the UN on a third UNCLOS implementing agreement on conservation and sustainable use of marine biodiversity beyond national jurisdiction the developing countries took the position that the CHM regime should be extended to cover marine genetic resources [The UN Informal Consultative Open-ended Process on Ocean and Law of the Sea (6-10 April 2015) <www.un.org/depts/los/consultative_process/consultative_process.htm> accessed 15 July 2015].

considers only the Moon and other celestial bodies within the solar system, other than the Earth to be the CHM.[684]

First of all the CHM is widely considered as underpinned with strong ethical and moral values. As expressed by Cocca, from the very beginning: "it is an ethical norm and essential for survival rather than a compulsory rule by force of law… a symbol of harmony, progress, friendship, understanding and peace."[685] Borgese states that the CHM is an ethical concept central to a new world order, based on new forms of cooperation, economic theory and philosophy. It is important to elucidating the ethical core of CHM: the responsibility of humans to care for and protect the environment, of which we are a part, for present and future generations.[686]

With respect to the legal nature of the CHM clause, one finds different views in the theory. It is clearly accepted that the CHM is a norm that rules part of the ocean area (seabed and ocean-floor and the subsoil thereof).[687] Many are consistent with the ILA Declaration and support the view that there is a general norm obliging States to apply the CHM to the areas beyond national jurisdiction, including outer space. The extreme opinion is, that CHM is an imperative rule of general international law. "The principle is embodied in many legal instruments, treaties and resolutions and explicitly or tacitly recognized by state practice, which is evidence of the existence of a general consensus *together with the conviction of its nature as jus cogens*."[688]

With passing time the CHM has lost its fresh appeal and even seems to fade away from the general legal domain, while remaining an expression of socio-political ideas[689] and a strong ethical norm. Its status outside the UNCLOS regime is by no means established. With respect to space law – in light of a clear and wide lack of State consent for the Moon Agreement coupled with the problematic legal status as a general norm the systemic attempts to apply the CHM to outer space do not gain much acceptance outside the academic debate.

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[684] The ILA Delhi Declaration calls '[t]he resources of outer space and celestial bodies and of the sea-bed, ocean floor and subsoil thereof beyond the limits of national jurisdiction as "the common heritage of humankind"'

[685] A. A. Cocca: CHM a Basic Principle of the International Legal System. IISL Coll. Proceedings 1988, p.94

[686] See for example Elisabeth Mann Borgese Ref

[687] The UNCLOS 1982 declares that the seabed and ocean-floor and the subsoil thereof […]as well the resources of the area are Common heritage of Mankind.[687] Ref.

[688] Resolutions of VII (1969) and XII (1982) Kongresses of Instituto Hispano-Luso Americano de Derecho Internacional.

[689] I. H. Ph. Diederiks-Verschoor: An Introduction to Space Law. Deventer-Boston 1993, pp.91-92.

#### *3.3.1.2. Acceptance of the CHM within space law as a qualified version of the province of mankind*

There is a school of thought that considers the CHM to be the functional and legal equivalent of the province of mankind. Therefore, the application of the CHM to space law is primarily assured by the legal recognition of the provision of the province of mankind.

Although the history of the provenance of these two concepts points to some confusion over their understanding and temporal treatment as essentially the same, the eventually established meanings significantly differ between each other. The term 'province of all mankind' was coined by the USSR in 1966 during the drafting process of the OST and then it found its way into Article 1 of the OST.[690] The term 'common heritage of mankind' was first used at the UN in 1967 by Cocca also with respect to outer space as a legal proposition[691] in order to replace vague 'province of all mankind.' Nevertheless more prominent entrance of the CHM to international law was made few months later at the Seabed Committee as proposed by Arvid Pardo.[692] It was subsequently adopted by the UNCLOS.[693] The USSR refused to recognise the CHM in space law, and since the beginning opposed their use in the drafting process of the Moon Agreement, mainly for ideological reasons, as being rooted in bourgeois Roman law.[694] For that reason the USSR later came to distinguish between the CHM and the

[690] In the OST drafting process, the US and USSR put forward proposals that contained similar basic concepts. The final draft of Article 1, paragraph 1 of the OST almost exactly adopted the language of the 1966 Soviet Draft [Carl Q. Christol, *The Modern International Law of Outer Space*, 38]. 'The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind' [OST, art 1].

[691] The UN Committee on Outer Space A/AC.lO5/C.2/SR 75.

[692] Williams points to the issue of paternity of the CHM concept and continues that more often than not it is wrongly attributed to the Permanent Mission of Malta to the U.N. as recorded in Doc. AJ669S of 18 August 1967) [Williams, "The Role of Equity in the Law of Outer Space," 5 International Relations 1 (1975)].

[693] The CHM was the main innovating aspect of the UNCLOS with respect to the previous law of the sea regime. While other important innovations, such as the exclusive economic zone, were to some extent an evolutionary development of the system, the introduction of the CHM had a revolutionary character. Borgese commented: 'The basic principle, the motor force of the "marine revolution", is the concept of the Common Heritage of Mankind. It cannot be stressed enough that the adoption of this principle by the XXV General Assembly as a norm of international law marked the beginning of a revolution in international relations' [cited in Ettinger and Payoyo (n 14) <http://archive.unu.edu/unupress/unupbooks/uu15oe/uu15oe0p.htm> accessed 20 May 2015].

[694] Dekanzov (1974) [Joanne Irene Gabrynowicz, 'The "province" and "heritage" of mankind reconsidered: a new beginning' (Proceedings of the 2nd Conference on Lunar Bases and Space Activities of the 21st Century, Houston, TX, 1988), 692].

province of all mankind concept.[695] The US at first saw the two concepts as indistinguishable and relating to the expansion of *res communis* governed by the principle of freedom and equitable access.[696] The less developed countries insisted that 'the province of mankind', like the CHM, means that all nations have vested rights in common resources and these should be shared equitably among them. As a result, in the negotiating process of the UNCLOS, the less developed countries led the move away from 'the province of mankind' as contained in the OST (in the negotiation of which, they had no real power) and turned to 'the common heritage of mankind' as an expression better suitable for guarding their interests.[697] Eventually the CHM formulated upon a civil law analogy was applied to the exploitable resources of the ocean protecting the interests of technologically less advanced states.[698] Since the very beginning, the CHM was to serve as a novel managing mechanism for the seas beyond national jurisdiction,[699] as an alternative to the freedom of the seas.[700] 'The province of all mankind', on the other hand, since the very beginning, has functioned as an equivalent of the principle of freedom of use underpinned by the theory of a big sky with a laissez-faire approach to activities in outer space. This approach was somehow understood, given that space exploration had just begun. The launch of Sputnik 1, apart from sparking fears of a military space race, awakened a tremendous thirst for space exploration. The set of freedoms provided by the OST was an incentive for the development of the space industry. Therefore the drafting history supports the stance on the different meaning of the heritage and province of mankind.

The established difference between those two concepts lay in their subject matter. The province of mankind refers to activities, namely use and exploration of outer space,

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[695] Maiorsky B. (1986) 'A few reflections on the meaning and the interrelation of "province of all mankind" and "common heritage of mankind" notions' (Proceedings of the 29th Colloquium on the Law of Outer Space, IAA, New York), 58-59 [cited in Joanne Irene Gabrynowicz, 'The "province" and "heritage" of mankind reconsidered: a new beginning' (Proceedings of the 2nd Conference on Lunar Bases and Space Activities of the 21st Century), 692].

[696] ibid. In practice, this interpretation was guiding the states' conduct in outer space until the moment when the actions were taken to tackle the problem of space debris.

[697] ibid.

[698] D. S. Myers, *Is there a CHM?* (IISL Coll. Proceedings 1990), 335.

[699] The CHM was originally intended as a concept that would revolutionise the law of the sea by applying to all ocean space and resources. But in 1967, Arvid Pardo suggested applying it to the limited entity of the seabed.

[700] Freedom of the high seas, developed by the Dutch jurist Hugo Grotius (1583–1645), creates an open access regime allowing for its laissez-faire use. Presently, however, the concept of freedom of the sea is not absolute and needs to be understood in the context of the present legal regime and in relation to the other potentially conflicting uses and interests.

while the common heritage of mankind as contained in the Moon Treaty refers to the material objects, notably to physical celestial bodies in the solar system, other than the Earth.[701] Moreover the heritage was formulated upon a civil law analogy to *res communis*, while province primarily relies on the right to free use and exploration of space.

The difference is also noticeable in the specific rights and duties arising from these two provisions. Although the province of mankind is often argued to be a vague and general statement, its development into more clear legal norm is mainly due to the doctrinal developments within the conceptualisation process the mankind itself. Upon application of the trusteeship doctrine, relevant when considering legal status of mankind, it is possible to draw far more specific rights and duties arising from the provision of the province of mankind. Since the activities and use of outer space are to be a province of mankind, the provision assures that those activities need to be possible to conduct by mankind, i.e. by present and future generations. The rights and duties are therefore distributed among generations, with each generation bearing first rights to prospective use of outer space and then rights to use outer space and preserve same options for future generation. The use and exploration of outer space must be conducted within the principles provided by space law and the dimension of the generational rights tightly related to the term 'mankind' must additionally assure for the environmental protection.

The rights and duties arising from the common heritage of mankind additionally encompass benefit sharing and common management. While those rights and obligations can be seen as a logical and desired continuum of the province of mankind they are clearly not equivalent to them and cannot be neither considered alike nor introduced to space law based on the approval of the province of mankind.

[701] On the virtue of Article 1 of the Moon Agreement. Such a distinction is widely supported in the space law doctrine. Maiorsky 1986, Bueckling 1979, Gabrynowicz, others…) it is less visible outside it. examples

## CONCLUSIONS

In October 1957, the Sputnik1 was launched into a physical as well as a legal vacuum. Since then, many new developments have taken place that have proven current international space law to be too general and in some aspects outdated. Emerging space activities such as resource mining or space travel, the proliferation of space actors, the changing roles of States in the international order and in the process of space exploration – all these factors call for corresponding developments in international space law.

Despite wide recognition of the need for changes in the international legal framework on outer space and attempts to address the issues, the *status quo* in the international hard law persists. Flaws in the treaties on outer space are to some extent alleviated by mostly *ad hoc* international soft instruments and developments on the national level.

Apart from the need for legal norms regulating the conduct of new and emerging activities in outer space, there is a need for legal norms addressing conflicting issues and interests that arise at the intersection of the economy, international social justice and environmental protection. The Moon Agreement has proved that more stringent solutions are not to be well received by States. Sustainable development is a concept recognised within the ambit of international law that on the one hand provides guidance and tools to address such conflicts and on the other hand allows for considerable flexibility. Nevertheless, its application to international space law has not been clearly accepted despite the lack of formal and substantive obstacles. Mainly for political and economic reasons, space law addresses these issues outside the legal framework of sustainable development. In contrast to sustainable development, whose objective is inter- and intragenerational equity, ongoing multilateral initiatives are focused on specific aspects of the long-term usability of outer space. Moreover, sustainable development provides a holistic systemic framework that could fill existing lacunae and guide the creation of new norms. This is especially important at the present time, when it appears law-making processes in space law may soon be dominated by domestic laws that do not always reflect the commonality of outer space.

As mentioned above, there are no legal obstacles precluding the extension of sustainable development to international space law. Nevertheless there are legal

difficulties that can impede such a process. The main difficulties are linked to the conceptualisation of sustainable development. The concept of sustainable development is complex and evolutive, which often results in overall ambiguity concerning its legal perception. Legal doctrine varies in the conceptualisation of sustainable development and its legal assessment. Many highlight that the connection of sustainable development with law is mainly restricted to the fact that, as a political objective, it impacts international negotiations; hence, it contributes to law formation while remaining separate from it. On the other hand, there are also voices that support legal recognition of sustainable development as a binding norm of international law. The noticeable inability to clearly acknowledge sustainable development as a norm of a traditional kind has led to the situation where it is often regarded not as a legal norm – a custom or principle – but as a new branch of international law altogether. Furthermore, some scholars associate sustainable development rather with certain specific principles and objectives, such as intergenerational equity or the principle of integration or the set of various principles advancing the issue of sustainable development.

In order to better apprehend the concept of sustainable development, the present study has proposed its conceptualisation as a form of systems theory dubbed 'the hierarchy theory'. This theory clarifies the concept by analysing it as a hierarchical structure within which different legal perspectives may be accommodated. The complexity of sustainable development can be better dealt with by addressing sustainable development as a hierarchical, as opposed to a flat, concept. The main reason for building such a structure is to enable a clearer apprehension of the relations between apparently competing views, or, using systems theory nomenclature, among levels and components of sustainable development. Unlike the flat concept, the elements or levels of the hierarchical structure of sustainable development are more amenable to the legal assessment. Therefore, the study advocates approaching sustainable development as a four-level concept: The first level encompasses the most general manifestation of sustainable development as a legal objective; the second level concerns sustainable development seen as the principle of integration; the third level comprises cross-sectoral principles enabling integration of socio-economic and environmental aspects towards sustainable ends; and the final level covers sectoral principles/norms advancing the transition towards sustainable development.

The acceptance of sustainable development on the level of Objective would mean accepting sustainable development as an interpretative tool that serves as a lens for the interpretation of norms, either in the hands of judges or as an 'object and purpose' of a particular treaty. However, as such this first layer of the hierarchical structure is rather devoid of tools that might directly and effectively guide the conduct of States, since it does not communicate what should be done in order to transform mere development into a sustainable process. It provides no solutions and imposes no stringent legal obligation. It simply points to a desirable effect that should be borne in mind in interpreting specific norms; therefore as a tool of interpretation sustainable development needs to operate within the scope of primary norms. Although it does conveys no specific solution to the problem of sustainability, the important legal result of the acceptance of this outermost level of sustainable development is that it directly refers to more specific levels of the hierarchical structure that, in turn, provide for more specific principles, norms and tools. It directly refers to the principle of integration as the heart of sustainable development and as a key procedural principle for the achievement of sustainable development.

The principle of integration constitutes the second level of the hierarchical structure of sustainable development. This principle is a key procedural level communicating that sustainable development must be achieved through integration of environmental aspects into the socio-economic development. Therefore, applying the concept of sustainable development to outer space means integrating socioeconomic and environmental issues related to space activities with the aim of achieving inter- and intragenerational equity.

Failures to adopt a holistic approach to human behaviour from the very first stage of planning often lead to segmented solutions that may be successful within their narrow boundaries, but which do not necessarily work well within the larger whole. Obviously, many steps that are currently undertaken to ensure the usability of outer space are consonant with sustainable development – to cite just one example, Space Debris Mitigation Guidelines aiming to reduce the proliferation of space debris are quite consistent with the environmental objectives promoted by sustainable development. Nevertheless, from the perspective of sustainable development there are important areas that have not been addressed (or that have not been adequately addressed) by the Long-Term Sustainability of Outer Space initiative, *inter alia* intragenerational equality.

Fairer distribution of the wealth generated by use of outer space is probably the most problematic aspect of the application of sustainable development to outer space.

In light of the proposed hierarchical approach to sustainable development, the principle of integration assures the binding character of sustainable development, because it constitutes a legal source as a general principle of international law. Unlike the interpretative tool, the function of the principle of integration as an autonomous binding principle potentially allows for the introduction to space law of the new legal quality oriented towards inter- and intragenerational equity. Moreover, as a norm of reference, the principle of integration points to specific norms and principles enabling integration.

These specific norms and principles, such as the precautionary principle, the principle of common but differentiated responsibilities and the polluter-pays principle, just to name a few, constitute the third level of the hierarchical structure. The principle of integration creates a procedural obligation to carefully consider and translate these enabling principles into the legal context of outer space. The principle of integration relies on the enabling principles for its substantive realisation.

The fourth level of the structure concerns the shape sustainable development will take in outer space. This level consists of the outer space sectoral norms enabling transition towards sustainable development that would result from the extension of sustainable development to space law. The application of sustainable development to outer space law would entail the reinterpretation of basic principles of space law in the light of sustainable development. The principle of integration would justify the applicability of cross sectoral principles, enabling the integration of the three aspects into space activities. All of this would eventually lead to the creation of a body of space law on sustainable development.

Advancement of the issue of sustainable development in a global commons such as outer space requires a shift of perspective, from the reciprocal to the collective. Space law already contains norms that could be operationalised towards more collective ends upon the application of the concept of sustainable development. As for the substance, the letter of space law is truly progressive. The related notions of mankind and common heritage of mankind already provide a good basis for further developments. What space law lacks is an acceptance of the need for systemic integration of environmental and social considerations with economic issues in exploring and exploiting space, as a way

of achieving intra- and inter-generational equity. This gap could be filled by the principle of integration, since it would enable operationalisation of the mankind provisions. As easy this may sound, in reality the process of the extension of sustainable development to outer space would probably not be a swift one. In order to achieve sustainable effects, future law-making in space law will need to be based on the inclusion and enablement of all parties. To this end, the process of law-making and the resulting decision-making must be based on cooperation, understood as an obligation conditioning the lawfulness of space activities.

On the basis of the analysis made it seems that, in fact, the lack of recognition of sustainable development within the framework of space law is legally more questionable than the issue of its extension. However, the explicit and formal recognition of sustainable development within the context of outer space is important. This is because however much it may be justified, any attempt to impose sustainable development on the basis of the systemic implications of international law could prove unsustainable.

The decomposition of the concept of sustainable development and its rebuilding within the hierarchical structure allows for a better understanding of the effect of extending sustainable development to international space law. From the perspective of the hierarchical structure, this extension can be approached as a gradual process. The step by step application of the hierarchical structure of sustainable development offers a clearer view of the relations between the levels, and thereby potentially enables a smoother and more transparent transition towards inter- and intragenerational equity in outer space.

Does the application of sustainable development to space law guarantee justice? There is a relationship between justice and law but law will probably never completely fulfil justice. While the recourse to principle in political and legal debate can never anticipate the attainment of justice, this should not marginalize the significance or the relevance of striving for fairness at the global level, particularly between economically divergent States. Sustainable development provides a framework and the tools for the constant pursuit of justice.

## APPENDIX 1

HIERARCHICAL LEGAL CONCEPT OF SUSTAINABLE DEVELOPMENT (SD) IN INTERNATIONAL LAW

| LEVEL | DESCRIPTION | FUNCTION | EFFECT ON SPACE LAW |
|---|---|---|---|
| *First level*<br>OBJECTIVE | • Inter- and intragenerational equity<br>• the most general manifestation of sustainable development | • Sets goals<br>• Interpretative tool: in hand of judges and as 'the purpose and object of a treaty' | Interpretation of norms in the light of sustainable development |
| *Second level*<br>PRINCIPLE OF INTEGRATION | • Binding component (general principle of law)<br>• An axis of SD legal concept : only the application on this level enables general application of SD legal concept | **Substantive:** orientates integration towards Inter- and intragenerational equity<br>**Procedural:**<br>As autonomous normative principle:<br>• Normative integration<br>• Integrated decision-making<br>As rule of reference:<br>• Triggers other cross-sectoral principles of sustainable development, i.e. introduces an obligation to translate them within the sectoral scope | Integration of environmental and social aspects into economic activity in outer space |
| *Third level*<br>CROSS-SECTORAL TOOLS | • Legal norms and principles recognised as enabling integration : polluter-pays principle, the precautionary principle, the principle of common but differentiated responsibilities, environmental impact assessment;<br>• The norms also hold a status independent from the SD concept. Form the part of SD legal concept only if used in order to enable integration with the ultimate goal to achieve inter- and intragenerational equity. | The principles function as tools that can be used within the framework of the concept of SD | Specific tools that need to be translated into the context of outer space |
| *Fourth level*<br>SECTORAL NORMS | • Sectoral norms in the field of sustainable development<br>• Specific to the sector<br>• Not directly transferable to other sectors | Advance the issue of sustainable development in the sector<br>Serve as a guiding example for normative solutions in other sectors | Body of space law in the field of SD |

**Functions of levels in the structure:**
Higher level: answers the question "So what?'
Lower level: answers the question "How?',

**BIBLIOGRAPHY**


Ahl Valerie and Allen Timothy F.H., *Hierarchy Theory: A Vision, Vocabulary, and Epistemology* (Columbia University Press 1996)

Al-Rodhan Nayef R. F., *Meta-Geopolitics of Outer Space: An Analysis of Space Power, Security and Governance* (Palgrave Macmillan 2012)

Arnould Jacques, *Icarus' Second Chance: The Basis and Perspectives of Space Ethics* (Springer-Verlag/Wien 2011)

Baker Howard A., *Space Debris: Legal and Policy Implications* (Martinus Nijhoff 1989)

Baslar Kemal, *The Concept of the Common Heritage of Mankind in International Law* (Martinus Nijhoff Publishers 1998)

Birnie Patricia W. and Boyle Alan, *International Law and the Environment* (2 edn, Oxford University Press 2002)

Birnie Patricia W. and Boyle Alan E., *International Law and the Environment* (Oxford University Press 2002)

Bosselmann Klaus, *The Principle of Sustainability: Transforming Law and Governance* (2008)

Boyle Alan E. and Chinkin Christine, *The making of international law* (Oxford University Press 2007)

Brownlie Ian, *Principles of Public International Law* (Oxford University Press 2003)

Burch John G., *Systems Analysis, Design and Implementation* (Boyd & Fraser 1992)

Burke Edmnd, *Reflections on the Revolution in France* (1790)

Cassese Antonio and Weiler Joseph H.H., *Change and Stability in International Law-making* (Walter de Gruyter 1988)

Cheng Bin, *General Principles of Law as Applied by International Courts and Tribunals* (Cambridge University Press 1953)

——, *Studies in International Space Law* (Clarendon Press 1997)

Christol Carl Q., *The Modern International Law of Outer Space* (Pergamon 1982)

——, *Space Law: Past, Present and Future* (1991)

Danilenko G. M., *Law-Making in the International Community* (Martinus Nijhoff Publishers 1993)

de Sadeleer Nicolas, *Environmental Principles: from political slogans to legal rules* (Oxford University Press 2002)

Decleris Michael, *The law of sustainable development: General principles. A report produced for the European Commission* (Office for Official Publications of the European Communities 2000)

Diederiks-Verschoor Isabella Henrietta Philepina and Kopal Vladimír, *An Introduction to Space Law* (Kluwer Law International 2008)

Doyle Stephen E., *Origins of Space Law and the International Institute of Space Law* (Univelt Inc. 2002)

Dupuy Pierre-Marie and Kerbrat Yann, *Droit International Publique* (10th edn, Dalloz 2010)

Dworkin Ronald, *Taking Rights Seriously* (Harvard University Press 1977)

Goh Gérardine, *Dispute Settlement in International Space Law: A Multi-Door Courthouse for Outer Space* (Martinus Nijjhoff Publishers 2007)

Hacket George T., *Space Debris and the Corpus Iuris Spatialis* (Benkö M ed, Editions Frontieres 1994)

Hart H. L. A., *Punishment and responsibility: Essays in the Philosophy of Law* (Oxford University Press 1968)

Ito Atsuyo, *Legal Aspects of Satellite Remote Sensing* (Martinus Nijhoff Publishers 2011)

Jakhu Ram S., Pelton Joseph N. and Nyampong Yaw Otu Mankata, *Space Mining and Its Regulation* (Springer 2017)

Kuchenhoff Gunther, *Rechtsphilosophische Grundlagen des kosmischen Rechts, Archiv fur Rechts und Sozialphilosophie* (1965)

Lachs Manfred, *The Law of Outer Space: an experience in contemporary law making*, vol 86 (Sijthoff Publisher 1972)

Laszlo Ervin, *Introduction to Systems Philosophy: Toward a New Paradigm of Contemporary Thought* (Gordon & Breach 1972)

Lyall Francis and Larsen Pal B., *Space Law: A Treatise* (Ashgate 2009)

Malanczuk Peter, *Akehurst's Modern Introduction to International Law* (Routledge 1997)

Mandl Vladimir, *Das Weltraum-Recht: Ein Problem der Raumfahrt* (J. Bensheimer 1932)

Maral Gérard and Bousquet Michael, *Satellite Communication Systems. Systems, Techniques and Technologies* (5th edn, John Wiley & Sons Ltd. 2009)

Marcoff Marco G., *Traité de droit international public de l'espace* (Éd. Univ. Fribourg Suisse 1973)

McBride Nicholas J. and Steel Sandy, *Great Debates in Jurisprudence* (Palgrave 2014)

Michael L. Gibson and Hughes Cary T., *Sytems Analysis and Design: A Comprehensive Methodology with Case* (Boyd & Fraser 1994)

OECD, *The Space Economy at a Glance* (OECD Publishing 2011)

Pattee Howard Hunt, *Hierarchy Theory; The Challenge of Complex Systems.* (George Braziller 1973)

Pawlowski Artur, *Sustainable Development as a Civilizational Revolution: A Multidisciplinary Approach to the Challenges of the 21st Century* (Taylor & Francis Group 2011)

Pelton Joseph N., *The Basics of Satellite Communications* (IEC Publications 2006)

Pureza José Manuel, *El Partimonio Común de la Humanidad* (Alcaide Fernández J tr, Trotta 2002)

Rawls John, *A Theory of Justice* (1971)

——, *A Theory of Justice* (Revised edn, The Belknap Press of Harvard University Press 1990)

Sands Philippe, *Principles of International Environmenal Law* (Cambridge University Press 2003)

Schrijver Nico J., *The Evolution of Sustainable Development in International Law: Inception, Meaning and Status* (Martinus Nijhoff Publishers 2008)

Segger Marie-Claire Cordonier and Khalfan Ashfaq, *Sustainable Development Law: Principles, Practicies and Prospects* (Oxford University Press 2004)

Shaw Malcolm N., *International Law* (6th edn, Cambridge University Press 2008)

Tams Christian J., *Enforcing Obligations Erga Omnes in International Law* (Cambridge University Press 2005)

Tladi Dire, *Sustainable Development in International Law: An Analysis of Key Enviro-Economic Instruments* (Pretoria University Law Press 2007)

Traa-Engelman H.L. van, *Commercial Utilization of Outer Space* (Martinus Nijhoff 1993)

Tronchetti Fabio, *The Exploitation of Natural Resources of the Moon and Other Celestial Bodies* (Martinus Nijhoff Publishers 2009)

Viikari Lotta, *The Environmental Element in Space Law. Assessing the Present and Charting the Future* (Martinus Nijhoff Publishers 2008)

Vogler John, *The global commons: environmental and technological governance* (JohnWiley & Sons 2000)

Voight Christina, *Sustainable Development as a Principle of International Law: Resolving Conflicts between Climate Measures and WTO Law* (Martinus Nijhoff Publishers 2009)

Wassenbergh Henri A., *Principles of Outer Space Law in Hindsight* (Kluwer Academic Publishers 1991)

Weinberg Gerald M., *An Introduction to General Systems Thinking* (Dorset House Publishing Company 1975)

Weiss Edith Brown, *In Fairness to Future Generations: International law, Common Patrimony and Intergenerational Equity* (Dobbs-Ferry 1989)

Alcaide Fernandez Joaquin, 'Los estados sobreanos' in *Lecciones de Derecho Internacional Público* (Madrid, Tecnos 2015)

Barral Virginie and Dupuy Pierre-Marie, 'Sustainable Development through Integration' in Viñuales JE (ed), *The Rio Declaration on Environment and Development: A Commentary* (Oxford University Press 2015)

Dunk Frans G. von der, 'Contradictio in terminis or Realpolitik? A Qualified Plea for a Role of 'Soft Law' in the Context of Space Activities' in Marboe I (ed), *Soft Law in Outer Space The Function of Non-binding Norms in International Space Law* (Elektronischer Sonderdruck 2012)

ECSL, 'Analysis of Legal Aspects of Space Debris' in Böckstiegel K-H, Benkö M and Hobe S (eds), *Space Law: Basic Legal Documents*, vol 1 (Eleven International Publishing 2002)

Folk Moore Sally, 'Legal Systems of the World: An Introductory Guide to Classification, Typological Interpretations, and Bibliographical Resources, ' in Lipson L and Wheeler S (eds), *Law And The Social Sciences* (1986)

Gabrynowicz Joanne Irene, 'The Outer Space Treaty and Enhancing Space Security' in *Building the Architecture for Sustainable Space Security—Conference Report, 30–31 March 2006* (United Nations Institute for Disarmament Research (UNIDIR) 2006)

Handl Günther, 'Sustainable Development: General Rules versus Specific Obligations' in Lang W (ed), *Sustainable Development and International Law* (1995)

Häusler Jurgen and Simonis. Georg, 'Underdevelopment via satellite: The interests of the German space industry in developing countries and their consequences' in Katz J (ed), *People in space: Policy perspectives for a "Star Wars" century,* (Transaction Books 1985)

Hobe Stephan and Pellander Erik, 'Space Law: a "Self-Contained Regime"?' in Hobe S and Freeland S (eds), *In Heaven as on Earth? The Interaction of Public International Law on the Legal Regulation of Outer Space: 1/2 June 2012, Bonn - Oberkassel* (Institute of Air and Space Law of the University of Cologne / Deutsches Zentrum für Luft- und Raumfahrt e.V. German Aerospace Center 2012)

Jakhu Ram, 'Transparency and Confidence-Building Measures for Space Security' in Lele A (ed), *Decoding the International Code of Conduct for Outer Space Activities* (Pentagon Press 2012)

Juste Ruiz José, 'El desarrollo sostenible y los derechos humanos' in Salcedo JAC and others (eds), *Sobreanía del Estado y Derecho Internacional* (Universidad de Cordoba, Univesidad de Sevilla, Univesidad De Malaga 2005)

Kopal Vladimir, 'Origins of Space Law and the Role of the United Nations' in Brünner C and Soucek A (eds), *Outer Space in Society, Politics and Law* (Springer 2011)

Kopal Vladimír, 'Vladimir Mandl: Founding Writer on Space Law' in Durant J (ed), *First Steps Toward Space* (Smithsonian Institution Press 1974)

Lafferranderie Gabriel, 'Basic Principles Governing the Use of Outer Space in Future Perspective' in Benkö M and Schrogl K-U (eds), *Current Problems and Perspectives for Future Regulations* (Eleven International Publishing 2005)

Loorbach Derk and Rotmans Jan, 'Managing Transitions for Sustainable Development' in Olsthoorn X and Wieczorek AJ (eds), *Understanding Industrial Transformation*, vol 44 (Springer 2006)

Lowe Vaughan, 'The Politics of Law-Making: Are the Method and Character of Norm Creation Changing?' in Byers M (ed), *The Role of Law in International Politics: Essays in International Relation and International Law* (Oxford University Press 2000)

——, 'Sustainable Development and Unsustainable Arguments' in Boyle A and Freestone D (eds), *International Law and Sustainable Development: Past Achievements and Future Challenges* (Oxford University Press 2001)

Marchiso Sergio, 'The ITU Regulatory System: a Self-Contained Regime or a Part of International Law?' in Penet G (ed), *Governing the Geostationary Orbit Orbital Slots and Spectrum Use in an Era of Interference* (IFRI 2014)

Meyer Lukas, ‘Intergenerational Justice’ in Zalta EN (ed), *The Stanford Encyclopedia of Philosophy* (2015) <http://plato.stanford.edu/archives/fall2015/entries/justice-intergenerational/>

Nollkaemper André, ‘Three Conceptions of the Integration Principle in International Environmental Law’ in Lenschow A (ed), *Environmental Policy Integration: Greening Sectoral Policies in Europe* (Earthscan Publications 2002)

Robinson Jana, ‘Europe’s Space Diplomacy Initiative: The International Code of Conduct’ in *Decoding the International Code of Conduct for Outer Space Activities* (Pentagon Press 2012)

Sands Philippe, ‘International Law in the Field of Sustainable Development: Emerging Legal Principles’ in Lang W (ed), *Sustainable Development and Interntional Law* (Graham & Trotman / Martinus Nijhoff 1995)

——, ‘Treaty, Custom and Coss-fertilization of International Law, in International Law’ in Boyle A and Freestone D (eds), *Law and Sustainable Development: Past Achievements and Future Challenges* (Oxford University Press 2001)

Soroos Marvin S., ‘Global commons, telecommunications, and international space policy’ in Papp D and McIntyre J (eds), *International space policy: Legal, economic, and strategic options for the twentieth century and beyond* (Quorum Books 1987)

Tronchetti Fabio, ‘Legal Aspects of Space Resource Utilization’ in Dunk FGvd and Tronchetti F (eds), *Handbook of Space Law* (Elgar Publishing 2015)

Vasak Karel, ‘A 30-Year Struggle’ in *UNESCO Courrier* (1977)

Carpanelli Elena and Cohen Brendan, ‘Interpreting “Damage Caused by Space Objects” under the 1972 Liability Convention (IAC-13,E7,1,5,x18256)’ (International Astronautical Congress)

Kerrest Armel, ‘Space debris, remarks on current legal issues’ (Proceedings of the Third European Conference on Space Debris)

Williamson Mark, ‘A pragmatic Approach to the 'Harmful Contamination' Concept in Art. IX of the Outer Space Treaty’ (5th Eilene M Galloway Symposium on Critical Issues in Space Law Art IX of the Outer Space Treaty and Peaceful Purposes: Issues and Implementation)

'Proceedings of the Workshop on Space Law in the Twenty-first Century’ (UNOOSA, Third United Nations Conference on the Exploration and Peaceful Uses o f Outer Space (UNISPACE III): The Workshop on Space Law in the 21st Century, Vienna, 1999)

Gabrynowicz Joanne Irene, 'The "province" and "heritage" of mankind reconsidered: a new beginning’ (Proceedings of the 2nd Conference on Lunar Bases and Space Activities of the 21st Century, Houston, TX, 1988)

Mayence Jean Francois, 'Article IX of the Outer Space Treaty and the Concept of Planetary Protection: Toward a Space Environment Law ?' (http://wwwspacelawolemissedu/events/pdfs/2010/galloway-mayence-paperpdf, 2010)

Motoko Uchitomi, 'SustainableDevelopment in Outer Space—applicability of the concept of sustainable development to space debris problems, Proceedings of the 43rd Colloquium on the Law of Outer Space, IISL, 2–6 October 2000, Rio de Janeiro' (2000)

Nagy Boldizsar, 'Common Heritage of Mankind: the Status of Future Generations' (IISL 31 Collection Proceedings, 1988)

Benkö Marietta and Schrogl Kai-Uwe (eds), *Space Law: Current Problems and Perspectives for Future Regulation*, vol 2 (Eleven International Publishing 2005)

Boyle Alan and Freestone David (eds), *International Law and Sustainable Development: Past Achievements and Future Challenges* (Oxford University Press 2001)

Codignola Luca and others (eds), *Humans in Outer Space - Interdisciplinary Odysseys* (Springer 2009)

Doyle Stephen E. and Skoog Ingemar (eds), *The International Geophysical Year: Initiating International Scientific Space Cooperation* (International Astronautical Federation 2012)

Dunk Frans G. von der and Tronchetti Fabio (eds), *Handbook of Space Law* (Elgar Publishing 2015)

Hobe Stephan (ed) *Pioneers of Space Law: a Publication of the International Institute of Space Law* (Martinus Nijhoff 2013)

Jasentuliyana Nandasiri (ed) *Space Law: Development and Scope* (Praeger Publishers 1992)

Schrijver Nico J. and Weiss Friedl (eds), *International Law And Sustainable Development: Principles And Practice* (Martinus Nijhoff Publishers 2004)

Simma Bruno and others (eds), *The Charter of the United Nations: A Commentary* (3 edn, Oxford University Press 2012)

Viñuales Jorge E. (ed) *The Rio Declaration on Environment and Development: A Commentary* (OUP Oxford 2015)

Benkö Marietta and Schrogl Kai-Uwe, 'The 1999 UNCOPUOS "Technical Report on Space Debris" and the New Work Plan on Space debris (2002-2005): Perspectives and Legal Consequences' <http://articles.adsabs.harvard.edu/cgi-bin/nph-iarticle_query?bibcode=2001ESASP.473..857B&db_key=AST&page_ind=0&plate_select=NO&data_type=GIF&type=SCREEN_GIF&classic=YES> accessed 13 April 2012

Doyle Stephen E., 'The Emergence of Space Law' <http://www.lacba.org/Files/Main%20Folder/Sections/International%20Law/InternationalLawNewsletter/files/Doyle.pdf> accessed 05 March 2015

Pop Virgiliu, 'Lunar Real Estate: Buyer, Beware!' Space Future <http://www.spacefuture.com/archive/lunar_real_estate_buyer_beware.shtml>

Tronchetti Fabio, 'The Non-Appropriation Principle under Attack: Using Article II of the Outer Space Treaty in Its Defence ' IAC-07-E6513 <http://www.iislweb.org/docs/Diederiks2007.pdf>

Wright David, Grego Laura and Gronlund Lisbeth, 'The Physics of Space Security: A Reference Manual' <http://www.amacad.org/publications/Physics_of_Space_Security.pdf> accessed 15 May 2010

Davies Margaret, *Legal Pluralism* (Oxrord Handbooks Online 2012)

Gilbert Juan Manuel de Faramíñan, *Space Debris: Technical and Legal Aspects* (Kluwer Law International 1997)

Aganaba-Jeanty Timiebi, 'Space Sustainability and the Freedom of Outer Space' (2016) 14 1 The International Journal of Space Politics & Policy 1

Atney-Yurdin Irene, 'Space Debris Legal Research Guide' (1991) 3 1 Pace International Law Review

Bailey III James Edwin, 'Current and Future Legal Uses of Direct Broadchast Satellites in International Law' (1985) 45 3 Louisiana Law Review 701

Baker Howard A., 'Protection of the Outer Space Environment: history and analysis of Article IX of the Outer Space Treaty' (1987) XII Annals of Air and Space Law 143

Barral Virginie, 'Sustainable Development in International Law: Nature and Operation of an Evolutive Legal Norm' (2012) 23 2 European Journal of International Law 377

Bassiouni Mahmoud Cherif, 'International Crimes: *Jus Cogens* and *Obligatio Erga Omnes*' (1997) 59 4 Law and Contemporary Problems 63

Benham-Hutchins Marge and Clancy Thomas R., 'Social networks as embedded complex adaptive systems' (2010) 40 5 Journal of Nursing Administration

Broude Tomer, 'Principles Of Normative Integration and the Allocation of International Authority: The Wto, the Vienna Convention on the Law of Treaties, and the Rio Declaration' (2008) 6 1 Loyola University Chicago International Law Review 173

Brunee Jutta, 'Of Sense and Sensibility: Reflections on International Liability Regimes as Tools for Environmental Protection ' (2004) 53 3 International Comparative Law Journal 351

Bueckling Adrian, ‘The Strategy of Semantics and the 'Mankind Provisions' of the Space Treaty’ (1979) 7 Journal of Space Law 15

Burke-White William W., ‘International Legal Pluralism’ (2004) 25 Michigan Journal of International Law 953

Cinelli Claudia and Pogorzelska Katarzyna, ‘The Current International Legal Setting for the Protection of the Outer Space Environment: The Precautionary Principle Avant la Lettre’ (2013) 22 2 Review of European Community & International Environmental Law 186

Cocca Aldo Armando, ‘The Advances of International Law Through the Law of Outer Space’ (1981) 9 Journal of Space Law 13

Czapliński Władysław, ‘Concepts of jus cogens and Obligations erga omnes in International Law in the Light of Recent Developments’ (1997-1998) 23 Polish Yearbook of International Law 87

Danilenko G. M., ‘Outer Space and the Multilateral Treaty-Making Process’ (1990) 4 High Technology Law Journal

Danilenko Gennady M., ‘International Jus Cogens: Issues of Law-Making’ (1991) 42 European Journal of International Law 42

Dembling Paul G. and Arons Daniel M., ‘The Evolution of The Outer Space Treaty’ (1967) 33 Journal of Air Law and Commerce 419

Dernbach John C, ‘Achieving Sustainable Development: The Centrality and Multiple Facets of Integrated Decisionmaking’ (2003) 10 1 Indiana Journal of Global Legal Studies

Dunk Frans G. von der, ‘Legal Aspects of Satellite Communications—A Mini Handbook’ (2015) 4 Journal of Telecommunication and Broadcasting Law 1

Dupuy Pierre-Marie, ‘Où en est le droit international de l’environnement à la fin du siècle?’ (1997) 101 Revué Générale de Droit International Public 873

Dupuy René-Jean, ‘The Notion of Common Heritage of Mankind Applied to the Seabed’ (1983) 13 Annals of Air and Space Law 347

Fasan Ernst, ‘The Meaning of the Term 'Mankind in Space Legal Language'’ (1974) 2 Journal of Space Law

Fievet Gilles, ‘Réflexions sur le concept de développement durable: prétentions économiques, principes stratégiques et protection des droits fondamentaux’ (2001) 128 Revue Belge de Droit International

Fitzmaurice Malgosia, ‘International Protection of the Environment’ (2001) 293 Recueil des Cours

Gabrynowicz Joanne Irene, ‘Space Law: Its Cold War Origins and Challenges in the Era of Globalization’ (2004) 37 Suffolk University Law Review 1041

Goepel M, ‘Formulating Future Just Policies: Applying the Delhi Sustainable Development Law Principles’ (2010) 2 Sustainability 1694

Gorove Stephen, ‘The Concept of 'Common Heritage of Mankind': A Political, Moral or Legal Innovation’ (1972) 9 San Diego Law Review 390

Hardin Garrett, ‘The tragedy of the commons’ (1968) 162 3859 Science 1243

Hasnas John, ‘Back to the Future: From Critical Legal Studies Forward to Legal Realism, Or How Not to Miss the Point of the Indeterminacy Argument’ (1995) 45 1 Duke Law Journal 84

Huebert J. H. and Block Walter, ‘Space Environmentalism, Property Rights, and the Law’ (2007) 37 The University of Memphis Law Review 281

Jakhu Ram, ‘Common interest of all the countries, global interests, ‘global commons’’ (2006) 32 1 Journal of Space Law

Jasentuliyana Nandasiri, ‘Space debris and Internationl Law’ (1998) 26 2 Journal of Space Law 139

Jennings Robert, ‘What is international law and how do we tell it when we see it?’ (1981) 37 Swiss Yearbook of International Law 59

Joseph Suzanne, ‘Hierarchy Theory: A Vision, Vocabulary, and Epistemology by Valerie Ahl and T. F. H. Allen - Revision’ (1999) 3 Georgia Journal of Ecological Anthropology 85

Kessler David J. and Cour-Palais Burton G., ‘Collision frequency of artificial satellites: the creation of a debris belt’ (1978) 83 Journal of Geophysical Research 2637

Kovar Jeffrey D, ‘A Short Guide to the Rio Declaration’ (1993) 4 Colo J Int'l Envtl L & Pol'y 119

LoPucki Lynn M., ‘The Systems Approach to Law’ (1997) 83 3 Cornell Law Rewiev 479

Marchisio Sergio, ‘The Evolutionary Stages of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS)’ (2005) 31 1 Journal of Space Law 219

Markoff Marko G., ‘Disarmament and "Peaceful Purposes" Provisions in the 1967 Outer Space Treaty ’ (1976) 4 1 Journal of Space Law 3

Mickelson Karin, ‘South, North, International Environmental Law, and International Environmental Lawyers’ (2000) II Yearbook of International Environmental Law 52

NASA, ‘First Natural Collision Of Cataloged Earth Satellites’’ (1996) 1 2 Orbital Debris Quarterly News

NASA JSC, ‘Chinese Anti-satellite Test Creates Most Severe Orbital Debris Cloud in History’ (2007) 11 2 Orbital Debris Quarterly News

——, ‘Satellite Collision Leaves Significant Debris Clouds’ (2009) 13 2 Orbital Debris Quarterly News

Paley John and Eva Gail, ‘Complexity theory as an approach to explanation in healthcare: A critical discussion’ (2010) 48 2 International journal of nursing studies 269

Pauwelyn J, ‘Bridging Fragmentation and Unity: International Law as a Universe of Inter-Connected Islands’ (2004) 25 Michigan Journal of International Law

Perek Luboš, ‘Interaction Between Space Technology and Space Law’ (1990) 18 1 Journal of Space Law 19

Posner Eric A., ‘Erga Omnes Norms, Instutionalization, And Constitutionalism in international law’ (2008) Paper no. 224 Public Law and Legal Theory Working Paper Series, The Law School of the University of Chicago

Rachovitsa Adamantia, ‘The Principle of Systemic Integration in Human Rights Law - A Critical Appraisal’ (2017) Forthcoming at International & Comparative Law Quarterly

Rathman Kim Alaine, ‘Sharing the harvest of the skies: outer space commercialization and third world development’ (1998) 3 4 Society for Philosophy and Technology

Rummel John D., ‘Planetary protection policy overview and application to future missions’ (1989) 9 6 Advances in Space Research 181

Rummel John D., Race M.S. and Horneck G., ‘Ethical Considerations for Planetary Protection in Space Exploration: A Workshop’ (2012) 12 11 Astrobiology 1017

Salardi Silvia, ‘Sustainable development: Definitions and Models of legal regulation. Some legal-theoretical outlines on the role of law’ (2011) 1 Rivista Quadrimestrale di Diritto dell'Ambiente 77

Salcedo Juan Antonio Carrillo, ‘Reflections on the Existence of a Hierarchy of Norms in International Law’ (1997) 8 European Journal of International Law 583

Sands Philippe, ‘International Law in the Field of Sustainable Development’ (1994) 64 British Yeabook of International Law 303

——, ‘International Law in the Field of Sustainable Development’ (1994) 65 1 British Yeabook of International Law 303

Sax Joseph L., ‘The Public Trust Doctrine in Natural Resource Law: Effective Judical Intervention’ (1970) 68 471 Michigan Law Review 473

Schiff Berman Paul, ‘A Pluralist Approach to International Law ’ (2014) 32 The Yale Journal of International Law

Shragga Daphna, ‘The Common Heritage of Mankind: the Concept and its Application’ (1986) 13 Annales d'Etudes Internacionales 45

Smith N.J. and Sage A.P., ‘An introduction to hierarchical systems theory’ (1973) 1 1 Computers & Electrical Engineering 55

Tan David, ‘Towards a New Regime for the Protection of Outer Space as the 'Province of All Mankind'’ (2000) 25 Yale Journal of International Law

Tanaka Yoshifumi, ‘Protection of Community Interests in International Law: The Case of the Law of the Sea’ (2011) 15 Max Planck Yearbook of the United Nations Law 329

Tronchetti Fabio, ‘The Non-Appropriation Principle as a Structural Norm of International Law: A New Way of Interpreting Article II of the Outer Space Treaty’ (2008) 33 3 Air and Space Law

van Zeijl-Rozema Annemarie and others, ‘Governance for sustainable development: a framework’ (2008) 16 6 Sustainable Development 410

Vereshchetin Vladlen S. and Danilenko Gennady M., ‘Custom as a source of International Law of Outer Space’ (1985) 13 1 Journal of Space Law 22

Weiss Edith Brown, ‘Our Rights and Obligations to Future Generations for the Environment’ (1990) 84 American Journal of International Law 198

——, ‘In Fairness to Future Generations and Sustainable Development’ (1992) 8 1 American University Journal of International Law and Policy 19

Williamson Mark, ‘Space ethics and protection of the space environment’ (2003) 19 Space Policy 47

Young Margaret A., ‘The WTO'S Use of Relevant Rules of International Law: An Analysis of the Biotech Case’ (2007) 56 4 International and Comparative Law Quarterly 907

Zemanek Karl, ‘New Trends in the Enforcement of erga omnes Obligations’ (2000) 4 Max Planck Yearbook of United Nations Law 1

UNGA, '*Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space*' (22 December 2007) Doc. A/AC.105/c.1/l.260

Development UNWCoEa, '*Report of the World Commission on Environment and Development: Our Common Future*' (1987) A/42/427(Annex)

UNCOPUOS, '*A Technical Report on Space Debris*' (1999) A/AC.105/720

UNGA, '*Principles Relevant to the Use of Nuclear Power Sources in Outer Space*' (1992) A/RES/47/68

Wolff Johannes M., *'Peaceful uses' of outer space has permitted its militarization—does it also mean its weaponization?* (UNIDIR 2003)

IAA, (Position Paper on Space Debris Mitigation: Implementing Zero Debris Creation Zones, 2006)

Koskenniemi Martti, *Fragmentation of International Law: Difficulties Arising From the Diversification and Expansion of International Law (Report of the Study Group of the International Law Commission, A/CN.4/L.682)* (2006)

——, *Fragmentation of International Law: Topic (a): The function and scope of the lex specialis rule and the question of 'self-contained regimes': An outline* (2006)

National Research Council Committee on Space Debris, (Orbital Debris: A Technical Assessment, 1995)

Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies

Hörl Kay-Uwe, 'Legal and Technical Consideration of Space Debris' (Institute of Air and Space Law. McGill University

2000)

Taylor Michael W., 'Orbital Debris: Technical and Legal Issues and Solutions' (McGill University 2006)

(*Enciclopaedia Britannica Online: Academic Edition*) <http://www.britannica.co.uk/> accessed 19 July 2012

Celestrak, 'Satellite Catalog (SATCAT)' (*Celestrak*) <http://celestrak.com/satcat/search.asp> accessed 19 July 2012

SpaceAcademy, 'A Guide to Orbital Space Debris' (*Space Academy*) <http://www.spaceacademy.net.au>

## TREATIES

Agreement among the Government of Canada, Governments of the Member States of the European Space Agency, the Government of Japan, the Government of the Russian

Federation, and the Government of the United States of America concerning cooperation on the International Space Station (29 January 1998) ('ISS Agreement')

Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (New York, 18 December 1979; in force 11 July 1984) ('Moon Agreement')

Agreement on the Conservation of Nature and Natural Resources (9 July 1985, not in force)

Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (London, Moscow, Washington, D.C., 22 April 1968; in force 3 December 1968) ('Rescue Agreement')

Agreement Relating to the Implementation of Part XI of the United Nation Convention on the Law of the Sea of 10 December 1982 (28 July 1994; in force 28 July 1996)

Antarctic Treaty (1 December 1959; in force 23 June 1961)

Antarctic Treaty, Protocol on Environmental Protection (4 October 1991, in force 14 January 1998)

Comprehensive Nuclear Test Ban Treaty (10 September 1996, not in force)

Consolidated Version of the Treaty on European Union (2012), OJ C326/13 ('TEU')

Consolidated Version of the Treaty on the Functioning of the European Union (2010), OJ C83/47 ('TFEU')

Constitution and Convention of the International Telecommunication Union (with annexes and optional protocol) (22 December 1992, in force 1 July 1994)

Convention Concerning the Protection of the World Cultural and Natural Heritage (16 November 1972; in force 17 December 1975) ('World Heritage Convention')

Convention for the Establishment of the European Space Agency (30 May 1975; in force 30 October 1980)

Convention on International Civil Aviation (7 December 1944; in force 14 April 1947) ('Chicago Convention')

Convention on International Liability for Damages Caused by Space Objects (29 March 1972; in force 1 September 1972) ('Liability Convention')

Convention on Nuclear Safety (17 June 1994; in force 24 October 1996)

Convention on Registration of Objects Launched into Outer Space (New York, 14 January 1975; in force 15 September 1976) ('Registration Convention')

Framework Agreement between the European Community and the European Space Agency (25 November 2003; in force 28 March 2004)

Protocol to the United Nations Framework Convention on Climate Change (11 December 1997; in force 16 February 2005) ('Kyoto Protocol')

Statute of the International Court of Justice (26 June 1945, in force 24 October 1945) ('ICJ Statute')

The Charter of the United Nations (26 June 1945, in force 24 October 1945) ('UN Charter')

The Constitution of United Nations Educational, Scientific and Cultural Organization (on 16 November 1945 in force 4 November 1946)

The Statute of the International Atomic Energy Agency (23 October 1956, in force 29 July 1957)

Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and Under Water (5 August 1963; in force 10 October 1963) (Partial Test Ban Treaty (PTBT))

Treaty of Lisbon Amending the Treaty on European Union and the Treaty Establishing the European Community (13 December 2007, in force 1 December 2009) (OJ 2007/C 306/01) ('Treaty of Lisbon')

Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (27 January 1967; in force 10 October 1967) ('Outer Space Treaty' (OST))

United Nations Convention on the Law of the Sea (10 December 1982; in force 16 December 1994) ('UNCLOS')

United Nations Framework Convention on Climate Change (9 May 1992; in force 21 March 1994) ('Climate Change Convention')

Vienna Convention on Civil Liability for Nuclear Damage (21 May 1963; in force 12 November 1977)

Vienna Convention on the Law of Treaties (23 May 1969; in force 27 January 1980) ('VCLT')

## UN DOCUMENTS

Agenda 21: A Programme for Action for Sustainable Development, Report of the United Nations Conference on Environment and Development, Annex II, A/Conf.151/26 (Vol. II) (Rio de Janeiro 1992) ('Agenda 21')

Concept of Suborbital Flights: Information from the International Civil Aviation Organization, A/AC.105/C.2/2010/CRP.9 (19 March 2010)

CSD, Plan of Implementation of the World Summit on Sustainable Development, A/CONF.199/20 (Johannesburg 2002) ('Plan of Implementation')

CSD, Report of the Secretary-General: Integrating environment and development in decision-making E/CN.17/1996/11 (1996)

Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, UNGA Resolution 1962 (XVIII) (13 December 1963)

Declaration of the United Nations Conference on the Human Environment, A/Conf.48/14/Rev.1 (16 June 1972) ('Stockholm Declaration')

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 (Resolution 51/122, 13 December 1996) ('Declaration on International Cooperation')

Declaration on the Establishment of a New International Economic Order, A/RES/S-6/3201, (1 May 1974)

Declaration on the Right to Development, U.N. Doc. A/Res/41/128 (1986), Article 2(1)

Dissemination of the principles of the Rio Declaration on Environment and Development, A/RES/48/190 (21 December 1993)

Dubai Declaration 2016 [Report on the United Nations/United Arab Emirates High-level Forum: Space as a Driver for Socioeconomic Sustainable Development, A/AC.105/1129 (2016)]

France comment on the Long-term sustainability of outer space activities, A/AC.105/C.1/2011/CRP.9 (2011)

Gérard Brachet, 'Future role and activities of the Committee on the Peaceful Uses of Outer Space', A/AC.105/L.268 and Corr. 1 (2007)

International Co-operation in the Peaceful Uses of Outer Space, A/RES/1472(XIV) (12 December 1959)

Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting (Resolution 37/92, 10 December 1982) ('Broadcasting Principles')

Principles Relating to Remote Sensing of the Earth from Outer Space (Resolution 41/65, 3 December 1986) ('Remote Sensing Principles').

Principles Relevant to the Use of Nuclear Power Sources in Outer Space (Resolution 47/68, 14 December 1992) ('NPS Principles')

Principles Relevant to the Use of Nuclear Power Sources in Outer Space, A/RES/47/68 (1992).

Question of the Peaceful Use of Outer Space, A/RES/1348(XIII) (13 December 1958)

Report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities, A/68/189 (2013)

Report of UNISPACE I, in UNCOPUOS, Report, A/7285, 65 (1968)

Report of UNISPACE II, A/CONF.101/10 (1982)

Report on the United Nations/United Arab Emirates High-level Forum: Space as a Driver for Socioeconomic Sustainable Development, A/AC.105/1129 (2016)

Solutions for the World's Problems, UNOOSA Report (2006)

Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space, A/62/20 (22 December 2007), Annex ('Space Debris Mitigation Guidelines')

Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space, Doc. A/AC.105/c.1/l.260 (22 December 2007)

Space Millennium: Vienna Declaration on Space and Human Development, in: Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, A/CONF.184/6 (18 October 1999)

Space Millennium: Vienna Declaration on Space and Human Development, in Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (18 October 1999), Doc A/CONF.184/6, 6; see also UNOOSA, Solutions for the World's Problems (UNOOSA 2006)

The Future We Want, A/RES/66/288 (11 September 2012)

The Rio Declaration on Environment and Development, Report of the United Nations Conference on Environment and Development, A/CONF.151/26/Rev.1, Annex I, (Vol. 1) (Rio de Janeiro 1992) ('Rio Declaration')

Towards Long-term Sustainability Long-term Sustainability, Section II, D

Transforming our world: the 2030 Agenda for Sustainable Development, A/RES/70/1 (25 September 2015)

UNCOPUOS 'Long-term sustainability of outer space activities', A/AC.105/C.1/L.303, (2010)

UNCOPUOS Terms of Reference and Methods of Work of the Working Group on the Long-term Sustainability of Outer Space Activities, in which it suggested extension of the concept of sustainable development to the domain of outer space as a topic for examination, A/AC.105/L.281/Add.4 (2011)

UNCOPUOS, A/AC.105/L.297, (2015)

UNCOPUOS, Report, A/66/20, (2011)

UNESCO Declaration of Guiding Principles on the Use of Satellite Broadcasting for the Free Flow of Information, the Spread of Education and Greater Cultural Exchange, A/AC.105/109 (15 November 1972)

United Nations World Commission on Environment and Development, Report of the World Commission on Environment and Development: Our Common Future, A/42/427(Annex) (1987) ('Brundtland Report')

World Charter for Nature, A/RES/37/7 (28 October 1982)

## OTHER DOCUMENTS

Directive 2014/52/EU of the European Parliament and of the Council (16 April 2014) amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment OJ L124/57

European Union White Paper on Space COM(2003) 673 final, (2003)

IAASS Statement on International Code of Conduct for Outer Space Operations presented at the UN during the meeting on 27 - 31 July 2015

ILA Draft Convention on Space Debris (1994)

ILA, Final Report (Sofia Conference 2012) ('ILA Report 2012')

ILA, New Delhi Declaration of Principles of International Law Relating to Sustainable Development, (New Delhi Conference 2002) ('New Delhi Declaration').

ILA, Report (Berlin Conference 2004) ('ILA Report 2004')

ILA, Report (Toronto Conference 2006) ('ILA Report 2006')

ILC Commentaries to the Draft Articles on the Law of Treaties [1966] ILC Yrbk 187.

International Code of Conduct, Council of the European Union, 14455/10, PESC 1234, CODUN 34, ESPACE 2, COMPET 284.

US Commercial Space Launch Competitiveness Act, Pub L. 114-90, 129 Stat. 704 § 101 (2015)

## CASES

*Fur Seals Arbitration (US v. UK)*, Decision, Bering Sea Tribunal of Arbitration, 15 August 1893, UN Reports of International Arbitral Awards, vol. XXVIII, 263-276

*Case Concerning Barcelona Traction, Light, and Power Company, L*td (Belg. v. Spain), Judgement, ICJ Reports, 1970.

*Case Concerning the Gabčikovo-Nagymaros Project (Hungary v. Slovakia)*, Judgment, ICJ Reports 1997 ('*Gabčikovo-Nagymaros Project'*)

*Case Concerning Pulp Mills on the River Uruguay (Argentina v Uruguay*), Judgement, ICJ Reports 2010 ('*Pulp Mills'*)

*United States – Import Prohibition of Certain Shrimp and Shrimp Products*, AB Report, WTO, WT/DS58/AB/R, 1998 ('*US-Shrimp'*)

*China – Measures Related to the Exportation of Various Raw Materials*, Reports of the Panel, WTO, WT/DS394/R WT/DS395/R WT/DS398/R, 2011 ('*China – Raw Materials*')

*Iron Rhine ("Ijzeren Rijn") Railway (Belgium v. Netherlands*), Decision, PCA, RIAA XXVII, 24 May 2005 ('*Iron Rhine'*)

*European Communities-Measures Affecting the Approval and Marketing of Biotech Products*, Panel Report, WTO, WT/DS291/R, WT/DS292/R, WT/DS293/R, 2006) ('*EC-Biotech'*)

*North Sea Continental Shelf (Germany v. Denmark; Germany v. Netherlands*), Judgement, ICJ Reports 1969 (‘*North Sea Continental Shelf*’)

*Case Concerning the Military and Paramilitary Activities In and Against Nicaragua (Nicaragua v. US),* Merits, ICJ Reports 1986 (‘*Nicaragua Case’*)

Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, ICJ Reports 226, 1996

## WEBSITES

The U.S. Department of State: http://www.state.gov/secretary/rm/2012/01/180969.htm

CelesTrak Database: www.celestrak.com

SpaceX: http://www.spacex.com

Moon Express: http://www.moonexpress.com

Forbes: https://www.forbes.com

PBS: http://www.pbs.org/

IISL: http://www.iislweb.org

Space News: http://spacenews.com

UN: http://www.un.org

UNESCO: http://en.unesco.org

IAEA: https://www.iaea.org/

The Space Review: https://www.thespacereview.com

Space Future: http://www.spacefuture.com

ESA: http://www.esa.int

SWF: http://swfound.org

Space Safety Magazine: http://www.spacesafetymagazine.com

Merriam Webster Dictionary: https://www.merriam-webster.com/dictionary/

Cambridge Dictionariy: http://dictionary.cambridge.org/

WTO: http://www.wto.

International Society for the System Sciences: http://www.isss.org/hierarchy.htm

International Space and Security: www.iss.europa.eu