



National Approaches to the Protection of Dark and Quiet Skies



The report is an additional document to the summary report of the International Astronomical Union Centre for the Protection of the Dark and Quiet Sky (IAU CPS), Policy Hub, Work Package 2 Working Group, titled "The National and International Landscape Concerning Dark and Quiet Skies." It includes detailed information on the existing regulatory frameworks for the protection of Dark and Quiet Skies (D&QS) for astronomical observation in 77 countries, as identified by the National Analysis team. The analysis for each country focused on three main aspects: (1) protection of dark skies; (2) protection of quiet skies; and (3) satellite regulations. This structure provides an overview of national regulations related to satellite interference with astronomical observations and identifies regulatory gaps.

Additionally, a table is included, providing examples of national acts relevant to the protection of D&QS for astronomical observation. However, this table is not exhaustive. More detailed information can be found in the section dedicated to a specific country.

The research was conducted between June 2023 and June 2024. Although the information presented in the

document is accurate, it is still limited. Therefore, further research into national regulations in different jurisdictions is needed due to the constant development of policy and legal acts. Conclusions, recommendations, and the research methodology are presented in the summary Report.

The intended audience includes government organisations, the space industry, the public, and the astronomy community. This document presents an in-depth overview of policy and regulatory instruments adopted by national states worldwide.

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The views and research contributions presented in this document are those of individual contributors (authors of each section) and do not necessarily represent the opinions of the IAU CPS or the affiliated institutes acknowledged.



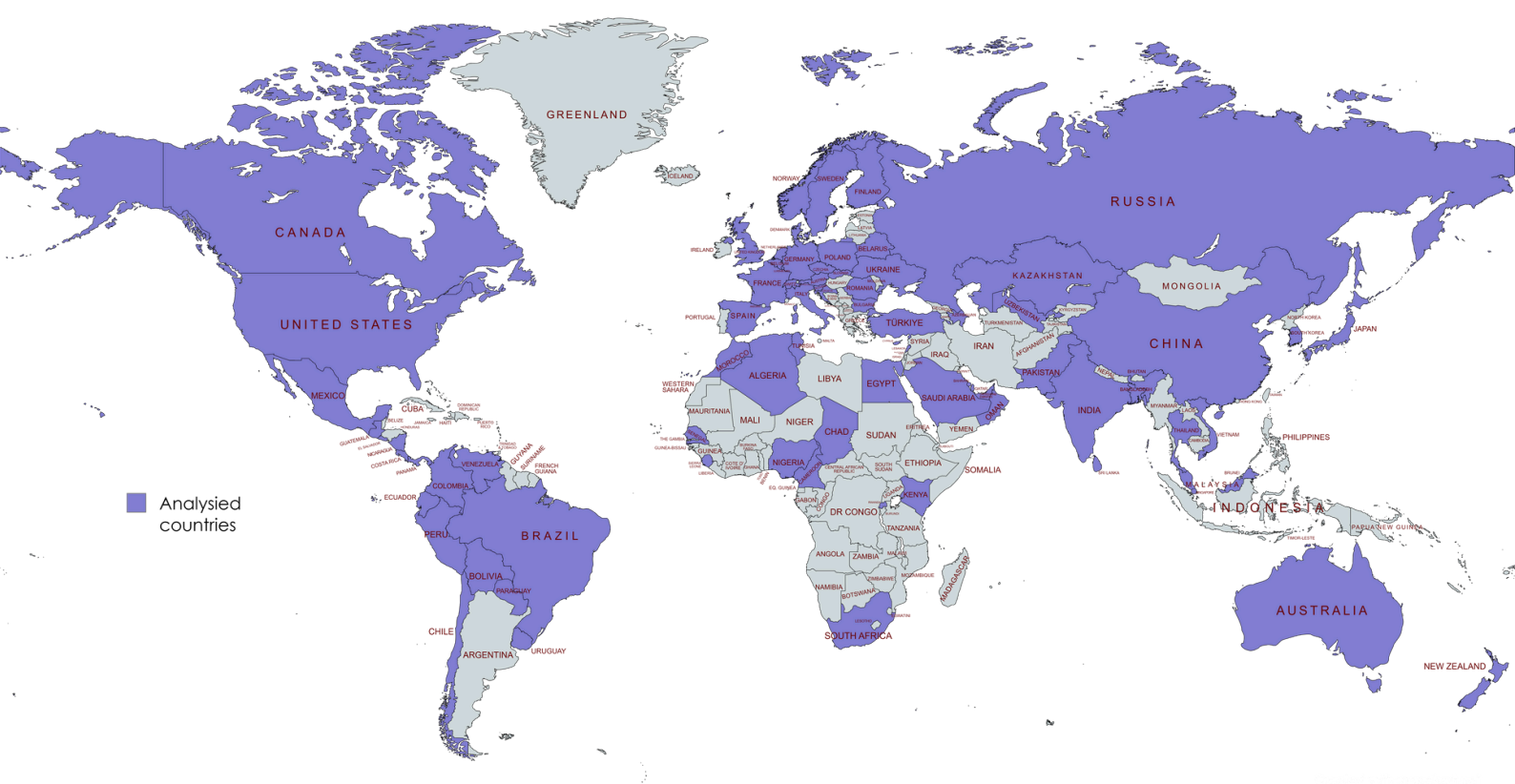
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Executive Summary

This document presents the research findings from the WP2 WG National Analysis Team, focusing on policy and legal approaches for protecting D&QS across various global jurisdictions. It summarises the primary outcomes of the research, provides examples of national strategies for safeguarding D&QS, and highlights opportunities for future research and action.

Countries were chosen based on their membership in the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS). Legislation and policies from over 70 countries were examined as part of this study.

Map of the Analysed Countries:



The document is organised into sections for each country analysed. Each country's section begins with general information related to international space regulations and is further divided into subsections: **dark skies protection** (with an emphasis on orbital light pollution), **quiet skies protection** (focusing on radio and sound pollution), and **satellite regulations** (addressing satellite requirements pertinent to D&QS protection).

Additional resources:

- Presentation of the Preliminary National Analysis Results (video presentation): <https://www.iau.org/public/videos/detail/yana-yakushina-national-approaches-to-the-protect/>
- National Approaches to the Protection of the Dark and Quiet Sky (paper - in press)

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1. Algeria (Anne-Sophie Martin)

• Protection of dark skies

The Algerian government enacted in February 1983 [Law No. 83/03 on the protection of the environment](#). This was followed by a series of laws and decrees,¹ as well as the development of an institutional framework for the protection of the environment, and the adoption of environmental policy instruments as a mechanism for preserving them. There are general rules on environmental protection. There is no specific regulation against light pollution or astronomical observation.

Some initiatives by civil society are being conducted in the field of astronomy, in particular with astronomy associations organizing conferences and educational events.² The country adopted a Report in 2021 by the CEREFE, *Commissariat aux énergies renouvelables et à l'efficacité énergétique*, on "Public lighting in Algeria - National standards for high-quality, energy-efficient lighting". It mentions the negative impact of public light on night skies.³

Adoption of regulations by Comunes (e.g. [Boumerdès Action Plan](#) (2015) but their policy and standard are not uniform.

• Protection of quiet skies

Frequencies are managed by the Agence nationale des fréquences.⁴ It is worth mentioning the Law n° 20-04 of 30 March 2020 relating to radiocommunications⁵ which makes a distinction between "admissible interference", "accepted interference" and "harmful interference". Article 6 of the Law refers to the fact that the Agency is in charge of the frequency management of LEO and GEO satellites. Diverse Executive Decrees were adopted to implement the Law.⁶ However, within the national framework, no other specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

• Satellites regulations

The *Law n. 19-06 of 17 July 2019 on space activities*⁷ established rules for the conduct of space activities. According to Chapter 2 and Article 9, a national register for the registration of space objects is maintained by the Algerian Space Agency (ASAL). The law does not make reference to a system of authorisation. Additionally, no specific provisions on regulating satellite activities relevant to the protection of D&QS were identified.

¹ Sihem Boucherit, Saoussene Seguia, Environmental Policy and Land Use Planning in Algeria, Overview and Perspectives, *International Journal of Innovative Studies in Sociology and Humanities*, 8(1), 2023, pp.193-194.

² <https://twanight.org/news/coverage-twan-in-algeria/>

³ République Algérienne Démocratique et Populaire, Premier Ministre, Commissariat aux énergies renouvelables et à l'efficacité énergétique, *Eclairage public en Algérie*, CEREFE, 2021, 79, <https://www.cerefe.gov.dz/wp-content/uploads/2022/02/Eclairage-Public-en-Algerie.pdf>

⁴ <https://anf.dz/index.php>

⁵ https://anf.dz/pdf/loi-ordonnances/Loi_20_04_fr.pdf

⁶ [Décret exécutif n° 07-162 du 30 mai 2007](#) complétant le décret exécutif n° 01-123 du 9 mai 2001 relatif au régime d'exploitation applicable à chaque type de réseaux, y compris radioélectrique et aux différents services de télécommunications; [Décret exécutif n° 06-76 du 18 février 2006](#) modifiant et complétant le décret exécutif n°03-37 du 13 janvier 2003 fixant le montant de la redevance applicable aux opérateurs titulaires d'autorisations pour l'établissement et l'exploitation de réseaux de télécommunications et/ou la fourniture des services de télécommunications.

⁷ Law N° 19-06 of July 17, 2019, on Space Activities, <https://asal.dz/wp-content/uploads/2022/02/Law-19-06-EN.pdf>

2. Australia (Andrew Falle)

- **Protection of dark skies**

Australia has a robust national space law consisting of the Space (Launches and Returns) Act 2018, supported by three sets of additional rules.⁸ The Act makes no clarification or mention of astronomy, yet focuses on the launching and return of space objects with some consideration of the environment broadly. In the Space (Launches and Returns) (General) Rules (2019), operators conducting space activities, i.e. launches and returns, are required to undergo “...an assessment of the likely impact of the launch and any connected return on the environment, and information on how any adverse effects on the environment are to be monitored and mitigated.”⁹

In 2020, a Memorandum of Understanding was reached between the Australian Space Agency and the Northern Territory of Australia that recognised the territory’s advantage in low light pollution and as a radio quiet zone.¹⁰ In January 2022, the Western Australian government published a statement on their new policy towards the dark sky and astrotourism. Defining astrotourism as “premises used for astronomical, commercial, scientific, cultural or environmental tourist activities directly related to the night sky...”¹¹, this policy recognises astrotourism’s need for a dark night sky free from terrestrial light and dust pollution.¹² The policy aims to reduce light pollution by avoiding over-lighting and light spills and encouraging energy-efficient lighting in warmer tones. This policy also aims to protect the night sky from dust pollution from dust-generating activities.

Furthermore, there are light pollution measures to reduce impacts on astronomy in certain areas. There are three designated dark sky areas in Australia: The Jump-Up in Queensland, Warrumbungle National Park in New South Wales and River Murray DSR in South Australia. Sliding Spring Observatory and Dubbo Observatory in New South Wales also have light pollution protections around each.

In terms of initiatives, there is the Australian Dark Sky Alliance (ADSA), an organisation that encourages and supports night sky conservation through education, commercial opportunities and environmental responsibility.¹³

Other light pollution measures concerning wildlife protection and environmental planning have been passed, though these measures do not mention light pollution from satellites. Legislation on this topic includes the Environment Protection and Biodiversity Conservation Act of 1999 and in 2020 the National Light Pollution Guidelines for Wildlife was published.¹⁴ On the regional level, the Australian Central Territory passed the Environment Protection Act in 1997 which designates light pollution as a form of pollution, and in New South Wales they passed the Environmental Planning and Assessment Regulation in 2000 and the Biodiversity Conservation Act in 2016.¹⁵

⁸ <https://www.industry.gov.au/australian-space-agency/regulating-australian-space-activities>

⁹ <https://www.legislation.gov.au/Details/F2019L01118>

¹⁰ <https://www.industry.gov.au/publications/memorandum-understanding-between-australian-space-agency-and-northern-territory-government>

¹¹ https://www.wa.gov.au/system/files/2022-01/PS_dark_sky_astrotoursim.pdf

¹² https://www.wa.gov.au/system/files/2022-01/PS_dark_sky_astrotoursim.pdf

¹³ <https://www.australasiandarkskyalliance.org/our-mission>

¹⁴ https://www.lindsaytaylorlawyers.com.au/in_focus/light-pollution/

¹⁵ https://www.lindsaytaylorlawyers.com.au/in_focus/light-pollution/

- **Protection of quiet skies**

The Australian Communications and Media Authority (ACMA) is responsible for licensing, oversight, and coordination of spectrum use by Australian operators. It ensures that Australia's obligations under the ITU's Radio Regulations, including the international coordination of spectrum use and prevention of harmful interference, are fulfilled.¹⁶ Australia's 1992 Radiocommunications Act¹⁷ guides the ACMA in its regulation of satellite operators with the goal of promoting spectrum management that is efficient, supports the commercial, defense, communication and public safety sectors, as well as the "policy objectives of the Australian Government."¹⁸

ACMA introduced the Australian Radio Quiet Zone Western Australia (ARQZWA) in 2005 as an effort to preserve a unique radio-quiet area of Western Australia.¹⁹ That area is now home to the Murchison Radio-astronomy Observatory (MRO). The area was further protected with the Radiocommunications (Mid-West Radio Quiet Zone) Frequency Band Plan of 2011, which established an inner protected area with a 70 km radius around MRO, an outer zone from 70 km to 150 km, and requires coordination of some frequency use up to a 260 km radius.²⁰ ARQZWA was most recently updated through a 2023 Frequency Band Plan made under subsection 32(1) of the 1992 Radio Communications Act.²¹

- **Satellites regulations**

In addition to radiocommunication licensing and oversight by ACMA, the *Australian Space Launches and Returns Act (2018)* contains rules for Australian satellite operators planning to launch from within Australia and from abroad. A "debris mitigation strategy" is required in both instances, which requires operators to outline the specifics including information about limiting debris generation at all stages.²² Operators are also required to provide information about basic orbital parameters, including nodal period, inclination, and apogee and perigee, which are then filed in a space object registry.²³

¹⁶ <https://www.nortonrosefulbright.com/en/knowledge/publications/f0a97b4e/global-outer-space-guide-australia>

¹⁷ <https://www.legislation.gov.au/Details/C2023C00161>

¹⁸ <https://www.nortonrosefulbright.com/en/knowledge/publications/f0a97b4e/global-outer-space-guide-australia>

¹⁹ <https://www.acma.gov.au/sites/default/files/2023-06/ARQZWA-1.PDF>

²⁰ [https://www.industry.gov.au/science-technology-and-innovation/space-and-astronomy/ska-project-australia/australian-radio-quiet-zone-wa#:~:text=The%20Australian%20Radio%20Quiet%20Zone,Industrial%20Research%20Organisation%20\(CSIRO\)](https://www.industry.gov.au/science-technology-and-innovation/space-and-astronomy/ska-project-australia/australian-radio-quiet-zone-wa#:~:text=The%20Australian%20Radio%20Quiet%20Zone,Industrial%20Research%20Organisation%20(CSIRO))

²¹ <https://www.legislation.gov.au/F2023L00286/asmade/text>

²² <https://www.legislation.gov.au/Details/F2019L01118>

²³ <https://www.legislation.gov.au/Details/F2019L01118>

3. Austria (Tiffany Nichols)

- **Protection of dark skies**

Austria has had a federal-level light emissions and regulation law since 2009, which it passed in response to EU Directive 2005/32/EC. The law places limits on light emission from streetlamps, business advertisements and retail signage under nuisance law theory. In 2012, Austria amended this law to directly address the topic of light pollution. This law places specific limits on emissions in terms of measurable values and time periods. The main area of concern appears to be preserving natural darkness and wildlife.²⁴ On May 1, 2024, the amendments to [the Upper Environmental Law](#) came into force, bringing additional legal measures to address light pollution to protect the environment, biodiversity and human health. These amendments are supplemented by an Annex on monitoring, measurements and limitations.

- **Protection of quiet skies**

Further research into national regulations and policies is necessary to identify specific norms applicable to protecting quiet skies for astronomical observations.

- **Satellites regulations**

Further research into national regulations and policies is necessary to identify specific norms related to the prevention of interference of satellites in astronomical observations.

²⁴ VERORDNUNG (EG) Nr. 245/2009 DER KOMMISSION vom 18. März 2009, <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:076:0017:0044:DE:PDF>

4. Azerbaijan (Yana Yakushina)

- **Protection of dark skies**

At present, Azerbaijan is actively engaged in the development of the space industry, as a consequence, special attention is paid to the adoption of space legislation. 24 June 2023 Law of the Republic of Azerbaijan²⁵ on space activities was adopted. The new law defines “space activity” as *“exploration and use of outer space for technical, economic, defense, security, informational, scientific, ecological and other purposes, including Earth orbits, as well as the Moon and other celestial bodies and their orbits, through a space object, the launch, management, operation and return to Earth of a space object or decommissioning”*. The definition limits space activities only to the activities associated with space objects. The law provide the following definition of “space object” - *“space object - is a space apparatus (satellite, spacecraft), space vehicle, rocket carrier, as well as other equipment intended for the proper performance of space vehicles and space installations, intended to be launched into outer space or launched”*. Therefore, unlike in other countries, the main space law of Azerbaijan does not consider ground-based astronomy as a form of space activity even though legal interpretation. Simultaneously, the new act also does not include any norms on the environmental impact assessment of satellites and other space objects with regard to dark skies.

It is interesting to have a look at the environmental legislation that may be applicable to the protection of dark and quiet skies. The Law on Environmental Protection²⁶ indicates that the environment is *“a combination of animate and inanimate nature surrounding it, regardless of human activity”*. More importantly, among the environmental principles, the act indicates the principle of prevention of environmental damage and damage assessment. Despite a lack of a “pollution” definition and no direct indication that light is an environmental pollutant, environmental legislation can be potentially applied to the mitigation of light pollution issues.

The absence of regulations aiming to protect astronomical observations and a rapid increase in construction activities in Azerbaijan significantly disturb the astronomical community. Astronomers are concerned that significant funding allocated for the reconstruction of observatories, in particular the Shamakhy Astrophysical Observatory²⁷, is being wasted due to the increase in light pollution and noise and that in this regard, appropriate measures must be taken to protect astronomical activity²⁸.

- **Protection of quiet skies**

In the Republic of Azerbaijan, there is currently no specific legal framework for the protection of the quiet sky. Much like many other nations, Azerbaijan adheres to the recommendations of the International Telecommunications Union (ITU) regarding the allocation of radio frequencies for various activities, including astronomy.²⁹ However, the country has not developed distinct legislative provisions aimed at protecting radio astronomy from potential harmful interference or disruptions. This absence of dedicated legal measures may present challenges to the protection of radio astronomical observations from unwanted interference, underlining the importance of addressing this gap in the legal framework to support scientific research and observation in this field.

²⁵ <https://president.az/az/articles/view/60774>

²⁶ <https://e-qanun.az/framework/3852>

²⁷ <https://shao.az/en/content/1/cat/1>

²⁸ <https://modern.az/az/news/59062>

²⁹ <https://dri.az/en/page/17>; Law of the Republic of Azerbaijan on approval of the Radiocommunication Regulations of the International Telecommunication Union and the Final Acts of the World Radiocommunication Conference of April 15, 2022.

- **Satellites regulations**

The legislative regulation of space activities within Azerbaijan began to take shape in 2023. The primary legal document governing activities related to satellites in the country is the Law of the Republic of Azerbaijan on Space Activities. This law covers various aspects of space activities, including certification, registration, and licensing.

Remarkably, the legislation explicitly states that the national space operator is not obliged to obtain licenses and permits specified in the list approved by the Cabinet of Ministries for its area of operations³⁰. Furthermore, the current legal framework does not outline specific document requirements for obtaining licenses for space activities. However, it's important to note that the law on space activities emphasizes the need for compliance with environmental legislation.

Nevertheless, the existing legislation lacks specific provisions for the protection of near-Earth or outer space. In summary, while Azerbaijan is dedicated to becoming an active participant in space activities and has made progress in developing relevant legislation, there are currently no regulations specifically aimed at preserving D&QS or mitigating adverse impacts on outer space. The development of such regulations in the future could contribute to the protection of the environment and scientific endeavours related to space exploration.

³⁰ Para. 6.2 Art. 6 of the [Law of the Republic of Azerbaijan on Space Activities](#)

5. Bahrain (Rayan Khan)

- **Protection of dark skies**

Over the past few decades, the Kingdom of Bahrain has implemented several laws, royal decrees, and ministerial decisions to regulate the use of natural resources and protect the environment. [Article 5 of Chapter 3 of the National Action Charter](#) underscores the importance of taking legal measures to reduce pollution from various sources.

The Public Commission for the Protection of Marine Resources, Environment, and Wildlife plays a significant role in assessing and addressing environmental issues. It is mandated to conduct research and studies in collaboration with relevant authorities and has issued periodic reports on the state of the environment. The Kingdom of Bahrain Public Commission for the Protection of Marine Resources, Environment and Wildlife State of the Environment in the Kingdom of Bahrain³¹ highlights the use of the integrated environmental assessment methodology developed by the United Nations Environment Program (UNEP) known as the Global Environment Outlook (GEO). GEO aims to identify the current state of the environment and analyze the impact of human activities on ecosystems and human well-being.

While Bahrain's commitment to environmental protection and sustainability is evident, the report does not delve into specific details regarding dark skies or satellite-related environmental concerns. A closer examination of Bahrain's environmental laws and policy frameworks is necessary to understand its stance on light pollution and satellite activities, shedding light on the Kingdom's approach to preserving environmental quality and balancing technological development.

- **Protection of quiet skies**

[The National Frequency Plan \(NFP\)](#) of the Kingdom of Bahrain ensures efficient and effective utilization of the finite radio frequency spectrum, while also safeguarding the integrity of radio astronomy observations, crucial for preserving quiet skies.

Under the NFP, specific frequency bands are allocated for radio astronomy purposes, aiming to shield these bands from harmful interference originating from terrestrial or space radiocommunication services. This protection is in line with international agreements and is essential for the reception of radio waves from cosmic sources. Furthermore, administrations are urged to take proactive measures to prevent interference with radio astronomy stations, particularly by controlling emissions within designated frequency bands. The NFP reflects a commitment to honor international agreements and national policies, ensuring the integrity of radio astronomy research and observations in the Kingdom of Bahrain.

However, within the national framework, no other specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

The current regulatory framework does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

³¹<https://www.sce.gov.bh/Media/Downloads/reports/pdf/11%20Eng%20Final%20Version%20of%20the%20report.pdf>

6. Bangladesh (Pragati Mot & Tamara Blagojevic)

- **Protection of dark skies**

As per the *Bangladesh Environmental Conservation Act of 1995* environment pollutant means “any solid, liquid or gaseous substance which causes a harmful effect to the environment and also includes heat, sound and *radiation*.”³² Pollution is defined as “contamination or alteration of physical, chemical or biological properties of air, water or soil, including change in their temperature, taste, odor, density, or *any other characteristics*, or such *other activity* which, by way of discharging any liquid, gaseous, solid, *radioactive* or other substances into air, water or soil or any component of the environment, destroys or causes injury or *harm to public health* or to domestic, commercial, industrial, agricultural, recreational or other useful activity, or which by such discharge destroys or causes injury or harm to air, water, soil, livestock, wild animal, bird, fish, plant or *other forms of life*.”³³ Compared to some national legislations, both of these definitions appear broader and less restrictive, which allows for subsuming light pollution under the definition of pollution, however, as visible, it isn’t explicitly included. Additionally, a good sign towards a pathway forward is the provision indicating that the Government may formulate environmental guidelines relating to the control and mitigation of environmental pollution, conservation and improvement of the environment.³⁴

The Wildlife (Conservation and Security) Act 2012. allows for the declaration of sanctuaries, national parks and community conservation areas, and lays down the permissible activities within such premises, while also recognizing national heritage, memorial trees or sacred trees and respecting the traditional or cultural values and norms of the communities.³⁵ Bangladesh also has the Animal Welfare Act of 2019,³⁶ however, it does not recognize the effects of artificial light on certain species, as it mainly focuses on domesticated and farm animals.³⁷

There have recently been new rules issued, but the SRO no. 255/LAW/2022³⁸ focuses mainly on air pollution and SRO NO. 53/LAW/2023. focuses on environmental conservation.³⁹ The Bangladesh Mega City, Divisional Town and District Town’s municipal areas including country’s all the municipal areas’ playground, open spaces, parks and natural water reservoir Conservation Act, 2000, also do not seem to explicitly mention light pollution.⁴⁰ Within the Dhamoirhat Paurashava Master Plan (2011-2031), the Bangladesh National Building Code (BNBC) ‘aims to insure public safety, health, and general welfare in so far as they are affected by

³²https://bangladeshbiosafety.org/wp-content/uploads/2017/05/Bangladesh_Environmental_Conservation_Act_1995.pdf

³³ Ibid, Article 2.

³⁴https://bangladeshbiosafety.org/wp-content/uploads/2017/05/Bangladesh_Environmental_Conservation_Act_1995.pdf Article 13.

³⁵<https://www.thedailystar.net/law-our-rights/news/overview-environmental-laws-bangladesh-1753360>

³⁶<https://www.globalanimallaw.org/downloads/database/national/Bangladesh-AnimalWelfareAct2019.pdf>

³⁷<https://www.thedailystar.net/law-our-rights/news/overview-the-animal-welfare-act-2019-1813918>

³⁸https://www.vdb-loi.com/bd_publications/sro-no-255-law-2022-on-the-air-pollution-rules-2022-dated-25-july-2022/

³⁹https://www.vdb-loi.com/bd_publications/sro-no-53-law-2023-dated-05-march-2023-issued-by-the-ministry-of-environment-and-forest-on-environmental-conservation-rules-2023/

⁴⁰<https://file-rajshahi.portal.gov.bd/uploads/fd07c668-af78-407c-9223-2f78ea318f34//633/6cb/ba9/6336cbba95f14339349047.pdf>

the construction, alteration, repair, removal, demolition, use or occupancy or buildings, structures of premises, through (...among else), safety from fire and other hazards, sanitation, *light* and ventilation'.⁴¹ However, in the Environmental Management Plan, although sound pollution and one of its forms - lighting hum,⁴² are recognized, light pollution and associated phenomena, are not.

On 4th June 2018, Bangladesh launched its first nanosatellite 'BRAC Onnesha' from the Kennedy Space Centre in Florida, USA. Again, on 11th May 2018 as the 57th aspiring space-faring nation Bangladesh sent its 1st geostationary satellite the 'Bangabandhu-1' which brings ample opportunities in different sectors including telecommunication, broadcasting, weather forecasting and navigational sectors of the country.⁴³ In 2023, the Bangladesh Satellite Company Ltd (BSCL) has already signed a letter of intent on cooperation with Airbus for the Bangabandhu-2, which will be the country's first earth-observation satellite.⁴⁴

In 2021, the Bangladesh government was planning to build the country's first-ever observatory - the "Bangabandhu Sheikh Mujibur Rahman Space Observatory Centre" at the Bhangra Upazila of Faridpur, which was constructed in collaboration with the Bangladesh Space Research and Remote Sensing Organization (SPARSSO).⁴⁵ In 2022, the first-ever full-size private astro observatory was established in Sreepur of Gazipur, which has created a new history in the astronomy practice of the country, as per the press release.⁴⁶ Freedom fighter and businessman Shahjahan Mridha Benu funded the observatory at his own expense and established it on his own residential land.⁴⁷ There is also the Bangladesh Observatory which is a working research observatory, located in Dhaka.⁴⁸

- **Protection of quiet skies**

Bangladesh Telecommunication Regulatory Commission (BTRC) is the only agency responsible for the issuance and monitoring of License in Bangladesh, with prior approval from the Government.⁴⁹ All the services like Wireless, Wire Line, Internet, and Long Distance require licenses from BTRC.⁵⁰ Currently, only call center service providers do not require any license from BTRC, but only registration. In Bangladesh, an individual license is issued to provide a telecom service.⁵¹

⁴¹[https://oldweb.lged.gov.bd/UploadedDocument/UnitPublication/10/1549/Dhamoirhat%20Paurashava%20Master%20Plan%20\(Bangla\)%202011-31.pdf](https://oldweb.lged.gov.bd/UploadedDocument/UnitPublication/10/1549/Dhamoirhat%20Paurashava%20Master%20Plan%20(Bangla)%202011-31.pdf)

⁴² Ibid, page 155.

⁴³<https://www.dhakatribune.com/amp/feature/tech/24055/first-bangladeshi-nanosatellite-starts-orbiting>

⁴⁴ Airbus: Bangladesh to be among few countries with sovereign satellite (dhakatribune.com)

⁴⁵<https://www.dhakatribune.com/bangladesh/236042/bangladesh%E2%80%99s-first-space-observatory-in-faridpur>

⁴⁶<https://www.tbsnews.net/bangladesh/bangladeshs-first-private-astro-observatory-launched-gazipur-474754>

⁴⁷ Ibid.

⁴⁸ <https://www.go-astronomy.com/observatory-global.php?ID=581>

⁴⁹ SATRC REPORT ON EMERGING LICENSING FRAMEWORK INCLUDING EXIT AND RELICENSING POLICY, [SATRC_Report_Relicensing.docx \(live.com\)](#), page 20.

⁵⁰ Ibid.

⁵¹ Ibid.

Spectrum management activities are mainly undertaken by the Spectrum Division and distributed in two Directorates.⁵² The BTRC in consultation with the Spectrum Management Committee (SMC) has produced and published the 2010 National Frequency Allocation Plan (NFAP),⁵³ which was last updated in November 2022.⁵⁴

However, within the national framework, no specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

Under the *National Telecommunication Policy of 1998* and the subsequent *Bangladesh Telecommunications Act of 2001*, the Bangladesh Telecommunications Regulatory Commission [BTRC] was established to be effective from 31 January 2002.⁵⁵ The draft of the new Bangladesh Telecommunication Act of 2024, has already been shared for consultation with some entities, including the Bangladesh Telecommunication Regulatory Commission (BTRC), AMTOB (Association of Mobile Telecom Operators of Bangladesh), and Internet Service Provider Association of Bangladesh (ISPAB).⁵⁶ The new act will replace the Bangladesh Telecommunication Act of 2001, which was amended twice - in 2006 and 2010.⁵⁷

In 2020, the BTRC has also issued regulatory Guidelines on Landing Rights for Broadcasting Satellite Service in Bangladesh, which contains a provision providing that: *“Licensee shall ensure that the licensed system and the licensed services do not cause any damage to, or interference with, any communication systems or communication services of any other operator.”*⁵⁸ However, the current regulatory framework, however, does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

⁵² [https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2016/Nov-SM-Economics/Presentations/Day%20%20-%20Session%205%20\(Bangladesh\).pdf](https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2016/Nov-SM-Economics/Presentations/Day%20%20-%20Session%205%20(Bangladesh).pdf)

⁵³ [National Frequency Allocation Plan\(NFAP\)..pdf \(portal.gov.bd\)](#)

⁵⁴ [National-Frequency-Allocation-Plan - Bangladesh Telecommunication Regulatory Commission-Government of the People's Republic of Bangladesh \(btrc.gov.bd\)](#)

⁵⁵ SATRC REPORT ON EMERGING LICENSING FRAMEWORK INCLUDING EXIT AND RELICENSING POLICY, [SATRC_Report_Relicensing.docx \(live.com\)](#), pg 20

⁵⁶ 2024, [Bangladesh Telecommunication Act, 2024 | Govt drafts fresh telecom act \(thedailystar.net\)](#)

⁵⁷ Ibid.

⁵⁸ REGULATORY GUIDELINES ON LANDING RIGHTS FOR BROADCASTING SATELLITE SERVICE IN BANGLADESH, I5. MISCELLANEOUS, 15.03, https://btrc.portal.gov.bd/sites/default/files/files/btrc.portal.gov.bd/page/1c1ea1c0_f8ef_4cdf_9005_d8a34b9ca554/2022-08-14-07-15-bc5e4d1f7c1a41cd6dc6472350f9e10d.pdf

7. Belarus (Yana Yakushina)

- **Protection of dark skies**

In Belarus, the space industry has been developing relatively recently. The Belarusian space program was first launched in 2007. On November 1, 2013, the UN General Assembly accepted the Republic of Belarus into the UN Committee on the Peaceful Uses of Outer Space.⁵⁹ Currently, the State Program for the Exploration and Use of Outer Space for Peaceful Purposes for 2021-2025 is in force.⁶⁰ However, this program does not directly provide for any actions aimed at protecting the dark and quiet sky.

To protect dark skies in Belarus, environmental legislation can be applied. For instance, the Law of the Republic of Belarus of November 26, 1992 No. 1982-XII On Environmental Protection⁶¹ defines “*environmental pollution*” as “*entry into the components of the natural environment, the presence and (or) occurrence in them as a result of a harmful effect on the environment of substances, physical factors (energy, noise, radiation and other factors), microorganisms, the properties, location or number of which lead to negative changes in physical, chemical, biological and other indicators of the state of the environment, including exceeding the standards in the field of environmental protection*”. Thus, providing for consideration of artificial light at night (ALAN) as an environmental pollutant.

Beyond that, Belarus has a national standard “Fluorescent lamps without built-in ballast, high-intensity discharge lamps, ballasts and fixtures for such lamps. Energy efficiency. Requirements and methods of control. STB 2460-2020”,⁶² which provides for the definition of light pollution. Light pollution is defined as “*the sum of all the negative effects of artificial light on the environment, including interfering light*”. This definition is fully taken from the Technical Regulations of the Eurasian Economic Union On the requirements for energy efficiency of energy-consuming devices adopted by the Decision of the Eurasian Economic Commission dated August 8, 2019 No. 114.⁶³ However, additional norms were not adopted on this matter.

- **Protection of quiet skies**

In the legislative framework of the Republic of Belarus, the sole document that encompasses provisions related to radio astronomy is the Table for the distribution of radio frequency bands among radio services.⁶⁴ This document adheres to international recommendations, including guidelines from the International Telecommunications Union (ITU). Within this table, specific radio frequency bands are allocated for radio astronomy activities.

However, it is noteworthy that the current legal framework does not include more comprehensive regulations or specific measures aimed at protecting quiet skies within the Republic of Belarus. The absence of such measures highlights a potential need for the development of specific legal provisions to protect D&QS, which are essential for astronomical research and the preservation of proper astroclimate.

⁵⁹ https://www.unoosa.org/res/oosadoc/data/documents/2023/aac_105/aac_1051271add_2_0_html/V2218227.pdf

⁶⁰ <https://pravo.by/document/?guid=3871&p0=C22100245>

⁶¹ <https://pravo.by/document/?guid=3871&p0=v19201982>

⁶² <https://pravo.by/document/?guid=12551&p0=W02035905p&p1=1>

⁶³ <https://pravo.by/document/?guid=3871&p0=F91900478>

⁶⁴ [Resolution](#) of the Council of Ministers of the Republic of Belarus dated August 9, 2016, N 620 On approval of the Distribution Table radio frequency bands between radio services of the Republic of Belarus

- **Satellites regulations**

While Belarus actively participates in space activities and collaborates on international space programs, such as the joint project to create an Earth remote sensing satellite with Russia,⁶⁵ it is essential to note that there is a notable lack of comprehensive legislative regulation concerning satellite-related activities in the country. This absence of specific legal provisions for satellite operations highlights the need for the development and implementation of a more comprehensive legal framework to govern and ensure the responsible and efficient use of satellites within Belarus. Such regulations are crucial to addressing various aspects of satellite-related activities, including licensing, environmental considerations, and protection of D&QS.

⁶⁵ <https://eurasia.expert/top-3-kosmicheskikh-programm-s-uchastiem-belarusi/>

8. Belgium (Yana Yakushina & Andrew Falle)

- **Protection of dark skies**

The rapid development of space legislation in Belgium started in 2005⁶⁶ when the law on space activities was adopted.⁶⁷ The Law defines “space activities” as “*activities of launching, flight operations and guidance of space objects carried out by natural or legal persons in the zones placed under the jurisdiction or control of the Belgian State or using installations, personal or real property, owned by the Belgian State or which are under its jurisdiction or its control*”. Considering this, astronomy can be viewed as an activity that supports launching, flight operations and guidance of space objects.

In light of the protection of dark and quiet skies, it is interesting to discuss Art.8 of the Act: “*The impact on the environment of all activities covered by this law shall be assessed by one or more experts designated for that purpose by the Minister. Such an assessment may be carried out at different stages of the activities.*”

The Law requires the impact assessment of space activities in the initial, intermediate, and final stages. The aim is to assess the potential impact on the environment on Earth or in outer space of launching or operating the space object. The protection of the sky is not explicitly mentioned there. However, the Royal Decree,⁶⁸ which provides for the content of the impact assessment of space objects indicates the need to analyze (1) the potential impact of the activity on the terrestrial environment, including the atmosphere and, in particular, on the natural and human environment of the place of launching and (2) potential impact of the activity on the outer space environment, and includes a description of the measures taken or planned to reduce or limit such impact and, where appropriate, the measures taken or planned to ensure the sustainable and rational use of the natural resources of the outer space environment. The Decree provides for analysis of potential mid-term and long-term impacts of the planned space activities. Additionally, in general, Belgian space law highlights the important role not only of international legislation but also the recommendations adopted by, inter alia, UNOOSA. The latter means that guidelines and recommendations potentially adopted by international authorities, e.g. impact assessment of satellites on the visibility of dark skies, are more likely to be recognized and incorporated into the Belgian national legislation. Therefore, the possibility of considering dark skies, as a part of the natural and human environment, will allow the application of the aforementioned regulations to the issues related to the impacts of satellites and mega-constellations.

Protection of dark and quiet skies from the environmental point of view can be broadened by the analysis of Belgian environmental legislation. Regulation of most aspects of environmental protection is dedicated to the regional government - Flemish, Walloon and Brussels Metropolitan regions. Despite some differences, all the regional environmental law is based on precautionary and preventive principles, aiming at preventing the risk of serious and irreversible damage to the environment.⁶⁹ Following that, the lack of scientific certainty should not become an obstacle to the adoption of effective and proportionate environmental protection measures. These principles play an important role in practice. A lack of regulations which specifically address light pollution has not become an issue for cancellation of the permit for lighting installations on a bicycle path. In support of the decision, the Flemish administrative court indicated the need to perform an impact

⁶⁶ https://www.belspo.be/belspo/space/belaw_en.stm

⁶⁷ Belgian Law of 17 September 2005 on the Activities of Launching, Flight Operation or Guidance of Space Objects ([English version](#)).

⁶⁸ Royal Decree of 19 March 2008 on implementing certain provisions of the Law of 17 September 2005 on the activities of launching, flight operations and guidance of space objects ([English version](#)).

⁶⁹ See, for instance, the [Walloon environmental code](#) of 27 May 2004.

assessment of artificial light at night prior to its installation.⁷⁰ The considered principles could be generally applied towards light pollution issues.

Additionally, the Belgian astronomical community is actively involved in the protection of dark and quiet skies. Several major initiatives can be named, such as Leve(n)de Nacht vzw⁷¹ ((Dutch for "Living Night NGO"), former Preventie Lichthinder vzw⁷² (Dutch for: "Prevention of Light Nuisance NGO")), and Nacht van Duisternis⁷³ (Dutch for: "Night of Darkness"). The community is involved in educational activities, and outreach, as well as participation in funding programs and the development of new regulations to reduce light pollution in Belgium.

- **Protection of quiet skies**

On the territory of Belgium, the *Belgian Institute for Postal Services and Communications* (BIPT)⁷⁴ is responsible for (1) managing the radio frequency spectrum; (2) examining requests for use of the radio frequency spectrum, with the exception of requests destined for the exclusive conveyance of signals of audiovisual and auditory media services; (3) coordinating the radio frequencies, both on the national and international levels; and (4) monitoring the use of spectrum.⁷⁵ Radio equipment intended for commercial use in Belgium must adhere to the Belgian frequency plan, which follows the recommendations and obligatory measures set by the International Telecommunication Union (ITU). Certain frequency bands are explicitly allocated for radio astronomy purposes.⁷⁶

However, no specific regulations are adopted to protect radio astronomy from satellite interference. A similar situation exists at the policy level, where matters concerning the preservation of "quiet skies" are currently not being addressed within any existing policies.

Despite a lack of specific regulations in this regard, the Belgian astronomical community has taken proactive steps by organizing and actively participating in various initiatives. These efforts are directed at increasing awareness of the significance of radio astronomy and formulating recommendations to mitigate potential adverse satellite interference.⁷⁷

Additionally, in the context of Belgium, it is relevant to explore the European Union (EU) regulatory framework. The EU Commission Implementing Decision 2018/661,⁷⁸ dated 26 April 2018, introduced amendments to Implementing Decision (EU) 2015/750, which addresses the harmonization of the 1,452-1,492 MHz frequency band for terrestrial electronic communications services within the EU. The new amendments include provisions aimed at preserving quiet skies for radio astronomy. Among these provisions is an objective to promote the coexistence of radio astronomy and passive earth exploration satellite services within the 1,400-1,427 MHz frequency band. The EU member states are required to submit biennial reports on the implementation of these measures, reflecting the EU's desire to facilitate the protection of radio astronomy.

⁷⁰ Arrest RvVb-A-2122-1097: <https://www.dbrc.be/sites/default/files/2022-08/Arrest%20RvVb-A-2122-1097%20in%20de%20zaak%202021-RvVb-0745-A.pdf>

⁷¹ <https://levendenacht.be/>

⁷² <http://www.preventielichthinder.be/>

⁷³ <https://nachtvandeduisternis.be/>

⁷⁴ <https://www.bipt.be/operators>

⁷⁵ Art. 13 of the Act of 13 June 2005 on Electronic Communications; available online: https://www.ejustice.just.fgov.be/cgi_loi/change_lg.pl?language=nl&la=N&cn=2005061332&table_name=wet

⁷⁶ <https://www.bipt.be/operators/frequency-plan>

⁷⁷ <https://www.sidc.be/activities/ground-observations>

⁷⁸ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018D0661&rid=1>

- **Satellites regulations**

The Belgian satellite launching industry is experiencing consistent growth. As per data from Belgian Aerospace Technologies,⁷⁹ there were 64 commercially procured launches in 2016, and this figure has continued to increase annually.

The primary legislation governing activities related to satellites, including licensing, authorization, and regulatory aspects, is the *Act of 17 September 2005 on the Activities of Launching, Flight Operation, or Guidance of Space Objects*.⁸⁰ Under these provisions, satellite operators are required to have authorization from the Belgian Minister for Science Policy and all satellites are subject to be registered in the National Register of Space Objects.

Authorization for satellite activities is granted subject to several conditions, primarily aimed at ensuring the safety of people and property, environmental protection, and the efficient utilization of airspace and outer space. While specific conditions can vary on a case-by-case basis, satellite operators must provide various data while submitting the application to obtain authorization. Notably, this data does not encompass the technical specifications of the space object. Nevertheless, the Act does allow for the possibility to request additional information.

The authorization process entails a three-step impact assessment for potential space objects, such as satellites. The initial stage involves an evaluation of the potential impact on the Earth's environment or outer space due to launching or operating the space object, and this assessment must be conducted prior to receiving authorization. The intermediate stage can be initiated by the Minister after the launch to assess the actual consequences on the environment on Earth or in outer space resulting from the activities in question. The final stage can also be initiated by the Minister upon re-entry into the Earth's atmosphere.

More specific regulations are outlined by the Royal Decree implementing certain provisions of the Law of 17 September 2005 on the activities of launching, flight operations and guidance of space objects.⁸¹ The regulatory framework includes a comprehensive impact assessment study composed of four key parts, addressing various aspects of space activities. Of particular interest is the third part, which evaluates the potential impact of these activities on the outer space environment. It necessitates measures to mitigate these impacts and promote sustainable use of outer space resources, considering both short-, mid-, and long-term consequences.

Furthermore, this regulatory framework emphasizes the need for compliance with international standards for limiting space debris. The presence of such regulatory provisions opens the door to the potential implementation of impact assessment requirements to reduce the impacts on dark and quiet skies in the future.

⁷⁹ https://www.flandersinvestmentandtrade.com/export/sites/trade/files/market_studies/Final%20-%20Belgian%20Aerospace.pdf

⁸⁰ Belgian Law of 17 September 2005 on the Activities of Launching, Flight Operation or Guidance of Space Objects ([English version](#)).

⁸¹ Royal Decree on implementing certain provisions of the Law of 17 September 2005 on the activities of launching, flight operations and guidance of space objects ([English version](#)).

9. Bolivia (Christopher L. Martin)

Bolivia does not currently have any laws or regulations concerning light pollution or radio quiet skies for astronomy. However, attention to the issue of light pollution in Bolivia's capital of La Paz has been raised by environmental groups⁸² and members of the public have made proposals for a law regulating the issue.⁸³ Bolivia created a space agency (Agencia Boliviana Espacial, <https://www.abe.bo/>) in 2010, but its mission is to increase the use of commercial satellites and specifically to support the launch of its first satellite Tupac Katari 1 (TKSat-1). TKSat-1 was constructed and launched by China in 2013.

⁸² <https://anabolivia.org/contaminacion-luminica-afecta-al-centro-de-la-ciudad-de-la-paz/>

⁸³ <http://biblioteca.usfa.edu.bo/cgi-bin/koha/opac-detail.pl?biblionumber=1712>

10. Brazil (Christopher L. Martin)

- **Protection of dark skies**

While there are no national laws specifically focusing on dark sky issues, Brazilian environmental laws intended to protect coastal animals (e.g. sea turtle nesting sites) have been used as the basis for establishing light pollution restrictions. For instance, along various coastal areas, regulation⁸⁴ prevents any continuous illumination within 50m of the highest high tide line. Inland from the coast, another example is Desengano State Park which is well known for its protection of endangered bird species, but local staff also certified the park as a Dark Sky Park in 2021.⁸⁵ The city of Santa Maria Madalena, one of the municipalities covered by the Desengano State Park, was declared by the Legislative Assembly of the State of Rio de Janeiro the "City of Stars",⁸⁶ as a step towards promoting astrotourism in the region. In this same movement, the "State Week of Astrotourism" was created and included in the official calendar of events of Rio de Janeiro.⁸⁷

At the moment, two bills related to the protection of dark skies are in the analysis by the Brazilian National Assembly. PL 1975/2021⁸⁸ deals with the creation of a national certification for dark sky areas with potential for astrotourism. PL 1400/2021⁸⁹ proposes to include light pollution in the Brazilian constitution as an environmental crime. Multidisciplinary groups of people active in raising awareness about the problems caused by light pollution have sought to pressure deputies to move forward with the analysis of these proposals, in addition to offering support to the discussions and preparation of alternative legislation. However, the discussions continue at a slow pace and the expectation is that they will not progress in the short term due to the articulations surrounding the 2024 municipal elections.

- **Protection of quiet skies**

In the context of radio astronomy, since the 1970s, the Radio Observatório Pierre Kaufmann (ROPK, which until 2019 was known as Radio Observatório do Itapetinga) has been protected by a Municipal Law⁹⁰ of the city of Atibaia (São Paulo). The law determines that no new construction can be carried out within a radius of 2 km around the Observatory and explicitly prohibits the subdivision of land and the installation of any type of industry.

- **Satellites regulations**

In space activities more broadly, the Brazilian government is actively working to increase its capability for launching satellites and has recently updated the relevant laws and regulations

⁸⁴ Portaria N° 11, 30 Jan. 1995, <https://www.ibama.gov.br/sophia/cnia/legislacao/IBAMA/PT0011-300195.PDF>

⁸⁵ <https://darksky.org/places/desengano-dark-sky-park/>

⁸⁶ Lei Estadual no. 9543 de 10 de janeiro de 2022 (RJ) <https://gov-rj.jusbrasil.com.br/legislacao/1352359605/lei-9543-22-rio-de-janeiro-rj>

⁸⁷ Lei Estadual no. 9561 de 12 de janeiro de 2022 (RJ) <https://gov-rj.jusbrasil.com.br/legislacao/1385082737/lei-9561-22-rio-de-janeiro-rj>

⁸⁸ Projeto de Lei 1975/2021. <https://www.camara.leg.br/propostas-legislativas/2284897>

⁸⁹ Projeto de Lei 1400/2021. <https://www.camara.leg.br/propostas-legislativas/2278050>

⁹⁰ <https://leismunicipais.com.br/a1/sp/a/atibaia/lei-ordinaria/1975/151/1503/lei-ordinaria-n-1503-1975-da-nova-redacao-ao-artigo-1-da-lei-n-1285-72-que-estabelece-limitacoes-administrativas-na-area-adjacente-ao-observatorio-do-itaperitinga?q=observat%C3%B3rio>. This law is in the process of being updated, as there is a typing error in the observatory's coordinates,

to make this possible.⁹¹ While satellite constellations are specifically regulated⁹² under Brazilian law, only their electromagnetic spectrum use is discussed and not any consideration of light pollution more broadly.

⁹¹ The Space Law Review: Brazil, F. W. Maranhão, Jan. 2023, <https://thelawreviews.co.uk/title/the-space-law-review/brazil>

⁹² <https://www.gov.br/anatel/pt-br/regulado/satellite/satellite-networks>

11. Bulgaria (Tamara Blagojevic)

- **Protection of dark skies**

The Bulgarian *Environmental Protection Law* lists the “ambient air, atmosphere, water, soil, bowels of the earth, landscape, natural sites, mineral diversity, biological diversity and the *components* therein”, as the “environmental media”.⁹³ Furthermore, the factors of environmental pollution or environmental damage can be natural and anthropogenic *substances* and *processes*; different types of waste and the *locations* therein; hazardous *energy* sources: noise, vibrations, *radiation*, (...). Having in mind the scope of protected components, although light pollution is not introduced in terminology explicitly, it could be considered in environmental impact assessments, environmental assessment or compatibility assessment (e.g. for sensitive species), or subsumed by interpretation, under hazardous energy source - radiation, especially having in mind that it can affect biological diversity in natural sites, both of which are protected.

The *Protected Areas Act* provides the prohibited activities in national and natural parks,⁹⁴ some of which, for instance, “any manufacturing activities” or “interfering with biological diversity”, can by interpretation also extend to the introduction of excessive artificial light or light pollution.

According to the [Law on Energetics](#), municipalities are the owners of the street lighting systems, they invest in its reconstruction, build new sections, and pay the cost for electricity consumption, while the costs for street lighting represent about 3% of the total municipality costs.⁹⁵ On a regional level, several municipalities issue ordinances on advertising, informational and monumental decorative elements, which could impose reasonable regulation of light exposure, considering the effect on human health. In 2016, Bulgaria published an [Ordinance](#), according to which systems for outdoor artificial lighting located in settlements with over 20.000 inhabitants are subject to obligatory energy audits. Additionally, Bulgaria has harmonized European standards for street lighting by introducing a voluntary Bulgarian national standard BDS EN 13201-2:2016 (European Standard) which includes requirements for limiting light pollution by minimizing light intrusion in spaces where it is neither necessary nor desirable, such as in private property or over the horizon and scattered in the atmosphere. Being a CEN member, Bulgaria is bound to comply with the CEN/CENELEC Internal Regulations, and the said European Standard defines performance requirements which are specified as lighting classes for road lighting aiming at the visual needs of road users, and it considers environmental aspects of road lighting.⁹⁶ One of the basic requirements of the European Standard for street lighting is that the average brightness of the roadway does not fall below a specified operating brightness, to ensure the safe movement of motor vehicles and pedestrians.

⁹³ Environmental Protection Act, Article 4, <https://www.moew.government.bg/en/environmental-protection-act-7628/>

⁹⁴ Protected Areas Act Promulgated, State Gazette No. 133/11.11.1998, Article 21 and 31, https://eea.government.bg/bg/legislation/biodiversity/zztan_15.pdf

⁹⁵ Veselka Kamburova et al, *Energy - Efficient Reconstruction of Public Lighting in Pravets Municipality from Bulgaria*, E3S Web of Conferences 112, 04008 (2019), https://www.e3s-conferences.org/articles/e3sconf/pdf/2019/38/e3sconf_te-re-rd18_04008.pdf

⁹⁶ EN 13201-2:2015, Road lighting - Part 2: Performance requirements, The British Standards Institution 2016, BSI Standards Limited 2016, <https://www.mklights.com/data/upload/ueditor/20210904/613329b522bf2.pdf>

In 2022, since the signing of the *Cooperation Agreement with ESA* (in 2020) and its entry into force, 43 projects were approved regarding Scientific research and applications, Telecommunications, Microgravity studies, Engineering and exploitation of the ground segment. In 2023, at the 62nd session of the UNCOPUOS Legal Subcommittee - general exchange of views, Bulgaria's delegation's representative stated that during the last STSC session, Bulgaria together with Spain, Chile, Slovakia, Dominican Republic and South Africa, submitted under agenda item 17, a Conference Room Paper on the Protection of Dark and Quiet Skies for Science and Society.⁹⁷ As per the delegations' statement, Bulgaria fully shares the concern that the sun-reflected luminosity and their radio-frequency emissions have a serious impact on astronomical observations as well as on the pristine appearance of the night sky, and finds it important to explore the legal aspects of the establishment of an expert group where all stakeholders can collaborate in studying and implementing measures that can mitigate the negative impact of the constellations on astronomy and visibility of the night sky.⁹⁸

- **Protection of quiet skies**

When it comes to astronomy and astronomical activities specifically, it seems that Bulgaria showcases intent to be active, but claims to lack sufficient funding.⁹⁹ The National Astronomical Observatory – Rozhen is a part of the Institute of Astronomy, Bulgarian Academy of Sciences and its main observational spot, and has 3 telescopes: 2m Ritchie-Chretien-Coudé telescope, 60cm Cassegrain telescope and 50/70cm Schmidt telescope. Similarly, the Department of Astronomy at the [University of Sofia "St. Kliment Ohridski"](#) has two observatories - [The Astronomical Observatory](#) at Boris Garden and the [Students' Astronomical Observatory - SAO Plana](#), and owns modern and adequate [instrumentation](#) and also has experienced specialists, facilitating the students' theoretical and practical education in the fields of stellar and nonstellar photometry, spectroscopy and radio astronomy, and science communication. The biggest Planetarium with an astronomical observatory in Bulgaria began operations in 1975. is located in the town of Smolyan. Aside from the main projector – a space flight planetarium (RFP), there are also several other telescopes in the planetarium.

When it comes to astronomy-related activities, the year 2017 was marked by the launch of the first Bulgarian satellite into orbit,¹⁰⁰ while up until today, the Online Index of Objects Launched into Space, countries four [Bulgarian satellites](#): PLATFORM 1, SPARTAN, ENDUROSAT ONE, and BULGARIASAT 1. As per the ITU Explorer, the Bulgarian Ministry of Transport, Information Technology and Communications is the responsible administration, and

⁹⁷ Item 17 of the provisional agenda - General exchange of views on dark and quiet skies for science and society, Committee on the Peaceful Uses of Outer Space Scientific and Technical Subcommittee Sixtieth session Vienna, 6–17 February 2022, https://www.unoosa.org/res/oosadoc/data/documents/2023/aac_105c_12023crp/aac_105c_12023crp_18_0.html/AC105_C1_2023_CRP18E.pdf

⁹⁸ 2023 Statement by Bulgaria under Agenda Item 3 „General exchange of views”, COPUOS, 62nd session of the Legal Subcommittee, 2023, https://www.unoosa.org/documents/pdf/copuos/lsc/2023/Statements/23_AM/COPUOS_-_LSC_-_statement_by_Bulgaria_under_a.i.3.pdf

⁹⁹ <https://nao-rozhen.org/astroce/index.html>

¹⁰⁰ <https://www.reuters.com/article/us-space-launch-bulgaria/bulgarias-first-communications-satellite-launched-into-orbit-idUSKBN19F05U>

as of 2023, it has issued approximately 32 notifications regarding nationally licensed satellites, out of which commercial space companies operate: the BULGARIA SAT AD - BULSAT-30B-1.9E, BULSAT-1.9E and BUL-QV-1.9E; and the BALKANSAT EOOD - BALKANSAT AP30B satellite; SOLAR SPACE LTD - SPARTAN satellite.¹⁰¹

However, within the national framework, no specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

Bulgaria Regulatory Telecommunications Authority Communications Regulation Commission ([CRC](#)) is a specialized independent regulatory body that implements sectoral policy in the field of electronic communications and postal services. In the conditions of equality and transparency, in accordance with Bulgarian and European legislation, the Commission strives to promote competition in the communications markets in the country and is working to increase investment in the communications sector, develop new technologies and protect consumers in Bulgaria.¹⁰² Regarding the Radio Frequency Spectrum, the CRC website contains the [Bulgarian National Frequency Plan](#) and provides on its website a variety of [rules](#)¹⁰³ for the use of the radio frequency spectrum.

The CRC website indicates the *Law of Telecommunications*¹⁰⁴ as applicable to the spectrum regulation, and this law, among else:

- Settles public relations regarding telecommunications.
- This does not apply to the telecommunication activities for the needs of the Ministry of Defence, the Ministry of Interior, the National Guard Service and the National Intelligence Service, and the interior distribution of the frequencies and the determination of the beckoning of their operative radio connections;
- The management of telecommunications is carried out by the Council of Ministers, by the Council for the national radio frequency spectrum and by the Minister of Transport and Communications.
- When terminal telecommunication equipment assessed for conformity, causes serious damage to the network, generates harmful interference, harms the network or its functioning, or is not used in accordance with their intended use, the operators have the right to refuse the connection, to disconnect or terminate the providing of services through them, after performing all the necessary technical examinations.

¹⁰¹ <https://www.itu.int/itu-r/space/apps/public/spaceexplorer/networks-explorer/space-stations>

¹⁰² <https://ppp.worldbank.org/public-private-partnership/library/bulgaria-regulatory-telecommunications-authority-crc>

¹⁰³ Such are the rules for: The free use of radio frequency spectrum; The use of radio frequency spectrum after registration; The use of spectrum for terrestrial networks allowing the provision of electronic communications services after authorization; The use of radio spectrum for electronic communication networks from satellite radio services after authorisation; The use of radio frequency spectrum for electronic communications network from fixed radio service after authorization; The use of radio frequency spectrum for electronic communications networks from mobile radio service after authorization; the use of radio frequency spectrum of electronic communications networks of radio broadcasting service; The use of radio frequency spectrum for radio equipment by amateur radio service; The use of spectrum for production purposes after authorization.

¹⁰⁴ https://www.crc.bg/files/en/LAW_OF_THE_TELECOMMUNICATIONS.html

Moreover, applicable to the spectrum in Bulgaria, is also the Electronic Communications Act¹⁰⁵ which regulates the social relations pertaining to the implementation of electronic communications, applicable to the conveyance, emission, transmission or reception of signs, signals, written text, image, sound or message of any nature by wire, radio waves, optical or other electromagnetic medium. Among the objectives, along with the promotion of the efficient, effective and coordinated use of spectrum, open innovation is also provided. In applying this Act, the state bodies shall respect the principles of legal status, predictability, transparency, public openness, consultation, equal treatment, proportionality, technological neutrality of networks and, minimization the regulatory intervention. In exercising their powers, the state bodies should not restrict end-users access to or use of services and applications through electronic communications networks (...) the exercise of the rights or freedoms recognized by the Charter of Fundamental Rights of the European Union, and the principles of European Union law.

The State management of electronic communications shall be implemented by the Council of Ministers, by the National Radio Spectrum Council, and by the Minister of Transport, Information Technology and Communications. In carrying out the activities related to strategic planning and coordination of the policy in the field of the radio frequency spectrum, the state bodies shall cooperate with the relevant authorities of the Member States of the EU and with the European Commission in the strategic planning, coordination and harmonization of the use of radio spectrum in accordance with the EU policies for the establishment and functioning of the internal market in the electronic communications sector, also taking into account the economic aspects, relating to safety, health, public interest, freedom of expression, the cultural, scientific, social and technical aspects of the EU policies, as well as the diverse interests of spectrum user groups with a view to optimizing spectrum use and avoiding harmful interference. Granting of individual rights for use of the radio frequency spectrum shall be limited to the cases where such rights are necessary for the most efficient use of the radio frequency spectrum in view of the demand, taking into account the criteria under Par. (2), which includes among else - the need for protection against harmful interference. The Commission shall apply the most relieved spectrum use regime possible, accounting for the technological solutions for the management of harmful interference. The permits are under para. 1 shall include all or some (...among else...) technical and operational conditions to avoid harmful interference and to protect public health from the harmful effect of electromagnetic fields, taking into account as far as possible the requirements for limiting the exposure of the population to electromagnetic fields. The management and efficient use of the radio frequency spectrum without harmful interference shall be carried out in accordance with the state policy on planning and allocation of the radio frequency spectrum, the National Radio Spectrum Allocation Plan, the Regulatory Policy for Radio Spectrum Management for Civilian Needs, as well as in accordance with (the applicable) international agreements.

The harmonized use of radio frequency spectrum by electronic communications networks and services in the EU is promoted in accordance with the need to ensure efficient and effective use and to create benefits for consumers, (...), as well as for the purpose of¹⁰⁶ (...among else...) preventing cross-border or national harmful interference and taking appropriate preventive and corrective measures. The radio frequency spectrum management and the use of the

¹⁰⁵ https://www.crc.bg/files/en/ZES_ENG.pdf

¹⁰⁶ (4) (New, SG No. 105/2011, effective 29.12.2011, renumbered from Paragraph (3), amended, SG No. 20/2021).

geostationary orbital positions with the relevant radio frequency spectrum shall be implemented for the purpose of the efficient use of the radio spectrum without harmful interference, taking into consideration the national security interests and respecting the principles of predictability, equal treatment and objectivity. Restrictions of the rights to use radio frequency spectrum in respect of the technologies used shall be admissible solely in the cases where this is necessary to, among else, avoid harmful interference and protect public health against the impact of electromagnetic fields. The Ministry of Transport, Information Technology and Communications, in agreement with the Commission, shall take the necessary measures for the use of radio frequency spectrum in a manner that does not create obstacles to other Member States of the EU to allow the use of harmonized radio frequency spectrum in their territory in accordance with the law of the EU, including cross-border harmful interference between Bulgaria and other Member States of the EU. Additional requirements for putting into service and/or use of radio equipment may only be implemented for reasons related to effective and efficient use of the radio spectrum; avoidance of harmful interference; avoidance of electromagnetic disturbances; and the protection of public health. "Harmful interference" is interference which endangers the functioning of a radio navigation service or of other safety services or which otherwise seriously degrades, obstructs or repeatedly interrupts a radio communications service operating in accordance with the applicable international, European Union or national regulations.

Furthermore, Bulgaria has a [Law for Radio and Television](#) which provides, among else that: the radio and television operators have the right to create and include commercials in their programmes. Radio and television activity is the creation of radio and television programmes and of additional information for broadcasting through land broadcasting, cable, satellite or other technical devices, (...). The commercials must comply with the requirements for loyal competition according to the acting legislation. The commercials cannot encourage behavior harmful to the health or the personal security of the citizens, as well as behavior damaging the environment.

The General License No. 202 of 29.07.2004 on Carrying out Telecommunications through Satellite Networks for Reporting Purposes, stipulates the conditions for the implementation of telecommunication activities – carrying out of telecommunications through satellite networks for Satellite News Gathering (SNG), as well as the requirements with regard to persons wishing to implement them.¹⁰⁷ This SNG License also contains technical requirements in section III, which among else oblige Registered persons not to cause harmful interference to other radio services functioning on a primary basis.

Additionally, Bulgarian legislation does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

¹⁰⁷ General License No. 202 of 29.07.2004 on Carrying out Telecommunications through Satellite Networks for Reporting Purposes - SNG, Issued by Decision No 1555 of 29.07.2004 of the Communications Regulation Commission, promulgated in the State Gazette, issue 75 of 27.08.2004, in force since 27.08.2004., Article 1. https://crc.bg/files/en/GENERAL_LICENSE_No_202.mht

12. Cameroon (Anne-Sophie Martin)

- **Protection of dark skies**

Cameroon adopted the *Law 96/12 of 5 August 1996 relating to environmental management*.¹⁰⁸ The Law deals with the protection and the rational management of the resources which concern mostly the geosphere, the hydrosphere, the atmosphere, their material and immaterial content, as well as the social and cultural aspects they comprise (Article 2.2).

The country does not adopt specific regulations in the field of light pollution or astronomy. However, there are some initiatives to raise public awareness on the importance of astronomy through the activities undertaken by the Cameroon Astronomy and Space Research Organization and the Astronomy Club of Cameroon, Nkongsamba.

Both entities are raising awareness of the need to limit light pollution.

- **Protection of quiet skies**

In 1998, Cameroon adopted the *Law n.98/014 to govern its telecommunications*.¹⁰⁹ The law provides that radio installations shall, in particular, include networks using satellite capacity. It details management rules for the frequency spectrum in order to ensure rational utilisation by users (Chapter II).

- **Satellites regulations**

There are no specific regulations in this area. However, the country is undertaking a technical feasibility study to launch a space program.¹¹⁰

¹⁰⁸ Law n°96/12 of 5 August 1996 relating to environmental management, [Law No 96 / 12 of 5 August 1996. Relating to environmental management | InforMEA](#).

¹⁰⁹ Law n. 98/014 of 14 July 1998 to govern telecommunications in Cameroon, <https://www.itu.int/ITU-D/treg/Legislation/Cameroon/law.html>

¹¹⁰ https://www.connectingafrica.com/author.asp?section_id=816&doc_id=786601.

13. Canada (Andrew Falle)

- **Protection of dark skies**

There are no national laws regulating light pollution or protecting astronomy in Canada at present. However, Canada does support dark sky preservation, and ultimately astronomy, through Parks Canada Dark-Sky Preserves,¹¹¹ a collaborative program between Parks Canada and the Royal Astronomical Society of Canada (RASC), which designates areas as Dark-Sky Preserves, Urban Star Parks, and Nocturnal Preserves. A minimum light abatement management plan is required to be in place to obtain one of three RASC designations.¹¹² Parks Canada currently oversees thirteen Dark-Sky Preserves, protecting “more dark skies than any other agency or jurisdiction in the world,” one of which is an International Dark Sky Preserve extending into the United States.¹¹³ In addition to Parks Canada preserves, RASC has certified eight other areas as dark-sky sites.¹¹⁴ The RASC Dark Skies Program is only a certification and has no enforcement protecting the designated areas unless local by-laws restricting light pollution are put in place.

Canada has 38 protected national parks that are federally regulated by the National Parks Act.¹¹⁵ Although the Act does not address light pollution mitigation, several of the parks that have received RASC’s dark-sky certification have developed guidelines requiring new lighting within the parks to be “dark-sky compliant.”¹¹⁶

Light pollution regulation and policy are present on the municipal level in Canada, with roughly 30 municipalities having existing bylaws regulating light pollution.¹¹⁷ Some of these bylaws are designed to protect observatories. For instance, Bylaw No. 8789 in Saanich, British Columbia, requires signage in a 5-kilometer radius of the Dominion Astrophysical Observatory to abide by light pollution standards (more examples can be added).¹¹⁸ Other bylaws focus on harmful light pollution more generally. The Foothills region of Alberta’s “Dark Sky Bylaw” recognizes that light pollution is “shown (in certain instances) to adversely affect astronomical observation, plant and animal cycles, and the safety and health of those persons within the MD,” and seeks to limit existing and new light pollution through regulating light sources and fixtures installed in the region.¹¹⁹ The Foothills region is also home to Calgary’s Rothney Astrophysical Observatory (RAO), the Wilson Coulee Observatory, and the Ann & Sandy Cross Conservation Area, which was designated as Canada’s first nocturnal preserve by RASC in 2015.¹²⁰ The Canadian Lighting Bylaw & Policy Index lists additional provincial bylaws developed to protect and preserve dark skies.¹²¹

¹¹¹ <https://parks.canada.ca/voyage-travel/experiences/ciel-sky>

¹¹² <https://rasc.ca/lpa/application-and-cgol#:~:text=through%20the%20process.-,Contact%20us,or%20requests%20for%20additional%20information>

¹¹³ <https://www.pc.gc.ca/en/voyage-travel/experiences/ciel-sky>. See the full list of dark-sky protected areas here: <https://rasc.ca/lpa/dark-sky-sites>

¹¹⁴ <https://rasc.ca/lpa/dark-sky-sites>

¹¹⁵ <https://laws-lois.justice.gc.ca/eng/acts/n-14.01/>

¹¹⁶ <https://parks.canada.ca/pn-np/ab/jasper/gestion-management/permis-permits/amenagement-development/reglements-regulations>

¹¹⁷ https://drive.google.com/drive/folders/1d3S6509Gul0VaN_5BqPwhuFM8knW3_bu;

¹¹⁸ <https://www.saanich.ca/assets/Local-Government/Documents/Bylaws-and-Policies/sign-bylaw-2006-no-8789.pdf>

¹¹⁹ https://www.foothillscountyab.ca/sites/default/files/2022-04/DarkSkyBylaw_2011_6gz.pdf

¹²⁰ <https://www.foothillscountyab.ca/sites/default/files/2022-04/ASCCA-Canada-first-Nocturnal-Preserve-PressRelease.pdf>

¹²¹ <https://docs.google.com/spreadsheets/d/1aG81PFUP4PbjETNHycuKRYUSFXiYiGoYtzh8Mt8F4/edit#gid=0>

- **Protection of quiet skies**

Canada's Radiocommunication Act (1985) regulates the use of radio spectrum and aims to prevent harmful interference amongst operators. Under the Act, the Minister is given the power to, amongst other things, "make determinations as to the existence of harmful interference" and order the responsible persons in control of the equipment causing such interference to "cease or modify" it until it can be operated without causing such interference.¹²² Consequences for operators of equipment who violate the act are included within, primarily in the form of fines.

The Canadian table of radio frequency allocations is based on Final Acts concluded at ITU World Radio Conferences. Within it, there are a number of bands allocated specifically for radio astronomy observations.¹²³ Canada also has several radio observatories that are protected under federal and local laws to further prevent harmful interference, including the Dominion Radio Astrophysical Observatory Research Facility (DRAO) and Algonquin Radio Astronomy Observatory.¹²⁴

- **Satellites regulations**

Operators of Canadian satellite systems, or foreign satellites operating within Canada, must obtain a radiocommunication license in order to conduct activities. Licenses are provided by Innovation, Science and Economic Development Canada (ISED), which has detailed licensing procedures and requirements detailed in their Client Procedures Circulars (CPCs) for space stations.¹²⁵ CPCs require operators to adhere to domestic and international radio spectrum use and allocation regulations and guidelines, as well as requiring other sustainability-related details such as debris mitigation plans (for Canadian licensed satellites).

¹²² <https://laws-lois.justice.gc.ca/eng/acts/r-2/>

¹²³ <https://ised-isde.canada.ca/site/spectrum-management-telecommunications/en/learn-more/key-documents/consultations/canadian-table-frequency-allocations-sf10759>

¹²⁴ https://astro-canada.ca/l_observatoire_algonquin_de_radioastronomie-the_algonquin_radio_observatory-eng

¹²⁵ <https://ised-isde.canada.ca/site/spectrum-management-telecommunications/en/learn-more/key-documents/procedures/client-procedures-circulars-cpc>

14. Chad (Mukulu Kioko)

- **Protection of dark skies**

In recent years, Chad has become part of the 19 African countries that participate in UN COPUOS and has largely expressed support for the protection of D&QS skies. However, within the national framework, no specific provisions which directly or indirectly address light pollution were identified.

- **Protection of quiet skies**

No specific regulations to protect quiet skies for radio astronomy were identified.

- **Satellites regulations**

Chad has one of the most underdeveloped regulatory frameworks in satellite regulations. This has partly been attributed to the country's turbulent past and its national priorities being on matters with a more direct impact on development. Hence, no specific provisions relevant to the protection of D&QS were identified.

15. Chile (Marieta Valdivia Lefort)

Broadly, at the international level Chile has been actively involved in space activities, maintaining a permanent presence in UN COPUOS since 1973. The country has signed and ratified all five UN treaties, without prejudice to the bilateral agreements on space cooperation matters, also signed and ratified.¹²⁶ At the national level, Chile recognises the importance of astronomy and its development, which crystallizes in, among other measures, the availability of funding for research and technological development, and the creation of a ministerial advisory committee for this matter in 2021.¹²⁷ Despite this, Chile does not have a national space agency, nor is it part of the recently formed *Ibero-American Network of Aerospace Agencies* [*Red Iberoamericana de Agencias Aeroespaciales* in Spanish, 2023], of which countries such as Argentina, Peru and Venezuela are members.¹²⁸

• Protection of dark skies

Regarding the protection of dark skies, Chile has focused its attention on developing standards to control terrestrial light pollution throughout the national territory, although particularly in the north. In this regard, legislation in place includes *Decree 43*, *Decree 2*, and *Law 21162*.¹²⁹ In October 2023, the country approved the *Nueva Norma Lumínica* [*New Lighting Standard*] (*D.S. N°1/2022 MMA*), which is a modification of *Decree 43* [of the Ministry of the Environment] and a significant step forward in the protection of dark skies. Decree 43 began to operate officially in 2014 and established emission standards for the regulation of light pollution [based on the revision of Decree 686 of 1998, of the Ministry of Economy, Development and Reconstruction] in the Atacama, Antofagasta and Coquimbo regions (north). The new lighting standard of 2023 extends this regulation to the entire national territory, including new technical requirements and the incorporation of biodiversity and human health as an object of protection.¹³⁰

Although not legislation, other measures are also in place for the protection of dark skies in the country. Since 2000, the *Oficina de Protección de la Calidad del Cielo del Norte de Chile* [*Northern Chile Sky Quality Protection Office*, *OPCC* in Spanish] has been actively operating, with one its lines of work being the reduction of light pollution for the preservation of dark skies. Another example is the *Regional Commission for the Care of the Night Skies*, operating in the Coquimbo

¹²⁶ <https://www.defensa.cl/wp-content/uploads/POL%C3%8DTICA-DE-DEFENSA-NACIONAL-DE-CHILE-2020.pdf> (p. 46).

¹²⁷ <https://www.minciencia.gob.cl/noticias/ministerio-de-ciencia-presenta-comision-asesora-para-potenciar-la-astronomia-en-chile/>

¹²⁸ An alternative to the inexistence of a space agency in Chile today would be the *Asociación Chilena del Espacio* [Chilean Space Association, *ACHIDE* in Spanish], however this is private and is not yet associated with any public institution.

¹²⁹ Decree 43. “Establishing Emission Standards for the Regulation of Light Pollution”. This regulation applied only in the Atacama, Antofagasta and Coquimbo regions (north), and began to operate officially in 2014. <https://www.bcn.cl/leychile/navegar?idNorma=1050704>; Decree 2. “Declaring Areas of Scientific and Research Value for Astronomical Observation” [Ministry of Science, Technology, Knowledge and Innovation] Published in 2023, this declares as *astronomical areas* - and therefore protected - the skies of 39 communes of the country in the regions of Antofagasta, Atacama and Coquimbo (north). <https://www.bcn.cl/leychile/navegar?i=1193763>; Law 21162 amends Law No. 19.300, which approves the Law on the general basis of the environment, to require the preparation of an environmental impact study for projects that may generate light pollution in the areas indicated” (creation of the *astronomical areas* concept). <https://www.bcn.cl/leychile/navegar?idNorma=1133780>

¹³⁰ New Lighting Standard (2023): <https://www.diariooficial.interior.gob.cl/publicaciones/2023/10/18/43679/01/2391423.pdf>

Region [north] since April 2023. Its aim is to manage and prioritize research actions, development of regional policies and initiatives that strengthen the protection and conservation of Coquimbo's night skies. Together with this, certain actors are of special relevance to bring technical discussions and initiatives for the protection of D&QS to the public and decision-making spaces, such as *Fundación Cielos Chile*, the *Comité Mixto ESO-Gobierno de Chile* [Joint ESO-Government of Chile Committee], the *Sociedad Chilena de Astronomía* [Chilean Astronomical Society, SOCHIAS in Spanish], and to some extent, as a potential contributor for this task, the *Asociación Chilena del Espacio* [ACHIDE].

- **Protection of quiet skies**

Regarding quiet skies, there is no national standard directly related to its protection for astronomical purposes, although the discussion is indeed in place within the field of astronomy and observatories on national territory. The subject on which it is possible to find legislation is the radio spectrum for telecommunications. In this regard, *Decree 192* was approved last year (2023) in Chile. Among other elements, this decree modifies the allocation of frequency bands originally defined in *Decree 127* of 2006, including those applied to satellite technology.¹³¹ Nevertheless, in both documents, there is no mention of astronomy or the protection of the quiet skies.

The public entity that could work on future legislation for the protection of quiet skies is the *Subsecretaría de Telecomunicaciones* [Undersecretariat for Telecommunications, SUBTEL in Spanish], which is responsible for regulating radio communications in Chile. SUBTEL is a member of and follows the regulations defined by the *International Telecommunication Union* [ITU], and is part of the *Ministerio de Transportes y Telecomunicaciones* [Ministry of Transport and Telecommunications]. Specifically, the *Departamento de Administración del Espectro Radioeléctrico y Números* [Radio Spectrum and Numbers Management Department], part of the *Regulatory Policy and Studies Division*, is the sub-entity within the SUBTEL that could be contacted to raise the discussion on regulation for the protection of quiet skies.

- **Satellite regulations**

Similarly to the protection of quiet skies, there is no national norm in place directly related to satellite regulations for the protection of D&QS (meaning technical requirements for the manufacturing and launching of satellites), although the discussion is indeed in place within the field of astronomy - this specifically linked to *ESO* and *SOCHIAS*.

Regarding satellite activity in the country, in 2021 the 15-year programme *National Satellite System* [SNSat] was launched, contemplating the manufacturing of ten or thirteen satellites in the *Chilean National Space Centre* [CEN in Spanish, to be inaugurated as part of the SNSat programme]. The CEN contemplates four areas: a laboratory for manufacturing satellites and payloads; a space mission control center; a geospatial information analysis and processing center; and a *Centre for Space Entrepreneurship and Innovation*. The CEN is led by the FACH [air force] and assumed also by the *Ministry of Science, Technology, Knowledge and Innovation*, which chairs the *Space Policy Council and Space Executive Committee* created in 2022 by

¹³¹ Decree 127: "APPROVES GENERAL PLAN FOR THE USE OF THE RADIO SPECTRUM" [Ministry of Transport and Telecommunications; Sub-secretariat of Telecommunications]. <https://www.bcn.cl/leychile/navegar?idNorma=249068&idVersion=2023-04-25>; Decree 192: "Modifies supreme decree N° 127, of 2006, of the Ministry of Transport and Telecommunications, which approves the General Plan for the use of the Radio Spectrum" [Ministry of Transport and Telecommunications; Sub-secretariat of Telecommunications]. <https://www.bcn.cl/leychile/navegar?idNorma=1191538&idVersion=2023-04-25>

Supreme Decree 24.¹³² In the *National Space Programme 2022* associated with the CEN (planned to be rectified during 2023), there is no explicit mention of the protection of the D&QS.¹³³ Universities have also contributed significantly to technological and satellite development in Chile. In 2022, SpaceX put into orbit the *SUCHAI 2*, *SUCHAI 3* and *Plantsat* satellites, developed and operated by academics and students of the *Faculty of Physical and Mathematical Sciences* (FCFM) of the *University of Chile*, part of the university's Space Programme, and whose purposes are essentially research.

¹³² Decree 24 creates a Presidential Advisory Commission on Space Matters” [Ministry of Science, technology, Knowledge and Innovation] <https://www.bcn.cl/leychile/navegar?idNorma=1173665>

¹³³ National Space Programme (2022): https://www.camara.cl/verDoc.aspx?prmID=257336&prmTipo=DOCUMENTO_COMISION

16. China (Tamara Blagojevic & Pragati Mot)

- **Protection of dark skies**

The Constitution of the People's Republic of China states that "*The state protects and improves the environment in which people live and the ecological environment. It prevents and controls pollution and other public Air Quality hazards*".¹³⁴ The General Principles of the Civil Law of the People's Republic of China state that "In the spirit of helping production, making things convenient for people's lives, enhancing unity and mutual assistance, and being fair and reasonable, neighboring users of real estate shall maintain proper neighborly relations over such matters as water supply, drainage, passageway, ventilation, and *lighting*."¹³⁵ As per the *Property Law of the People's Republic of China*: "A possessor of an immovable shall not, in violation of State regulations, discard solid waste or discharge hazardous substances, such as air and water pollutants, noises, and *optical* and *electromagnetic* radiation."¹³⁶

The Environmental Protection law defines the "Environment" as the 'total body of all-natural elements and artificially transformed natural elements affecting human existence and development, which includes the atmosphere, water, seas, land, minerals, forests, grasslands, wildlife, natural and human remains, nature reserves, historic sites and scenic spots, and urban and rural areas'.¹³⁷ Due to the open clause "*total body of natural elements*" and the fact that the atmosphere is included and having in mind that Karman's line is not binding and not precisely defined, there is no reason to exclude outer space if the atmosphere is included. The revised China's environmental protection law in 2014 defines *light radiation* as a specific form of environmental pollution and puts forward overall requirements for the prevention and control of light pollution.¹³⁸

The local laws and regulations of Shanghai, Guangzhou, Shenzhen, Xiamen and other cities have made specific provisions on the prevention and control of light pollution of glass curtain walls, urban and rural lighting or outdoor advertising signboards.¹³⁹ The Shanghai Environmental Protection Regulation¹⁴⁰ requires the Shanghai Housing and Urban-Rural Development Commission and the City Appearance and Landscaping Bureau to formulate standards of illumination intensity for different areas based on the levels of social and economic development, traffic safety, and other factors.¹⁴¹

¹³⁴Constitution of the People's Republic of China, Article 26, <https://www.proquest.com/openview/d08e57525f5498a6298a093a9a198295/1?pq-origsite=gscholar&cbl=2032327>

¹³⁵ The General Principles of the Civil Law of the People's Republic of China, Article 83, <https://www.proquest.com/openview/d08e57525f5498a6298a093a9a198295/1?pq-origsite=gscholar&cbl=2032327>

¹³⁶ Property Law of the People's Republic of China, Article 90, <https://www.proquest.com/openview/d08e57525f5498a6298a093a9a198295/1?pq-origsite=gscholar&cbl=2032327>

¹³⁷ Article 2.

¹³⁸ The Ministry of Ecology and Environment: the motion of CBCGDF on light pollution has a positive reference value, CBCGDF, 2021, <https://cbcgdf.wordpress.com/2021/09/30/the-ministry-of-ecology-and-environment-the-motion-of-cbcgdf-on-light-pollution-has-positive-reference-value/>

¹³⁹ Ibid.

¹⁴⁰ See: Shanghai Environmental Protection Regulation, Shanghai's Municipal Bureau of Ecology and Environment, 2022, <https://sthj.sh.gov.cn/hbzhywpt1013/hbzhywpt1042/20201019/0a75713d4b8e490d95e17d85ccb112c4.html>

¹⁴¹ <https://www.chinadaily.com.cn/a/202208/05/WS62ec779ea310fd2b29e70776.html>

New language on light pollution in the Shanghai environmental regulations came into effect in August 2022, and refer to “the needs of ecological and environmental protection”, but the articles only cover the impact of light pollution on residents and traffic safety (light sources should not directly illuminate homes or distract drivers), whereas there are no regulations to protect wildlife.¹⁴² In the Hong Kong Building Environmental Assessment Method (HK-BEAM), lighting forms a significant part of the assessment, while the lighting assessment consists of two main items: energy consumption, and indoor lighting quality.¹⁴³ Although cities like Beijing, Shenzhen and Hangzhou have issued regulations on lighting facilities or landscape lighting, these are neither legally binding nor do they feature agreed standards and explicit penalties.¹⁴⁴

As per a study conducted in 2018/9, Lighting ordinances exist in Beijing, Shanghai, Tianjin and Guangzhou, out of which cities Shanghai, Guangzhou and then Beijing (in that order) have the most light pollution prevention measures.¹⁴⁵ Qinghai province in Northwest China has approved the country's first local regulation (in effect since Jan 1, 2023)¹⁴⁶ to protect the night sky in Lenghu, where China is building an astronomy observation site. According to the regulation, in the core dark sky reserve, the type and brightness of light sources will be strictly controlled, and the illumination direction of all outdoor fixed night lighting facilities should be 30 degrees below the horizontal line.¹⁴⁷ Construction of projects that affect the local astronomical observation environment and activities that affect the astronomical observation environment will all be prohibited in the reserve.¹⁴⁸ In the buffer area, the irradiation direction of all outdoor fixed night lighting facilities should be kept below the horizontal line.¹⁴⁹ The observation site in the town of Lenghu on the north side of the Qinghai-Tibetan Plateau will have two designated dark preservation areas, a dark core zone and a buffer zone, to ensure its optical observation environment at night.¹⁵⁰

In 2016, in order to preserve the view of the night sky and conduct astronomical research, as well as educate visitors on the issue of light pollution, China Biodiversity Conservation and Green Development Foundation (CBCGDF) piloted a project to build (according to international standards) China's first dark-sky preservations with two Dark-sky parks, called Ngari and Nagqu, planned in two locations in Tibet. Measures taken were to include using only shielded, downward-pointing lights, and limiting the maximum colour temperature to 4000k. The CBCGDF aims to build the first Dark Sky Place in Asia to be certified and accredited by the International Dark-Sky Association.¹⁵¹ Chinese mainland cities Nanjing, Chengdu, Hangzhou, Beijing and Shenzhen, also announced plans to establish Dark Sky zones, with Shenzhen's Dark Sky project being in the Xichong area of the Dapeng Peninsula.¹⁵²

¹⁴² Niu Yuhan, *Light pollution policy: don't forget the birds*, Eco-Business, Nov, 2022, <https://www.eco-business.com/news/light-pollution-policy-dont-forget-the-birds/>

¹⁴³ Developing a Green Building Rating system for Egypt, pg 53, https://fount.aucegypt.edu/cgi/viewcontent.cgi?article=3435&context=retro_etds

¹⁴⁴ Lan Xinzheng, Let There Be Light, China Focus, 2022, <http://www.cnfocus.com/let-there-be-legal-light/>

¹⁴⁵ <https://www.proquest.com/openview/d08e57525f5498a6298a093a9a198295/1?pq-origsite=gscholar&cbl=2032327t> table 5 and 6 page 5.

¹⁴⁶ <https://npcobserver.com/legislation/qinghai-tibet-plateau-ecological-conservation-law/>

¹⁴⁷ <https://www.globaltimes.cn/page/202210/1277170.shtml>

¹⁴⁸ <https://www.globaltimes.cn/page/202210/1277170.shtml>

¹⁴⁹ <https://www.globaltimes.cn/page/202210/1277170.shtml>

¹⁵⁰ <https://www.chinadaily.com.cn/a/202210/30/WS635dc562a310fd2b29e7f40d.html>

¹⁵¹ <https://www.hindustantimes.com/world-news/china-sets-up-first-dark-sky-reserve-to-limit-light-pollution/story-Cr5J8zRHBOlwvBR0RYo5pK.html>

¹⁵² Xinhua, Don't pollute with light, 2022-03-09, http://www.chinacelacforum.org/eng/zgtlmjlbqjgx_1/202203/t20220306_10648439.htm

When it comes to space activities related to astronomical research and observation, Neither of the existing space-related regulations in China (the Measures for the Administration of Registration of Objects Launched into Outer Space 2001¹⁵³, the Interim Measures on the Administration of Permits for Civil Space Launch Projects 2002,¹⁵⁴ and the Examination and Interim Instrument of Space Debris Mitigation and Management 2010)¹⁵⁵ apparently do not contain any explicit definitions of space activities. When it comes to related projects and initiatives, China launched a new optical remote-sensing Earth observation satellite - Gaofen-9 03, from the Jiuquan Satellite Launch Center in northwest China, into orbit by a Long March-2D carrier rocket. The satellite will be mainly used for land survey, city planning, land proper confirmation, road network design, crop yield estimation and disaster prevention and mitigation, and providing information for the construction of the Belt and Road.¹⁵⁶ In 2021, China also launched the Shijian-21 satellite from Xichang into geosynchronous transfer orbit, with the stated aim of testing space debris mitigation technologies.¹⁵⁷ The China Aerospace Science and Technology Corp. (CASC) confirmed launch success within an hour from launch.¹⁵⁸ Additionally, some of the other observatories that China has are the Ali Observatory and the Beijing XingLong Observatory,¹⁵⁹ along with two more observatories in Beijing, three more in Shanghai, one in Hing Kong, as well as some scattered around other areas and provinces.¹⁶⁰

- **Protection of quiet skies**

Further research into national regulations and policies is necessary to identify specific norms applicable to protecting quiet skies for astronomical observations.

- **Satellites regulations**

[China launched its first satellite launched on April 24, 1970.](#)

The implementation of the "[Broadband China](#)" strategy, "[Made in China 2025](#)" and the "[Internet Plus](#)" initiatives led to more radio spectrum requirements.

In China, the Bureau of Radio Regulation of the Ministry of Industry and Information Technology (the State Radio Office) has as its main responsibilities:¹⁶¹

- drawing up the planning of the radio spectrum;
- allocation, allotment and assignment of radio frequencies;

¹⁵³ Procedure of Space Objects Registration and Management (Order No. 6 of the Commission of Science, Technology, and Industry for National Defense and the Ministry of Foreign Affairs, 8 February 2001

¹⁵⁴ "Interim Measures on the Administration of Permits for Civil Space Launch Projects", The Commission of Science, Technology, and Industry for National Defense, Decree of the Commission of Science, Technology, and Industry for National Defense of the People's Republic of China No.12, in force on December 21, 2002, <http://www.asianlii.org/cn/legis/cen/laws/imotaopfcslp771/>

¹⁵⁵ <https://thelawreviews.co.uk/title/the-space-law-review/china#:~:text=China%20ratified%20the%20Outer%20Space,from%20implementing%20international%20legal%20rules>

¹⁵⁶ <https://www.cnsa.gov.cn/english/n6465652/n6465653/c6809694/content.html>

¹⁵⁷ <https://spacenews.com/china-launches-classified-space-debris-mitigation-technology-satellite/#:~:text=HELSINKI%20%E2%80%94%20China%20launched%20the%20Shijian,21%20into%20geosynchronous%20transfer%20orbit>

¹⁵⁸ http://www.news.cn/english/2021-10/24/c_1310265138.htm

¹⁵⁹ <https://airmass.org/observatories>

¹⁶⁰ <https://www.go-astronomy.com/observatories-china.php>

¹⁶¹ <https://www.srrc.org.cn/en/responsibilities5.aspx>

- supervising and regulating the radio stations in accordance with law;
- coordinating and managing the satellite orbital positions;

The Registration Measures 2001 (CHN) were largely enacted to fulfill China's obligations under the Registration Convention. Where China launches or procures the launch of a space object it must register the space object on its national register, as well as the United Nations register maintained by the UN Secretary-General.¹⁶² The national registry is maintained by SASTIND through the Chinese National Space Administration (CNSA). The Licensing Measures define the licensing procedures for civil space launches in China and licenses shall not be altered or transferred.¹⁶³

The Ministry of Industry and Information Technology has recently unveiled the updated "Radio Frequency Allocation Regulations of the People's Republic of China", which have been effective since July 1, 2023. Some updates include:¹⁶⁴

- Expanded Frequency Allocation for IMT Systems
- Sustainable Satellite Communication Development
- Frequency Safety for Major Aerospace Projects
- Guidance for Automotive Radar Industry.

However, within the national framework, no specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

¹⁶² <https://www.unoosa.org/pdf/pres/lsc2014/tech-05E.pdf>

¹⁶³ https://www.unoosa.org/res/oosadoc/data/documents/2023/aac_105c_22023crp/aac_105c_22023crp_28_0_html/AC105_C2_2023_CRP28E.pdf

¹⁶⁴ <https://technotrend.substack.com/p/chinas-radio-frequency-allocation>

17. Colombia (Marieta Valdivia Lefort)

At the international level, Colombia has had a presence in UN COPUOS since 1977. The country has ratified the *Outer Space Treaty*, the *Liability Convention*, and the *Registration, and signed the Rescue Agreement*. Other ratified environmental international treaties include the *Minimata Convention* (member since 2019), the *Paris Agreement* (member since 2018), the *UNCCD* (member since 1999), the *CMNUCC* (member since 1995), the *Montreal Protocol* (member since 1993), the *Vienna Convention* (member since 1990), and the *Escazú Agreement* (signed in 2019).¹⁶⁵

Colombia has two significant bodies in relation to space development. On the one hand, there is the *Comisión Colombiana del Espacio* [Colombian Space Commission, CCE in Spanish], Colombia's government body for the promotion and use of space. Created in 2006, the CCE can be described as an intersectoral body for consultation, coordination, guidance and planning, which aims to guide the implementation of national policy for the development and application of space technologies.¹⁶⁶ On the other hand, there is the *Agencia Espacial de Colombia* [Colombian Space Agency, AEC in Spanish], which has been operating since 2017 as a private non-profit corporation and has contributed significantly to the development of the national space sector. The AEC was created with the aim of developing the country's aerospace technologies and services industry, allowing it to evolve in the application and development of satellite technologies.¹⁶⁷

● Protection of dark skies

Regarding the protection of dark skies, currently, Colombia does not have official legislation on this matter, nevertheless, the discussion is in place and is mainly driven by the perceived benefits of *astrotourism* - the *Starlight Foundation* could be a key actor in this respect. Therefore, it is likely that in the near future, a situation similar to Chile's will arise with regard to standards to control light pollution (terrestrial illumination).

Despite not having regulations directly related to the protection of dark skies, Colombia's constitution guarantees *as constitutional rights the access to a healthy environment and the recognition of the environment as a common heritage*, implying a window of opportunity for environmental legislation to generate regulations for the protection of D&QS.

● Protection of quiet skies

Similarly to Chile, Colombia does not have legislation officially operating for the protection of quiet skies, although the discussion is in place within the astronomical community and this can potentially lead to legislation in the future.

Broadly, the subject on which it is possible to find related legislation is radio spectrum for telecommunications, specifically the *Radio Spectrum Policy 2020 - 2024* linked to the *Ministry of Information and Communication Technologies* [MinTIC, in Spanish] through the *National Spectrum Agency* [ANE, in Spanish].¹⁶⁸ Created in 2009 through *Law 1341*,¹⁶⁹ the ANE is responsible for the planning, allocation, monitoring and control of the radio spectrum as a public

¹⁶⁵ Observatorio del Principio 10 en América Latina y el Caribe: <https://observatoriop10.cepal.org/es>

¹⁶⁶ ¿Qué es la Comisión Colombiana del Espacio?: <http://www.ideam.gov.co/web/ecosistemas/comision-colombiana-espacio-grupo-observacion-tierra>

¹⁶⁷ Agencia Espacial de Colombia [AEC]: <https://www.agenciaespacialdecolombia.org/>

¹⁶⁸ Política Pública de Espectro 2020-2024: https://www.ane.gov.co/Documentos%20compartidos/ArchivosDescargables/Planeacion/polilineamientos-manuales/PoliticaEspectro/Politica_espectro_2020_2024.pdf

¹⁶⁹ Ley 1341 de 2009: <https://www.funcionpublica.gov.co/eva/gestornormativo/norma.php?i=36913>

asset subject to the management and control of the Colombian state, therefore it represents a significant actor in decision-making for this matter.

Regarding the *Radio Spectrum Policy 2020 - 2024*, this mentions the *Spatial Development Policy* - CONPES 3983 of 2020, highlighting the importance of developing satellite services for improving national competitiveness, nevertheless, there is no mention of specific satellite regulations or requirements for the protección of quiet skies.¹⁷⁰

- **Satellites regulations**

Similarly to the previous sections, although the discussion is in place within the field of astronomy, there are no national regulations on satellites and issues relevant to the protection of D&QS, such as technical requirements for the manufacturing and launching of satellites in Colombia. As previously mentioned, CONPES 3983 of 2020 is the norm in place highlighting the importance of satellite development in the country, however, this does not address the protection of D&QS.

Regarding satellite activity, Colombia launched its second satellite this year (2023), the *FACSAT2 'Chiribiquete' satellite*, manufactured by the *Colombian Air Force* [FAC, in Spanish] and launched from the United States on a SpaceX rocket. The main objective of this satellite is to take images of Colombian territory and analyze greenhouse gases.

¹⁷⁰https://www.ane.gov.co/Documentos%20compartidos/ArchivosDescargables/Planeacion/poli-lineamientos-manuales/PoliticaEspectro/Politica_espectro_2020_2024.pdf (p. 33)

18. Costa Rica (Marieta Valdivia Lefort)

Costa Rica joined UNCOPUOS in 2012, and since 2021 has had the *Costa Rican Space Agency* [AEC]. This governmental entity, together with the *Space Centre* (part of AEC), is responsible for conducting research on meteorological activity, environmental monitoring, telecommunications management, and geographic location, among others. Nevertheless, due to funding and infrastructure concerns, the AEC has been questioned by some sectors. Despite not having legislation in place regarding the protection of D&QS, the country is rather active in the astronomy field, with different activities and programs operating such as the *National Centre of Science and Technology* [CIENTEC], *Space Systems Laboratory* [SETECLab], *Space Radar Costa Rica*, and the *Planetary and Astronomical Observatory of San José* (University of Costa Rica), among others. Key actors for the policy-making process in the country include the *National Aerospace Research and Development* [CONIDA] and the *Costa Rican Aerospace Cluster* [CRAC].

- **Protection of dark skies**

Regarding the protection of dark skies, Costa Rica currently does not have official legislation on this matter, nevertheless the discussion is in place and, similarly to Colombia, is mainly driven by the perceived benefits of *astrotourism*. In this respect, the country has an alliance between *CIENTEC* [Costa Rica] and the *Starlight Foundation*, which aims to promote astrotourism in Costa Rica through the certification of appropriate places for this activity.¹⁷¹ Therefore, the *Starlight Foundation* could be a key actor in the potential definition of legislation for the protection of dark skies in the country.

- **Protection of quiet skies**

Currently, Costa Rica does not have legislation officially operating for the protection of quiet skies. Broadly, and similarly to Chile and Colombia, the subject on which it is possible to find related legislation is radio spectrum for telecommunications. One of the key actors in this area would be the *Superintendence of Telecommunications* [SUTEL, in Spanish], which monitors the *Sistema Nacional Monitoreo Espectro* [National Spectrum Monitoring System] - all measurements are made according to international standards set by the *International Telecommunication Union* [ITU]. However, within the national framework, no other specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

Similarly to the previous sections, there is no national norm in place directly related to satellite regulations for the protection of D&QS (meaning technical requirements for the manufacturing and launching of satellites). However, one official document that mentions some regulation of satellites is the [*General Telecommunications Law N° 8642*](#), specifically *Article 30*. This states that “(...) all satellite system operators that, by means of a permanent link, transmit or receive radio signals to or from the national territory, for commercial exploitation or resale of services, must comply with the obligations defined in the respective concession, as well as the following requirements: a) Conform their transmissions to the standards specified by the ITU for satellite frequencies; b) Have international rights to use orbital positions; and c) Register their transmitting equipment, as established by regulation”.

Additionally, current legislation does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

¹⁷¹ Proyecto Astroturismo en Costa Rica: <https://cientec.or.cr/articulos/proyecto-astroturismo-en-costa-rica>

19. Croatia (Yana Yakushina)

- **Protection of dark skies**

Croatia has not yet developed space legislation since space activities are at their beginning. At the same time, astronomical observations always have played an important role in culture and science.

More importantly, Croatia became one of the first European states which introduced a light pollution law. In 2019, the Croatian government adopted NN 14/2019 Act on Protection against Light Pollution (*Zakon o Zaštiti od Svjetlosnog Onečišćenja*).¹⁷² The aim of this Act is to protect against light pollution caused by light emissions into the environment from artificial light sources to which humans, flora and fauna in the air and water, other natural resources, the night sky and observatories are exposed, with the use of more energy-efficient lighting. The law provides for strict regulation of the implementation of ALAN sources, such as the direction of the light below the horizon, lighting monitoring measures and some other measures. More detailed provisions were enacted by three Ordinances: Ordinance on lighting zones, permitted lighting values and methods of managing lighting systems,¹⁷³ Ordinance on the content, format and drafting of the lighting plan and action plan for the construction and/or reconstruction of outdoor lighting,¹⁷⁴ and Ordinance on measurement and monitoring of environmental lighting.¹⁷⁵ The Ordinances, inter alia, provide for the establishment of lighting zones with maximally permitted lighting levels and strict requirements for energy-efficient lighting products.

In addition, in February 2022, The International Dark-Sky Association (IDA) designated the Municipality of Jelsa on the island Hvar as the first International Dark Sky Community (IDSC) in both Croatia and Southern Europe.¹⁷⁶ Moreover, the Croatian Astronomical Union has started the project with the main aim of the designation of Lastovo Island as an International Dark Sky Park or Sanctuary.¹⁷⁷

- **Protection of quiet skies**

Following the examples of other EU member states, Croatia applies ITU Radio Regulations, which encourages states to adopt measures to protect radio astronomy from harmful interference.¹⁷⁸ Many frequency bands are allocated for radio astronomy; however, no specific requirements or measures were identified in the national legislation.

Within the Croatian context, it's pertinent to examine the European Union (EU) regulatory framework. The EU Commission Implementing Decision 2018/661 of 26 April 2018¹⁷⁹, which

¹⁷² NN 14/2019 [Act on Protection against Light Pollution](https://leap.unep.org/countries/hr/national-legislation/law-protection-against-light-pollution), 25 January 2019. The English version can be found here: <https://leap.unep.org/countries/hr/national-legislation/law-protection-against-light-pollution>

¹⁷³ NN 128/2020 Ordinance on lighting zones, permitted lighting values and methods of managing lighting systems (2020): https://narodne-novine.nn.hr/clanci/sluzbeni/2020_11_128_2442.html

¹⁷⁴ NN 22/2023 (February 24, 2023), Rulebook on the content, format and method of creating a lighting plan and an action plan for the construction and/or reconstruction of outdoor lighting (2023): <https://www.zakon.hr/cms.htm?id=56107>

¹⁷⁵ NN 22/2023 (February 24, 2023), Rulebook on measuring and monitoring environmental illuminance: <https://www.zakon.hr/cms.htm?id=56101>

¹⁷⁶ <https://darksky.org/news/jelsa-croatia-is-the-first-international-dark-sky-community-in-southern-europe/>

¹⁷⁷ <https://www.themayor.eu/en/a/view/croatia-s-lastovo-island-of-stars-project-is-being-revived-7272>

¹⁷⁸ Regulations on the Purpose of the Radio Frequency NN 107/13, 94/15, 32/17; <https://www.zakon.hr/cms.htm?id=27645>; Regulation NN 121/2020 on amendments to the Rulebook on the use of the radio frequency spectrum adopted by the Ministry of the Maritime Affairs, Transport and Infrastructure; https://narodne-novine.nn.hr/clanci/sluzbeni/2020_11_121_2365.html

¹⁷⁹ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018D0661&rid=1>

amended Implementing Decision (EU) 2015/750 concerning the harmonization of the 1,452-1,492 MHz frequency band for terrestrial systems providing electronic communications services in the EU, extends its scope to the harmonized 1,427-1,452 MHz and 1,492-1,517 MHz frequency bands. Notably, this decision incorporates requirements aimed at protecting quiet skies for radio astronomy.

One of these requirements is designed to enhance the coexistence of radio astronomy and passive earth exploration satellite services in the 1,400-1,427 MHz frequency band and mobile satellite services in the 1,518-1,559 MHz frequency band. The EU member states should report biennially on the implementation of such measures, signifying the EU's commitment to protect radio astronomy.

- **Satellites regulations**

Croatia has yet to attain the status of a satellite-launching nation. This also explains the lack of legislation related to space activities and objects, including satellites. In 2022, the Adriatic Aerospace Association (A3) and Spacemanic entered into an agreement aimed at facilitating the development and launch of Croatia's first satellite¹⁸⁰, known as CroCube¹⁸¹, a compact satellite measuring 10x10x10 centimetres. The launch is scheduled for the end of 2023. Croatia is committed to an environmentally friendly approach to outer space activities and has affirmed that upon re-entry into Earth's atmosphere, the satellite will be incinerated. No specific provisions or indicators were found with regard to the protection of D&QS.

¹⁸⁰ <https://www.spacemanic.com/news/meet-crocube-the-first-croatian-satellite-a-joint-project-of-a3-and-spacemanic/>

¹⁸¹ <https://crocube.hr/en/>

20. Cyprus (Yana Yakushina)

- **Protection of dark skies**

Light pollution has not been discussed in the political agenda in Cyprus. The Department of Environment under the Ministry of Agriculture is responsible for conducting environmental impact assessments of new developments that could have an impact on turtle nesting sites or bird foraging sites that are not part of the Natura 2000 network¹⁸². While granting a permit, the Department has to consider light wavelength, the height of the light source and visibility.

Despite a lack of regulations, Cyprus has a strong astronomical community which aims at protection dark and quiet skies. Since 2017, Cyprus has had the International Dark-Sky Association Chapter which is maintained by the Cyprus Astronomy Organisation (CAO)¹⁸³. The CAO works to protect dark skies for present and future generations through awareness-raising and educational campaigns, as well as conservation activities.

In addition, the new Space Strategy for Cyprus 2022-2027¹⁸⁴ has introduced one of the future goals is to make Cyprus an attractive destination for astronomers and develop the appropriate infrastructures for that reason. The strategy indicates the need to adopt appropriate measures to protect dark sky locations and make sure that light pollution in general is kept to a minimum for astronomical observations (*Section 8.7*).

- **Protection of quiet skies**

In 2023, Cyprus introduced a new [Radio Frequency Plan](#) that includes dedicated frequency bands for radio astronomy. While this plan designates specific frequency bands for radio astronomy activities, it does not incorporate special measures to protect these frequencies from interference or disruptions both ground-based and from satellites.

The absence of specific standards for the protection of radio astronomy frequencies highlights the potential need for further regulatory measures to ensure the preservation of radio astronomy observations and the prevention of harmful interference.

- **Satellites regulations**

The strategic approach in Cyprus, as outlined, underscores its commitment to astronomy and the mitigation of ground-based light pollution. However, there is a notable omission regarding the impacts of satellites, particularly mega-constellations, on astronomical observations. While a future step involves the adoption of a "Cyprus Space Law," at present, there are no specific regulations governing space activities in the country.

Of particular significance, the strategy actively supports and encourages the involvement, commercialization, and development of satellite-related activities, including communication and navigation. It acknowledges the need to amend laws, regulations, and policies to stimulate the growth of the space sector, including private utilization of satellite spectrum.

However, the strategy does not address the potential impacts of this rapid expansion of the space sector, particularly the adverse consequences on D&QS for astronomical observations. The absence of a comprehensive regulatory framework for space activities, the lack of requirements for impact assessments, and the fast-paced development of the space industry in Cyprus could potentially lead to challenges in protecting D&QS, thereby affecting astronomical research in the country.

¹⁸² [https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/\\$FILE/Light_pollution_reduction_measures.pdf](https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/$FILE/Light_pollution_reduction_measures.pdf)

¹⁸³ <http://www.cyprusastronomy.org/index.php/services/50-recognized-authority-on-light-pollution>

¹⁸⁴ [Cyprus Space Strategy 2022-2027](#)

21. Czech Republic (Charlotte Hook)

- **Protection of dark skies**

In 2017, the Czech Republic's Act of the Czech National Council on Nature and Landscape Protection was updated to include lighting conditions in national parks in order to prevent light pollution.¹⁸⁵ In 2023, new legislation was implemented in Czechia to limit light pollution in the city.¹⁸⁶ Furthermore, the State Environmental Policy of the Czech Republic 2030 document adopted by the Ministry of the Environment called for more legislation on the issue.¹⁸⁷ Light pollution has also been included in Environmental Impact Assessments since 2020.¹⁸⁸ The Ministry of the Environment also created a set of recommendations in regard to public lighting in 2017 that was updated in 2021.¹⁸⁹ The Czech Republic also engages the public in light pollution mitigation efforts by holding conferences and seminars and since 2020 the Ministry of the Environment has held an annual light pollution conference.¹⁹⁰

Moreover, the Czech Republic has several dark sky areas. These include dark sky parks (Beskydy Dark-Sky Park, Manětín Dark-Sky Park, and Izera Dark-Sky Park) as well as observatories (Ondřejov Observatory and Klet Observatory).

- **Protection of quiet skies**

Within the national framework, no specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

Czech legislation in this regard is underdeveloped and does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

¹⁸⁵ [https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/\\$FILE/Light_pollution_reduction_measures.pdf](https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/$FILE/Light_pollution_reduction_measures.pdf)

¹⁸⁶ <https://www.expats.cz/czech-news/article/new-czech-rules-will-put-a-lid-on-light-pollution>

¹⁸⁷ [https://www.mzp.cz/C1257458002F0DC7/cz/statni_politika_zivotniho_prostredi/\\$FILE/SPZP-2030_4AK_EN-20220525.pdf](https://www.mzp.cz/C1257458002F0DC7/cz/statni_politika_zivotniho_prostredi/$FILE/SPZP-2030_4AK_EN-20220525.pdf)

¹⁸⁸ https://portal.cenia.cz/eiasea/dokumenty/dokumentSoubor/167/SZ_EIA%20Metodika_final.pdf?lang=cs

¹⁸⁹ [https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/\\$FILE/Light_pollution_reduction_measures.pdf](https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/$FILE/Light_pollution_reduction_measures.pdf)

¹⁹⁰ [https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/\\$FILE/Light_pollution_reduction_measures.pdf](https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/$FILE/Light_pollution_reduction_measures.pdf)

22. Denmark (Charlotte Hook & Andrew Falle)

- **Protection of dark skies**

Denmark's Outer Space Act defines a "space activity" as "launching space objects into outer space; operation, control and return of space objects to Earth; as well as other essential activities in this connection," as well as "(a)ny object, including its component parts, which has been launched into outer space, or which is planned to be launched into outer space, and any device which has been used, or is planned to be used, to launch an object into outer space."¹⁹¹ This definition is likely exclusive of astronomical activities. However, Part 3 of the Act, which pertains to the approval of space activities, does require that space activities be carried out in "an appropriately safe manner" while meeting "the relevant standards and guidelines," including that operators take "appropriate measures with regard to space debris management" and that the space activity "is carried out in an environmentally safe manner."¹⁹²

Denmark has some existing legislation and guidelines restricting light pollution. The Nature Conservation Act (2013) prohibits the placement of "illuminated advertisements" in the "open country", which likely relates to rural areas away from cities (no specific definition of "open country" was available).¹⁹³ Denmark's Building Act (2010) empowers municipal boards to restrict lighting conditions of buildings in relation to the existing surroundings to ensure a good overall impact; other signage and light installations must not disadvantage or appear "disfiguring" (or unsightly) to existing surroundings (from translation).¹⁹⁴ There is a decree that limits light, retro-reflectivity, and digital screens related to advertising in an open landscape.¹⁹⁵ Lastly, the Danish Road Directorate developed a series of recommendations aimed at limiting light pollution at night, and notably how to reduce the impact of light pollution on flora and fauna.¹⁹⁶

Denmark has Scandinavia's first IDA-recognized International Dark Sky Park and International Dark Sky Community located on the Islands of Møn and Nyord located in the south of the county.¹⁹⁷ The total area consists of over 223 km² of land, part of which is state-owned.

- **Protection of quiet skies**

Within the national framework, no other specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

¹⁹¹ <https://ufm.dk/en/legislation/prevailing-laws-and-regulations/outer-space/outer-space-act.pdf>

¹⁹² <https://ufm.dk/en/legislation/prevailing-laws-and-regulations/outer-space/outer-space-act.pdf>

¹⁹³ <https://www.retsinformation.dk/eli/lt/2013/870>; [https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/\\$FILE/Light_pollution_reduction_measures.pdf](https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/$FILE/Light_pollution_reduction_measures.pdf)

¹⁹⁴ <https://faolex.fao.org/docs/pdf/den99311.pdf>

¹⁹⁵ The Decree (817/2018 (§ 2 par. 1 – advertising in open landscape - no light, retroreflective or moving; including digital screens)) is mentioned in this report, although not in detail: [https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/\\$FILE/Light_pollution_reduction_measures.pdf](https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/$FILE/Light_pollution_reduction_measures.pdf).

¹⁹⁶ [https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/\\$FILE/Light_pollution_reduction_measures.pdf](https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/$FILE/Light_pollution_reduction_measures.pdf); <https://en.vejregler.dk/h/7e0fba84-06dd-483b-898a-c7b3e3affaa1/64c7b17b30634c6889ba17d3346f28ed?showExact=true>

¹⁹⁷ <https://darksky.org/news/mon-and-nyord-designated-scandinavia's-first-ida-dark-sky-places/>

- **Satellites regulations**

Denmark's 2016 Outer Space Act implements a government regulatory/licensing process for outer space activities, including satellites, under the Ministry of Higher Education and Science.¹⁹⁸ This Act also implements a public registry of space objects as well as specifying liability and insurance.¹⁹⁹ An Executive Order updated the regulatory regimes and explicitly specifies that environmental impacts of space activities “on the Earth, in the atmosphere and in outer space”²⁰⁰ must be included in applications. Subsequently, the impacts of space activities on astronomical observations can be mentioned under this. However, the current regulatory framework does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

¹⁹⁸ <https://ufm.dk/en/legislation/prevailing-laws-and-regulations/outer-space/outer-space-act.pdf>

¹⁹⁹ <https://ufm.dk/en/legislation/prevailing-laws-and-regulations/outer-space/outer-space-act.pdf>

²⁰⁰ https://ufm.dk/en/legislation/prevailing-laws-and-regulations/outer-space/executive-order-on-requirements-in-connection-with-approval-of-activities-in-outer-space-etc-_final.pdf

23. Ecuador (Sarah Thiele)

- **Protection of dark skies**

There does not currently exist specific regulations or policies to protect astronomy. Local astronomers however do recognize the impact of light pollution on their work: there exists only one astronomical research institution in Ecuador, the *Escuela Politécnica Nacional (EPN)* in Quito, home to one of South America's oldest observatories. It is uniquely posed to observe both the Northern and Southern Hemispheres, but due to light pollution, their research has shifted over time from astrometric measurements to a focus on computational astrophysics.²⁰¹

However, there are a number of laws and policies pertaining to light pollution and environmental protection. In Ecuador, the public lighting service and its costs are fully the responsibility of the state.²⁰² The system is protected by the 2015 regulation *Ley Orgánica del Servicio Público de Energía Eléctrica*, or LOSPEE²⁰³, which states that electric companies must work to prevent and reduce the negative environmental impacts associated with their activities. Multiple institutions regulate the public lighting sector and apply the LOSPEE law. Two of these are the Ministry of Energy and Non-Renewable Natural Resources (MERNNR)²⁰⁴, a regulating and planning entity that includes setting policies, monitoring/assessing compliance, and encouraging academic research on energy efficiency,²⁰⁵ and the Agency for Regulation and Control of Electricity (ARCONEL)²⁰⁶, a public law institution with legal status that regulates and controls services of electrical energy and public lighting. Its duties include receiving complaints regarding “non-compliance of environmental and pollution prevention regulations” and relaying them to the national environmental authority.²⁰⁷ MERNNR has established technical specifications for LED and high-pressure sodium (HPS) luminaires²⁰⁸, and requires observance or compliance with multiple standards of the International Commission on Illumination - of particular relevance are the observance of CIE 126-1997, “Guidelines for Minimizing Sky Glow”,²⁰⁹ and compliance with CIE 150-2017, “Guide on the limitation of the effects of obtrusive light from outdoor lighting installations”.²¹⁰

The Technical Commission for Determination of Greenhouse Gas Emission Factors (CTFE) was also created, and their studies on CO₂ emissions from the public lighting system have led to studies on potential local regulations to prevent and mitigate light pollution within the

²⁰¹ <https://www.astronomy.com/science/a-visit-to-ecuadors-astronomical-center/>

²⁰² S.P. Galindo, D. Borge-Diez, D. Icaza. “Energy sector in Ecuador for public lighting: Current status”. *Energy Policy*, Vol. 160, 2022, <https://doi.org/10.1016/j.enpol.2021.112684>.

²⁰³ *Ley Orgánica del Servicio Público de Energía Eléctrica*, año 2015. <https://www.regulacionelectrica.gob.ec/ley-organica-de-servicio-publico-de-energia-electrica-da-paso-a-la-creacion-de-la-arconel/>

²⁰⁴ <https://www.recursosyenergia.gob.ec/>

²⁰⁵ See 249.

²⁰⁶ <https://www.regulacionelectrica.gob.ec/>

²⁰⁷ See 249.

²⁰⁸ http://unidadespropiedad.com/index.php?option=com_content&view=article&id=579&Itemid=899 , http://unidadespropiedad.com/index.php?option=com_content&view=article&id=577&Itemid=900

²⁰⁹ <http://cie.co.at/publications/guidelines-minimizing-sky-glow>

²¹⁰ <http://cie.co.at/publications/guide-limitation-effects-obtrusive-light-outdoor-lighting-installations-2nd-edition>

Municipality of Cuenca.²¹¹ Other local initiatives are also in place, such as in Loja (one of the largest cities in Southern Ecuador) where the amount of urbanization as well as the city's geographic location embedded in a valley - creating a "bowl" effect which traps/reflects light - has caused a larger amount of light pollution. Loja has taken steps such as implementing energy-efficient streetlights and requiring buildings in some regions to turn off their lights during portions of the night.²¹²

In 2008 an amended and ratified Constitution of Ecuador was released with a new set of articles, Articles 10 and 71-74 that reformed environmental protection within the state²¹³. This constitution treats the environment in an ecocentric way (rather than typical anthropocentric perspectives in environmental law), reflecting the amount of biodiversity of the country and the philosophies held by the indigenous peoples of Ecuador regarding the connection between humanity and nature. The articles grant the environment the "inalienable right to exist, persist, regenerate, and be respected"²¹⁴, and also grant citizens of Ecuador the right to take legal action in enforcing these constitutional rights. There have been multiple cases in recent years of groups that have sued on behalf of nature and taken their cases to the Constitutional Court, and subsequently oil extraction and mining projects were blocked for violating the rights of nature.²¹⁵ The indigenous peoples of Ecuador have also been given the final say concerning extractive projects that impact them.²¹⁶ It is, however, unspecified whether the "environment" in the constitution includes the night sky.

The main conservation strategy in Ecuador is the Sistema Nacional de Áreas Protegidas del Ecuador (National System of Protected Areas; SNAP)²¹⁷. This currently includes 74 protected areas across Ecuador, 15 of which are in the Amazon and three in the Galapagos Island region. Discussions on existing threats to these protected areas do not typically focus on light pollution (SNAP aims to guarantee coverage that is terrestrial, coastal-marine, and marine-based ²¹⁸), and instead focus on other anthropogenic pressures on wildlife, flora and fauna and biodiversity such as deforestation, tourism, oil and mining, invasive species and climate change.²¹⁹ The Galapagos Conservation Trust lists light pollution's impact on species migration patterns as one of their conservation challenges,²²⁰ but do not cite any specific action/projects being carried out in this area. There also exist multiple national mechanisms to assist in managing protected areas and to help with enforcement of the multilateral Convention on Biological Diversity that Ecuador is a part of: the National Biodiversity Policy and Strategy (2001-2010; Política y Estrategia Nacional de Biodiversidad del Ecuador), Policies and Strategic Plan of the National System of Protected Areas of Ecuador (2007 – 2016), and others focussing on funding and planning.²²¹

²¹¹ See 249.

²¹² <https://www.nightearth.com/showitem.php?item=loja-ecuador&lang=en#gsc.tab=0>

²¹³ <https://pdba.georgetown.edu/Constitutions/Ecuador/ecuador08.html#mozTocId288188>

²¹⁴ <https://digitalcommons.law.uw.edu/cgi/viewcontent.cgi?article=1581&context=wilj>

²¹⁵ *ibid.*

²¹⁶ <https://insideclimatenews.org/news/21022022/rights-of-nature-laws-ecuador/>

²¹⁷ <http://areasprotegidas.ambiente.gob.ec/>

²¹⁸ <http://areasprotegidas.ambiente.gob.ec/es/content/%C2%BFqu%C3%A9-es-el-snap>

²¹⁹ <https://www.mdpi.com/2076-3298/10/5/79>

²²⁰ <https://galapagosconservation.org.uk/about-galapagos/conservation-challenges/pollution/>

²²¹ See 256.

There exists scientific interest in quantifying and monitoring light pollution and lighting patterns over the cities of Ecuador, for both economic and environmental purposes. For example, researchers at the Facultad Latinoamericana de Ciencias Sociales and the Research Center for the Territory and Sustainable Habitat at the Universidad Tecnológica Indoamérica, both in Ecuador, recently completed an evaluation of ALAN in Quito and its connection to socioeconomic development, and specifically test using high-resolution satellite imaging to create low-cost methods of mapping/monitoring light sources. They promote the concept that “ALAN could become an input to environmental, climate action, productive development, and public safety plans”²²². They note that urban planning organizations focus primarily on public lighting via infrastructure and aesthetic criteria, and maintaining energy efficiency, and that “ALAN is indirectly addressed through public space management plans”.²²³

- **Protection of quiet skies**

There do not appear to exist any regulations to protect radioastronomy in Ecuador.

Article 16 of the Constitution of the Republic of Ecuador gives all people the right to communication and information. In consideration of this, Ecuador has *Ley Orgánica de Comunicación* (the Organic Telecommunications Law; Law 439)²²⁴, which dictates communication and media freedoms and affirms equal access to the radio frequency spectrum in public and private sectors. There is also *Ley Especial de Telecomunicaciones* (the Special Telecommunications Law of 1992)²²⁵, which includes but is not limited to frequency allocation, standardization, as well as “the protection and defense of the spectrum, the technical verification of radioelectric emissions” and “the identification, location and elimination of harmful interference”. They do not define harmful interference in this document, but defer to the ITU’s definition.

ARCOTEL (Agency of Regulation and Control of Telecommunications), is part of the Telecommunications Ministry MINTEL. MINTEL is the central governing agency in the information and communication technologies policies of Ecuador.²²⁶ ARCOTEL is one of the regulatory agencies of the telecom sector in Ecuador²²⁷, which also monitors the use of radio spectrum frequencies to ensure compliance with state resolutions like Law 439²²⁸ and is in charge of satellite licensing.

- **Satellites regulations**

Ecuadorian legislation in this regard is underdeveloped and does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

²²² <https://www.tandfonline.com/doi/full/10.1080/01431161.2023.2205983>

²²³ *ibid.*

²²⁴ https://www-informatica--juridica-com.translate.goog/ley/ley-organica-telecomunicaciones-10-febrero-2015/?x_tr_sl=es&x_tr_tl=en&x_tr_hl=en&x_tr_pto=sc

²²⁵ https://www.oas.org/juridico/PDFs/mesicic4_ecu_especial.pdf

²²⁶ https://www.telecomunicaciones.gob.ec/wp-content/uploads/2021/11/Report-Consultation-on-Policy-for-Spectrum-Allocation-and-Efficient-Us.._compressed.pdf

²²⁷ [https://dlca.logcluster.org/34-ecuador-telecomunicaciones#:~:text=Telecomunicaciones%20in%20Ecuador%20include%20telephone,the%20Telecomunicaciones%20Ministry%20\(MINTEL\)](https://dlca.logcluster.org/34-ecuador-telecomunicaciones#:~:text=Telecomunicaciones%20in%20Ecuador%20include%20telephone,the%20Telecomunicaciones%20Ministry%20(MINTEL))

²²⁸ <https://www.larcg.com/where-we-work/ecuador/#:~:text=Wireless products%2C telecommunication terminal equipment,representation%2C or specific product labeling>

24. Egypt (Tamara Blagojevic)

- **Protection of dark skies**

In regard to light pollution-related regulation, although the *Environmental Law 9/1994*²²⁹ requires that new establishments or projects, expansions or renovations of existing establishments must be subjected to an environmental impact assessment before issuing permits,²³⁰ it is generally more focused on energy-saving costs,²³¹ and mainly regulates air, water, waste, soil and even noise pollution, but not light explicitly. Furthermore, neither the *Environmental Law 9/1994* or any of its amendments (*Environmental Law No.9 of 2009*²³² and the *Presidential Decree Law No.105 of 2015 amending some provisions of the Environmental Law No.4 of 1994*) contain any explicit provisions in reference to light pollution. Similarly, the Executive Regulations (*Decree 388/95*),²³³ specify the maximum permissible limits of pollutants which generated from industrial activities that affect the environment and defines the standards,²³⁴ which also do not specifically refer to light pollution. As per the Decree, the *Egyptian Environmental Affairs Agency* (EEAA) supervises the Environmental Protection and Development Fund, whose resources are allocated, inter alia, for pilot projects for natural wealth and environmental pollution protection, financing the manufacture of equipment, devices and stations treating environmental pollutants, and establishing and administering Natural Reserves, as well as confronting pollution from unknown sources.²³⁵

The EEAA is also responsible for the enforcement of [Law 4/1994](#), environmental management plans, environmental data collection, pollution prevention (ensuring that permissible levels of pollutants are not exceeded) and adaptation of international environmental agreements.²³⁶ There are certain articles of the *Egyptian Unified Building Law no.119 of 2008* (UBL), mandatory for getting a license for public and private buildings, such as not to build within farmland, wetlands and close to coastal areas, and that every space (even bathroom, kitchen, stairs and service room) has to be lit with *natural source of light*,²³⁷ which could indicate an interesting idea from best practices. However, a conference paper indicates that the current UBL,

²²⁹ Law No. 4 of 1994 on Environment (Environmental Law 9/1994), <http://extwprlegs1.fao.org/docs/pdf/egy4984A.pdf>

²³⁰ Environmental Law 4/1994, Articles 19, 20, 21, 22 & 23

²³¹ GASCO Abr Sinai Onshore Gas Pipeline, *Environmental Impact Assessment - Section 2: Environmental Legislation*, Egyptian Natural Gas Co. (GASCO), https://www.eib.org/attachments/pipeline/20070088_eia3_en.pdf

²³² Environmental Law No.9 of 2009 amending some provisions of Law No.4 of 1994 on Environment, <http://extwprlegs1.fao.org/docs/pdf/egy152133.pdf>, English summary: <https://www.ecolex.org/details/legislation/environmental-law-no9-of-2009-amending-some-provisions-of-law-no4-of-1994-on-environment-lex-faoc152133/>

²³³ Decree No. 338 of 1995 issuing the Implementing Regulation of Environment Law No. 4 of 1994, <http://extwprlegs1.fao.org/docs/pdf/egy4986E.pdf>

²³⁴ Executive Regulations (Decree 388/95), https://www.eib.org/attachments/pipeline/20070088_eia3_en.pdf

²³⁵ <https://www.ecolex.org/details/legislation/decreed-no-338-of-1995-issuing-the-implementing-regulation-of-environment-law-no-4-of-1994-lex-faoc004986/>

²³⁶ https://www.eib.org/attachments/pipeline/20070088_eia3_en.pdf

²³⁷ Usama Elfiky, *Towards a Green Building Law in Egypt: Opportunities and challenges*, Energy Procedia 6 (2011) 277–283, pg 280, <https://pdf.sciencedirectassets.com/277910/>

although stressing the significance of natural lighting,²³⁸ does not properly consider it in planning and design, as a better alternative to artificial, and as a priority when it comes to saving non-renewable energy causing carbon emissions and global warming.²³⁹ The 2015 version of the Executive Appendix for the UBL mainly focuses on *natural light* but has similar contradictions in planning and design, when specifying the heights of neighboring buildings.²⁴⁰ Additionally, it is stated that it showcases negligence of environmental concerns, as in some instances priority is given to artificial light rather than natural (as the law represents HVAC systems and artificial lighting as the only ventilation and lighting solutions for office buildings).²⁴¹

When it comes to initiatives, there is currently available information only to ones prioritizing energy efficiency and GHG emission reductions,²⁴² such as the National Efficient Lighting Initiative (NELI),²⁴³ including encouraging local manufacturing of Compact Fluorescent lamps (CFL), the National Plan for Improving Lighting Systems Used for Street Lighting, as well as the Public awareness programme to encourage EE lamp adoption,²⁴⁴ and the UNDP project on Improving Energy Efficiency of Lighting & Building Appliances in Egypt (focused on implementing a LED/PV street lighting project and on energy efficiency for buildings that could not afford CFL, and finalized in 2020).²⁴⁵ All of such projects, however, were mainly focused on energy efficiency.

A study from 2022 states that based on the recommendation of the Egyptian Ministry of Electricity, the use of LED lighting and an HVAC set-point temperature of 25C° allowed for a total saving of more than 37% of total electricity demand and more than 50% of the electricity used for cooling,²⁴⁶ also indicated the main focus on energy efficiency rather than environmental protection. The Egyptian Green Building Council, established in January 2009, with its main goals are to encourage investors to adopt existing codes that meet the goals of energy efficiency and environmental conservation, developed the Egyptian Green Building Rating System, called the

²³⁸ Unified Building Law (Law no. 119 2008), Article 15

²³⁹ Alaa K. Abo Al Yazeed, Mohamed Fikry and Zeyad El Sayad, *Reconsidering the Egyptian building code with regard to street widths and their impact on the daylight quality inside residential spaces*, Second Arab Land Conference, Cairo, Egypt, 23/2/2021, https://arabstates.glt.net/wp-content/uploads/2021/03/TechnicalSession5b_building-code_Alyazeed_et-al-paper.pdf

²⁴⁰ Eman M. E. Attiya, Mohamed A. Shebl, and Maii M. Nasser, *A Comparative Analysis of LEED and GPRS for the Applicability in Egyptian Office Buildings*, <https://www.ijert.org/a-comparative-analysis-of-leed-and-gprs-for-the-applicability-in-egyptian-office-buildings>

²⁴¹ Karim M. Ayyad and Mostafa Gabr, *Greening Building Codes in Egypt*, Sustainable Futures: Architecture and Urbanism in the Global South, Kampala, Uganda, 30 June 2012, pg.62 and 63. https://sfc2012.org/ayyad_gabr_1.pdf

²⁴² Ibrahim Yassin, *Market Development of Compact Fluorescent Lamps*, Energy Efficiency Improvement and Green House Gass Reduction Project, <http://www.enlighten-initiative.org/portals/0/documents/country-support/regional-workshops/Market%20Development%20of%20Compact%20Fluorescent%20Lamps%20in%20Egypt.pdf>

²⁴³ Egypt Air Quality Policies, UNEP, 2015, <https://wedocs.unep.org/bitstream/handle/20.500.11822/17186/Egypt.pdf?sequence=1&isAllowed=1>

²⁴⁴ SERN Energy Efficiency 2012 – Country Profiles – Egypt, <https://www.reeep.org/sites/default/files/SERN%20Energy%20Efficiency%202012%20-%20Country.pdf>

²⁴⁵ <https://www.undp.org/egypt/projects/improving-energy-efficiency-lighting-building-appliances>

²⁴⁶ GamalEldine, M.; Corvacho, H. Compliance with Building Energy Code for the Residential Sector in Egyptian Hot-Arid Climate: Potential Impact, Difficulties, and Further Improvements. Sustainability 2022, 14, 3936, page 17, <https://doi.org/10.3390/su14073936>

Green Pyramid Rating System (GPRS).²⁴⁷ Some of the criteria to award either Silver, Golden or Green pyramid, are among else: using energy saving lighting, lowest possible negative environmental impacts, indoor environmental quality, natural lighting quality, noise level control, and allowing for the visual dimension. Although light pollution is not directly considered in either versions of the GPRS (2011, 2016),²⁴⁸ considering that the highest number of points is awarded for the fulfillment of the criteria related to “Energy Efficiency and Environment”, the combination of a few factors can lead to practices considering it in the future, and Egypt can serve as an example of usage of traditional natural lighting systems instead of artificial ones. However, another study has shown that the 1998 Leadership in Energy and Environmental Design (LEED) rating system, which accredits points for minimizing light pollution by reducing the impact of lighting on nocturnal environments, was found to have a more accurate representation of sustainability when compared to GPRS in terms of certification levels awarded and was found as a more suitable option for Egyptian office buildings.²⁴⁹

When it comes to the Established World Heritage Sites, in Egypt there are a few, which have been highlighted by the [International Council on Monuments and Sites](#) as having possible connections to astronomy: the Nubian Monuments from Abu Simbel to Philae, the Memphis and its Necropolis (The Pyramid Fields from Giza to Dahshur) and the Ancient Thebes and its Necropolis.²⁵⁰ Additionally, the [Dendera Temple](#) and the [Valley of the Whales](#) have been informally accentuated in connection to the possibility of stargazing.²⁵¹

The Egyptian Society for Astronomy is a member of DarkSky International, lobbying for greater legislative protection in this area, but no recent updates have been made publicly available on their progress in this area.

- **Protection of quiet skies**

The National Telecommunications Regulatory Authority (NTRA) is responsible for the management, supply and regulation of radio spectrum in the Arab Republic of Egypt in accordance with the provisions of the *Telecommunications Regulation Act No. 10 of 2003*.²⁵² This responsibility includes the supply of frequency bands in accordance with Radio Regulations issued by the ITU that regulate different terrestrial and satellite radio systems and services, in order to optimize and harmonize the use of radio spectrum with relevant international agreements. The other responsibilities of the NTRA include:

²⁴⁷ Waleed Hussein Ali and Nermine Abdel Gelil Mohamed, *Green Architecture Assessment System in Egypt with an Application on Zeinab Khatoun House*, pg.62, <https://core.ac.uk/download/pdf/234681427.pdf>

²⁴⁸ <https://www.ijert.org/a-comparative-analysis-of-leed-and-gprs-for-the-applicability-in-egyptian-office-buildings>

²⁴⁹ Eman M. E. Attiya, Mohamed A. Shebl, and Mai M. Nasser, *A Comparative Analysis of LEED and GPRS for the Applicability in Egyptian Office Buildings*, <https://www.ijert.org/a-comparative-analysis-of-leed-and-gprs-for-the-applicability-in-egyptian-office-buildings>

²⁵⁰ https://www.unoosa.org/res/oosadoc/data/documents/2023/aac_105c_1/aac_105c_1_406add_5_0_html/AC105_C1_L406Add05E.pdf; https://openarchive.icomos.org/id/eprint/267/1/ICOMOS_IAU_Thematic_Study_Heritage_Sites_Astronomy_2010.pdf

²⁵¹ <https://darksky.org/news/engineer-by-day-astronomer-by-night/>

²⁵² <https://www.tra.gov.eg/en/regulations/radio-spectrum/spectrum-supply/>

- Allocating spectrum bands to all radiocommunication services in accordance with international Radio Regulations of the International Telecommunication Union.
- Assigning frequencies to users and coordinating and protecting this usage locally and internationally; and
- Representing the Arab Republic of Egypt in all relevant international and regional forums.

To carry out these commitments, NTRA has developed the [National frequency chart](#) and the [table](#) dated from 2021, as the governing framework for the supply of radio spectrum in Egypt, which shows the allocations of various radiocommunication services to the frequency bands between 8.3 kHz and 3000 GHz.²⁵³ In accordance with the National Frequency table, as well as recommendations of ITU-R and with the adopted technical and regulatory controls, the NTRA also adopts Radio Spectrum Guidelines, that govern the specific use of different frequency bands according to the nature of such use, to ensure regular and efficient performance of the various wireless applications.²⁵⁴

As per the ITU EXplorer, as of 2023, Egypt has issued 58 notifications regarding licensed satellites.²⁵⁵

● **Satellites regulations**

When it comes to astronomical and space activities, The National Authority for Remote Sensing & Space Sciences (NARSS) was established in 1991 as an American-Egyptian venture and has since been responsible for Egypt's national space program, serving as the operator of the nation's Earth observation satellites. As per the 2022. ESPI Report on emerging space-faring nations, Egypt currently has 9 satellites in orbit, with its first satellite, Tiba-1 launched in 2019 and plans to send its first astronaut into space in 2026.²⁵⁶ As per the UN Registry, since then and up until 2023, Egypt has issued three Note Verbales, furnishing Information in Conformity with General Assembly Resolution 1721 B (XVI) by States Launching Objects into Orbit or Beyond, for [Tiba-1](#), [NARSSCube-2](#) and [MisrSat-1](#) and [National Research Institute of Astronomy and Geophysics \(NRIAG\)](#) is listed as having an observatory.²⁵⁷

Egyptian Space Agency (EgSa), is a Governmental Organization aiming at acquiring Space Technology and Satellite Launching capabilities towards the accomplishment of the [National Sustainable Development Strategy "Egypt-SDS 2030" objectives](#). The [agency](#) is targeting the promotion of the peaceful use of space, leveraging the space industry for a sustainable future, supporting research and development, driving innovations, and enhancing space outreach developing reliable, responsive and viable economical solutions to serve the national objectives. [EgSA](#) also offers education and services in the Space Environmental Test Laboratory, Satellite Ground Telemetry, Tracking and Control Station (TT&C), and Satellite Electric Power Systems Laboratory, as something potentially relevant to astronomical activities enablement.

²⁵³ <https://www.tra.gov.eg/en/regulations/radio-spectrum/spectrum-supply/>

²⁵⁴ <https://www.tra.gov.eg/en/regulations/radio-spectrum/spectrum-supply/>

²⁵⁵ <https://www.itu.int/itu-r/space/apps/public/spaceexplorer/networks-explorer/space-stations>

²⁵⁶ <https://www.espi.or.at/wp-content/uploads/2022/06/ESPI-Report-79-Emerging-Spacefaring-Nations-Full-Report.pdf>

²⁵⁷ <https://www.go-astronomy.com/observatories-middle-east.php>

25. El Salvador (Christopher L. Martin)

- **Protection of dark skies**

In 1998, El Salvador enacted an environmental law that makes specific mention of light pollution as an issue²⁵⁸, but the only formal regulation of light pollution seems to come from the energy efficiency standards for light bulbs that came into force in 2023.²⁵⁹ These regulations focus more on reducing the energy required for lighting which only indirectly affects their emissions into the night sky.

- **Protection of quiet skies**

No relevant laws or regulations were found.

- **Satellites regulations**

Formally established in 2021,²⁶⁰ the El Salvador Aerospace Institute (<https://www.esai.sv/>) is the country's space agency, but it focuses on education, training, and facilitation of international partnerships rather than regulation.

²⁵⁸Article 47(a) of Ley del Medio Ambiente
<https://www.transparencia.gob.sv/institutions/marn/documents/1538/download>

²⁵⁹ https://members.wto.org/crnattachments/2021/TBT/SLV/21_6768_00_s.pdf

²⁶⁰ Diario Oficial, 7 Sept. 2021 available at <https://imprentanacional.gob.sv/servicios/archivo-digital-del-diario-oficial/>

26. Finland (Charlotte Hook & Andrew Falle)

- **Protection of dark skies**

Finland's Act on Space Activities defines "space activities" as "launching a space object into outer space" including the "operation and other control of the space object in outer space, as well as measures to return the space object and its return to the earth" that follows the launch.²⁶¹ Although the definition is exclusive of ground-based astronomy, there are requirements for "space object" operators to "prevent the generation of space debris and adverse environmental impacts on the earth, in the atmosphere and in outer space in accordance with section 10" of the Act that could encompass light pollution produced by satellites registered through Finland. Section 10 of the Act further states that for space activities to be authorized operators must, amongst other things, "assess the environmental impacts of the activities on the earth, in the atmosphere and in outer space, and present a plan for measures to counter and reduce adverse environmental impacts."²⁶²

Finland does not have any legislation specifically addressing light pollution but several existing legislation designate lighting as a possible source of pollution or disturbance. These legislations include the Environmental Protection Act (2014),²⁶³ the Land Use and Construction Act (1999), the Nature Conservation Act (1996), the Health Protection Act (1995), and the Neighbourhood Relation Act (1920).

The Environmental Protection Act (2014) and the *Nature Conservation Act* (1996) both prohibit or limit light pollution that can be deemed as polluting the environment or threatening wildlife and the landscape. The former defines 'emission' as "the direct or indirect release, discharge or deposit of substances, energy, noise, vibration, radiation, light, heat or odor caused by human activity from point or diffuse sources into air, water or onto land,"²⁶⁴ and equates artificial light with artificial noise where both can pollute the environment.²⁶⁵ The *Land Use and Construction Act* (1999) places limits on the use of neon signs. The *Health Protection Act* (1995) allows authorities to prohibit lighting that causes a health hazard.²⁶⁶ The *Neighborhood Relation Act* (1920) prohibits one from causing an unreasonable burden on their neighbor via disturbances like noise, dirt, odor, and lighting, among other things.²⁶⁷

The City of Helsinki published in 2014 the Helsinki Interference Light Report which identifies sources of light pollution in the city and gives recommendations for mitigation.²⁶⁸

- **Protection of quiet skies**

Finland has established a radio quiet zone around their Metsähovi radio astronomy observatory.²⁶⁹ This radio quiet zone is established 1km around the observatory.²⁷⁰ However,

²⁶¹ <https://tem.fi/documents/1410877/3227301/Act+on+Space+Activities/a3f9c6c9-18fd-4504-8ea9-bff1986fff28/Act+on+Space+Activities.pdf?t=1517303831000>

²⁶² Ibid, Section 10.

²⁶³ https://finlex.fi/en/laki/kaannokset/2014/en20140527_20190049.pdf

²⁶⁴ https://finlex.fi/en/laki/kaannokset/2014/en20140527_20190049.pdf

²⁶⁵ <https://helda.helsinki.fi/server/api/core/bitstreams/336d3951-a7ff-47d2-ab2b-a8cf84b4308e/content>

²⁶⁶ <https://helda.helsinki.fi/server/api/core/bitstreams/336d3951-a7ff-47d2-ab2b-a8cf84b4308e/content>

²⁶⁷ <https://helda.helsinki.fi/server/api/core/bitstreams/336d3951-a7ff-47d2-ab2b-a8cf84b4308e/content>

²⁶⁸ [https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/\\$FILE/Light_pollution_reduction_measures.pdf](https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/$FILE/Light_pollution_reduction_measures.pdf)

²⁶⁹ <https://www.craf.eu/radio-quiet-zones-around-observatories/>

²⁷⁰ <https://www.craf.eu/radio-quiet-zones-around-observatories/>

within the national framework, no other specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellite regulations**

Finland's 2018 Act on Space Activities includes provisions that govern satellite operations.²⁷¹ Among other provisions, satellite operations launched from Finland must obtain authorisation from the Ministry of Economic Affairs and Employment prior to launch. Additionally, satellite activities must comply with Finland's national security interests and must seek to avoid the generation of space debris or other adverse environmental effects.²⁷² Along with the 2018 Act on Space Activities, a decree was issued by the Ministry of Economic Affairs and Employment that concurs with the Act and includes additional provisions such as annual reporting by operators.²⁷³

The current regulatory framework, however, does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

²⁷¹ <https://finlex.fi/en/laki/kaannokset/2018/en20180063.pdf>

²⁷² <https://finlex.fi/en/laki/kaannokset/2018/en20180063.pdf>

²⁷³ <https://finlex.fi/en/laki/kaannokset/2018/en20180074.pdf>

27. France (Anne-Sophie Martin)

- **Protection of dark skies**

France adopted a Decree (*Arrêté*) for the protection of astronomy.²⁷⁴ It is the Order of 27 December 2018 which sets the list and the perimeter of exceptional astronomical observation sites in the application of Article R.583-4 of the Environmental Code. In natural areas and in astronomical observation sites, lighting installations are subject to more restrictive measures than those applied to devices installed in built-up areas and outside built-up areas. These requirements may relate to illuminance levels (in lux), the luminous and energy efficiency of the installations (in watts per lux and per square meter) and the luminous efficacy of the lamps (in lumens per watt), the average luminous power of the installations (total luminous flux of the sources in relation to the surface area intended to be illuminated, in lumens per square meter), luminance levels (in candelas per square meter), glare limitation, spectral distribution of light emissions and quantities characterising the spatial distribution of light; they may lay down operating conditions for certain lighting installations, depending on their use and the area concerned.

Article 1 makes reference to the [following sites](#):

- the Star Farm observation site;
- Pic du Midi de Bigorre observatory;
- the Haute-Provence observatory;
- the Calern plateau observatory (part of the Côte d'Azur observatory);
- the Jean-Marc Salomon astronomy centre;
- the Couyère observatory;
- Les Makes observatory;
- Château-Renard observatory;
- the Cévennes National Park observation site - Pises observatory;
- the Baronnies Provençales observatory;
- the Planète Mars - Hubert Reeves Observatory site;
- the Saint-Michel-l'Observatoire astronomy centre.

In addition, the French Ministry of Environment organized with the National Association for the Protection of the Night Sky and Environment (ANPCEN), the national “Starry Towns and Villages” which is a label recognizing initiatives to improve the quality of the night as well as the night-time environment.

Since 2011, the country has also addressed the light pollution issue in various legal instruments. The most recent one is the *Decree of 27 December 2018 on the prevention, reduction and limitation of light pollution*. It aims to reduce or prevent light pollution, specifying requirements for the design and operation of outdoor lighting installations and regulations for public and private owners (see Articles 1, 3 and 6). In 2018, the Ministry of Ecological Transition and solidarity published a Report on “*A la reconquête de la nuit - La pollution lumineuse: état des lieux et propositions*”.

²⁷⁴ [Decree of December 27, 2018, establishing the list and scope of exceptional astronomical observation sites in the application of article R. 583-4 of the environmental code](#)

- **Protection of quiet skies**

In order to implement the procedures of the ITU and the Radio Regulations, France created the National Frequencies Agency (ANFR)²⁷⁵ in 1996 through the Telecommunications Regulatory Act of 26 July 1996.²⁷⁶

The Agency is responsible for the process of requesting frequency assignments to satellite systems, which it communicates to the ITU. The Agency is also in charge of the international coordination of these assignments in order to limit the risks of interference, both from the point of view of interference that could be caused to satellites of other countries and interference that the latter could cause to French satellites.

Lastly, on behalf of the minister for electronic communications, the Agency examines applications for authorisation to operate assignments, this step enabling a private entity to operate its satellite system under clear legal conditions.

The ANFR manages requests for frequency assignments for satellite systems. More specifically, it receives French applications, checks their compatibility with the Radio Regulations and the national table of frequency band allocations, then forwards them to the ITU.

With the help of the entities that have applied for frequency assignments, ANFR ensures the regulatory monitoring of satellite networks filed by France in its own name or on behalf of intergovernmental organisations.

No specific measures are adopted to protect and ensure the presence of quiet skies for astronomical observations.

- **Satellites regulations**

Space activities are regulated in France under Law n°2008-518 of 3 June 2008 which contains provisions related to the authorisation of national activities and registration of space objects.²⁷⁷ The Law is completed by various Decrees on space operations.²⁷⁸ The law is currently being revised to take account of the legal challenges posed by new space activities, especially mega-constellations.

Pursuant to Article 12 of the Law, the *Centre National d'Etudes Spatiales* (CNES) is responsible for maintaining the national registry of space objects.

²⁷⁵ Agence nationale des fréquences, <https://www.anfr.fr/accueil>

²⁷⁶ Loi n°96-659 du 26 juillet 1996 de réglementation des télécommunications, <https://www.legifrance.gouv.fr/loda/id/JORFTEXT000000733177>

²⁷⁷ Loi n°2008-518 du 3 juin 2008, <https://www.legifrance.gouv.fr/loda/id/JORFTEXT000018931380/>

²⁷⁸ Ordonnance n° 2022-232 du 23 février 2022 relative à la protection des intérêts de la défense nationale dans la conduite des opérations spatiales et l'exploitation des données d'origine spatiale, <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000045222114>; Décret n° 2022-233 du 24 février 2022 modifiant le décret n° 2009-640 du 9 juin 2009 portant application des dispositions prévues au titre VII de la loi n° 2008-518 du 3 juin 2008 relative aux opérations spatiales, <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000045222138#:~:text=2009%20portant%20...-D%C3%A9cret%20n%C2%B0%202022%2D233%20du%2024%20f%C3%A9vrier%202022%20modifiant,2008%20relative%20aux%20op%C3%A9rations%20spatiales&text=Recherche%20simple%20dans%20le%20code%20Recherche%20dans%20le%20texte...>; Décret n° 2022-234 du 24 février 2022 modifiant le décret n° 2009-643 du 9 juin 2009 relatif aux autorisations délivrées en application de la loi n° 2008-518 du 3 juin 2008 relative aux opérations spatiales, <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000045222163>; Décret n° 2022-235 du 24 février 2022 relatif aux réquisitions de biens et services spatiaux, <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000045222243>;

28. Germany (Tiffany Nichols)

- **Protection of dark skies**

Currently, Germany does not have a national law directly regulating light pollution. However, it does have a federal level emissions prevention act, *Gesetz zum Schutz vor schädlichen Umwelteinwirkungen durch Luftverunreinigungen, Geräusche, Erschütterungen und ähnliche Vorgänge* (*Das BImSchG*), which translates to: Law to Protect Against Harmful Environmental Effects Caused by Pollution, Noise, Vibration, and Similar Phenomena. Forms of this law have existed since 1974 and its most recent amendment was in 2015. Although light is named as a form of emission coerced under the law, no specific guidance and provisions is provided, as is the case for other forms of emission. The addition of new forms of emission to the law over the years may indicate that the German government would be willing to further amend the law to incorporate specific guidance for light pollution—especially given the strong astronomy community in Germany. Further, the German public generally supports measures to protect the environments of national parks and outdoor spaces. Under the BImSchG, actions that constitute pollution are determined on a case-by-case basis by the governments of the Bundesländer. Das BImSchG grants these governing bodies monitoring, approval, and sanction power.²⁷⁹

Beyond das BImSchG, lighting standards regulations exist in some Bundesländer. For example, under the Bavarian Light Emissions Control Act (*Bayerisches Immissionsschutzgesetz*) enacted in December 2019, Bayern places restrictions on certain lighting including barring illuminated advertisements after 11 pm, provides limits on outdoor lighting, and specifies that lighting should not affect insects.²⁸⁰ These provisions are part of a collection of regulations to limit all types of emissions that are harmful to the environment under the BImSchG.

- **Protection of quiet skies**

Further research into national regulations and policies is necessary to identify specific norms applicable to protecting quiet skies for astronomical observations.

- **Satellites regulations**

Further research into national regulations and policies is necessary to identify specific norms related to the prevention of interference of satellites in astronomical observations.

²⁷⁹ Gesetz zum Schutz vor schädlichen Umwelteinwirkungen durch Luftverunreinigungen, Geräusche, Erschütterungen und ähnliche Vorgänge (Bundes-Immissionsschutzgesetz - BImSchG), <https://www.gesetze-im-internet.de/bimschg/BJNR007210974.html>

²⁸⁰ Bayerisches Immissionsschutzgesetz, BayRS 2129-1-1-U, Article 9 Vermeidbare Lichtemissionen, <https://www.gesetze-bayern.de/Content/Document/BayImSchG/true>

29. Guatemala (Rayan Khan)

- **Protection of dark skies**

Guatemala's national legal and policy framework is grounded in the Energy Policy 2013-2027,²⁸¹ which draws its legal foundation from the Constitution of the Republic. The Constitution mandates the state to actively support social, economic, and technological development while preventing environmental pollution and maintaining ecological equilibrium. This policy further directs the undertaking of essential measures for the efficient conservation, development, and utilization of natural resources.

The Energy Policy emphasizes the technical and rational exploitation of hydrocarbons, minerals, and other non-renewable resources as a matter of public interest and necessity. It underscores the promotion of conditions conducive to the exploration, exploitation, and commercialization of these resources.

For detailed information, please refer to the official document: Energy Policy 2013-2027.

Notably, it should be acknowledged that regulations pertaining to light pollution may not be readily available within the ministries of Guatemala.

- **Protection of quiet skies**

Within the national framework, no specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

The current regulatory framework does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

²⁸¹ <https://www.mem.gob.gt/wp-content/uploads/2015/07/Energy-Policy-2013-2027.pdf>

30. India (Tamara Blagojevic)

- **Protection of dark skies**

Although India ranks fifth in global space technology, the nascent regulatory framework for space activities does not necessarily directly regulate or explicitly mention the protection of D&QS. However, some policies can have relevance or benefits for astronomical activities. One of such policies is the 2011. Remote Sensing Data Policy (RSDP) which dealt with the inadequate provisions nested in the prior 2001 policy.²⁸² Additionally, there is a policy framework for satellite communication in India (SATCOM policy), followed by the SATCOM norms and the technology transfer policy of ISRO and with aims to develop a SATCOM and ground equipment industry in India and the intention to make available the Indian National Satellite System (INSAT) to the general Indian public. However, currently, none of these policies have definitions or provisions explicitly relating to, or providing direct protection against light pollution, sky glow, glare, light trespass or artificial light at night.

When it comes to dark sky protection and light pollution directly related to legislation and regulations in India, as of mid-2019, it was indicated in Mumbai news that, although there is no binding law to directly prevent light pollution, the police take action under Bombay Police Act, as per which the nuisance to the general public, of any kind, is punishable.²⁸³ The *1986 Environment Protection Act of India*, does not explicitly mention light or light pollution and defines environmental pollutant as “any solid, liquid or gaseous substance (...)”, and environmental pollution as the “presence in the environment of any environmental pollutant”,²⁸⁴ for which reasons it remains questionable if this definition can be interpreted to include light pollution. Similarly, it is a question of interpretation whether “light” can be implied by the definition of “hazardous substance”, as it means any substance or preparation which, by reason of its chemical or physicochemical properties or handling, is liable to cause harm to human beings, other living creatures, plants, micro-organism, property or the environment. There is also little scope to imply that outer space is an environment, as the current definition of “environment” includes water, air and land and the inter-relationship which exists among and between (them) and human beings, other living creatures, plants, micro-organisms and property. However, there are certain provisions provided by some special laws, such as per *Wildlife (Protection) Act of 1972*, which provides that “No activities shall be permitted in and around the turtle nesting ground including those causing light and sound pollution except for those required for conservation and protection of these sites.”²⁸⁵

The activist Sumaira Abdulali, known for campaigning against sound pollution, points out that there is no real definition of what constitutes light pollution.²⁸⁶ Furthermore, it is stated that the advertisers are not held responsible for light clutter which is often the cause of accidents. The Awaz Foundation conducted a study on light pollution in 2017, measuring the ambient light levels along Juhu Beach, as per which results - the lux level underneath the lights then (at a height of

²⁸² <https://www.lexology.com/library/detail.aspx?g=4d90359c-b79e-40c3-8d2c-8c9fdf308484>

²⁸³ https://www.indiacode.nic.in/bitstream/123456789/6792/1/bombay_police_act_1951.pdf

²⁸⁴ The Environment Protection Act, 1986, https://www.indiacode.nic.in/bitstream/123456789/6196/1/the_environment_protection_act%2C1986.pdf

²⁸⁵ <https://cpcb.nic.in/7thEditionPollutionControlLawSeries2021.pdf>

²⁸⁶ <https://www.mid-day.com/mumbai/mumbai-news/article/Mumbai-Residents-fight-against-light-pollution-for-a-peaceful-sleep-in-the-city-20877178>

100 feet) through the landward side of the beach was 67,000 lux, while near the edge of the water, it was 0.03 lux. The Collector of Mumbai, Shivajirao Jondhale, tells Mid-day that his office receives regular complaints regarding light pollution, and added that either the High Court or the government should legislate a law to prevent this menace for the welfare of citizens. As of 2021, another research article indicates that there are no explicit and particular laws governing light pollution per se.²⁸⁷ However, the Indian legal system has made a scope for the same to be punished by a tortious approach if a light source proves to be a nuisance. A Hindustan Times Article mentioned a complaint filed against a local gym by a resident in the area, Nilesh Desai, which led to the local police and district collector issuing a notice to the gym to switch off their lights after 10 pm. A senior officer, in relation to the case, said that there is an attempt being made to mandate the rule across all gyms and non-residential public places across the city. In a study, the result of a questionnaire survey showed that 57% of the participants are unaware about the term “light pollution”.²⁸⁸ However, when asked about the impact of excessive artificial lighting, 76% of the participants responded to had been affected. The comparison between the Light pollution map of India of 2013 and 2019 showed Delhi, Uttar Pradesh, Bihar, Maharashtra, Telangana, Karnataka, Tamil Nadu, and West Bengal have recorded high rates of light pollution. Problems of glare, clutter or light trespass have latent effects which are enormously detrimental to the Space Industry of India.

The *2010 National Lighting Code (NLC)*,²⁸⁹ published by the Bureau of Indian Standards, aims at encouraging good lighting practices and systems which would minimize light pollution, glare, light trespass and conserve energy while maintaining safety, security, utility and productivity.²⁹⁰ NLC also contains good practices for departments and public bodies, as well as technical guidance in respect of light products and methods of lighting designs, for professionals. In the area of public lighting, it recommends essential provisions necessary for the convenience of the people with reference to lighting levels, quality of light and devices and safe usage. In 2005, the TERI (Energy and Resources Institute) developed GRIHA, which measures the environmental performance of buildings, focusing on India’s varied climate and building practices in India.²⁹¹ The evaluation criteria are, inter alia, lighting and electrical, integration of renewable energy sources to generate energy onsite, selection of ecologically sustainable materials, and indoor environmental quality. The *2016 National Building Code of India (NBC)* provides recommended values of illuminance for different types of spaces, based on the activities carried out in the space,

²⁸⁷ https://3fdef50c-add3-4615-a675-a91741bcb5c0.usrfiles.com/ugd/3fdef5_f92db87c8f21460aa64718d42fd2e262.pdf

²⁸⁸ <https://www.sciencedirect.com/science/article/pii/S2226585622000383>

²⁸⁹ See: National Lighting Code 2010 [ETD 24: Illumination Engineering and Luminaries], SP 72 (2010), <https://law.resource.org/pub/in/bis/S05/is.sp.72.2010.pdf>

²⁹⁰ National Lighting Code (NLC) SP 72: 2010 Released, Code to Encourage Good Lighting Practices for Energy Conservation and Safe Usage, Press Information Bureau Government of India Ministry of Consumer Affairs, Food & Public Distribution, January 2011, <https://pib.gov.in/newsite/PrintRelease.aspx?relid=69397#:~:text=Published%20by%20the%20Bureau%20of,%2C%20security%2C%20utility%20and%20productivity.>

²⁹¹ Vivian Adel Younan, *Developing a green building rating system for Egypt*, The American University in Cairo AUC, November 2021, page 40, https://fount.aucegypt.edu/cgi/viewcontent.cgi?article=3435&context=retro_etds

as well as the age of occupants.²⁹² The NBC also provides for the inclusion of lighting techniques such as LED and induction light and their energy consumption, as well as comprehensive provisions relating to lightning protection of buildings, and provisions on aviation obstacle lights.²⁹³

When it comes to international projects, India was also participating in the *Interreg V Indian Ocean cooperation programme for the period 2014-2020*, which focuses on cooperation between the outermost regions of Réunion and Mayotte, and 12 third countries in the southern Indian Ocean, as well as the French Southern and Antarctic Lands.²⁹⁴ This project consists of five strategic priorities, among which some may have a potential future direct or at least indirect benefit to light pollution mitigation in India, such as, e.g. creating a research and innovation centre, in the pharmacopoeia, biotechnology, energy and climate change sectors, developing capacities for climate change adaptation and risk prevention and management, and promoting natural and cultural heritage through joint environmental and biodiversity conservation measures.

When it comes to Astronomical activities, the *2017 Draft Space Activities Bill*²⁹⁵ tied the definition of “*commercial space activities*” to generating profit, and the definition of “*space activities*” towards the different uses of space objects (launch, use, operation, guidance, entry, procurement) which would leave little room for interpretation so as to include earth observation, unless tied to profit. On the other hand, the new *2023 Space Policy* in India, defines “*space activity*” as ‘*an activity pertaining to the space sector, which shall include, inter-alia, launch, operation, guidance and/or re-entry of any Space Object from outer space*’,²⁹⁶ meaning that astronomical activities are not explicitly excluded, and since they do pertain to the space sector, they have to be subsumed under said definition.

At the 60th STSC UNCOPUOS session, during the General exchange of views on D&QS for science and society, delegates of India stated that they are aware that the Ultra-Violet Imaging Telescope onboard ISRO’s multi-wavelength astronomy observatory satellite AstroSat had to be reset due to bright object detection traced back to such satellites penetrating the view of the telescope, which trails would make parts of the sky completely out of reach for astronomy observations, and the render data collected unusable.²⁹⁷ Similarly, the radio interference from these satellites will also constrain radio studies of the cosmos. In this regard, to help reduce the effects of satellite constellations on astronomy research, India supports the maintenance of the single Agenda item “General exchange of views on Dark and Quiet Skies” in the upcoming sessions of STSC, and the creation of an Expert Group with the task of monitoring the impact of the satellite constellations on astronomy, and intends to actively participate in the proposed expert

²⁹² *Identification Of Lighting Requirements*, Frontdesk, April 25, 2023, <https://frontdesk.co.in/building-services/identification-of-lighting-requirements/>

²⁹³ <https://www.bis.gov.in/standards/technical-department/national-building-code/>

²⁹⁴ Indian Ocean Area – Programme description, European Commission.

https://ec.europa.eu/regional_policy/in-your-country/programmes/2014-2020/fr/2014tc16rftn009_en#:~:text=The%20Interreg%20V%20Indian%20Ocean,Mozambique%2C%20Kenya%2C%20India%2C%20Sri

²⁹⁵ Draft Space Activities Bill, 2017, No.E.11020/2/2015-Sec-VI Government of India Department of Space, https://prsindia.org/files/bills_acts/bills_parliament/1970/Draft%20Space%20Activities%20Bill%202017.pdf

²⁹⁶ Indian Space Policy – 2023, ISRO, 2023, https://www.isro.gov.in/media_isro/pdf/IndianSpacePolicy2023.pdf

²⁹⁷ https://www.unoosa.org/documents/pdf/copuos/stsc/2023/Statements/16_PM/17_India_16_Feb_PM_1.pdf

group and contribute in the international efforts to reduce the impact of large constellations on astronomy.

In 2022, the district administration of Ladakh in India created the Hanle Dark Sky Reserve (HDSR) which is the first International Dark Sky Reserve in India, and comprises of six hamlets within the Changthang Wildlife Sanctuary.²⁹⁸ The reserve thus had a responsibility to keep the skies dark, particularly for the astronomical observatories located in the area. India also has numerous astronomical observatories, such as Aryabhata Institute, Gauribidanur Radio Observatory, Giant Meterwave Radio Telescope and Girawali Observatory, Indian Astronomical Observatory, Kodaikanal Solar Observatory, Mount Abu InfraRed Observatory, Nizamia Observatory, Udaipur Solar Observatory, Vainu Bappu Observatory and other telescopes.²⁹⁹

- **Protection of quiet skies**

Within the national framework, no specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

In India, the satellite sector has been largely government-controlled with limited scope for private participation. Under the existing regime, satellite capacity utilisation is governed by the *Satellite Communications Policy* ('Satcom Policy') of 1997, administered by the Department of Space (DoS) through the Indian Space Research Organisation (ISRO).³⁰⁰ The Satcom Policy was primarily issued to allow Indian and foreign entities to lease the satellite capacity of INSAT and lay down the process for establishing and operating an Indian satellite system. While it permits limited use of foreign satellites to provide services in India, the use of domestic satellite capacity is given preferential treatment.

In October 2020, the DoS released the draft *Space-Based Communication Policy of India – 2020* for public consultation (New Spacecom Policy).³⁰¹ The New Spacecom Policy attempts to bring private participation and investments in the sector, strengthen India's satcom capabilities and align it with unprecedented growth in technology.

Satellite-based communication services can be provided within the respective scope of the following licences/authorisations issued under Section 4 of the *Indian Telegraph Act 1885*, such as the *Global Mobile Personal Communication by Satellite* (GMPCS) Service authorisation under a Unified Licence (whose scope covers all types of mobile services (voice and non-voice messages), data services by establishing GMPCS gateway in India); Commercial Very Small Aperture Terminal Closed User Group ('Commercial VSAT CUG') Service authorisation (whose scope includes providing backhaul connectivity to telecom service providers for mobile services and establishing Wi-Fi hotspots, as well as providing data connectivity between various sites in India using VSATS, where users belong to a closed user group (CUG). It can also be used to aggregate traffic from Machine-to-Machine (M2M)/Internet of Things (IoT) devices/aggregator devices). Even service licensees having In-Flight and Maritime Connectivity (IFMC) authorisations

²⁹⁸ <https://indianexpress.com/article/india/first-dark-sky-reserve-ladakh-7974532/>

²⁹⁹ <https://www.go-astronomy.com/observatories-india.php>

³⁰⁰ https://www.ibanet.org/changing-landscape-of-satellite-communication-laws#_edn1

³⁰¹ <https://ispa.space/assets/pdf/policies/indian/policies/draft-spacecom-policy-2020.pdf>

can provide wireless voice or data connectivity on ships or aircraft within Indian territorial waters using satellites.

The *Telecommunications Act, 2023* (“Telecommunications Act”) which received the President’s assent on December 24, 2023, and provides for the administrative allocation of satellite spectrum as well as liberalization of the FDI policy applicable to the space sector further spurs the gaining momentum in satellite-based communication technology in India. This note explores the regulatory shifts in the Indian satellite communications landscape. Under the Telecommunications Act, a satellite network has been included in the definition of “telecommunication network”.³⁰² Any person intending to establish, operate, maintain or expand the telecommunication network is required to obtain an authorization from the Central Government. Satellite-based communication services can be provided within the scope of existing licenses/authorizations under the Indian Telegraph Act of 1885, which includes global mobile personal communication by satellites (“GMPCS”) license, commercial very small aperture terminal (“VSAT”) CUG service license, in-flight and maritime connectivity (“IFMC”) service authorization, captive VSAT CUG license, national long distance (“NLD”) and other authorization under the unified license. With respect to satellite spectrum allocation, the Telecommunications Act provides that spectrum for certain satellite-based services will be allocated by administrative process.

The [Indian Space Policy of 2023](#), which is applicable to any space activity to or from India, permits non-government entities to, inter-alia, (i) offer space-based communication services through self-owned or procured or leased Geo-Stationary Orbit (“GSO”)/Non-Geo-Stationary Orbit (“NGSO”) communication satellites; and (ii) use any GSO and/or NGSO slot along with the associated frequency spectrum and coverage to establish communication services, subject to guidelines prescribed by Indian National Space Promotion and Authorization Centre (“IN-SPACe”). Under the [Indian Space Policy, 2023](#), the IN-SPACe has been designated as the single window agency for the authorization of space activities.

[India’s National Frequency Allocation Plan \(NFAP\) dates back to 2022](#). There is a rising interest in satellite-based connectivity in the Indian market among internet service providers. Eutelsat OneWeb India, Jio Satellite Communications, Elon Musk’s Starlink and Amazon’s Kuiper are in the process of obtaining the requisite licenses to provide satellite communication services in India.

³⁰² https://www.legal500.com/developments/thought-leadership/regulatory-shifts-in-indias-satellite-communication-landscape/#_ftn1

31. Italy (Anne-Sophie Martin)

● Protection of dark skies

Italy represents one of the first countries to have adopted laws and policies concerning light pollution dating back to 1942.³⁰³ Over the years, different legislative texts were adopted³⁰⁴ providing specific guidelines and standards concerning lighting in order to avoid unnecessary upward illumination and reduce glare. There is also a draft law “Provisions for the sustainable management of public lighting and for the contract of light pollution” under discussion since 2019. The draft law sets out the necessary requirements to reduce light pollution and mitigate its consequences.

At the regional level, 15 regions have approved laws against light pollution including [Lombardy 31/15 \(ex 17/00\)](#), [Emilia-Romagna 19/03](#), [Marche 10/02](#), [Lazio 23/00](#), [Campania 13/02](#), [Veneto 17/09](#), [Toscana 37/00](#), [Piemonte 31/00](#), [Valle d'Aosta 17/98](#), [Basilicata 41/00](#), [Abruzzo 12/05](#), [Umbria 20/05](#), [Puglia 15/05](#), [Friuli-Venezia Giulia 15/07](#), [Liguria 22/07](#), thus covering a large part of the Italian population and major cities (Milan, Rome, Venice, Florence, Bologna, Naples).

Three technical standards refer directly or indirectly to light pollution ([UNI10819](#), [UNI10439](#), [UNI9316](#)). The 2021 standard *UNI 10819:2021 “Light and lighting - External lighting systems”* defines methods for calculation and verification of the upwards-directed luminous flux from outdoor artificial light sources. It was elaborated by the UNI (*Italian National Standards Institute*), the Italian Astronomical Society's Light Pollution Committee, lighting engineers and representatives of lighting manufacturers.

● Protection of quiet skies

Frequency management is divided into a number of actions carried out in different phases, with competences for each phase assigned to the Authority or to the Ministry of Economic Development (MISE).

In particular, the use of frequencies is primarily governed by the *National Frequency Allocation Plan (PNRF)*, a general regulation that, in line with the international provisions of the International Telecommunication Union (ITU), provides for the subdivision of the radioelectric spectrum, up to 400 GHz, into frequency bands, allocating each band to specific services and users. The PNRF is adopted by the Ministry of Economic Development (MISE), after consultation with the Authority.

The assignment of frequencies and the issuing of the relevant rights of use, on the basis of the PNRF or of the Allocation Plans, as well as the supervision of their use and the elimination of interference, are the responsibility of the MISE.

Law No 249/97³⁰⁵ entrusted the Authority with the task of identifying, after consulting the interested parties, the criteria for defining the national numbering plan for telecommunications networks and services, which must be based on criteria of objectivity, transparency, non-discrimination, fairness and timeliness.

³⁰³ Kaja Widmer et al., Review and Assessment of Available Information on Light Pollution in Europe, European Environment Agency (ETC-HE Report 2022/8) 25.

³⁰⁴ <http://www.lightpollution.it/cinzano/en/page95en.html>;
http://www.lightpollution.it/download/cinzano_unesco_techmeasures.pdf

³⁰⁵ Law of 31 July 1997, n. 249, <https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:1997-07-31;249!vig=>

The review of the National Frequency Allocation Plan (PNRF) was approved by a Decree of the Minister signed on 31 August 2022.³⁰⁶

The PNRF is the frequency regulatory plan, the result of spectrum planning at national level aimed at maximising efficiency and ensuring harmonisation of the use of the spectrum resource.

- **Satellites regulations**

By ratifying the *1975 Registration Convention with Law 153 of 12 July 2005*³⁰⁷ which assigns to the Italian Space Agency (ASI) the task of setting up and maintaining the National Registry of Objects Launched into Space.

In order to implement the provisions of Law 153/2005, the ASI has drawn up a 'Regulation establishing the Register', approved by the Ministry of Education, Universities and Scientific Research, the Ministry of Foreign Affairs and the Ministry of Economic Development, which defines the implementation methods of art. 3 and the technical-procedural elements relating to the keeping and operation of the National Register.

Art. 3 of Law 153/05 of Italy's accession to the 1975 Convention provides that the National Registry shall record every object launched in Space by:

- A. natural or legal persons of Italian nationality (public and private) or commissioned by them;
- B. from a launch base located on Italian territory or under Italian control, by natural or legal persons of another nationality.

Pursuant to Article 8 of the Regulation, ASI has set up a 'Complementary Register' for records relating to objects launched into outer space whose ownership is acquired by natural or legal persons of Italian nationality while such objects are in orbit, if this results in changes to the jurisdiction and control of such objects.

The natural or legal persons referred to above shall provide the following information:

- Title and date of transfer of ownership;
- Identification of the new owner or operator;
- Any change in the orbital position of the space object;
- Any change in the function of the space object.

³⁰⁶ Decree of the Minister signed on 31 August 2022 (Ordinary Supplement no. 35 to the Official Gazette no. 214 of 13 September 2022).

³⁰⁷ Law of 12 July 2005, n. 153, <https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:2005;153>

32. Japan (Tiffany Nichols)

● Protection of dark skies

The Japanese Office of Spectrum Management and the Ministry of Environment have engaged in light pollution (光害, hikarigai) awareness campaigns since the early 2000s. In 2008, as part of this effort, the Ministry of Environment issued the Guidelines for Reduction of Light Pollution, which provides an overview of “environmental considerations” for artificial lighting.³⁰⁸ As for specific ordinances, the governments of the Tottori, Kumamoto, Okayama, and Nagano prefectures have led the way by enacting such laws as part of their “living environment” policies. Each provides regulations on searchlights and sets luminosity limits. Tottori additionally has regulations for the “starry sky conversation areas” as it is a destination for astrotourism that supports the local economy, along with the city of Ibara in Okayama Prefecture.³⁰⁹

As of 2020, Japan has also worked with manufacturers of light bulbs to bring street lighting in compliance with DarkSky International through partnering with Panasonic, which manufactures street light LEDs. Iwaski Electric has also ensured its LEDs are IDA-compliant.³¹⁰

An additional route Japan has taken is to certify certain national parks as International Dark Sky Places. The Japanese designation is “Starry Sky Reserve Accreditation System” (星空保護区認定制度). An example is the Iriomote-Ishigaki National Park in Okinawa Prefecture, which was certified in 2018. Since then, Kozushima, an island known for astrotourism, and Ibara (mentioned above) have also been certified as International Dark Sky Places. It should be noted that this certification in Ibara was the first community certification in Asia.³¹¹ Ibara’s dark sky designations are the result of advocacy from astronomers at Bisei Astronomical Observatory located in the city.

Resources:

- Ibara City Light Pollution Ordinance is entitled the Ibara City Light Prevention Ordinance to Protect the Beautiful Starry Sky (美しい星空を守る井原市光害防止条例) was established in 1989 and most recently amended in 2020. <https://biseikankou.jp/dark-sky-places/16-03.html>. This ordinance draws justification from the region’s indigenous history of shooting stars and the region’s astronomical observatories. The purpose balances dark skies for astronomical observation with the need for lighting for daily life with the goal of preventing increased brightness from year to year. Citizens are encouraged to avoid outdoor lighting. For example, the ordinance specifies that lights should be turned off by 10:00 pm except for necessary security lights. Further, the municipal government provides citizens with subsidies for their light pollution prevention efforts.
- Kozushima Village Light Pollution Ordinance is entitled the Light Pollution Prevention Ordinance to Protect the Beautiful Starry Sky of Kozushima Village (神津島村の美しい星空を守る光害防止条例). https://www.vill.kouzushima.tokyo.jp/reiki/reiki_honbun/g159RG00000451.html The justification for the ordinance includes the following results from light pollution: 1) difficulty in sky viewing; 2) adverse effects on plants and animals; 3) human life; and 4) wasteful energy use. The limitations are the same as those for Ibara

³⁰⁸ Japanese Spectrum Management Office (国立天文台 周波数資源保護室), “光害軽減のための活動,” https://prc.nao.ac.jp/fregras/optical_and_infrared_astronomy.html#reduce_pollution

³⁰⁹ Japanese Spectrum Management Office, “可視光・赤外線天文学の保護,” https://prc.nao.ac.jp/fregras/optical_and_infrared_astronomy.html.

³¹⁰ Japanese Spectrum Management Office, “可視光・赤外線天文学の保護,” https://prc.nao.ac.jp/fregras/optical_and_infrared_astronomy.html.

³¹¹ Ibara boasts this fact on the welcome page of their city’s website. See: <https://www.biseikankou.jp/>

City with the addition for specifications for the direction in which light is irradiated, shading of light, rather than 10 pm, the specification is at the time businesses close, and much oversight is specified mainly under the responsibility of the village mayor (権限) who is allowed to enter premises to inspect and measure illumination.

- Starry Sky Reserve Accreditation System” (星空保護区認定制度). <https://hoshizorahogoku.org/idsp/>. This is an honor bestowed on those places that have engaged in “outstanding efforts to protect and preserve the dark, natural night sky without light pollution and thus also comes with an International Dark Sky Association Dark Sky Place designation.

- **Protection of quiet skies**

Further research into national regulations and policies is necessary to identify specific norms applicable to protecting quiet skies for astronomical observations.

- **Satellites regulations**

Further research into national regulations and policies is necessary to identify specific norms related to the prevention of interference of satellites in astronomical observations.

33. Kazakhstan (Yana Yakushina)

- **Protection of dark skies**

The space industry plays an important role in the Republic of Kazakhstan. The legal regulation of the space sector, however, is at the development stage. Currently, Kazakhstan does not have a state policy on the development of space activities. In total, 4 ambitious space programs have been implemented in the country. The last program for the development of the space industry for the period 2010-2014 was adopted by the Decree of the Government of the Republic of Kazakhstan in 2010.³¹² The state policy considered the space industry within the framework of industrial and innovative development of the country, and all the set goals were aimed at achieving the growth and commercialization of the sector. Despite that the ambitious goals included the development and implementation of scientific and experimental research, the state policy did not pay any attention for the environmental protection and sustainability of space, including protection of dark and quiet skies. A similar situation is formed with regard to astronomy.

Like many other countries, Kazakhstan has a Law on Space Activities.³¹³ According to this law, space activities are defined as activities aimed at the exploration and use of outer space to achieve scientific, economic, environmental, defense, information and commercial purposes. Despite the absence of a direct indication, this definition allows one to consider astronomy as a space activity. The legal regime of space activities provides for the obligation to environmental control and monitoring of the environmental quality and human health.

Interestingly, the Environmental Code of the Republic of Kazakhstan³¹⁴ establishes that the environment is the set of conditions, substances and objects of the material world surrounding a person, including the natural environment and the anthropogenic environment. The definition of the natural environment in the code is given by providing an exhaustive list of components of the natural environment, which include atmospheric air, surface and ground waters, the Earth's surface and soil layer, subsoil, flora, fauna and other organisms, all layers of the Earth's atmosphere, including the ozone layer, and as well as climate, providing in their interaction favourable conditions for the existence of life on Earth. Thus, despite the absence of a direct indication that the night sky is part of the natural environment, this definition allows the possibility of protecting the dark sky as part of the natural environment. The latter is confirmed by a number of acts. For instance, among the functional requirements for the design of outdoor artificial light at night (ALAN), building codes provide for the need to protect the environment from light pollution.³¹⁵ The considered building codes provide standards for the reduction of light pollution, in particular the reduction of excessive lighting, brightness and light interference.

Analysis of Kazakhstan cannot be performed without paying particular attention to Baikonur. The legal regime of the Baikonur complex is regulated by a number of international treaties concluded between the Republic of Kazakhstan and the Russian Federation. In the context of protecting the dark sky, special attention should be paid to the Protocol between the

³¹² Decree of the Government of the Republic of Kazakhstan dated October 29, 2010, No. 1125 On approval of the Program for the development of space activities in the Republic of Kazakhstan for 2010-2014; <https://adilet.zan.kz/rus/docs/P1000001125>

³¹³ Law of the Republic of Kazakhstan dated January 6, 2012 No. 528-IV On Space Activities; https://online.zakon.kz/Document/?doc_id=31112199&pos=3;-106#pos=3;-106

³¹⁴ Code of the Republic of Kazakhstan dated January 2, 2021 No. 400-VI Environmental Code of the Republic of Kazakhstan; https://online.zakon.kz/Document/?doc_id=39768520#pos=634;-86.33332824707031

³¹⁵ Order of the Chairman of the Committee for Construction and Housing and Communal Services of the Ministry of Industry and Infrastructure Development of the Republic of Kazakhstan dated September 4, 2019 No. 131-nq On approval of building codes of the Republic of Kazakhstan; <https://adilet.zan.kz/rus/docs/V1900019361#z19>

Government of the Russian Federation and the Government of the Republic of Kazakhstan on the procedure for the activities of enterprises and organizations, military units, other legal entities on the territory of the Baikonur complex in terms of environmental issues, dated December 23, 2014, (entered into force on February 27, 2016).³¹⁶

According to the protocol, environmental protection on the territory of Baikonur is carried out in accordance with the legislation of the Republic of Kazakhstan. The protocol provides for the need for state environmental expertise, environmental control and environmental monitoring. In particular, the objects of the state ecological expertise are materials for assessing the impact on the environment of the areas where the separated parts of launch vehicles fall, as well as projects for construction, reconstruction, development, technical re-equipment, re-profiling and liquidation, accompanied by materials for assessing the impact on the environment, draft standards for emissions of pollutants in the environment for existing Baikonur facilities. Thus, despite the absence of a direct reference to the protection of the dark sky, nevertheless, these provisions can be extended to the protection of the dark sky within the implementation of space activities.

- **Protection of quiet skies**

Kazakhstan places great importance on the field of radio astronomy and remains actively engaged in ongoing research endeavours. The country has adopted an *Order on approval of the Table of distribution of frequency bands between radio services of the Republic of Kazakhstan in the frequency range from 3 kHz to 400 GHz for radio-electronic equipment for all purposes*³¹⁷, including radio astronomy. This order aligns with the guidelines established by the International Telecommunication Union (ITU). However, it does not contain explicit provisions dedicated to protecting radio astronomy from harmful interference.

In an effort to protect radio astronomy observations, Kazakhstan has the authority to designate certain regions as "quiet zones".³¹⁸ These areas impose stringent limitations on the emission of radio frequencies by neighbouring sources, such as telecommunications and broadcasting facilities. The enforcement of these zones serves to maintain a radio-quiet environment conducive to astronomical research. It is important to note, however, that these measures do not address the potential impacts of satellites on radio astronomy observations.

- **Satellites regulations**

The operation of satellites in Kazakhstan necessitates the acquisition of licenses and approvals from relevant governmental entities. Furthermore, space objects, including satellites, must undergo state registration, a process overseen by the Aerospace Committee within the Ministry of Digital Development, Innovation, and Aerospace Industry of the Republic of Kazakhstan.³¹⁹

³¹⁶ <http://publication.pravo.gov.ru/Document/View/0001201604070034>

³¹⁷ Order of the Acting Minister for Investment and Development of the Republic of Kazakhstan of January 20, 2015, N22 [on approval of the Table of distribution of frequency bands between radio services of the Republic of Kazakhstan in the frequency range from 3 kHz to 400 GHz for radio-electronic equipment for all purposes](#) (Registered with the Ministry of Justice of the Republic of Kazakhstan on March 3, 2015, N 10375).

³¹⁸ [Law of the Republic of Kazakhstan of July 5, 2004, N 567-II on Communications](#)

³¹⁹ [Order of the Minister of Investment and Development of the Republic of Kazakhstan of April 24, 2015 N 484 On approval of the Rules for state registration of space objects and rights to them and the form of the register of space objects](#)

The Law on Space Activities Law outlines that all space-related activities must prioritize the safeguarding of human health and the environment.³²⁰ It also emphasizes the importance of conducting impact assessments in the areas affected by these activities, including the drop zones, prior to registering the space object. However, it's notable that the initial license application does not require the submission of documents related to impact assessments or detailed technical documentation.³²¹ Moreover, the existing legislation lacks specific provisions for evaluating the adverse effects on outer space. These regulatory gaps could potentially impede the protection of D&QS.

³²⁰ Art. 27 of the [Law of the Republic of Kazakhstan of January 6, 2012 N 528-IV on Space Activities](#)

³²¹ [Order of the Minister of Digital Development, Innovation and Aerospace Industry of the Republic of Kazakhstan of April 14, 2020 N 140/HK On approval of the Rules for the provision of public services Issue of a license to carry out activities in the field of use of outer space](#); [Law of the Republic of Kazakhstan of May 16, 2014 N 202-V ZRK On permits and notifications](#)

34. Kenya (Anne-Sophie Martin)

- **Protection of dark skies**

There are different initiatives in Africa, through for instance the African Astronomical Society. At the national level, some countries also have their own space agencies, such as Kenya (Kenya Space Agency). This country does not have specific laws or regulations regarding the protection of dark skies, although it has an astronomy programme part of the National Space Agency and is in line with the Strategic Plan 2020-2025 adopted in October 2020. Kenya is also developing 'Astrotourism'.

The Noctia Institute's current activities in Kenya involve researching the ecological effects of light pollution on Kenyan wildlife through partnerships, and outreach work through involvement with establishing the first Dark Sky Chapter in Africa.

- **Protection of quiet skies**

The *Communications Authority of Kenya (CA)* is mandated to license all communications systems and services in the country. In executing this and its other responsibilities, CA is guided by relevant statutes, including the [Kenya Information and Communications Act, 1998](#).³²²

The Authority has adopted suitable administrative and technical procedures to ensure various radio communication services operate without causing harmful interference. The Authority manages the radiofrequency spectrum resource efficiently to cater for various radio-communication services. To facilitate the uptake of radiocommunication services, the Authority assigned frequencies and issued authorisations to licensees for various radiocommunication services. The allocation deals primarily with Earth observation satellites.

The 2023 *Draft Space Policy* refers to the necessity to address at international and national levels the equitable use of orbital slots and radio frequency spectrum management to ensure sustainable use of outer space resources.³²³ The Policy also provides that the CA shall undertake allocation of radiofrequency, equipment type approval, landing rights and communication licensing for space-based platforms.³²⁴

- **Satellites regulations**

In Kenya, space activities are managed through the Kenya Space Agency (KSA). The country is drafting its national space legislation which mentions that the Agency will maintain the national registry of space objects.³²⁵ Hence, no specific provisions relevant to the protection of D&QS were identified.

³²²[http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/KenyaInformationandCommunicationsAct\(No2of1998\).pdf](http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/KenyaInformationandCommunicationsAct(No2of1998).pdf).

³²³Draft Kenya Space Policy, July 2023, <https://ksa.go.ke/static/2bb27281f0d710e31478bb935a1282e1/Draft%20Kenya%20Space%20Policy%202023%20-%20FINAL%20DRAFT%2024-07-2023.pdf>

³²⁴ Idem, p. 24.

³²⁵Kenya Space Bill, 2023, https://ksa.go.ke/static/aea65a96225a4f35e5238e03e6392ba0/Draft%20Kenya%20Space%20Bill,%202023_Rev2%20Nov%2023.pdf.

35. Lebanon (Anne-Sophie Martin)

- **Protection of dark skies**

Lebanon has a unique mix of factors that make it an appealing astrophotography destination. Indeed, the country has as many as 300 clear nights each year and possesses areas of high ground, advantageous for astrophotography.³²⁶ Nevertheless, light pollution is clearly visible in Beirut and many other cities. Villages were also affected by this pollution a few years ago, resulting in a loss of night sky.

It is worth mentioning the [Law 78/2018 on the Protection of Air Quality](#) (Law 78, 19 April 2018). It comprises 34 articles related to ambient air pollution, monitoring air pollutants and levels in the atmosphere, prevention, control and surveillance of the ambient air pollution resulting from human activities. The Lebanese Parliament also enacted *Law 444 of 29 July 2002 on the Protection of the Environment*³²⁷ which defines the basis and norms for environmental protection – notably for water, soil, use of chemicals and resource management – as well as institutional, administrative and technical aspects.

So far, regulations cover environmental protection in general. Initiatives in the field of astronomy are being developed by civil society. However, there is no specific regulation or law in terms of light pollution. Civil society is creating awareness on the necessity to protect nature in the country. For instance, in 2022 the *Society for Protection of Nature in Lebanon* (SPNL) implemented a campaign aiming to raise awareness on the impact of light pollution on migratory birds.

Lebanon has more than 10% of its protected areas impacted by artificial night lighting and associated human activities,³²⁸ in particular its marine protected areas.³²⁹

- **Protection of quiet skies**

In Lebanon, the mission of the *Telecommunications Regulatory Authority (TRA)* is to ensure that spectrum use is in line with international developments and to stimulate technological innovation and competitiveness. The Authority is responsible for the effective management of the radio spectrum taking into account the needs of the market, the government and the private sector. To this end, TRA published in 2015 the *Lebanese National Frequency Allocation Table (LNFT)*,³³⁰ which allocates the Lebanese radio spectrum into a series of frequency bands that comply with ITU regulations and specify the general purposes for which the bands can be used. This process is known as allocating frequency bands to radiocommunication services.

The LNFT is an essential document that exhaustively details the frequency allocation schemes in Lebanon. Its publication is an important step in the efficient use of spectrum and will bring many benefits, such as the reduction of interference. The LNFT will be updated on a case-by-case basis in line with international initiatives and national decisions.

³²⁶ Eoghan McGuire, Lebanon's astrophotographers aim for the stars, CNN, 2017, <https://edition.cnn.com/travel/article/lebanon-astrophotography/index.html>

³²⁷ <https://www.fao.org/faolex/results/details/en/c/LEX-FAOC037678/>

³²⁸ Christoph Aubretch et al., Global Assessment of Light Pollution, Impact on Protected Areas, CIESIN/AIT, Working Paper, 2010, 27, <https://www.ciesin.columbia.edu/documents/light-pollution-Jan2010.pdf>

³²⁹ Lebanon's Marine Protected Area Strategy, Supporting the management of important marine habitats and species in Lebanon. Beirut, Lebanon, Gland, Switzerland y Malaga, Spain: the Lebanese Ministry of Environment / IUCN, 2012, <https://www.cbd.int/doc/meetings/mar/ebaws-2014-03/other/ebaws-2014-03-submission-lebanon-01-en.pdf>

³³⁰ <http://www.tra.gov.lb/Lebanese-National-Frequency-Allocation-Table-LNFT>

- **Satellites regulations**

Lebanon does not have national space legislation and there are no specific rules on satellite regulations. However, a Law No.531 on satellite broadcasting was adopted in 1996³³¹ to regulate channels and TV broadcasts. Therefore, no specific provisions relevant to the protection of D&QS were identified.

³³¹ <https://www.ministryinfo.gov.lb/en/2686>

36. Luxembourg (Tiffany Nichols)

- **Protection of dark skies**

Since 2017, Luxembourg has had a national law for limiting light pollution that regulates lumination practices.³³² Individual municipalities monitor and enforce the law. These municipalities are responsible for communicating the law through guidelines to the public. The scope of municipality standards for these guidelines is provided by the national regulation, *Règlement-type sur les Bâtisses, les Voies publiques et les Sites*, passed in 2018.³³³ Street lighting standards are separately covered by the Permitted Standards for Bridges and Roads (*permissions de voirie der Brücken- und Straßenbauverwaltung*).³³⁴ Lighting regulations for public venues such as governmental buildings are governed by the National Civil Security and Security Service (Le Service national de la sécurité dans la fonction publique).³³⁵

- **Protection of quiet skies**

Further research into national regulations and policies is necessary to identify specific norms applicable to protecting quiet skies for astronomical observations.

- **Satellites regulations**

Further research into national regulations and policies is necessary to identify specific norms related to the prevention of interference of satellites in astronomical observations.

³³² This was part of the Omnibus Gesetz.

³³³ *Règlement-type sur les Bâtisses, les Voies publiques et les Sites* (2018), <https://mint.gouvernement.lu/de/publications/brochure-livre/reglement-batisses-voies-publiques-sites.html>.

³³⁴ *Permissions de voirie der Brücken- und Straßenbauverwaltung*, <http://www.pch.public.lu/fr/organisation/attributions-competences/permissions-voirie/index.html>.

³³⁵ Le gouvernement du Grand-Duché de Luxembourg, Département de l'environnement, "Leitfaden „Gutes Licht“ im Außenraum für das Großherzogtum Luxemburg," <https://environnement.public.lu/dam-assets/actualites/2018/06/Leitfaden-fur-gutes-Licht-im-Aussenraum.pdf>.

37. Malaysia (Rayan Khan)

- **Protection of dark skies**

As of the present, Malaysia does not have specific regulations or policies in place to directly address light pollution issues. The country's regulatory framework primarily relies on the *Environmental Quality Act of 1974 (Act 127)*³³⁶ to manage environmental concerns.

Under the *Environmental Quality Act of 1974 (Act 127)*, the term "pollution" is broadly defined to encompass any direct or indirect alteration of the physical, thermal, chemical, biological, or radioactive characteristics of any segment of the environment. This alteration can occur as a result of the discharge, emission, or deposition of various substances and materials, ultimately leading to adverse effects on the environment. These adverse effects can encompass impacts on the beneficial use of the environment, potential threats to public health, safety, and welfare, as well as harm to animals, birds, wildlife, fish, aquatic life, or plants. Furthermore, pollution may lead to violations of specific conditions, limitations, or restrictions stipulated in licenses issued under this Act. It's important to note that Malaysia's regulatory framework, while comprehensive, does not currently address light pollution as a specific concern. However, it underscores the nation's commitment to managing a wide range of environmental issues that may indirectly contribute to light pollution control in the future.

- **Protection of quiet skies**

The Spectrum Plan for 2022³³⁷, issued by the Malaysian Communications and Multimedia Commission, governs the use of radio spectrum in Malaysia. The document emphasizes the protection of the radio astronomy service against harmful interference, particularly from emissions from spaceborne or airborne stations. Assignments to space stations in specified frequency bands must consider safeguarding the radio astronomy service from unwanted interference. Additional allocations for the radio astronomy service are noted in Australia, India, and the African Broadcasting Area. Measures are outlined to prevent harmful interference to stations of the radio astronomy service, including compliance with specified power flux-density criteria. The Spectrum Plan aims to ensure efficient spectrum management while protecting critical services and adhering to international regulations outlined by the International Telecommunication Union. However, within the national framework, no specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellite Regulations**

Concerning satellite operations, Malaysia mandates the acquisition of licenses and approvals from relevant governmental entities. The oversight of space objects, including satellites, falls under the jurisdiction of the relevant authorities, such as the Malaysian Space Agency (MYSA).³³⁸ Notably, existing legislation lacks specific provisions for evaluating adverse effects on outer space. These gaps in regulation could pose challenges to the protection of D&QS from potential disruptions caused by satellite activities. In the absence of dedicated measures, it becomes crucial for Malaysia to consider the implications of satellite operations on astronomical observations and explore avenues for future regulatory adjustments to ensure the preservation of its dark skies.

³³⁶ https://www.env.go.jp/en/recycle/asian_net/Country_Information/Law_N_Regulation/Malaysia/Malaysia_mal13278.pdf

³³⁷ <https://www.mcmc.gov.my/skmmgovmy/media/General/MCMC-Spectrum-Plan-2022.pdf>

³³⁸ <https://www.mysa.gov.my/faq/>

38. Mexico (Christopher L. Martin)

- **Protection of dark skies**

In 2021, Mexico's environmental laws were explicitly amended³³⁹ to define light pollution as an environmental contaminant and that astronomical observations and observatories were in need of special protection. However, the descriptions of light pollution in the law and in its analyses imply a focus on terrestrial light pollution rather than orbital light pollution, for instance, Article VI (translated) refers to light pollution as a *"luminous glow in nocturnal environments or brightness produced by the diffusion and reflection of light in gases, aerosols and particles suspended in the atmosphere, which alters the natural luminosity conditions at night and makes astronomical observations of the objects difficult."*

- **Protection of quiet skies**

In contrast, Radio Astronomy is specifically protected through a radio quiet zone in a 100km radius around the Large Millimeter Telescope on the Sierra Negra-Pico de Orizaba Volcano³⁴⁰, but there is no protection for quiet skies beyond this area.

- **Satellites regulations**

Space law in Mexico is in flux with a constitutional amendment³⁴¹ currently in process that would give the Mexican legislature clearer jurisdiction over space activities and make expanding the development of space activities a national priority. After an exhaustive search, no mention of light pollution from space was found on the web page of the Mexican Space Agency (AEM, <https://www.gob.mx/aem>), instead, most of the focus was on the economic and societal benefits of increased space activity.

³³⁹ https://www.dof.gob.mx/nota_detalle.php?codigo=5609968&fecha=18/01/2021#gsc.tab=0, see <https://darksky.org/news/mexico-light-pollution-law/> for a longer discussion in English.

³⁴⁰ https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-RA.2259-1-2021-PDF-E.pdf

³⁴¹ <https://www.gob.mx/aem/es/articulos/aprueba-camara-de-diputados-reforma-constitucional-en-materia-espacial-331196?idiom=es>

39. Morocco (Tamara Blagojevic)

- **Protection of dark skies**

In 2019, the *Arab Group for Space Collaboration* was founded (Member States include Algeria, Bahrain, Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Saudi Arabia, Sudan, and the United Arab Emirates), to promote regional cooperation through joint projects and the sharing of knowledge, with the group's first project being the development of an advanced satellite to monitor climate change.³⁴² In 2022 and 2023, statements to UN COPUOS, Morocco highlighted that its space activities experienced a historic development after the launch, in November 2017 and 2018, of the two Mohammed VI A. and B satellites.³⁴³ Aside from supporting the progress achieved by the Working Group on the Long-Term Sustainability of Outer Space Activities in the 2022 Statement to COPUOS, in the 2023 Statement, Morocco also supported the resolution 62/217 on Space Debris Mitigation Guidelines and explicitly showcased awareness and support for the need to put in place measures to mitigate the factors likely to hinder scientific discoveries, stating that the "dark sky must be preserved and protected as part of the world's common cultural and natural heritage".³⁴⁴

Due to the fact that the *Law Concerning the Environmental Protection and Improvement of the Environment* (2003), lists as objectives "protecting the environment against all forms of pollution and degradation of whichever origin", and includes the protection of historical and cultural heritage, specially protected areas, as well as biological diversity (all living animal and plant species), light pollution can be subsumed under the scope. Furthermore, the 2023 *UNECE Environmental Performance Review* indicates positive progress in expanding the network of conservation areas to protect certain species and habitats.³⁴⁵ Additionally, since the deployment of the *National Energy Efficiency Strategy 2030*, in August 2020 public lighting has been a part of the main sectoral objectives essential to achieve the overall goal of saving 20% of energy by 2030.³⁴⁶ The Moroccan governmental and legislative bodies have endorsed this approach by setting up a legislative, regulatory and institutional framework, namely *Law 47-09 on energy efficiency* and the creation of the *Moroccan Agency for Energy Efficiency (MAEE)* by Law 39-16 and the adoption of Decree No. 2.17.746 on the mandatory energy audit and mandatory energy audit bodies. Additionally, initiatives to modernize the governance of public lighting in Morocco have emerged through the creation of local development companies (DCL) in the framework of public-private partnerships (PPP).

The Astronomical Observatory of the Oukaimeden ([IAU J43](#)), located in the Atlas Mountains in Morocco, is leading a citizen project "[Atlas Dark Sky](#)", which consists of creating a dark sky reserve, covering a large territory including the [Toubkal National Park](#) in Morocco, with other partners (Canada, U.S, Spain, France, and the Africa Initiative for Planetary and Space

³⁴² <https://www.espi.or.at/wp-content/uploads/2022/06/ESPI-Report-79-Emerging-Spacefaring-Nations-Full-Report.pdf>

³⁴³ https://www.unoosa.org/documents/pdf/copuos/2022/Statements/8JunePM/5_Morocco_8_June_PM.pdf

³⁴⁴ https://www.unoosa.org/documents/pdf/copuos/2023/Statements/2_AM/4_Morocco_2_June_AM.pdf

³⁴⁵ https://unece.org/sites/default/files/2023-01/ECE_CEP_191_E.pdf

³⁴⁶ <https://www.sciencedirect.com/science/article/abs/pii/S2214785322047459#preview-section-references>

Science). As per the proceedings of the Dark and Quiet Skies for Science and Society Conference from 2021, and as per the New Plan 2021-2023, by the end of 2023, there was supposed to be 100% coverage of the Atlas Dark Sky Reserve Communities, and the site was to gain recognition from IDA.³⁴⁷ Additionally, from 1999 Morocco has had an observatory located in [Rabat](#), and has recently claimed (at the 2022 UNCOPUOS Session) to continue to support the African Regional Center for Space Science and Technology (affiliated with the UN) in Rabat, in terms of science and Space Technology.³⁴⁸ When it comes to astrotourism, the Moroccan SaharaSky Hotel is an astronomy-dedicated hotel in the Sahara desert, featuring a rooftop observatory equipped with various Schmidt-Cassegrain and Ritchey-Chretien telescopes up to 400mm/16 inches in aperture, as well as Takahashi and William apochromatic refractors for astrophotography.³⁴⁹ When it comes to raising awareness on light pollution issues in Morocco, the Aldebaran Project (for the creation of astronomy school clubs) organizes yearly contests during the Global Astronomy Months,³⁵⁰ and the astronomy club in the national park of Ifrane presented a Charter for the Protection of the night sky.³⁵¹

- **Protection of quiet skies**

Within the national framework, no specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

The Royal Centre for Remote Sensing (CRTS) is the main national space entity responsible for promoting and coordinating remote sensing activities in Morocco.³⁵² The current regulatory body in Morocco is the National Telecommunications Regulatory Agency (ANRT) which environs fostering and sustaining market conditions favourable to sector development to make telecommunications more accessible to customers and positioning Morocco as a leading player in the field of information technology.³⁵³ The ANRT ensures, on behalf of the State, the management and monitoring of the radio frequency spectrum,³⁵⁴ prepares studies and regulatory acts relating to the telecommunications sector, monitors the application of the regulations and also ensures compliance with the general operating conditions. As per the information available

³⁴⁷ https://www.unoosa.org/documents/pdf/psa/activities/2021/DQS2021/Day1/Sess2/D1S2_3_ALWG_BE_NKHALDOUN.pdf

³⁴⁸ https://www.unoosa.org/documents/pdf/copuos/2022/Statements/8JunePM/5_Morocco_8_June_PM.pdf

³⁴⁹ <https://www.skyatnightmagazine.com/advice/african-astronomy-where-to-stargaze-on-the-continent>

³⁵⁰ <https://www.google.com/url?sa=D&q=http://archive.astronomerswithoutborders.org/320-awb-blog/dark/gam-2013-blog/2353-raising-awareness-about-light-pollution-issues-in-morocco.html&ust=1693134840000000&usq=AOvVaw1okbpMZ3MQor8uq8SCgb1T&hl=sr&source=gmail>

³⁵¹ <http://archive.astronomerswithoutborders.org/320-awb-blog/dark/gam-2013-blog/2353-raising-awareness-about-light-pollution-issues-in-morocco.html>

³⁵² https://link.springer.com/chapter/10.1007/978-3-030-05980-4_9

³⁵³ [Vision | Morocco - National Telecommunications Regulatory Agency \(anrt.ma\)](#)

³⁵⁴ Version consolidée de la Loi n°24-96 relative à la poste et aux télécommunications, telle qu'elle a été modifiée et complétée, Article 29, 7) and 8).

on the ANRT website, the current National Frequency Plan in force dates from 2021.³⁵⁵ The current laws governing telecommunications are:

- The Consolidated version of law n° 24-96 on postal and telecommunications services³⁵⁶. As per this Law, the establishment and operation of all public telecommunications networks using the public domain or using the radio frequency spectrum are subject to licensing. The establishment and operation of independent networks are subject to authorization, with the exception of internal networks. on the other hand, radio installations, terminal equipment intended to be connected to a public telecommunications network and telecommunications equipment testing and measurement laboratories, are subject to approval. Article 5 The provision of value-added services, set by regulation, using the available capacities of the telecommunications networks is subject to declaration. Internal networks and radio installations exclusively composed of low-power and short-range devices are freely established. The radio frequency spectrum is part of the public domain of the State. The assignment of radio frequencies is subject to payment of a fee in accordance with the regulations in force.
- Consolidated version of [decree n° 2-97-1024 of 27 chaoual 1418](#) (February 25th, 1998) establishing the list of value-added services.
- The Consolidated version of [decree n° 2-97-1025 of 27 chaoual 1418](#) (February 25th, 1998) on the interconnection of telecommunications networks.
- The Consolidated version of [decree n° 2-97-1026 of 27 chaoual 1418](#) (February 25th, 1998) on the general operating conditions of public telecommunications networks.
- The specific licence conditions are also visible in the [Consolidated version of the license conditions of Itissalat Al-Maghrib S.A.](#) published on the ANRT website.

However, Moroccan legislation does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

³⁵⁵ anrt.ma/sites/default/files/document/pnf-2021_1.pdf?csrt=18250090967464618008

³⁵⁶ Version consolidée de la Loi n°24-96 relative à la poste et aux télécommunications, telle qu'elle a été modifiée et complétée, [LOI 24/96 relative à la Poste et aux Télécommunications \(anrt.ma\)](#)

40. Netherlands (Charlotte Hook)

- **Protection of dark skies**

Currently, in the Netherlands, there is no national legislation addressing light pollution, yet due to both public and road lighting the Netherlands remains one of the most illuminated countries globally.³⁵⁷ Other efforts to reduce light pollution are present. The *Netherlands' Environmental Activities Management Decree (2020)*³⁵⁸ maintains the objective of “preventing and minimizing noise nuisance, vibration nuisance, light nuisance and outdoor nuisance”.³⁵⁹ Additionally, the Environmental Management Activities Decree³⁶⁰ limits lighting used to grow crops in greenhouses and agriculture, as well as lighting on sports fields, so as not to reduce the disturbance for local residents.³⁶¹

Two dark sky parks, Boschplaat Dark-Sky Park and Lauwersmeer National Park, are located in the Netherlands.³⁶² Both parks are part of the European Union's Natura 2000 initiative, which makes up “the largest coordinated network of protected areas in the world”.³⁶³ There are also a number of dark sky initiatives and events in the Netherlands. Nacht van de Nacht (*Night of the Night*) is held in October in several cities where local governments and companies turn off their lights to encourage more sustainable lighting practices.³⁶⁴ Seeing Stars Leiden, an annual event every September, encourages residents around Leiden's Old Observatory to turn off their lights for one hour to reduce light pollution and increase the number of visible stars in the night sky.³⁶⁵ There is also the Amsterdam Dark Festival taking place in September, which hosts a series of activities around dark sky appreciation and education.³⁶⁶

- **Protection of quiet skies**

In the Dutch province of Drenthe, authorities have established a two-step radio quiet zone around their Low-Frequency Array (LOFAR) telescope.³⁶⁷ The immediate 5km zone around the telescope prohibits all electromagnetic radiation that could impact the telescope. The next zone, with a radius of 10km, is a consultation zone that allows electromagnetic radiation that is approved by the management of the LOFAR telescope as not interfering with the telescope's activities.³⁶⁸ Within the national framework, no other specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

³⁵⁷[https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/\\$FILE/Light_pollution_reduction_measures.pdf](https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/$FILE/Light_pollution_reduction_measures.pdf)

³⁵⁸<https://aandeslagmetdeomgevingswet.nl/@249081/the-environmental-activities-decree-bal-2020/>

³⁵⁹ *ibid.*

³⁶⁰<https://wetten.overheid.nl/BWBR0022762/2021-07-01#Hoofdstuk5>

³⁶¹[https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/\\$FILE/Light_pollution_reduction_measures.pdf](https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/$FILE/Light_pollution_reduction_measures.pdf)

³⁶²<https://www.np-lauwersmeer.nl/het-lauwersmeer/dark-sky-park/>; <https://darksky.org/places/de-boschplaat-dark-sky-park/>

³⁶³https://ec.europa.eu/environment/nature/natura2000/index_en.htm

³⁶⁴[https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/\\$FILE/Light_pollution_reduction_measures.pdf](https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/$FILE/Light_pollution_reduction_measures.pdf)

³⁶⁵<https://leiden2022.nl/en/highlights/seeing-stars-leiden>

³⁶⁶<https://www.amsterdamdarkfestival.nl/over-ons/>

³⁶⁷<https://lofar.ie/wp-content/uploads/2020/11/Web-Page.pdf>

³⁶⁸<https://lofar.ie/wp-content/uploads/2020/11/Web-Page.pdf>

- **Satellites regulations**

Regulations for satellite activities operating out of the Netherlands were first issued in 2007 – *Rules Concerning Space Activities and the Establishment of a Registry of Space Objects* (the Space Activities Act). This Act establishes a regulatory regime for the Netherlands as well as a registry of space objects. This Act has been updated since in 2008, 2010, and 2015.³⁶⁹ These amendments have updated the regulatory process for the Netherlands. However, Dutch legislation does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

³⁶⁹ <https://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/index.html>

41. New Zealand (Christopher L. Martin)

- **Protection of dark skies**

New Zealand hosts multiple Dark Sky Reserves, Parks, and Sanctuaries and these locations are protected by local or regional regulations.³⁷⁰ However, there are growing concerns that even with these regulations, light pollution is rapidly increasing,³⁷¹ which is in part why a petition³⁷² has been submitted to Parliament requesting the establishment of a national law to limit light pollution and promote dark skies.

- **Protection of quiet skies**

Radio Astronomy is conducted in New Zealand by the Institute for Radio Astronomy and Space Research of the Auckland University of Technology (IRAS, <https://irasr.aut.ac.nz/>). Since 2010, IRAS has operated a 12m and 30m radio telescope from the Warkworth Radio Astronomy Observatory which is affiliated with the Australian VLBA project. New Zealand regulates the use of the radio spectrum through the Radio Spectrum Management division of the Ministry of Business, Innovation, and Employment (<https://www.rsm.govt.nz/>) and the restrictions on bands are generally in alignment with ITU standards for the protection of radio astronomy bands.³⁷³

- **Satellites regulations**

New Zealand also has a rapidly growing space launch industry, with nine successful launches in 2022 (out of a global total of 180) being made from a launch site on New Zealand's North Island.³⁷⁴ This rapid increase in space activity has led to New Zealand enacting a law in 2017 and adopting a National Space Policy in 2023³⁷⁵. Astronomy and satellite constellations are mentioned in the 2023 policy as an issue of concern and a regulatory process for constellation launches has begun in which the need for sustainable space practices that preserve the benefits of space for future generations will be considered.

Finally, New Zealand has laws that explicitly acknowledge and require the inclusion of indigenous views on all topics of governance, and dark sky protection and space launches are no exception. For instance, the space policy explicitly mentions Māori whakapapa (genealogical links to the beginning of the universe), wairuatanga (the spiritual connection between Earth and the universe, derived from Māori cosmology), and tātai arorangi (Māori knowledge of astronomy). Thus, it should also come as no surprise that Māori are also closely involved in the governance of the dark sky reserves in New Zealand since protecting the dark sky for all is of deep cultural importance.

³⁷⁰ Lighting Restrictions for the Mackenzie District to protect the Aoraki Mackenzie International Dark Sky Reserve. https://www.mackenzie.govt.nz/_data/assets/pdf_file/0007/677959/Light.pdf

³⁷¹ "150% increase in light pollution in three years may lead to loss of dark sky status for park," Stuff, July 28, 2023.

³⁷² "Petition of John Hearnshaw: New Zealand needs a national law to limit light pollution and promote dark skies," NZ Parliament, 11 Jan 2023, <https://petitions.parliament.nz/564eab3a-b648-412e-8f3e-2c45b68393d0>

³⁷³ <https://www.rsm.govt.nz/assets/Uploads/documents/pibs/table-of-radio-spectrum-usage-in-new-zealand-pib-21.pdf>

³⁷⁴ "2022 was a record year for space launches", Nature, 11 January 2023, <https://www.nature.com/articles/d41586-023-00048-7>

³⁷⁵ NZ National Space Policy, Adopted 31 May 2023, <https://www.mbie.govt.nz/science-and-technology/space/national-space-policy/>

42. Nicaragua (Sarah Thiele)

- **Protection of dark skies**

In Nicaragua, there do not currently exist any national policies or regulations pertaining to ALAN or the protection of astronomy. There are however a few initiatives based around promoting astronomical observations and teachings, as well as environmental laws that would contribute positively to dark sky protection if light pollution were recognized as an environmental threat.

Nicaragua has well-known spots for stargazing, such as Managua, Playa Maderas or the Escamequita Valley, associated with astrotourism activities.³⁷⁶ There also exists a National Astronomy Education Coordinator Team, or NAEC, built in collaboration with the IAU Office of Astronomy for Education (OAE). The team works to document, analyse and improve how astronomy is taught in Nicaragua.³⁷⁷

Nicaragua has the *Ministerio del Ambiente y de los Recursos Naturales (Marena Ministry of the Environment and Natural Resources; MARENA)*,³⁷⁸ which regulates compliance with national environmental policies, and environmental quality. They further manage the System for Environmental Assessment, which regulates the sustainable use of natural resources (Decree no. 20-2017) and imposes Environmental Impact Assessment requirements depending on the type of project.³⁷⁹ This decree was enabled through Law No. 217, the General Law of Environment and Natural Resources of 1996 and its amendments by Law 647 in 2008.³⁸⁰ Article 4 of Law 647 included the addition of the precautionary principle as the dominant principle for managing environmental systems in both the public and private sectors. Under this principle, the “State shall take preventive measures in case of doubt about the negative environmental impact or consequences of any action or omission, even if there is no scientific evidence of the damage”.³⁸¹

Art. 17 of Law 647 created the *Sistema Nacional de Áreas Protegidas (National System of Protected Areas; SINAP)*, which now includes 78 protected areas, as well as a surrounding buffer zone (Art. 24). Each protected area and its buffer zone is subject to an associated management plan. Relevant to ALAN, many of these management plans include the scenic background as a landscape component and a goal to preserve the aesthetic and “visual beauty” of the area (see e.g. Somoto Canyon National Monument Management Plans³⁸²). National Monuments, one of the protected area categories, furthermore, aim to preserve natural and cultural features of the landscape associated with significant spiritual heritage.

- **Protection of quiet skies**

There do not currently exist any norms or regulations to protect radio astronomy.

Nicaragua’s telecommunications services are regulated by the state-run *El Instituto Nicaragüense de Telecomunicaciones y Correos (The Nicaraguan Institute of Telecommunications and Postal Services; TELCOR)*. TELCOR is responsible for administrating and regulating the radio frequency spectrum, as well as the “granting of concession, license,

³⁷⁶<https://www.astrotourism.com/place/unlocated/playa-maderas-nicaragua/>,
<https://theskylive.com/guide?geoid=3617763>

³⁷⁷ <https://astro4edu.org/naec-network/>

³⁷⁸ <https://www.marena.gob.ni/>

³⁷⁹ <https://www.eia.nl/en/countries/nicaragua>

³⁸⁰ https://climate-laws.org/document/law-217-on-the-environment-and-natural-resources-as-amended-by-law-647_6ac7

³⁸¹ *ibid.*

³⁸² <https://www.marena.gob.ni/planes-de-manejo/>

permit or registration certificate applicable to companies interested in providing telecommunications services and postal services or make use of radio spectrum frequencies”.³⁸³

There also exists Decree No. 55-90, *Uso del Espectro Radio Eléctrico (Use of the Radio Electrical Spectrum)*.³⁸⁴ Article 3 of this decree establishes the Nicaraguan Administrative Division of the Radioelectric Spectrum (ANDER) as a body of TELCOR, which serves to regulate the Radio Spectrum in Nicaragua. The decree also establishes ANDER’s role, which includes frequency allocation to the Nation, documentation, station inspections, and ensuring compliance with the ITU. Relevant to quiet skies are Articles 24 and 25, which pertain to frequency interference. They state that ANDER will avoid interference between National and International Stations, including determining “the limits of the bands of the different services, the tolerance or frequency deviation and the width of the emission frequency bands for all types of broadcasters when they were not specified in the treaties in force.” They do not consider sporadic interference from “radio propagation phenomenon” as interference.³⁸⁵

- **Satellites regulations**

Telecommunication industry members are protected under the *Ley de Protección de Señales Satelitales Portadoras de Programas (Regulations of the Satellite Signals Protection Law; Law No. 322)*,³⁸⁶ which dictates ownership rights and protections, and registration requirements (registration, for example, requires a TELCOR permit to operate and a description of the signal on which the authorization is granted, as well as other requirements). However, Law No. 322 does not mention space protection.

In 2021, Nicaragua created the National Ministry for Extraterrestrial Space Affairs, The Moon and Other Celestial Bodies,³⁸⁷ to promote the development of space activities in the country. The National Assembly discussion surrounding this new ministry involved reaffirming of Nicaragua’s commitment to “security, peace and the common good of all humanity”, outer space as the common heritage of all humanity, as well as “the principles for the use of outer space, the prohibition of nuclear weapons that threaten global security and the principle of international responsibility, especially in the issue of accidents that may bring satellites into geostationary orbit”. They also discussed the benefits of satellites, the debris field they are contributing to, and the need to have a specialized body in charge of “compensation for damages, not only human losses but also environmental damage to our country”.³⁸⁸ However, current legislation does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

³⁸³ <https://telcor.gob.ni/institucional/quienes-somos/>

³⁸⁴ <https://www.leybook.com/doc/9803>

³⁸⁵ *ibid.*

³⁸⁶ https://internet-law.ru/law/int/nation_cleo/nicaragua/ni002es.pdf

³⁸⁷ <https://apnews.com/article/nicaragua-extraterrestrial-space-affairs-4dd5c84b9fc4b766c6390e88b22f3a12>

³⁸⁸ <https://noticias.asamblea.gob.ni/nicaragua-creara-secretaria-para-asuntos-relacionados-con-el-espacio-ultraterrestre/>

43. Nigeria (Anne-Sophie Martin)

- **Protection of dark skies**

The country does not adopt specific regulations in the field of light pollution.

Astronomy is part of the *National Space Policy* approved in 2001 by the Federal Government.³⁸⁹ The objective is to pursue capacity building in the field of astronomy, in particular in the design and realization of instruments and systems for astronomical observations.

In the country, the [Nigerian Conservation Foundation](#) aims to combat light pollution. Also, here civil society plays an important role in creating awareness in the promotion of astronomical observation and in the limitation of light pollution.

- **Protection of quiet skies**

The *Nigerian Communications Commission (NCA)* is empowered to make and publish regulations on matters such as, but not limited to; written authorisations, permits, assignments and licenses granted or issued under the NCA 2003; the assignment of rights to spectrum or numbers; communications related offences and penalties; any fees, charges, rates or fines to be imposed; a system of universal service provision; Quality of Service (QoS) standards; and any other matters as are necessary to enforce the provisions of Section 70 of the 2003 Nigerian Communications Act (NCA).³⁹⁰

- **Satellites regulations**

The 2015 *Nigerian Regulations on Licensing and Supervision of Space Activities* empowers the National Space Agency, NASRDA, to license all space activities in Nigeria.³⁹¹ “Space activities” in the regulations include “space objects and their control/management”. In addition, according to Article 11, the National Space Council maintains the national registry of space objects.

³⁸⁹ <https://spacesecurityportal.org/states/nigeria>

³⁹⁰ Federal Republic of Nigeria, Nigerian Communications Act, 2003, <https://www.ncc.gov.ng/accessible/documents/128-nigerian-communications-act-2003/file>.

³⁹¹ Federal Republic of Nigeria, Regulations on Licensing and Supervision of Space Activities, 2015, <https://central.nasrda.gov.ng/wp-content/uploads/2023/11/Space-Regulation-official-gazette.pdf>.

44. Norway (Charlotte Hook)

- **Protection of dark skies**

In Norway, although there is no legislation specifically on light pollution, parts of existing legislation do pertain to light pollution mitigation. [Section 2 of the Neighbourhood Act \(1961\)](#) asserts that “...No one must have, do or implement something that is unreasonable or unreasonably harmful or inconveniencing on neighbouring property” and light pollution can exceed this limit. Light pollution is also covered by the Biodiversity Act (2009) which protects wildlife and geographical diversity. The Act is driven by principles such as the precautionary principle, taking a holistic approach to environmental impact assessments and a requirement of environmentally responsible methods.³⁹² Conservation measures in this Act can be applied both to the protection of wildlife and the night sky as the latter is considered an essential joy of outside life which light pollution could threaten.³⁹³ The Pollution Act (1981) could also be used against light pollution if the Norwegian Pollution Control Authority was to deem it as such, so far, they have not. Lastly, the Planning and Building Act (2008) set out regulations on lighting that require lighting to blend into the surrounding environment, limits on illuminated signs, limits on lighting in construction sites and lighting regulations for building permits.³⁹⁴ It has also been argued that its Public Health Act (2011) could regulate light pollution as there is consensus that outdoor lighting affects public health.³⁹⁵

- **Protection of quiet skies**

In 2012, Norway passed the *General Authorisations Regulations on radio frequencies*. This law mandates restrictions on the use of the 2-32GHz range within 20km of the Ny-Ålesund observatory.³⁹⁶ Within the national framework, no other specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

Norway passed its first legislation on space in 1969 - Act on launching objects from Norwegian territory etc. into outer space.³⁹⁷ This law only contains a couple of provisions. First, launches from Norwegian territory, including Norwegian vessels and aircrafts, and from territory not under any national jurisdiction but conducted by a Norwegian resident must obtain permission for the launch from the Norwegian government. Second, that the Norwegian government can issue regulations on launches.³⁹⁸ In 2012, Norway passed the General Authorisations Regulations on radio frequencies that mandated that satellites are restricted to certain windows of the radiofrequency spectrum.³⁹⁹ Currently, it seems that the Norwegian government are in the process of formulating new national legislation on outer space activities, but this legislation has not been finalised yet.⁴⁰⁰ Hence, the current regulatory framework does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

³⁹² <https://snl.no/naturmangfoldloven>

³⁹³ <https://www.duo.uio.no/bitstream/handle/10852/61565/205.pdf?sequence=1&isAllowed=y>

³⁹⁴ <https://www.duo.uio.no/bitstream/handle/10852/61565/205.pdf?sequence=1&isAllowed=y>

³⁹⁵ <https://www.duo.uio.no/bitstream/handle/10852/61565/205.pdf?sequence=1&isAllowed=y>

³⁹⁶ <https://nyalesundresearch.no/research-and-monitoring/researchers-guide/using-radio-frequencies/>

³⁹⁷ https://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/norway/act_38_1969E.html

³⁹⁸ Ibid.

³⁹⁹ <https://nyalesundresearch.no/research-and-monitoring/researchers-guide/using-radio-frequencies/>

⁴⁰⁰ https://www.duo.uio.no/bitstream/handle/10852/90397/Marius_551_Simply_Pozdnakova_web%2B%25281%2529.pdf?sequence=1&isAllowed=y

45. Oman (Rayan Khan)

- **Protection of dark skies**

Oman is taking significant steps to address light pollution and preserve the natural beauty of its skies and stars. In response to this commitment, a Royal Decree⁴⁰¹ has been signed to establish a new starlight reserve in the Al Dakhiliyah Governorate. This reserve will prohibit all forms of light pollution, allowing people to observe the splendor of the night sky.⁴⁰²

The decision to create this starlight reserve demonstrates Oman's dedication to protecting its natural environment and promoting astronomical observation. By banning light pollution within the reserve, the government is taking a proactive approach to ensure that the country's citizens and visitors can fully appreciate the magnificence of the celestial realm, as well as highlights its commitment to controlling light pollution and providing an opportunity for people to connect with the wonder of the night sky.

On May 8, 2019, a significant step was taken to protect Oman's night skies and natural environment. His Majesty Sultan Qaboos bin Said issued a royal decree⁴⁰³ to establish the "Western Hajar Starlight Reserve" in the Governorate of Dakhiliyah. This report provides a summary of the key provisions and implications of this decree.

Decree Overview:

Article I: The royal decree formally establishes the "Western Hajar Starlight Reserve in the Governorate of Dakhiliyah." It designates a specific area for the reserve, with precise dimensions specified in accompanying annexes and maps. This move reflects Oman's commitment to preserving the beauty of the night sky.

Article II: The Minister of Environment and Climate Affairs is entrusted with the task of formulating regulations and decisions to implement the decree. These regulations will be developed in coordination with relevant ministries and authorities. They will encompass guidelines for managing the reserve, rules governing public access, prescribed fees, visitation schedules, allowable activities, prohibited activities, and the imposition of appropriate administrative penalties when required.

Article III: The decree will be published in the Official Gazette, and it becomes effective on the day following its publication.

The establishment of the "Western Hajar Starlight Reserve" is a significant development in Oman's commitment to environmental conservation and the preservation of its night skies. This initiative aims to protect the natural beauty of the night sky and promote astronomical observation while mitigating light pollution. It reflects the Sultanate's dedication to public interest and the preservation of its natural environment.

- **Protection of quiet skies**

*Oman TRA Releases National Spectrum Allocations & Assignment Plan*⁴⁰⁴ has released crucial guidelines for radio astronomy spectrum management. The document emphasizes the protection of radio astronomy observations from harmful interference originating from various radiocommunication services, including space stations.

Key points highlighted in the guidelines include:

- Identification of specific frequency bands critical for radio astronomy research.

⁴⁰¹ <https://faolex.fao.org/docs/pdf/oma205970E.pdf>

⁴⁰² <https://timesofoman.com/article/76313-oman-to-set-up-new-star-light-reserve#:~:text=Muscat%3A%20Oman%20will%20soon%20set,reserve%20in%20Al%20Dakhiliyah%20Governorate>

⁴⁰³ <https://faolex.fao.org/docs/pdf/oma205970E.pdf>

⁴⁰⁴ <https://tra.gov.om/pdf/national-spectrum-allocations-and-assignment-plan-ar.pdf>

- Urging administrations to take proactive measures to mitigate interference, particularly in bands such as 150.05-153 MHz and 406.1-410 MHz.
 - Recognition of different categorizations of service allocation in countries like Argentina, Australia, and Canada, where certain frequency bands are designated to the radio astronomy service on a primary basis.
 - Adherence to these guidelines is essential to maintain the integrity of radio astronomy observations in Oman and uphold international standards for spectrum management.
- However, within the national framework, no other specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

The current regulatory framework does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

46. Pakistan (Rayan Khan)

- **Protection of dark skies**

This research report delves into Pakistan's environmental protection framework, with a particular focus on the *Pakistan Environmental Protection Act (PEPA)* of 1997 and its implications for controlling light pollution.⁴⁰⁵ Additionally, it explores Pakistan's general statements to the United Nations Office for Outer Space Affairs (UNOOSA) under agenda item 17 (b), which is "Dark and quiet skies: the way ahead" highlighting the nation's commitment to environmental preservation.

The Pakistan Environmental Protection Act (PEPA) of 1997 serves as a cornerstone in Pakistan's approach to environmental conservation. This comprehensive legislative document addresses various environmental concerns. While light pollution is not explicitly mentioned, of notable interest in the context of light pollution control is the Act's definition of "air pollutant" in Section 2(iii). This definition includes a range of substances responsible for air pollution, one of which is "light." The Act's inclusive approach reflects Pakistan's commitment to a holistic view of environmental protection.

Pakistan, as a responsible global actor, has made general statements to the *United Nations Office for Outer Space Affairs (UNOOSA)* under agenda item 17.⁴⁰⁶ These statements underscore Pakistan's dedication to environmental protection, sustainable development, and the responsible utilization of outer space. While these statements do not explicitly address light pollution, they demonstrate Pakistan's recognition of the environmental implications associated with space activities.

Furthermore, Pakistan's general statements to UNOOSA highlight the country's commitment to responsible environmental stewardship in the context of outer space activities. These statements may not specifically address light pollution, but they underscore Pakistan's active engagement in global initiatives aimed at safeguarding the environment.

In summary, Pakistan's legislative framework and international engagement demonstrate its commitment to addressing environmental issues, even when specific mention of light pollution is not included.

- **Protection of quiet skies**

The *Pakistan Telecommunication Authority (PTA)*⁴⁰⁷, through its website, provides access to guidelines established by the Frequency Allocation Board of Pakistan. These guidelines, formulated in accordance with directives from the International Telecommunication Union (ITU) Radio, delineate regulatory frameworks and definitions essential for the preservation of radio frequency bands critical to astronomers' observations. Serving as a comprehensive framework, the document outlines the allocation and management of radio frequencies within Pakistan's jurisdiction, emphasizing the imperative of maintaining the integrity of these bands for astronomical pursuits. The Frequency Allocation Board, in alignment with international standards and guidelines stipulated by the ITU, aims to mitigate interference and uphold the clarity and precision of astronomical observations conducted within the nation's airspace. Through these measures, the PTA and the Frequency Allocation Board endeavor to facilitate advancements in scientific research and exploration, thereby contributing to the broader global scientific community.

⁴⁰⁵ <https://www.elaw.org/system/files/Law-PEPA-1997.pdf>

⁴⁰⁶ https://www.unoosa.org/res/oosadoc/data/documents/2023/aac_105c_1/aac_105c_1_406add_5_0_html/AC105_C1_L406Add05E.pdf

⁴⁰⁷ https://www.pta.gov.pk/media/Pakistan_Table_of_Frequency_Allocations.pdf

However, no specific regulations to protect quiet skies for radio astronomy were identified.

- **Satellites regulations**

The article explores Pakistan's global position on space laws, emphasizing its recent statement during the *61st session of the Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space*. While Pakistan aligns with global principles for outer space use, it lacks comprehensive domestic legislation. The absence of a national space policy hampers collaboration and investment opportunities, hindering its space program's growth. The report advocates for Pakistan to enact legislation addressing national security concerns while encouraging private sector involvement. Establishing statutory frameworks, guidelines for international collaboration, and fostering a supportive regulatory environment for space entrepreneurship and joint ventures are identified as critical steps for Pakistan's sustainable space program development and effective management of space activities.⁴⁰⁸ Hence, no specific provisions relevant to the protection of D&QS were identified.

⁴⁰⁸ <https://www.ibanet.org/space-laws-in-pakistan-a-need-for-domestic-legislation>

47. Panama (Christopher L. Martin)

While Panama regulates the energy efficiency of public lighting and streetlights, there are no particular standards regarding light pollution either from the ground or space. Similarly, no restrictions on satellites or radio frequency contamination relevant to astronomical observations were found based on searches of Panama's laws and regulations. Additionally, the current regulatory framework does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

48. Paraguay (Rayan Khan)

- **Protection of dark skies**

The Ministry of Environment and Sustainable Development (MADES)⁴⁰⁹ in Paraguay has partnered with the Coalition's Supporting National Planning (SNAP) Initiative⁴¹⁰ to create an integrated greenhouse gas, short-lived climate pollutant (SLCP), and air pollutant emission inventory. This collaboration aims to enhance Paraguay's capacity to mitigate SLCPs, enabling the development of informed policies and emission reduction strategies. Ultimately, these efforts will yield tangible benefits for health and economic growth within the country. However, current national legislation does not include any provisions on the protection of astronomical observations from light pollution.⁴¹¹

- **Protection of quiet skies**

The document, titled "*FCC Online Table of Frequency Allocations 47 C.F.R. § 2.106 Revised on July 1, 2022*,"⁴¹² provides valuable insights into Paraguay's radio frequency allocations, with a specific focus on radio astronomy.

It emphasizes that harmful interference must be prevented to stations of the radio astronomy service within the frequency band 1610.6-1613.8 MHz by stations of the radiodetermination-satellite and mobile-satellite services, in accordance with No. 29.13.

Furthermore, the document highlights an alternative allocation in Bolivia, Chile, Paraguay, and Peru, where the frequency band 1850-2000 kHz is allocated primarily to fixed, mobile (except aeronautical mobile), radiolocation, and radionavigation services, as stipulated by WRC-15.

Additionally, it delineates the use of the frequency band 4400-4940 MHz for aeronautical mobile telemetry for flight testing by aircraft stations in Region 2 and Australia, under specific conditions to avoid harmful interference, as per WRC-07.

Moreover, in the United States, the French overseas departments and communities in Region 2, Guyana, and Paraguay, the allocation of the frequency band 76-88 MHz to fixed and mobile services holds primary status.

In essence, the document underscores Paraguay's commitment to effectively managing radio frequency allocations, ensuring the protection of radio astronomy services while facilitating the efficient utilization of spectrum resources across diverse services and applications. However, no other specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

Furthermore, Paraguay achieved a significant milestone in space exploration with the launch of its first satellite, GuaraniSat-1.⁴¹³ Launched to the International Space Station on 20 February 2021 and deployed into orbit on 14 March 2021, this achievement was made possible through a Research Cooperation Agreement with the Kyushu Institute of Technology (Kyutech)

⁴⁰⁹ <https://www.mades.gov.py/>

⁴¹⁰ <https://www.ccacoalition.org/projects/paraguay-institutional-strengthening-support>

⁴¹¹ Information about Paraguayan environmental laws: <https://www.mades.gov.py/leyes/>

⁴¹² <https://transition.fcc.gov/oet/spectrum/table/fcctable.pdf>

⁴¹³ <https://aep.gov.py/index.php/proyectos/guaranisat-1>

and the Birds-4 project.⁴¹⁴ GuaraniSat-1 represents the successful realization of the "Paraguay to space" project, involving collaboration from academia, the scientific sector, and civil society.

Within the framework of examining these noteworthy developments, it is relevant to underscore that the report does not presently offer specific details pertaining to regulations related to the protection of D&QS from harmful interference.

⁴¹⁴ <https://birds4.birds-project.com/>

49. Peru (Christopher L. Martin)

- **Protection of dark skies**

In July 2021, Peru passed its first law to prevent and control light pollution.⁴¹⁵ While the new law mostly focuses on the environmental effects on humans and nature due to excessive exposure to light at night, there is a brief mention of protection of the night sky itself in the list of motivations for the law. Specifically, the law 1) prohibits the installation of LED billboards in residential areas and within 500m of beaches, parks, and protected or fragile ecosystems, 2) requires that LED billboards be turned off between 11 pm and 6 am every night except along certain busy roads, 3) requires streetlights to be energy efficient models that direct their light downwards, and 4) that sports stadiums and industrial facilities use energy-efficient lighting. Various agencies of the Peruvian government have been tasked with developing regulations to implement the law, but as of yet, none seem to be explicitly focused on astronomical aspects.

Many tourist organizations tout Peru's dark skies and highlight astrotourism at the country's numerous UNESCO World Heritage Sites, such as Machu Picchu and the Nasca Lines but as of yet there appear to be no specific regulations protecting the dark skies at these sites.

- **Protection of quiet skies**

Peru established the Jicamarca Radio Observatory in 1961 to study the Earth's ionosphere and other radio astronomy sources. More recently in 2005, an old satellite communications facility was donated to Peruvian astronomers to become the Sicaya Radio Telescope. However, after searching Peruvian laws and regulations there appear to be no special laws protecting these sites beyond the usual laws enforcing ITU band usage.

- **Satellites regulations**

In 1974 Peru established CONIDA (Comisión Nacional de Investigación y Desarrollo Aeroespacial)⁴¹⁶ with the mission to "promote, research, develop and disseminate space science and technology, generating products and services that contribute to the socioeconomic development and security of the nation." CONIDA is operated by the Ministry of Defence and does not appear to have a regulatory role beyond its promotion role.

⁴¹⁵https://leyes.congreso.gob.pe/Documentos/2016_2021/Proyectos_de_Ley_y_de_Resoluciones_Legislativas/PL07193-20210222.pdf

⁴¹⁶Decreto Ley 20643
https://www.peru.gob.pe/docs/PLANES/85/PLAN_85_2015_1.2.1.0._NORMA_DE_CREACION_DE_LA_ENTIIDAD_D.L._20643_11_JUN1974.PDF

50. Poland (Tamara Blagojevic)

- **Protection of dark skies**

Although the latest *2022 EU Environmental Impact Review*, indicates progress in the area of implementation of the Natura 2000 Directive, as well as access to justice under the *Environmental Impact Assessment Directive*, as of 2022, there were no explicit and formal requirements in Poland to prevent light pollution (or they are only at an early stage of implementation).⁴¹⁷ Neither the *2001 Environmental Protection Act*⁴¹⁸ (EPA) (the legal framework for all commercial and environmental activities)⁴¹⁹ nor the latter *2008 Act on Providing Information on the Environment and Environmental Protection, Public Participation in Environmental Protection and on Environmental Impact Assessment* (the “EIA Act”),⁴²⁰ which replaced the EPA, do not explicitly mention light pollution or provide for its consideration when conducting impact assessments. However, the EPA defines emissions as energy, such as heat, noise, vibration or electromagnetic fields, which allows for subsuming light pollution.

The older Environmental Law definition of the essential elements of the environment would allow space to be subsumed or implied as a part or a type of it, as elements such as “the totality of natural elements” provide an open clause, and it is not explicitly excluded. The EIA Act⁴²¹ only requires that the environmental impact assessments must be carried out for projects which always have a significant environmental impact, as well as for projects that could have a significant impact if the environmental protection authority decides that an assessment is necessary. In addition, the implementation of other projects must be preceded by an assessment of the project’s impact on Natura 2000 sites if the project is not directly related to, but could have a significant impact on the sites and the environmental protection authorities decide that it is required. The classification of project types in terms of environmental impact is provided in the Council of Ministers EIA Regulation from 2004.⁴²² The same issues are also regulated by the Decree of the Council of

⁴¹⁷ Krzysztof Skarżyński, PhD Eng. “Brightness, I see brightness! About the problem of light pollution”, 2022, <https://www.pw.edu.pl/engpw/News/Brightness-I-see-brightness!-About-the-problem-of-light-pollution>

⁴¹⁸ Environmental Protection Act of 27 April 2001 (uniform text: Journal of Laws of 2008 no. 25, item 150, as amended) ACT of 27 April 2001 Environmental Protection Law (OJ 2001 No. 62 item 627), <https://www.g-regis.com/downloads/POEnvironProtectLawTS1.pdf>
<https://faolex.fao.org/docs/pdf/pol60001.pdf>

⁴¹⁹ “Country Commercial Guides: Poland - Environmental Technologies”, 2022-07-22, <https://www.trade.gov/country-commercial-guides/poland-environmental-technologies#:~:text=The%202001%20Environmental%20Protection%20Act,of%20environmental%20legislation%20and%20strategies>

⁴²⁰ Act on Providing Information on the Environment and Environmental Protection, Public Participation in Environmental Protection and on Environmental Impact Assessment, dated 3 October 2008 (Journal of Laws no. 199, item 1227).

⁴²¹ The Act of October 3, 2008, on providing information on the environment and its protection, public participation in environmental protection and environmental impact assessments, <https://www.gov.pl/web/gdosc/eia>; <https://leap.unep.org/countries/pl/national-legislation/act-providing-information-environment-and-environmental>

⁴²² Council of Ministers Regulation of 9 November 2004 (Journal of Laws no 257, item 2573, as amended) (the “EIA Regulation”).

Ministers from 2019, on projects that may have a significant impact on the environment.⁴²³ However, no explicit reference to light pollution exists in either of the regulations. Additionally, as evidenced by the 2022 Report on Light Pollution Reduction Measures in Europe, and that time, there was no national policy on light pollution in Poland.⁴²⁴ Only the Regulation of the Minister of Infrastructure of April 12, 2002, on the technical conditions to be met by buildings and their location⁴²⁵ very laconically and vaguely provides, that the lighting devices, including advertisements, placed outside the building or in its surroundings must not cause a nuisance to its users or to passers-by and drivers.

When it comes to ongoing initiatives, at the Faculty of Law and Administration of the University of Gdańsk there is ongoing research on the legal and administrative aspects of counteracting artificial light pollution within the project 'GOOD LIGHT LAW' (GLL) at the Metropolitan Institute, which aims to raise awareness on the 'good law' in the design and implementation of outdoor lighting.⁴²⁶ As the project leads to stress, the fight against light pollution requires the coordination of environmental, development and spatial planning and development policies, which areas, in Poland, are still treated marginally in the public discourse, and the law in force does not provide for effective protection measures against this category of pollution. In 2022, the Metropolitan Institute published a *Memorandum on the Establishment of a Legal Basis for a Sustainable Outdoor Lighting Policy*,⁴²⁷ as a call for immediate legislative action, by including solution proposals, as a prerequisite for the implementation of a sustainable lighting policy. The distribution of the Memorandum was met with a positive response from the Ombudsman who made several interventions: First, the Ombudsman asked the Ministry of Climate and Environment in October 2022 whether the ministry was addressing the problem of protection from light pollution while pointing out the need for legislative action.⁴²⁸ In March 2023, the Ombudsman asked the Minister of Health whether the issue of the impact of artificial light on the health of citizens has been analyzed, and if so, what was the result, or whether it is currently the subject of analysis and proposed legislative solutions.⁴²⁹ In June 2023, the Ministry of Climate and Environment acknowledged that the topic of light pollution is interdisciplinary, and that detailed action on light pollution requires coordination of various public administration departments, but that the Ministry currently does not have dedicated activities on this issue. However, [The Responsible Outdoor](#)

⁴²³Decree of the Council of Ministers of September 10, 2019, on projects that may have a significant impact on the environment, <https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20190001839>

⁴²⁴[https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/\\$FILE/Light_pollution_reduction_measures.pdf](https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/$FILE/Light_pollution_reduction_measures.pdf) page 48.

⁴²⁵ Regulation of the Minister of Infrastructure of April 12, 2002. on the technical conditions to be met by buildings and their location, <https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=wdu20020750690>

⁴²⁶<https://ug.edu.pl/news/en/1033/she-explores-legal-and-administrative-aspects-tackling-artificial-light-pollution>

⁴²⁷ <https://goodlightlaw.im.edu.pl/en/memorandum-2/>

⁴²⁸ Address of the Commissioner for Human Rights to the Ministry of Climate and Environment, Public Information Bulletin of the Commissioner for Human Rights, 2022, https://bip.brpo.gov.pl/pl/content/rpo-mkis-zanieczyszczenie-swiatlem?fbclid=IwAR36yzWRXdb7hW6AKMYftUvIWSXYZi3HgAkSm3xgpQi-u7QGd5_Y7VZPX04

⁴²⁹ Marcin Wiącek intervenes - responses of the GIS, the Ministry of Health and the Ministry of Environmental Protection, Public Information Bulletin of the RPO, 2023, https://bip.brpo.gov.pl/pl/content/rpo-swiatlo-zanieczyszczenie-mkis-mz-gis-odpowiedz-mz-mkis?fbclid=IwAR2SHGxs0crYhvHHeMpAPBdw0ek6YaOSiVhgDLM9P5yCPsO_ZLnzhZ50_zl

[Lighting At Night \(ROLAN\) Manifesto](#), which sets out ten core principles for external illumination and a plan of action to implement positive change in the lighting community, and was created under the auspices of the ILLUME research group and the Gdansk University of Technology, and the DarkSky International, along with support from other partners.⁴³⁰

As per information originating from 2016, the Scientists from the Space Research Centre planned to examine the differences in the night sky pollution in Poland and prepare an interactive map and a computer model calculating the brightness of the night sky, to be able to model the spread of this phenomenon and determine the brightness of the sky in every place in Poland.⁴³¹ This project called "Light Pollution Sources in Poland - LiPS", co-financed by the National Science Centre in the programme Sonata Biswas, was supposed to be finalized within five years, meaning approximately in 2020-2021, but no information was found on the development, progress or finalization of the project. The first experimental maps for some cities - including Warsaw, Tri-City, Wrocław, Poznań - should have been available in two years, while the full map for the entire Poland - in three years, upon what the computer modelling was to begin.

When it comes to initiatives and projects related to astronomical activities, it was already in 2004 that a nationwide "Dark Sky" program was established by the POLARIS – OPP Association (POA, with head office in Sopotnia Wielka).⁴³² In 2005, there was a campaign led by POA, organizing a Polish-Slovakian convention for astronomical societies at the Silesian Planetarium in Chorzów. The main postulates and concepts have been formulated, aiming at the protection of Polish heritage (Copernicus). Later on, in 2012, the 12th European Symposium for Dark-Sky Protection in Bielsko-Biała was organized by POLARIS-OPP and the Institute of Astronomy from University of Wrocław, with guardianship of DarkSky International, which included topics on light pollution. On a Polish dark-sky tourism website, already in 2015, it was indicated that the town of Sopotnia Wielka in the Beskidy mountains could be held up as a model when it comes to the quality of night lighting.⁴³³ Several years prior, its municipal authorities decided to fit street lamps with shades deflecting light downwards, which resulted in the new lighting saving 30% of energy while ensuring the same visibility. The "Dark Sky Community" project, realized in 2020-2021, was created by the POA and groups of friends, who decided to intensify the activities serving the local Sopotnia Wielka community, to make it the first in Poland to earn the International Dark Sky Community designation.⁴³⁴

The Dark Sky Poland, a project realized in 2019, was aimed to raise the awareness of the local community about light pollution, its harmfulness and the positive effects of the existence of the "dark sky", its impact on astronomy, ecology, health and economy. A deal was made between the Dark-Sky Poland Program and Instal-Eko store in Jelesnia to promote dark-sky-friendly luminaires, which led to them now being available for purchase. The village mayor and councillor were convinced to implement the activities related to the rational lighting policy, which led to filling out reports of the modernization of outdoor lamps and encouraged residents to join the initiative.

⁴³⁰ <https://darksky.org/news/responsible-outdoor-lighting-at-night-rolan-manifesto-for-lighting/>

⁴³¹ <https://scienceinpoland.pl/en/news/news%2C408445%2Cscientists-are-preparing-a-map-of-light-polluted-sky.html>

⁴³² <https://ciemnieniebo.pl/en/about-dark-sky-program>

⁴³³ <https://poland.pl/tourism/nature/under-stars/>

⁴³⁴ http://www.polaris.home.pl/pub/DarkSkyCommunity/aplikacja_latex/Application_Sopotnia_Wielka_default.pdf

Furthermore, the replacement of incorrect luminaires around the church, for ones that significantly reduce the spread of light in Sopotnia Wielka was completed in November 2020. Since 2022, recommendations on the establishment of a dark sky protection area in Poland have been made by an interdisciplinary team called the Light Pollution Think-Tank (LPTT), and the official resolution is made by the board of the POA.⁴³⁵ The same year, the LPTT members developed the LPTT Multidisciplinary Guide, titled 'Light Pollution. Identification and Counteraction'.

There are also awareness-raising initiatives connected to areas of dark sky - Izerski Park Ciemnego Nieba (located in Poland and the Czech Republic), Bieszczady Starry-Sky Park and East Carpathian Dark-Sky Tripark.⁴³⁶ In 2013, the Bieszczady Starry Sky Park (Poland's second and Europe's sixth) was established, covering over 113 ha across the Bieszczady National Park, the San Valley Landscape Park, and Cisna-Wetlina Landscape Park.⁴³⁷ Together with the Połoniny Dark Sky Park in Slovakia and Transcarpathian Dark-Sky Park in Ukraine, it makes up the East Carpathian Biosphere Reserve and Europe's largest night sky reserve, with an area of over 208 ha. The Izera Dark-Sky Park was realized during the [International Year of Astronomy 2009](#), as a bilateral Czech Republic and Polish collaboration project (from the Polish side: [Astronomical Institute of the University of Wrocław](#), [Polish State Forests, Forestry Commission Świeradów](#) and [Polish State Forests, Forestry Commission Szklarska Poręba](#)).

Poland joined ESO as a Member State in 2015 and has contributed though providing a community of scientists that participate in important discoveries with ESO's telescopes. Currently, Polish involvement in instrument consortia is mostly limited to future projects, such as ESO's upcoming Extremely Large Telescope (ELT). Polish scientists and engineers, coordinated by the Nicolaus Copernicus University in Toruń, are [participating in the design](#) of the [ANDES](#) spectrograph for the ELT, which will study astronomical objects with unprecedented sensitivity. Additionally, Poland will be a member of the future CTA ERIC, the European Research Infrastructure Consortium, that will construct and operate the [Cherenkov Telescope Array](#) (CTA), as a ground-based observatory for very high energy gamma-ray astronomy, consisting of two arrays of dishes, a southern-hemisphere array hosted at ESO's [Paranal Observatory](#) and a northern array on the island of La Palma, Spain. Additionally, Poland's industry has already been awarded important ESO contracts (e.g. Solaris Optics S.A. - providing: mirrors for the auxiliary telescopes of ELT Interferometer, and mechanical components and glass-ceramic samples; AIES Sp. z o.o. - a module for an ESO detector controller).

Poland has a couple of observatories, namely the Grudziadzu Observatory, Jagiellonian University Observatory, Mount Suhora Observatory, Poznan Observatory, Silesian Observatory, Torun Centre for Astronomy and the Warsaw University Observatory.⁴³⁸

- **Protection of quiet skies**

The President of the Electronic Communications (UKE) as a legally distinct and independent regulatory authority, is responsible for telecommunications, postal activities and frequency resources management. It's also a supervisory authority responsible for controlling

⁴³⁵ <https://noc.edu.pl/>

⁴³⁶ [https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/\\$FILE/Light_pollution_reduction_measures.pdf](https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/$FILE/Light_pollution_reduction_measures.pdf) page 48.

⁴³⁷ <http://www.izera-darksky.eu/index-en.html>

⁴³⁸ <https://www.go-astronomy.com/observatories-poland.php>

compliance of products emitting or vulnerable to the emission of electromagnetic fields, including radio equipment placed on the market in Poland.⁴³⁹ Although the law in place has allowed for the possibility of allocating spectrum through auction rules much earlier (since 2004), an auction was used for the first time for the 800 MHz and 2.6 GHz bands. Until that time, the spectrum had been distributed by using a comparative selection where the winner was chosen based on several factors, such as price, coverage commitments made, financial credibility or maintaining the conditions of competition. However, within the national framework, no specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellite regulations**

As per the ITU Explorer database, Poland has issued approximately 22 notifications regarding launched satellites, operated by commercial space companies such as: Creotech Instruments S.A. - PIAST and EAGLEEYE satellites; SATREVOLUTION S.A.- the STORK, STORK-1, STEAMSAT, STEAMSAT-2, SW1FT-VISION, LABSAT, REC, and SWIATOWID satellites; THORIUM SPACE SP. Z.O.O. - the TST-1 and TST-2 satellite; KP LABS SP. Z O.O. - the INTUITION-1.⁴⁴⁰

Since 2018 Poland is a member of the EUSST consortium responsible for Space Surveillance and Tracking, which allows the further development of domestic capabilities related to observation and situational awareness in space.⁴⁴¹ In 2023, Poland has signed an agreement with the European Space Agency (ESA) that will allow the country to launch its first constellation of at least four satellites (three optoelectronic and one radar) in 2027.⁴⁴²

The [Polish Space Agency \(POLSA\)](#) was established by the Act of 26 September 2014 (amended in 2018)⁴⁴³ and participates in fulfilling the strategic goals of the Republic of Poland by supporting the utilization of satellite systems and the development of space technologies.⁴⁴⁴ The main tasks of POLSA cover the following 5 areas: coordinating the activity of the Polish space sector on the national and international level, representing Poland in relations with international space sector organizations, supporting national science and business projects associated with space technologies, popularizing the use of satellite data by public administration and increasing the defensive capabilities of the country. Polish Space law is still waiting for Parliamentary approval, while several versions of the draft have been developed, and at present, the Government Legislation Centre website has published a draft law on space activities and the National Register of Space Objects. The Act regulates the rules of performing space activities and the rules of maintaining the National Register of Space Objects.

In regards to sat-telecom space commercial operators, the *2004 Telecommunications Act* can be applicable due to its containing and applying to, among else, but not limited to: the principles of performing and monitoring business activities consisting in the provision of

⁴³⁹ <https://uke.gov.pl/en/about-us/>

⁴⁴⁰ <https://www.itu.int/itu-r/space/apps/public/spaceexplorer/networks-explorer/space-stations>

⁴⁴¹ <https://spacewatch.global/2021/02/survey-for-polish-space-law-its-a-good-time-to-create-polish-space-law-act/>

⁴⁴² <https://notesfrompoland.com/2023/10/31/poland-signs-agreement-to-launch-first-satellite-constellation/>

⁴⁴³ Act on Polish Space Agency, Polish Journal of Laws of 2014, item 1533. <https://isap.sejm.gov.pl/isap.nsf/download.xsp/WDU20140001533/U/D20141533Lj.pdf>

⁴⁴⁴ https://link.springer.com/chapter/10.1007/978-3-030-78551-2_12#Sec3

telecommunications services, and of telecommunications networks or associated facilities; rights and obligations of telecommunications undertakings, as well as of users and radio equipment users; conditions for frequency, orbital resources and numbering management; and the requirements that should be met by radio equipment.⁴⁴⁵

From 2012 up until 2021, Poland has registered 6 space objects in the UN Registry of Objects launched into Space, under Article IV of the Registration Convention (PW-Sat, BRITE-PL-1 “Lem”, BRITE-PL-2 “Heweliusz”, PW-Sat2, KRAKsat, Światowid (international designator 1998-067QL)).⁴⁴⁶

As visible, there is no specific regulation found with regard to satellite specifications regarding the reduction of impacts on D&QS.

⁴⁴⁵ https://www.uke.gov.pl/gfx/uke/userfiles/m-pietrzykowski/telecommunications_act_en.pdf Article 1.

⁴⁴⁶ <https://www.unoosa.org/oosa/en/spaceobjectregister/submissions/poland.html>

51. Qatar (Tamara Blagojevic)

- **Protection of dark skies**

The *Environmental Protection Law* aims at protecting and preserving the quality and natural balance of the Qatari environment, to develop natural resources and protect biodiversity, to protect the population and human health, and to protect the environment from the harmful impact of activities happening abroad.⁴⁴⁷ The Law also aims at combating "the effects of pollution in its *various forms*, and *prevent damage as well as instant and long-term environmental effects of construction, industrial, agricultural and economical activities*,"⁴⁴⁸ and states that undertaking an EIA is essential for development projects.⁴⁴⁹ Additionally, environmental pollution is defined as "Any changes that occur in *environment characteristics*, which lead directly or indirectly to injure the live creatures or *installations*, or *affect the human natural daily life*".⁴⁵⁰ Furthermore, the environment components consist of *air, seas, and inland waters* that include the groundwater, the terrain, the natural reserves, and the *other natural resources*.⁴⁵¹ Additionally, the environment is defined as the *biosphere* that includes the live creatures of humans, animal, and plant, and their surroundings of air, water, and soil, and that contains solid, liquid, or gases materials or radiations, and what established by human, like installations, industries or innovations.

Having in mind that Qatar ratified the OST and other space treaties, although the aforementioned definition doesn't provide for scope to subsume outer space, due to the inclusion of air and other natural resources as components, there is no reason to exclude it. However, the definition of Pollutant elements and materials, explicitly includes "*any materials*, solid-liquid, gas, noise, *radiations*, heat, or quivering, caused by humans and leads directly or *indirectly* to pollution, or deterioration of environment".⁴⁵² Such broad objectives and definitions promulgated by the main environmental law, along with the fact that radiation is explicitly included as a pollutant, provides for scope for accounting for light pollution. The Executive By-Law for The Environment Protection Law 2002. regulates minimum lighting levels, but with a main focus on human health.⁴⁵³ It also provides a definition of environmental quality standards, which are legally enforceable standards that dictate the level of pollution or nuisance that shall not be exceeded on a daily average basis unless otherwise specified, while to get an Environmental Authorization, an impact analysis and measures have to be done, among else for 'visual' pollution and nuisance/noise, as well as any other impacts resulting from the activity.⁴⁵⁴ Although not explicitly stated in the recent

⁴⁴⁷ Law by Decree No. 30 of the Year 2002 Promulgating the Environmental Protection Law (2003), https://climate-laws.org/document/environmental-protection-law-and-decree-no-30-promulgating-it_7ec7

⁴⁴⁸ Ibid.

⁴⁴⁹ https://www.gatalum.com/Lists/Publications/EIA_Report/Legal%20Framework%20and%20Environmental%20Protection%20Criteria.pdf page 2.

⁴⁵⁰ Law by Decree No. 30 of the Year 2002 Promulgating the Environmental Protection Law (2003),, <https://faolex.fao.org/docs/pdf/qat55012E.pdf>

⁴⁵¹ Ibid.

⁴⁵² Ibid.

⁴⁵³ 2005 Executive By-Law for the Environmental Protection Law No. 11 of 2000 and Law No. 30 of 2002, <https://www.wkcgroupp.com/wp-content/uploads/2022/12/Qatar-Executive-By-Law-for-The-Environment-Protection-Law-Issued-vide-the-Decree-Law-No.-30-for-the-Year-2002.pdf>

⁴⁵⁴ Ibid.

Executive By-Law, SCENR expects that new industries will be established on the basis of the best available technology.⁴⁵⁵

When it comes to initiatives related to light pollution mitigation, the “Global Sustainability Assessment System 2019 Design & Build Guidelines Manual” is a joint project developed by Qatar and other countries, which provides explicit guidelines addressing *external lighting, light pollution, glare and light trespass*.⁴⁵⁶ Additionally, the Qatar Foundation highlights environmentally friendly buildings and their role in promoting health and productivity.⁴⁵⁷ The Qatar Green Building Council began in 2009, focusing on how to promote a culture of sustainability among individuals, architects and all Specialists in construction and architectural design, by providing the necessary training to help them design environmentally friendly buildings.⁴⁵⁸ On the sidelines of the "Project Qatar" 2021 exhibition, the Qatar Green Building Council also launched a booklet entitled: "Environmentally Friendly Homes – a guide to a healthier and more sustainable home", which is a booklet dedicated to the environment in Qatar, directed to experts in this field.⁴⁵⁹

As per a study originating from 2016. Qatar is listed as one of the most light polluted countries (97%), with a large portion of the territory where seeing the Milky Way is precluded (55%).⁴⁶⁰ However, more recently, and when it comes to astrotourism, the East Sand Ridge spans over 90 square kilometres in length and has become a hot spot for amateur astronomers from all over Qatar. Another location that is great for stargazing is Qatar's Mushayrib Park. At an elevation of around 300 meters, and is one of Qatar's highest mountains covered in trees and sand dunes, with only a few light sources nearby, making it an ideal spot for stargazing. Additionally, Al Wakrah, situated in the south, with an observation point set up in a park with a number of telescopes, is one of the best places for stargazing, as the city has little light pollution. Wakrah also holds an annual astronomy festival that usually takes place at the end of November.⁴⁶¹ In 2021, the Qatar National Tourism Council (QNTC) marked the rare Pink Supermoon (26-27 April) event with the announcement of its new range of astro-tourism experiences - the unique 'Arabian Nights' packages, inspired by the starry skies of the Qatari desert.⁴⁶²

[Law No. 30 of 2002 Promulgating the Law of the Environment Protection](#). Environmental preservation is a top priority for the State of Qatar. The Government is aware of the importance of balancing the country's industrial growth and its limited resources. It is also well aware of the environmental challenges posed by the oil and gas industry that drives the State's economy. MOECC was established in 2021 to promote environmental sustainability and to coordinate

⁴⁵⁵ https://www.qatalum.com/Lists/Publications/EIA_Report/Legal%20Framework%20and%20Environmental%20Protection%20Criteria.pdf

⁴⁵⁶ <https://gsas.qord.qa/wp-content/uploads/2021/10/GSAS-2019-Design-and-Build-Guidelines-Manual-for-Building-Typologies.pdf>

⁴⁵⁷ <https://www.qf.org.qa/ar/stories/qf-explains-the-role-that-green-buildings-can-play-in-promoting-a-greener>

⁴⁵⁸ <https://www.qf.org.qa/ar/stories/qf-explains-the-role-that-green-buildings-can-play-in-promoting-a-greener>

⁴⁵⁹ <https://www.qf.org.qa/ar/stories/qf-explains-the-role-that-green-buildings-can-play-in-promoting-a-greener>

⁴⁶⁰ <https://www.science.org/doi/10.1126/sciadv.1600377>

⁴⁶¹ <https://irangashttour.com/2023/03/01/qatars-top-stargazing-destinations-a-heartwarming-guide/#:~:text=Situated%20in%20the%20south%20of,down%20and%20enjoy%20the%20view>

⁴⁶² <https://www.traveldailymedia.com/qntc-unveils-astro-tourism-experiences/>

Qatar's environmental initiatives. MOECC works closely with officials in a number of government entities to develop responsible environmental policy and spearhead efforts to expand official records and banks of environmental data of the State. MOECC also plays an increasing role in expanding efforts to improve preservation and it includes the following:

- Recruiting experts, scientists, specialists and technicians to oversee monitoring systems and regulation
- Establishing emergency preparedness committee charged with responding to environmental disasters
- Launching a nationwide campaign to clean up Qatar's beaches
- Coordinating and maintaining knowledge banks on environmental data
- Creating and managing comprehensive biodiversity database including protected areas and marine resources and environmental impact

<https://hukoomi.gov.qa/en/articles/environmental-preservation>

- **Protection of quiet skies**

Communications Regulatory Authority (CRA) is the communications regulator of the State of Qatar established by virtue of the Emiri Decree 42 of 2014. CRA regulates the telecommunications and information technology sector, postal sector and access to digital media. CRA promotes and supports an open and competitive information and communications technology (ICT) sector that provides advanced, innovative, and reliable communications services. Balancing consumers' rights and service providers' needs is at the heart of what CRA does.

Bands of spectrum exist in layers, and it is the role of CRA to regulate radio spectrum to allocate frequencies so technologies and devices using radio spectrum can operate without interference. As the regulatory authority body that monitors access to spectrum, CRA's role is to carefully balance public and commercial interests in deciding allocation and assignment. To meet this goal, CRA has developed a National Frequency Allocation Plan and completed a public review of its Radio Spectrum Policy.

In 2022, CRA issued an *Individual License for the Provision of Public Satellite Telecommunications Networks and Services to Starlink Satellite Qatar W.L.L.*⁴⁶³

However, within the national framework, no other specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

As per the ESPI report as of 2022 on Emerging space-faring nations, Qatar has two satellites in orbit, with its first Es'hail 1, launched in 2013.⁴⁶⁴ In addition to its activity in the field of peaceful use of outer space in the field of communications, Qatar concluded a joint cooperation project with NASA in order to design and launch a scientific satellite specialized in climate studies, the effects of climate change, and the determination of groundwater resources and their

⁴⁶³<https://www.cra.gov.qa/press-releases/cra-issues-a-telecommunications-license-to-starlink-satellite-qatar>

⁴⁶⁴<https://www.espi.or.at/wp-content/uploads/2022/06/ESPI-Report-79-Emerging-Spacefaring-Nations-Full-Report.pdf>

properties, and many other tasks related to promoting sustainable development, with the first phase aiming at designing the “OASIS” vehicle and its peripheral devices and preparing a launch plan for the end of 2025 in conjunction with the low cycle of the solar movement.⁴⁶⁵

Additionally, the current regulatory framework does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

⁴⁶⁵ https://www.unoosa.org/pdf/reports/ac105/AC105_1025Add1E.pdf

52. Republic of Korea (Charlotte Hook & Andrew Falle)

- **Protection of dark skies**

South Korea's Space Development Promotion Act (2005) is intended to, amongst other things “*promote the peaceful use and scientific exploration of outer space*” as well as “*raise the national standard of living through the systematic promotion of space development and the effective use and management of space objects.*” In the Act, the term “*space development*” includes under its definition “*research activities and technology development activities relevant to the design, manufacturing, launch, and/or operation of space objects*” and also those related to the “*use and exploration of outer space as well as activities that promote such activities.*”⁴⁶⁶ The Act also covers “*space development projects*” which are defined as projects that “*promote the development of the relevant sectors in education, technology, information, and industry, etc.*”⁴⁶⁷ Although astronomy is not explicitly referred to in the Act, it is clear that astronomical activities would fall under the encompassing definitions of space development and space development projects, as well as the scope of the act more generally.

The *Artificial Light Pollution Prevention Act (2012)* in South Korea aims to prevent light pollution from harming the environment and public health.⁴⁶⁸ The Act first establishes a Light Pollution Prevention Committee within the Ministry of Environment and a Light Pollution Prevention Plan that is renewed every 5 years. Similar committees and plans are implemented on the regional level as well. Second, the Act calls for regional authorities to designate areas as “lighting environment management zones” to categorize levels of light pollution with each classification having an individual limit for light emissions. Third, every three years regional authorities must evaluate the impact of light pollution in the surrounding area and report the results to the Ministry of Environment.⁴⁶⁹ This Act has been argued to mitigate light pollution impacts on the ecosystem, wildlife, public health, and astronomical observation.⁴⁷⁰

Additionally, South Korea is home to the Yeongyang Firefly Eco Park in North Gyeongsang Province, which was designated as a dark-sky park in 2015 by the International Dark-Sky Association (IDA) and is Asia's first International Dark Sky Park.⁴⁷¹

- **Protection of quiet skies**

South Korea hosts the Taeduk Radio Astronomy Observatory (TRAO), which was completed in 1986,⁴⁷² and the Korean VLBI Network (KVN) in the early 2000s. Although there appears to be no bylaws specific to protecting areas around the radio astronomy sites, Korea's Waves Act⁴⁷³ contains restrictions that prevent harmful interference between radio communications. The Act seeks to ensure “efficient utilization and control of radio waves” and to facilitate “utilization of radio waves and the development of radio wave technology.”

⁴⁶⁶https://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/republic_of_korea/space_development_promotions_actE.html

⁴⁶⁷ Ibid

⁴⁶⁸ <https://goodlight.or.kr/link.do>

⁴⁶⁹ <https://goodlight.or.kr/link.do>

⁴⁷⁰ <https://journals.sagepub.com/doi/epub/10.1177/1477153513508971>

⁴⁷¹ https://www.yyg.go.kr/tourengr/tourist_attraction/darksky_parks/international_parks

⁴⁷² <https://trao.kasi.re.kr/main.php>

⁴⁷³ https://elaw.klri.re.kr/eng_service/lawView.do?hseq=7162&lang=ENG

The Korea Astronomy and Space Sciences Institute (KASI) recognizes the importance of “Dark and Quiet skies protection”, and supports IAU CPS activities, included in a presentation at the 66th Committee on the Peaceful Uses of Outer Space in 2023.⁴⁷⁴

- **Satellites regulations**

Article 8 of the *Space Development and Promotion Act (2005)* requires domestic registration of artificial space objects with South Korea's Minister of Science and ICT at least 180 days prior to launch.⁴⁷⁵ South Korea's Space Damage Compensation Act of 2007 details liability related to damages caused by space objects,⁴⁷⁶ which is, in part, relevant to satellite operators based within the state.

Additionally, the current framework does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

⁴⁷⁴<https://www.unoosa.org/documents/pdf/copuos/2023/TPs/20230606KASI2COPUOSv1.0.pdf>

⁴⁷⁵<https://www.law.go.kr/LSW/eng/engLsSc.do?menuId=2§ion=bdyText&query=satellite+&x=0&y=0#liBgcolor34>

⁴⁷⁶https://elaw.klri.re.kr/eng_mobile/viewer.do?hseq=46485&type=part&key=18#:~:text=The%20purpose%20of%20this%20Act,development%20of%20space%20development%20projects

53. Romania (Anne-Sophie Martin)

- **Protection of dark skies**

The topic of light pollution and dark skies is relatively new. At the moment, there is no specific legislation (law, decree or standards) in this regard. Nevertheless, the *Environment Fund Administration manages a Programme* to improve the Energy Efficiency of Public Lighting Infrastructure, with the goal of decreasing greenhouse gas emissions through the use of more energy-efficient LED lighting.⁴⁷⁷

There is a general [Law n.104 of 15 June 2011 on Ambient Air Quality](#) which aims to protect human health and the environment by providing requirements to maintain ambient air quality and combating air pollution.

Since 2021, Romania has been working on a national space legislation that could be an interesting element for the protection of dark skies in the country, in cooperation with the Romanian Space Agency.⁴⁷⁸

Lastly, in 2023 during the STSC meeting at the UNCOPUOS, Romania declared to support the actions undertaken by the International Astronomical Union (IAU) for the protection of the D&QS for science and society and supported the establishment of an Expert Group.⁴⁷⁹

- **Protection of quiet skies**

In Romania, the *National Authority for Management and Regulation in Communications (ANCOM)* manages the radio frequency spectrum according to the ITU's Radio Regulations rules. In the country, the most important and the most widely used radiocommunication services are land mobile service, sound broadcasting and television service, fixed service, maritime mobile service and maritime mobile-satellite service, aeronautical mobile service and aeronautical mobile-satellite service, fixed-satellite service, land mobile-satellite service, radiolocation service, maritime and aeronautical radionavigation service, meteorological aids service.

- **Satellites regulations**

Romania does not have specific norms regulating satellites but the country established its national space agency (*ROSA - Romania Space Agency*) in 1991. The missions of ROSA are to promote and coordinate development and national efforts in the field, and, as a government representative, to promote international cooperation. In particular, ROSA is responsible to establish research and development centres oriented on specific objectives of the Romanian Space Programme. ROSA is developing its own research and development projects.

The national strategy of Romania is built around the concept of 3S (Three S's): the first S means Science and technology (including exploration), the second S is represented by Services (including access to space) and the third S comes from Security.

Romania is drafting a national law for space activities, in concordance with the UN space treaties. This legal frame will also include specific issues related to space traffic management, launch activities and registration of space objects as the country accessed the 1975 Convention on Registration of Objects Launched into Outer space in February 2023.

Hence, no specific provisions relevant to the protection of D&QS were identified.

⁴⁷⁷ [https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/\\$FILE/Light_pollution_reduction_measures.pdf](https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/$FILE/Light_pollution_reduction_measures.pdf), p.45.

⁴⁷⁸ https://www.unoosa.org/documents/pdf/copuos/2021/statements/item_4_Romania_ver.1_26_Aug_AM.pdf

⁴⁷⁹ https://www.unoosa.org/documents/pdf/copuos/stsc/2023/Statements/3_Romania_6Feb_AM_1.pdf

54. Russian Federation (Yana Yakushina)

- **Protection of dark skies**

Space and astronomical activities are of great importance to the Russian Federation. *Law of the Russian Federation of 20.08.1993 N 5663-1 On space activities*⁴⁸⁰, the definition of "space activity" includes "any activity related to the direct conduct of work on the exploration and use of outer space, including the Moon and other celestial bodies", including "observation for objects and phenomena in outer space". Therefore, even though astronomical activities are not directly included in the definition, it can be still stated that based on the interpretation of the definition, such activities can be qualified as space ones. Despite Russia adopting more than 100 legal acts related to space activities, the protection of dark and quiet skies has not received due consideration at the federal level.

Nevertheless, a number of acts are devoted to the protection of astronomical observations at the level of the subjects of the federation, on whose territory important observatories are located. For instance, a number of acts were adopted in order to protect the observation of the sky in the Central Astronomical Observatory of the Russian Academy of Sciences at Pulkovo, Saint-Petersburg⁴⁸¹. The main measure to protect astronomical activities is the establishment of protective zones. Two main zones were established: (1) zones of protection of a cultural heritage object and (2) protective park zone of the observatory. The main purpose of the first zone is to prevent any changes to cultural heritage objects, including the landscape, since Pulkovo Observatory has been listed in the UNESCO World Heritage List since 1990⁴⁸². The protective park zone (3 km around the observatory) is a zone for special protection of the observatory. The main aim of this zone is to prevent any disturbance of astronomical activities. Protective park zone provides for several requirements, such as prohibition of industrial and large-scale housing construction; requirement of written consent from the observatory in case of construction within the zone; minimal background sky illumination during observation hours should be ensured; prohibited placement of illuminated outdoor advertising; prohibited placement on the surfaces of buildings of lighting equipment. However, with the absence of national dark sky protection legislation, local acts are not able to provide proper implementation of light pollution mitigation measures.

Beyond the special protection of astronomical observation, Russian legislation consists of a number of documents which can be applicable to dark sky protection, such as environmental, urban planning and culture heritage legislation. In particular, special attention should be paid to environmental legislation. According to the *Federal Law on Environmental Protection dated 10.01.2002 N 7-FZ*⁴⁸³, environmental pollution is the entry into the environment of a substance and (or) energy, the properties, location or amount of which have a negative impact on the environment. Thus, light pollution can be considered as an energy human-induced input that can have a negative impact on nature. Following this interpretation, the Ministry of Natural Resources and Environment of the Russian Federation has adopted an order on *Voluntary Environmental Certification of Real Estate based on the International Experience of Application of Green Standards dated December 30, 2009, N 75-r*⁴⁸⁴, which contains a number of provisions aimed at reducing light pollution. The provisions include, for instance, outdoor lighting should be 10,000 lm

⁴⁸⁰ <http://pravo.gov.ru/proxy/ips/?docbody=&nd=102025742>

⁴⁸¹ [The Council of People's Commissioners of the USSR Order dated March 11, 1945 N 4003r](#); Regulations on the astroclimate: Scientific Council of the Russian Academy of Sciences [Rules for making decisions on the coordination of economic and construction activities in the protective park zone of the observatory](#) 2015.

⁴⁸² <https://whc.unesco.org/en/list/540>

⁴⁸³ <http://pravo.gov.ru/proxy/ips/?docbody=&nd=102074303>

⁴⁸⁴ <https://rulings.ru/acts/Rasporyazhenie-Minprirody-RF-ot-30.12.2009-N-75-r/>

or less, the use of warmer lighting, and reducing the reflectivity of the roofs of buildings. These measures are, however, non-binding.

In addition to that, Russian environmental law does not specifically mention preventive and precautionary principles. The latter, however, are described in other principles, such as the presumption of the ecological danger of any planned economic and other activities; and the obligation to assess the impact on the environment when making decisions on the implementation of economic and other activities. Since ALAN can potentially impact the environment, it should be subject to the environmental impact assessment. Notably, environmental legislation incorporates near-Earth space as an integral component of the natural environment. This inclusion has the potential to enhance the protection of D&QS.

Beyond the regulatory approaches to light pollution mitigation, the Russian astronomical community fully supports dark and quiet skies initiatives addressed in the Dark and Quiet Skies Report I and II⁴⁸⁵. Recently, the Russian Academy of Science discussed the issue and indicated that light pollution is one of the growing threats to astronomy which already has a significant impact. The opinion of the Russian Academy of Sciences, in particular the Expert Working Group on Space Threats, may further influence the formation of the Federal Space Program of Russia, which may later also reflect the problem of light pollution.

In addition, light pollution is addressed as an issue at the international level by the *Eurasian Economic Commission*. The decision of the Council of the Eurasian Economic Commission dated 08/08/2019 N 114 (as amended on 04/15/2022) *On the technical regulation of the Eurasian Economic Union On the requirements for the energy efficiency of energy-consuming devices (together with the "EAEU TR 048/2019. Technical regulation of the Eurasian Economic Union "On the requirements for the energy efficiency of energy-consuming devices")*⁴⁸⁶ defines light pollution as the sum of all negative effects of artificial light on the environment, including exposure to excess light. The regulations, however, did not go beyond the definition.

- **Protection of quiet skies**

The Russian Federation is actively engaged in radio observation, but there is limited legal regulation in place to protect radio astronomy. Similar to many other countries, Russia adheres to the recommendations adopted by the International Telecommunications Union (ITU). These recommendations and more detailed regulations regarding radio frequencies are outlined in the *Government Decree of September 18, 2019, N 1203-47 on approval of the Table for the distribution of radio frequency bands between radio services of the Russian Federation*⁴⁸⁷. This decree introduces two key concepts: "radio astronomy service," which refers to services related to radio astronomy, and "radio astronomy," which pertains to the study of cosmic phenomena through the reception of radio waves.

While specific radio frequency bands are allocated for these activities, there is a lack of dedicated regulations to protect radio astronomy from potential disturbances, whether they originate from terrestrial sources or space-based objects like satellites. This situation is mirrored at the regional level, even in areas housing significant observatories and where astroclimate protection measures have been enacted, such as in St. Petersburg. These regional acts, unfortunately, do not include provisions for mitigating unwanted interference that could compromise the radio clarity required for astronomical research.

⁴⁸⁵ <https://new.ras.ru/activities/news/sovet-ran-po-kosmosu-obsudil-problemu-temnogo-neba/>

⁴⁸⁶ https://docs.eaeunion.org/docs/ru-ru/01424431/cncd_24122019_114

⁴⁸⁷ Decree of the Government of the Russian Federation of September 18, 2019 N 1203-47 (as amended on September 14, 2023) On approval of the Table of distribution of radio frequency bands between radio services of the Russian Federation and the recognition as invalid of certain resolutions of the Government of the Russian Federation; available online: <https://base.garant.ru/72767122/>

- **Satellites regulations**

The Russian Federation holds a prominent position in the field of space activities, which explains the fairly broad legal regulation of this area. Under current legislation, satellites are categorized as products of rocket and space technology. Consequently, any activities associated with satellites are subject to licensing, and the satellites themselves must undergo state registration, mandatory certification, or declaration of conformity as mandated by the *Federal Law on Space Activities*.

Space activities are subject to licensing in accordance with the *Federal Law of May 4, 2011, N 99-FZ, on Licensing of Certain Types of Activities*⁴⁸⁸, the *Government Decree of February 14, 2022, N 168 on the Regulations for Licensing Space Activities*⁴⁸⁹, and other relevant legal instruments. However, it's worth noting that the licensing process does not explicitly require the submission of technical documentation for the specific object or an assessment of its environmental impact on the Earth's environment and near-Earth space. Nonetheless, an essential provision outlined in the Federal Law on Space Activities underscores the importance of upholding acceptable anthropogenic loads on both the environment and near-Earth space while conducting space activities⁴⁹⁰. Unfortunately, the legislation lacks well-defined maximum permissible values for such loads, rendering this provision somewhat vague, but potentially beneficial.

In addition to licensing, the state registration of satellites is a mandatory procedure, overseen by Roscosmos. However, the registration process does not necessitate the provision of detailed technical specifications for the space objects, except for the fundamental parameters of their orbital trajectory⁴⁹¹.

Notably, Russia plans for continued satellite launches and the establishment of satellite mega-constellations, both independently and in collaboration with international partners. For instance, the Union State (comprising Russia and Belarus) approved a program in 2021 for creating satellite constellations for Earth's surface and near-Earth space observation, known as "Complex-SG."⁴⁹² The absence of legal requirements mandating the analysis of potential adverse impacts of space objects could potentially impede efforts to protect dark and quiet skies.

⁴⁸⁸ [Federal Law of May 4, 2011, N 99-FZ, on Licensing of Certain Types of Activities](#)

⁴⁸⁹ [Government Decree of February 14, 2022, N 168 on the Regulations for Licensing Space Activities](#)

⁴⁹⁰ Art. 22 [Federal Law on Space Activities](#)

⁴⁹¹ [Order of Roscosmos dated March 22, 2010 N 44 On approval of the Administrative Regulations of the Federal Space Agency for the performance of the state function of maintaining the Register of space objects launched by the Russian Federation into outer space \(Registered with the Ministry of Justice of the Russian Federation on September 22, 2010 N 18508\)](#).

⁴⁹² Resolution of the Council of Ministers of the Union State of Belarus and Russia of November 30, 2021, N 28 On the concept of the scientific and technical program of the Union State "Development of basic elements of orbital and ground-based facilities in the interests of creating satellite mega-constellations for observing the earth's surface and near-Earth space" ([Complex-SG](#)).

55. Rwanda (Mukulu Kioko)

- **Protection of dark skies**

The Law on Environment No 48/2018 articulates Rwanda's approaches to environmental protection for environments under Rwanda's territory.⁴⁹³ The purpose of the law is to determine modalities for protecting, conserving and promoting the environment. The definitions of the legislation do not make any reference to light pollution or expressly recognise it as falling under the definition of 'environment' as used in this legislation. It focuses on other areas such as noise, water, and soil but no reference to light pollution. Rwanda adopts the precautionary principle, the principle of environmental sustainability, polluter pays principle, and the principle of cooperation. These are defining principles in the area of international law and cut across areas of the global commons including space activities. Rwanda has ramped up its efforts to define and develop its law, regulations and policy on the country's space activities in recent years. Since the establishment of the Rwanda Space Agency in 2019, Rwanda has moved to cement its position in the global discourse on space activities.

The closest Rwandese legislation as it now comes to addressing the protection of quiet skies is in its framework for spectrum management discussed under satellite regulations. For a country that currently has a large application with the ITU for the deployment of hundreds of thousands of Low Earth Orbit satellites, Rwanda should explore the opportunity to beef up its laws on the protection of dark skies.

- **Protection of quiet skies**

The *Rwandese Space Agency (RSA)* was formed in 2020 with a mandate to develop Rwanda's space sector towards socio-economic development. This was following the government's 2019 announcement of a national space programme aimed at increasing the country's uptake of space technologies as well as build the country's capabilities for space activities. RSA represents Rwanda at UNCOPOUS, and joins ranks of other African states participating in deliberations at the committee. The law establishing the RSA, Law 22/2021⁴⁹⁴ does not address any requirements for quiet skies and neither does it impose any obligations.

The *General Guidelines and Procedure for Environmental Impact Assessment (EIA) in Rwanda* delves into matters of impact assessment and thresholds required in different fields. It mandates the requirements for impact assessment by the government of Rwanda to corporations operating in various areas of the environment but fails to address any issues of RFI or the protection of quiet skies.

- **Satellites regulations**

The provision of satellite services in Rwanda is governed through the *Law No 09/2013 of 1/03/2013*. The regulations establish the *Rwanda Utilities Regulatory Authority (RURA)* and provide Rwanda's position on the usage and regulation of spectrum resources for satellite communication services within the Rwanda territory.⁴⁹⁵ The regulations define a commercial satellite as being a satellite launched for profit-making or business purposes.

From the onset, the regulations pronounce one of their main objectives as being ensuring the efficient and effective use of satellite spectrum frequency in an interference-free environment

⁴⁹³ https://climate-laws.org/document/law-ndeg48-2018-on-the-environment_5d99

⁴⁹⁴ https://space.gov.rw/Gazette_RSA_Law.pdf

⁴⁹⁵ https://rura.rw/fileadmin/Documents/ICT/Laws/Draft_Regulation_governing_Satellites_services_in_Rwanda_18032022.pdf

as well as ensuring that Rwanda's satellite regulations are consistent with international law and policy in the area.

Starting in 2019, the government of Rwanda has made deliberate and targeted efforts towards building up space activities of the country and specifically, setting the stage for continuous satellite launches in Rwanda. The process of obtaining a license for a satellite in Rwanda is managed through the Rwanda Space Agency. Licenses are required for any person intending to build and run an electronic communications network or provide electronic communications services from the Regulatory Authority.

Notably, the regulations are silent on any requirements on LEOs specifically or operations on Low Earth orbit more generally. There are no direct statements that require companies licensed to build and deploy satellites from Rwanda's territory to mitigate the impact of their satellites or dark and/or quiet skies and this is a glaring gap in their laws. Licenses are issued for a period of 12 months and reviewed at the end of the period and may be extended or revoked.

Noting that Rwanda has made one of the largest applications to the ITU to launch a low-earth orbit constellation with approximately 300,000 satellites, it is critical that the licensing requirements in the country are accompanied by a regulatory requirement on justification for the volume of satellites as well as actionable plans for mitigation of the effects of LEOs. The current regulatory framework, however, does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

56. Saudi Arabia (Rayan Khan)

- **Protection of dark skies**

In Saudi Arabia, specific regulations (SASO 2927:2019)⁴⁹⁶ have been implemented by the local government to address light pollution. These regulations aim to restrict outdoor lighting usage and promote the adoption of energy-efficient light bulbs. Furthermore, an educational campaign has been launched to raise awareness among the local population regarding the detrimental effects of light pollution on both the environment and public health.

To further strengthen these efforts, the Saudi Arabian Standards, Metrology and Quality Organization (SASO) has introduced Standard SASO 2927:2019.⁴⁹⁷ This standard, which came into effect in 2020, focuses on energy efficiency, functionality, and labeling requirements for lighting products, with a particular emphasis on street lighting. It forms part of a broader regulatory framework encompassing various lighting applications, including residential, commercial, and professional settings. SASO 2927:2019 encompasses key aspects related to street and road lighting, including the classification of street/road lighting into three types (M, C, and P), as well as guidelines for tunnel lighting, covering both daylight and nightlight scenarios. This standard defines technical requirements for lighting products used in street lighting applications.

Additionally, it's worth noting that the Ministry of Environment, Water, and Agriculture (MEWA)⁴⁹⁸ of Saudi Arabia provides a comprehensive definition of pollutants. As per Environmental Law of Saudi Arabia Chapter 1: General Provisions Article 1 "Pollutants: Any solid, liquid, or gaseous material, as well as smoke, fumes, emissions, noise, lighting, or any other natural or man-made impact that directly or indirectly leads to environmental pollution or degradation." This definition includes lighting as a factor that can contribute to environmental pollution or degradation. This underscores the government's commitment to addressing various forms of pollution, including light pollution. These combined efforts highlight Saudi Arabia's dedication to controlling light pollution and promoting sustainable, energy-efficient lighting practices in the country.⁴⁹⁹

In Saudi Arabia, the local government has taken proactive measures to address light pollution through the implementation of specific regulations outlined in SASO 2927:2019. These regulations are designed to curtail the impact of outdoor lighting and encourage the widespread adoption of energy-efficient light bulbs. Complementing these regulations, an extensive educational campaign has been launched to inform the local population about the adverse effects of light pollution on both the environment and public health.

To bolster these initiatives, the *Saudi Arabian Standards, Metrology and Quality Organization* (SASO) has introduced Standard SASO 2927:2019, effective from 2020. This standard focuses on stringent criteria for energy efficiency, functionality, and labeling of lighting products, with a particular emphasis on street lighting. SASO 2927:2019 is part of a comprehensive regulatory framework covering various lighting applications, including residential, commercial, and professional settings.

This standard specifically addresses street and road lighting, categorizing them into three types (M, C, and P) and providing guidelines for tunnel lighting under both daylight and nightlight

⁴⁹⁶ https://wasif.saso.gov.sa/Pages/User/StandardInfo.aspx?ref=xc354345XS53x4_55436x6yty34554sfswet;https://www.saso.gov.sa/ar/mediacenter/events/Documents/311219%20Lighting%20part%203%20standard%20workshop_vf.pdf

⁴⁹⁷ <https://e.saso.gov.sa/content/wasif-service/Pages/User/StandardInfo.aspx>

⁴⁹⁸ <https://mewa.gov.sa/en/InformationCenter/DocsCenter/RulesLibrary/Docs/Environmental%20Law.pdf#search=lighting>

⁴⁹⁹ https://www.nightearth.com/showitem.php?item=al-hawiyah-mecca-saudi_arabia&lang=en#gsc.tab=0

scenarios. It sets forth technical requirements for lighting products utilized in street lighting applications.

The inclusion of lighting within the definition highlights the government's commitment to addressing various forms of pollution, including light pollution. Collectively, these concerted efforts underscore Saudi Arabia's dedication to controlling light pollution and fostering sustainable, energy-efficient lighting practices throughout the country.

- **Protection of quiet skies**

The *Spectrum Use Regulations of Space Science, Radio Astronomy, and Meteorological Services*, issued by Saudi Arabia's Communications and Information Technology Commission (CITC),⁵⁰⁰ manage the allocation of radio spectrum for meteorological and space science purposes. The regulations aim to facilitate applications such as earth exploration, weather forecasting, and climate change research while adhering to international obligations outlined by the ITU. Specific focus is placed on Radio Astronomy (RA), with 31 allocated frequency bands and requirements for operators to register equipment details to prevent interference. The document emphasizes efficient spectrum usage and compliance with ITU agreements while safeguarding against interference to ensure the integrity of scientific operations. However, within the national framework, no specific provisions that directly or indirectly address issues related to the protection of quiet skies were identified.

- **Satellites regulations**

No specific provisions on regulating satellite activities relevant to the protection of D&QS were identified.

⁵⁰⁰<https://istitlaa.ncc.gov.sa/en/transportation/citc/sur/Documents/The%20Spectrum%20Use%20Regulations%20of%20Space%20Science%20Radio%20Astronomy%20and%20Meteorological%20Services%20PDF.pdf>

57. Senegal (Anne-Sophie Martin)

- **Protection of dark skies**

In the field of light pollution, Senegal adopted its Environmental Code ([Law no. 2001-01 of 15 January 2001](#)) which deals with water pollution, noise pollution and air pollution.

The [Decree n. 2006-1252 of 15 November 2006](#) laying down minimum requirements for the prevention of certain physical environmental factors referring to light pollution. Article 2 lays down minimum requirements for the prevention of physical environmental factors such as lighting, thermal environments and noise.

So far, the country has not adopted specific laws or regulations related to astronomy and the protection of dark skies.

- **Protection of quiet skies**

The telecommunications sector in Senegal has recently undergone a complete restructuring as a result of the privatisation of the past national telecommunications operator. The new 2006 *Telecommunications*⁵⁰¹ replaces the 2001 and 1996 *Telecommunications Act* and institutes the Telecommunications Regulation Agency (Agence de Régulation des Télécommunications – ART) as the main player in formulating and supervising Senegalese regulations in radiocommunications.

- **Satellites regulations**

There is no specific rule at the moment even if the country created in 2023 its own space agency, *l'Agence sénégalaise d'études spatiales (ASES)* and launched its first satellite in 2024. In addition, the country collaborates with the European Space Agency for space technology development.⁵⁰² No specific provisions on regulating satellite activities relevant to the protection of D&QS were identified.

⁵⁰¹ https://sunulex.sn/fr/mdocs-posts/telecom_loi-2006-02-modifiant-la-loi-n-2001-15-du-27-decembre-2001-portant-code-des-telecommunications/

⁵⁰² <https://spacewatch.global/2023/10/senegal-to-partner-esa-for-space-technology-development/>.

58. Sierra Leone (Mukulu Kioko)

- **Protection of dark skies**

The *Environment Protection Agency Act No. 15 of 2022 (EPA 2022)* was signed into Law in September of 2022. The law was passed for the continuation of the Sierra Leone Environment Protection Agency as well as to provide steer for more effective and efficient protection and management of the environment in Sierra Leone⁵⁰³. The act provides for licensing requirements for project owners as well as impact assessments and metrics to be met⁵⁰⁴. The act defines a 'project' as being any activity that needs a license under the act. Although the act is silent on any issues on light pollution to promote dark skies, certain provisions of this act could be applicable to the promotion of the preservation of dark skies in Sierra Leone.

- **Protection of quiet skies**

No specific regulations to protect quiet skies for radio astronomy were identified.

- **Satellites regulations**

The *Telecommunications Act 2006 of Sierra Leone* provides the basis for telecommunications operations in the country including satellites. Noting the economic limitations of Sierra Leone and the fact that the country as yet to participate in deployment of any satellites, the act pronounces the country's position on issues of licensing, quality of service, radio frequency management and subscriber identification and management. *Article 82 of the Telecommunications Act* mandates that the *National Telecommunications Commission of Sierra Leone (NATCOM)* develops regulations to implement the Act. Of particular interest, are the *telecommunications licensing regulations of 2020*⁵⁰⁵. Section 3 of the regulations provide that they apply to: the process of granting business licenses and authorisations for telecommunications, broadband communications and ancillary services in Sierra Leone; the enforcement of license conditions of telecommunications operators of broadband service providers; and the use and operation of networks, systems, equipment or apparatus and the provision of telecommunications and broadband service. Additionally, NATCOM has developed the *Telecommunications Radio Frequency Spectrum Regulations 2020*⁵⁰⁶. Section 5 of the regulations highlights one of the key objectives being the promotion of transparency in licensing procedures, and promote an optimal approach to infrastructure development.

These regulations offer the basis for the licensing of Space X to operate Starlink satellites in the country beginning in 2023. The LEOs have been marketed as being a positive for Sierra Leone, to help achieve connectivity for all and in turn, leverage the connectivity to promote socio-economic development in Sierra Leone.

Additionally, the current framework does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

⁵⁰³ <https://sierralii.gov.sl/articles/2023-06-26/Samuel/an-overview-of-sierra-leones-environmental-laws-a-legal-framework>

⁵⁰⁴ <https://www.parliament.gov.sl/uploads/acts/THE%20ENVIRONMENT%20PROTECTION%20AGENCY%20ACT,%202022.pdf>

⁵⁰⁵ <https://www.natca.gov.sl/wp-content/uploads/2021/02/The-Telecommunications-Licensing-Regulations-2020.pdf>

⁵⁰⁶ <https://www.natca.gov.sl/wp-content/uploads/2021/02/The-Telecommunications-Radio-Frequency-Spectrum-Regulations-2020.pdf>

59. Singapore (Ranjekha AJ & Tamara Blagojevic)

- **Protection of dark skies**

The *Environment Protection and Management Act of 1999* mainly focuses on air, water, land, waste and even noise pollution, but contains no explicit mention or inclusion of light pollution or any associated phenomena.⁵⁰⁷ Furthermore, the “pollution of the environment” is defined as occurring ‘due to the release (into any environmental medium) from any process of substances which are capable of causing harm to humans or any other living organisms supported by the environment’,⁵⁰⁸ and therefore would be hard to interpret to include light pollution, unless a certain substance was to generate light. Transboundary Haze Pollution Act 2014. also contains no explicit reference to light pollution or associated phenomena, aside from lighting fires outdoors falling under conduct contributing to haze pollution.⁵⁰⁹ There have been indications that in recent years, the Singapore government has been working on policies for businesses and government related to Environmental Zones to control light pollution.⁵¹⁰ As part of the Singapore Green Plan,⁵¹¹ authorities are reviewing the transformation of its current lighting assets, allowing the use of only authority-approved fixtures, and have set in place industry guidelines.⁵¹² Singapore’s Land Transport Authority (LTA) maintains lighting at bus shelters, covered linkways, footpaths and road crossings, and the street lighting conditions are also checked every two months to ensure that any faulty lighting is swiftly dealt with.⁵¹³ The LTA continues to explore ways to cut energy costs for lighting (by reducing the illumination level at some commuter facilities), which can be seen as a gradual and calibrated way to return some dark spaces.⁵¹⁴

In 2019, LTA issued Streetlighting Guidelines⁵¹⁵ and claimed that the Street lamps island-wide would be replaced with more energy-efficient LED lights by 2022, while at the time, the development of a Remote Control and Monitoring System (RCMS) was in place of the current timer-based system so that street lamps can be more responsive to weather changes.⁵¹⁶ There is also Singapore’s Road Traffic (Motor Vehicles, Lighting) Rules (Road Traffic Act),⁵¹⁷ which

⁵⁰⁷ Environment Protection and Management Act 1999, 2020 Revised Edition, Singapore Government Agency, <https://sso.agc.gov.sg/act/epma1999>

⁵⁰⁸ Ibid. Part 2 - Interpretations, Article 1.

⁵⁰⁹ Act NO. 24 OF 2014 - Transboundary Pollution Act, 2014, Singapore, https://legal.un.org/ilc/sessions/67/pdfs/english/poa_singapore.pdf

⁵¹⁰ <https://www.lse.ac.uk/PBS/assets/documents/PEL-coursework/Tackling-Light-Polution-PEL-coursework-2020-2021.pdf>

⁵¹¹ <https://www.greenplan.gov.sg/>

⁵¹² <https://www.aurecongroup.com/insights/light-pollution-environmental-impacts>

⁵¹³ <https://www.thateconstutor.com/2018/02/20/light-pollution-singapore-public-lighting-boon-bane/>

⁵¹⁴ <https://www.thateconstutor.com/2018/02/20/light-pollution-singapore-public-lighting-boon-bane/>

⁵¹⁵ Guidelines To The Submission Of Design Drawings For Public Street Lighting, Cycling Path Lighting, Footpath Lighting And Zebra Crossing Flashing Beacon Lighting System, Land Transportation Authority, April 2019, https://onemotoring.lta.gov.sg/content/dam/onemotoring/Driving/Road_Safety/LTA_Streetlighting_Guidelines-05Apr19.pdf

⁵¹⁶ https://www.todayonline.com/singapore/all-street-lamps-use-led-lights-2022-lta?cid=h3_referral_inarticlelinks_03092019_todayonline

⁵¹⁷ Road Traffic Act, (Chapter 276, Sections 6 And 140), Road Traffic (Motor Vehicles, Lighting) Rules R 10, Revised Edition 1990, 25th March 1992, Singapore, <https://sso.agc.gov.sg/SL/276-R10?DocDate=20170823#pr4->

provides for requirements in terms of vehicle and traffic lights, and although there is no specific recognition of light pollution or associated phenomena, it can be of indirect relevance

There are also stargazer hobby groups in Singapore dedicated to fighting for tighter lighting rules in Singapore, which include the use of “downlighting” (directing light downwards towards the ground instead of skywards) and motion-activated light sensors.⁵¹⁸ In 2022, Mr Leon Perera asked the Minister for Transport “what is the colour temperature of Singapore’s street lighting and whether studies have been conducted to determine the feasibility of warmer white lighting for street lamps on minor roads, in view of the potential benefits in terms of human health and light pollution and what are the findings”.⁵¹⁹ Reply by Minister for Transport S Iswaran was that “Today, most of our streetlights are LED lights, comprising a mix of the warmer white light of 3000 Kelvin (K) colour temperature, and brighter white light of 4000 K color temperature. The specific type of lighting deployed will depend on the distance of the streetlight from residential areas. For minor roads, especially those in low-rise residential estates, LTA will generally deploy warm white light of 3000 K color temperature. LTA’s research and studies of international safety standards have shown that both these lights have no adverse impact on human health as the blue light emitted is of very low intensity”.⁵²⁰

Historically, the 1995, Civic District Lighting Plan Guidebook, was the first to map out lighting strategies for developments in the Central Area, starting with the historic Civic District, and subsequently, the 2009, Night Lighting Master Plan for the CBD, Marina Centre and Bay⁵²¹ was introduced.⁵²² This was followed by the implementation of the Night Lighting Master Plan for BBB precinct in 2010, where the guidelines for Civic District and BBB precinct were subsequently revised in 2013.⁵²³ Furthermore, some key revisions in the latest 2023. of the Night Lighting Guidelines For Developments in the Central Business District (Cbd), Civic District, Marina Bay And Marina Centre, included: The consolidation of night lighting guidelines for the precincts of CBD, Civic District, Marina Bay and Marina Centre, into a single document; reducing the number of areas where submission for evaluation and approval of night lighting proposals is required; simplifying the night lighting submission requirements (self-declaration checklist); consolidation of good practices in night lighting.⁵²⁴ The revision acknowledges the need to prevent light pollution and light trespass by stating that “(...) Any night lighting, including those in non-mandatory areas, should thus be executed sensitively to avoid glare, light trespass (lighting spilling beyond the

⁵¹⁸ <https://www.thateconstutor.com/2018/02/20/light-pollution-singapore-public-lighting-boon-bane/>

⁵¹⁹ Written Reply to Parliamentary Question on Colour Temperature of Singapore’s Street Lighting and Feasibility of Warmer White Lighting for Street Lamps on Minor Roads, News, 29 Nov 2022, In Parliament, Singapore, <https://www.mot.gov.sg/news/details/written-reply-to-parliamentary-question-on-colour-temperature-of-singapore%27s-street-lighting-and-feasibility-of-warmer-white-lighting-for-street-lamps-on-minor-roads>

⁵²⁰ Ibid.

⁵²¹ Night Lighting Master Plan Of Developments In The Central Business District (Cbd), Marina Centre And Marina Bay, URA/PB/2009/08-CUDG, April 2009, <https://www.ura.gov.sg/Corporate/Guidelines/Circulars/dc09-08>

⁵²² See: Revision To The Night Lighting Guidelines For Developments In The Central Business District (Cbd), Civic District, Marina Bay And Marina Centre, Circular No : URA/PB/2023/06-CUDG, Sept 2023, f-note 1, <https://www.ura.gov.sg/Corporate/Guidelines/Circulars/dc23-06>

⁵²³ Ibid.

⁵²⁴ Ibid.

subject development/boundaries) and light pollution”, while also including Light Trespass and Pollution, illuminated facades and festive light, as relevant parameters.⁵²⁵

In 2005, the Singapore Building and Construction Authority and the National Environment Agency developed the BCA Green Mark in Singapore, as a green building rating system that evaluates a building for its environmental impact and performance,⁵²⁶ which however, is more focused on energy efficiency and doesn't explicitly consider light pollution effects when awarding the BCA Green Mark. The 2008. Code for Environmental Sustainability of Buildings (CESB), references the Building Control Act and Building Control Regulations, Environmental Sustainability Regulations and other Codes (such as Practice for Artificial Lighting in Buildings; for Lighting of Work Places - Indoor; Practice for Energy Efficiency Standard for Building Services and Equipment; for Artificial Lighting in Buildings for various types of occupancy, and Code of Practice for Lighting of Work Places where appropriate)⁵²⁷ in terms of appropriate lighting requirements, but contains no specific reference or definitions of light pollution, light trespass or associated phenomena. Both the CESB, and the 2010 version 3.0 of the Green Mark Certification standard⁵²⁸ (with content almost the same as in the CESB) keep the lighting objectives (encourage the use of better efficient lighting and daylighting in common areas to minimize energy consumption from lighting usage while maintaining proper lighting level), and the artificial lighting objectives (encourage the use of better efficient lighting to minimize energy consumption from lighting usage while maintaining proper lighting level) consistently focused on energy efficiency.

As recognized by the Singapore delegation at the 60th UNCOPUOS Session in 2021, Singapore is a relatively new “space player”,⁵²⁹ and therefore, there have not been many developments yet, indicating the precise and official regulation of space activities.⁵³⁰ Consequentially, at the 61st UNCOPUOS Session, the Singapore delegation stated that Singapore has joined the Asia-Pacific Regional Space Agency Forum’s National Space Legislation Initiative, to learn about the national space legislation and policies of other countries.⁵³¹

At the 62nd UNCOPUOS Session, although the Singapore delegation acknowledged the need for responsible conduct to ensure the sustainable use of outer space while adding that Singapore is participating in international and regional efforts, such as the ASEAN Sub-

⁵²⁵ Revision To The Night Lighting Guidelines For Developments In The Central Business District (Cbd), Civic District, Marina Bay And Marina Centre, URA/PB/2023/06-CUDG, Sept 2023. <https://www.ura.gov.sg/-/media/Corporate/Guidelines/Development-control/Circulars/2023/Sep/dc23-06.pdf>

⁵²⁶ Page 41, https://fount.aucegypt.edu/cgi/viewcontent.cgi?article=3435&context=retro_etds

⁵²⁷ *The Code for Environmental Sustainability of Buildings is electronically published by the Building and Construction Authority, Building and Construction Authority, Apr 2008, https://www1.bca.gov.sg/docs/default-source/docs-corp-buildsg/sustainability/env_sus_code.pdf*

⁵²⁸ The BCA Green Mark Certification Standard for New Buildings, Building and Construction Authority, Apr 2010, https://www1.bca.gov.sg/docs/default-source/docs-corp-buildsg/sustainability/gm_certification_std.pdf

⁵²⁹ https://www.unoosa.org/documents/pdf/copuos/lsc/2021/statements/item_3_Singapore_ver.1_1_June_AM_Statement_60th_LSC_Agenda_3.pdf

⁵³⁰ <https://moonshot.space.co/2019/10/towards-a-singaporean-space-act/>

⁵³¹ https://www.unoosa.org/documents/pdf/copuos/lsc/2022/Statements/30MarAM/Item4/4_Singapore_30_March_AM.pdf

Committee for Space Technology and Applications and the Space Climate Observatory.⁵³² In addition, Singapore hosts the annual Global Space and Technology Convention to discuss how emerging new technologies in space can solve pressing challenges in the world today⁵³³ Singapore has two observatories, Exoplanet Observatory in the Maxwell House and the Science Center Observatory.⁵³⁴ Although not officially nominated as dark sky areas, Singapore does have certain places promoted for astrotourism and stargazing, such as Changi Beach Park, Yishun Dam and Rower's Bay Park, Upper Seletar Reservoir, Fort Canning Park, and so on.⁵³⁵

When it comes to other initiatives regarding astronomical activities, The Astronomical Society of Singapore (TASOS) was established in 1991. by a group of amateur astronomers, and organizes "Astro camps", "Astro tours", special observation events, and an astronomy course, to promote amateur astronomy.⁵³⁶ The Institute of Physics in Singapore organized the 27th IPS astronomy retreat, held on 19-22 June 2023, at the Villea Rompin Resort & Golf, Kuala Rompin, Malaysia.⁵³⁷ The Office for Space Technology and Industry in Singapore, as Singapore's national space office, lists the space-based STEM outreach, as one of their objectives.⁵³⁸ Singapore also has the Singapore Astronomy Forum - SingAstro, containing many useful discussions that could contribute to raising awareness on light pollution and promoting astronomical activities.⁵³⁹

- **Protection of quiet skies**

In July 2022, Singapore successfully launched its high-performance small satellite (160 kg) with a fully polarimetric Synthetic Aperture Radar (SAR) - NeuSAR.⁵⁴⁰ Finally, by now, as many as 20 Singapore-made satellites have been launched by India.⁵⁴¹

In Singapore, the *Infocom Media Development Authority (IMDA)* manages the frequency allocation and assignment for commercial and government spectrum usage per IMDA regulations.⁵⁴² The radio frequency spectrum is divided into bands allocated for different types of services.⁵⁴³ For spectrum bands recommended by the International Telecommunications Union (ITU), specific channeling plans may be adopted for assignment. The *Singapore National Table of Frequencies*⁵⁴⁴ dating from 2022, divides the radio frequency spectrum into frequency bands allocated to various radiocommunication services such as aeronautical, land mobile,

⁵³² https://www.unoosa.org/documents/pdf/copuos/lsc/2023/Statements/20_AM/3_Singapore_20_Mar_AM.pdf

⁵³³ https://www.unoosa.org/documents/pdf/copuos/lsc/2023/Statements/20_AM/3_Singapore_20_Mar_AM.pdf

⁵³⁴ <https://www.go-astronomy.com/observatories-southeast-asia.php>

⁵³⁵ <https://futr.sg/2023/03/17/stargazing-singapore/>

⁵³⁶ https://www.tasos.org.sg/about_tasos/about_tasos.html

⁵³⁷ <https://ipssingapore.org/index.html>

⁵³⁸ <https://www.space.gov.sg/singapore-space-ecosystem/stem-outreach/>

⁵³⁹ <https://www.singastro.org/forum2/viewforum.php?f=5>

⁵⁴⁰ [DSO National Laboratories - Singapore Launches Its First Locally Developed Synthetic Aperture Radar \(SAR\) Microsatellite](#)

⁵⁴¹ <https://www.straitstimes.com/asia/south-asia/india-launches-seven-singaporean-satellites#:~:text=As%20many%20as%2020%20Singapore,India%2C%20including%20those%20on%20Sunday>

⁵⁴² [Frequency Allocation & Assignment | IMDA - Infocomm Media Development Authority](#)

⁵⁴³ [Frequency Allocation & Assignment | IMDA - Infocomm Media Development Authority](#)

⁵⁴⁴ [\[IMDA\] Spectrum-Allocation-Chart-June 2022](#)

meteorological and satellite communication services.⁵⁴⁵ The *Singapore Spectrum Management Handbook*⁵⁴⁶ serves to provide information on Spectrum Management activities, assignment policies and the application procedures for the various radio-communication services, including mobile, fixed, satellite, short-range devices, and broadcasting services.⁵⁴⁷ However, within the national framework, no specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

References in Singapore's statute book to space activities are few and far between and relate primarily to satellites.⁵⁴⁸ When it comes to satellite regulation, the IMDA provides some soft law, such as the *Guidelines for Satellite Network Filing*, which provide certain rules on avoiding and elimination of existing harmful interference.⁵⁴⁹

The telecoms sector is regulated by the IMDA under the *Telecommunications Act* (Cap. 323)⁵⁵⁰ (the Telecoms Act) and the *Info-communications Media Development Authority Act 2016*⁵⁵¹ (the IMDA Act).⁵⁵² Other relevant legislation includes the *Info-communications Media Development Authority Act 2016* ("IMDAA"), the *Personal Data Protection Act 2012* ("PDPA") and the *Cybersecurity Act 2018* ("CS Act").⁵⁵³

In particular, under the *Telecommunications (Radio-Communication) Regulation*,⁵⁵⁴ Singapore currently issues four classes of "Satellite Communication Station Licence".⁵⁵⁵ However, these licences do not cover satellite operations in space.⁵⁵⁶ Rather, one of these licences is required if, for example, a tracking, telemetry and command station is to be operated from Singapore.⁵⁵⁷

The means to apply for orbital positions — the "Satellite Orbital Slot Licence"⁵⁵⁸ — is set out in section 5B of the Telecommunications Act.⁵⁵⁹ In addition, the Strategic Goods (Control) Order 2019.⁵⁶⁰ subjects spacecraft to export and transshipment control, and the Insurance (Approved Marine, Aviation and Transit Insurers) Regulations⁵⁶¹ require non-Singaporean entities

⁵⁴⁵ [Frequency Allocation & Assignment | IMDA - Infocomm Media Development Authority](#)

⁵⁴⁶ <https://www.imda.gov.sg/-/media/imda/files/regulation-licensing-and-consultations/frameworks-and-policies/spectrum-management-and-coordination/spectrummgmthb.pdf>

⁵⁴⁷ [Frequency Allocation & Assignment | IMDA - Infocomm Media Development Authority](#)

⁵⁴⁸ [Towards a Singaporean Space Act \(moonshotspace.co\)](#)

⁵⁴⁹ [GuideSatelliteNetworkFiling.pdf \(imda.gov.sg\)](#)

⁵⁵⁰ <https://sso.agc.gov.sg/Act/TA1999>

⁵⁵¹ <https://sso.agc.gov.sg/Act/IMDAA2016>

⁵⁵² [In brief: telecoms regulation in Singapore - Lexology](#)

⁵⁵³ [Telecoms, Media & Internet Laws and Regulations Report 2024 Singapore \(iclg.com\)](#)

⁵⁵⁴ <https://sso.agc.gov.sg/SL/323->

[RG5?DocDate=20020930&ViewType=Advance&Phrase=satellite&WiAl=1](#)

⁵⁵⁵ <https://www2.imda.gov.sg/regulations-and-licensing-listing/satellite-communication-station-licence>

⁵⁵⁶ [Towards a Singaporean Space Act \(moonshotspace.co\)](#)

⁵⁵⁷ [Towards a Singaporean Space Act \(moonshotspace.co\)](#)

⁵⁵⁸ <https://www2.imda.gov.sg/regulations-and-licensing-listing/licence-for-use-of-satellite-orbital-slot>

⁵⁵⁹ <https://www2.imda.gov.sg/regulations-and-licensing-listing/licence-for-use-of-satellite-orbital-slot>

⁵⁶⁰ <https://sso.agc.gov.sg/SL/SGCA2002-S532->

[2019?DocDate=20190801&ViewType=Advance&Phrase=satellite&WiAl=1](#)

⁵⁶¹ <https://sso.agc.gov.sg/SL/IA1966-RG15?DocDate=20161212>

to obtain approval from the Monetary Authority of Singapore if providing insurance in respect of space launches.⁵⁶² But there is nothing in Singapore law that governs, for example, launches or launch facilities, on-orbit operations or satellite transfers — that is, there is no comprehensive national space law.⁵⁶³

However, the current regulatory framework, however, does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

⁵⁶² [Towards a Singaporean Space Act \(moonshotspace.co\)](https://moonshotspace.co)

⁵⁶³ [Towards a Singaporean Space Act \(moonshotspace.co\)](https://moonshotspace.co)

60. Slovakia (Tamara Blagojevic)

- **Protection of dark skies**

The Slovak Republic is currently drafting the “*Act on Regulation of Outer Space Activities in the Slovak Republic*” (AROSA), including registration of the objects launched into outer space, which regulates the launch and execution of space activities.⁵⁶⁴ The Conceptual framework of Space activities in the Slovak Republic was prepared in 2019. by the Ministry of Education, Science, Research and Sport in cooperation with relevant ministries and stakeholders.⁵⁶⁵ Slovakia was one of the co-sponsors of the Conference Room Paper (CRP n. 17) during the Fifty-eighth session of the Scientific and Technical Subcommittee titled “Recommendations to Keep Dark and Quiet Skies for Science and Society”.⁵⁶⁶ Slovakia is actively and timely providing and sharing updated information on space objects and their orbital events to the UNOOSA through its Permanent Mission to the United Nations in Vienna, which will be maintained as a focal point also under the future “Space Law”.⁵⁶⁷

The right to protect the environmental and cultural heritage is established by the Constitution of the Slovak Republic in section six.⁵⁶⁸ The Environmental Law defines the “environment” as ‘everything that creates natural conditions of the existence of organisms including human and it is a precondition of their further development. Its components are mainly the air, water, minerals, soil, and organisms.’⁵⁶⁹ Furthermore, the “ecosystem is a functional system of live and lifeless components of the environment that are interconnected by exchange of substances, energy flow and information transmission and that are mutually affected and are developing in a specific space and time”. Due to the openness of these definitions, they can be interpreted so as to potentially include outer space as a part of the environment, or at least consider it as an ecosystem.

The only generally binding legal regulation that defines the terms “light pollution” and “disturbing light” as two different terms is Commission Regulation (EC) No. 245/2009,⁵⁷⁰ which was repealed by [Commission Regulation \(EU\) 2019/2020](#), implementing the [Directive 2009/125/EC](#), either of which does not contain such definitions. Light nuisance is also dealt with in the Civil Code,⁵⁷¹ which provides that the owner of the item must refrain from doing anything that would annoy another person beyond a reasonable level or would seriously threaten the exercise of others rights, and, must not disturb the neighbors with noise, light and vibrations⁵⁷². The interference with the peaceful state needs to be obvious to claim protection from the municipality (to temporarily prohibit or intervene in order to restore the previous state), which does not affect the right to seek protection in court.⁵⁷³

⁵⁶⁴ https://www.unoosa.org/res/oosadoc/data/documents/2023/aac_105c_12023crp/aac_105c_12023crp_12_0_html/AC105_C1_2023_CRP12E.pdf

⁵⁶⁵ https://www.unoosa.org/documents/pdf/copuos/2021/statements/Item_4_Slovakia_Ver.2_26_Aug_AM-For_interpreters.pdf

⁵⁶⁶ https://www.unoosa.org/documents/pdf/copuos/2021/statements/Item_4_Slovakia_Ver.2_26_Aug_AM-For_interpreters.pdf

⁵⁶⁷ https://www.unoosa.org/res/oosadoc/data/documents/2023/aac_105c_12023crp/aac_105c_12023crp_12_0_html/AC105_C1_2023_CRP12E.pdf

⁵⁶⁸ Constitution of the Slovak Republic No. 460/1992 Coll.

⁵⁶⁹ <https://faolex.fao.org/docs/pdf/slo45130.pdf>

⁵⁷⁰ Annex II, paragraph 3.

⁵⁷¹ Act No. 40/1964 Coll.

⁵⁷² Civil Code (Act No. 40/1964 Coll.) § 127 par. 1.

⁵⁷³ Ibid. §5.

According to the Building Act, every advertising device visible from public spaces must have a building permit.⁵⁷⁴ Similarly, the Road Traffic Act provides that the things that could lead to confusion with traffic signs or traffic equipment or that would cover them, or that would dazzle or distract and attract the attention of the road user, must not be placed on the road and next to the road.⁵⁷⁵ The Road Act states that banners, material dumps or advertising, information and promotional devices, as well as other devices that do not serve for the land road or road traffic management and operation, are prohibited at the intersection and in the field of view of the driver.⁵⁷⁶ It is also prohibited to place advertising, informational and promotional devices on highways, motor vehicles and international roads and in their protective zones, except for rest areas.⁵⁷⁷

The protection of residents from optical radiation is provided by the Act on the protection, promotion and development of public health.⁵⁷⁸ This act provides that the physical education and sports facilities should be located in a way that their operation does not adversely affect the surroundings, with noise, dust or light.⁵⁷⁹ Furthermore, a natural person, an entrepreneur and a legal entity that uses or operates artificial sources of optical radiation for purposes other than lighting the interior spaces of buildings, are obliged to ensure the exposure of residents and their environment does not exceed the limit values from the implementing regulation,⁵⁸⁰ and ensure objectification and assessment of optical radiation.⁵⁸¹ In case of violation, the operator commits an administrative offence.⁵⁸²

The executive regulation of the limit values of disturbing light for the protection of the health of the population established by the Act is the Decree of the Ministry of Health of the Slovak Republic.⁵⁸³ This Decree also defines the term "disturbing light" as the light from artificial light sources in the outdoor environment, excluding light from means of transport and from public lighting, which, after impacting the outer surface of the lit opened living room, subjectively annoys the users of the living room by its effect.⁵⁸⁴ As per the Decree, disturbing light sources that change intensity and color⁵⁸⁵ must not be observable in the living room, while "sources according to paragraph 1" are "lighting devices in the outdoor environment, (...) except for public lighting".⁵⁸⁶ Such changes in intensity and color are evaluated subjectively, while changes in brightness detected by direct viewing of external sources of disturbing light located lower than the living room window are not evaluated if they do not cause an observable change in the living room illumination.⁵⁸⁷ The decree also covers equipment used for advertising and public performances, by providing that such devices with sources of optical radiation must be installed so as to exclude danger, disturbance or annoyance to persons in the vicinity by direct rays or reflected radiation, while, when using laser devices for public performances, the light beams must not hit the eyes in the vicinity or the windows of the rooms of the surrounding buildings.⁵⁸⁸ Additionally, the lighting

⁵⁷⁴ Act no. 50/1976 Coll. (Building Act) § 71 par. 1, point c)

⁵⁷⁵ Act. no. 8/2009 Coll. (Road Traffic Act) § 60 par. 9.

⁵⁷⁶ Road Act No. 135/1961 Coll. § 8 par. 12.

⁵⁷⁷ Ibid, § 10 par. 3.

⁵⁷⁸ Act no. 355/2007. Coll. § 22 par. 2, § 29, and § 57.

⁵⁷⁹ § 22 par. 2.

⁵⁸⁰ § 62, point a).

⁵⁸¹ § 29.

⁵⁸² § 57 par 22.

⁵⁸³ Decree of the Ministry of Health of the SR No. 539/2007 Coll.

⁵⁸⁴ § 2.

⁵⁸⁵ § 5 par. 2.

⁵⁸⁶ Ibid. par. 1.

⁵⁸⁷ Ibid. § 6 par. 2.

⁵⁸⁸ Ibid. § 3 par. 3.

devices in the outdoor environment, (...) including public lighting, are designed, implemented and used in such a way that the light from these devices falls on the windows of residential rooms as little as possible in their surroundings.⁵⁸⁹ If the impact of light on the windows of living rooms cannot be prevented, the limit values of the disturbing light must not be exceeded. The said decree is essentially based on the technical standard STN EN 12464-2 regarding determining limit values, which also defines distracting light as useless light which, with its quantitative, directional and spectral properties, in a given situation increases annoyance, discomfort, distraction or limits the ability to see the most important information, while "useless light" is emitted by the lighting system beyond the boundaries of the illuminated object. However, the term "disturbing light" is then associated and equalised to the term "light pollution" - in order to protect and improve the night environment, it is necessary to control disturbing light, also known as light pollution, which can bring physiological and ecological problems for the surrounding environment and people.⁵⁹⁰

- **Protection of quiet skies**

In Slovak Republic, the state administration authorities in the area of electronic communications are as follows:

1. Ministry of Transport, Posts and Telecommunications of the Slovak Republic,
2. Regulatory Authority for Electronic Communications and Postal Services.

The Regulatory Authority for Electronic Communications and Postal Services (RÚ) is the national regulatory authority and pricing authority in the sector of electronic communications and postal services⁵⁹¹ The RU performs frequency spectrum management, which includes cooperation with the Ministry in elaboration of the draft of the national table of the frequency spectrum,⁵⁹² preparing the plan of use of frequency spectrum, assigning frequencies and laying down the conditions for their use, and coordinating and checking the use of frequency spectrum.

The frequencies are used only on the basis of the general authorisation, or the basis of an individual authorisation for the use of frequencies. The individual authorisation for the use of frequencies implies the decision of the Office on the allocation of frequencies and on laying down the conditions under which the frequencies may be used or the decision of the Office on the allocation or on the conditions. The Office shall issue the individual authorisation in line with the plan of the use of frequency spectrum, where applicable, in order to avoid harmful interference, ensure technical quality of service, and efficient use of frequency spectrum, or fulfil other objectives of the general interest in line with the binding international agreements. The Office issues the individual authorisation within six weeks from the date of delivery of the complete application in terms of the frequencies which are available in line with the plan of use of the frequency spectrum. If there are more applicants requiring the same frequencies, the Office issues individual authorisation in order for the delivery of the applications. The Office may extend the period for issuing the individual authorisation to a maximum of eight months, if necessary to ensure fair, proportionate, open and transparent procedures. Such time limits shall be without prejudice to the international agreements relating to the use of frequencies and orbital positions.

⁵⁸⁹ Ibid. § 5 par. 1.

⁵⁹⁰ Ibid, point 4.5.

⁵⁹¹ <https://www.teleoff.gov.sk/about-us/>

⁵⁹² <https://www.vus.sk/ntfs/php/index.php?jazyk=ang>

Slovakia has three observatories: Lomnický Peak Observatory, Modra Observatory, and the Skalnaté Pleso Observatory.⁵⁹³ Slovakia also has three recognized Dark Sky parks - Poloniny Dark Sky Park (recognized in 2010 by the Slovak Union of Amateur Astronomers), Beskydy Dark Sky Park (recognized in 2013. by Kysuce Protected Landscape Area and Slovak Astronomical Society of Slovak Academy of Sciences) and Veľká Fatra Dark Sky Park (declared by the 68th UN General Assembly during the International Year of Light and Light-based Technologies – IYL 2015).⁵⁹⁴

Within the national framework, no specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

As per the ITU Explorer, Slovakia has by now issued 9 notifications regarding licensed satellites (e.g. Veronika, GRBALPHA, SVK00000, SVK14401, etc.).⁵⁹⁵ As per the UN Register of Space Objects Launched into Space, Slovakia⁵⁹⁶ currently has two functional registered space objects: skCUBE, and GRBAAlpha. For the purposes of the launch of the skCUBE, a temporary Register of Space Objects of the Slovak Republic has been established at the Ministry of Education, Science, Research and Sport of the Slovak Republic, for purpose of the launch of the first Slovak satellite, skCUBE.⁵⁹⁷

The adoption of the Act on Space Activities in the Slovak Republic is an essential condition for the further development of the space activities in the country, including determining the competencies of state administration authorities. Slovak legislation is currently underdeveloped and does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

⁵⁹³ <https://www.go-astronomy.com/observatories-slovakia.php>

⁵⁹⁴ <https://www.kralovastudna.com/en/dark-sky-park/>

⁵⁹⁵ <https://www.itu.int/itu-r/space/apps/public/spaceexplorer/networks-explorer/space-stations>

⁵⁹⁶ <https://www.unoosa.org/oosa/en/spaceobjectregister/submissions/slovakia.html>

⁵⁹⁷ A conceptual framework of space activities in the Slovak Republic, 2019, <https://slovak.space/wp-content/uploads/2019/07/Koncepcia-FINAL-AJ.pdf> page 12.

61. Slovenia (Tamara Blagojevic)

- **Protection of dark skies**

The Environmental Protection law defines the environment as “(..) that part of nature which is or could be affected by human activity”,⁵⁹⁸ which allows for outer space to be subsumed under said definition. The active astronomy community raised public awareness in Slovenia on the increasingly light-polluted skies, which led to the adoption of a country-wide light pollution regulation in 2007.⁵⁹⁹ This Decree⁶⁰⁰ provides rules relative to illumination so as to prevent excessive light from man-made sources, requires the use of environment-friendly luminaries for external illumination and sets standards for the use of illumination of institutions, business places, facades, cultural objects, advertisements, etc.⁶⁰¹ In addition, the Decree stipulates that, if there is an endangered animal species in a building, the surfaces of such building containing domicile areas (e.g. nests) of these animal species, shall not be illuminated.⁶⁰² A first draft was prepared by the Ministry of the Environment already in 1999. and meant to mitigate the adverse biological, astronomical, and economic effects of excessive light emissions, while the final decree consisted of 31 articles providing lighting thresholds, technical restrictions on light installations, and inspection plans coupled with penalties.⁶⁰³ It further regulates light emissions for the general population, including public spaces such as monuments, churches, airports, harbors, train stations, or the freeway as well as for private office buildings and production facilities.⁶⁰⁴ On September 14, 2023, the Ministry of the Environment, Climate and Energy organized a public consultation on the topic of amending the Decree, where more than 50 participants participated, and 14 participants presented their contributions.⁶⁰⁵

The Interreg Europe project [Night Light](#) (addressing among else, the light pollution issues) has identified good practices in Gorenjska County (Slovenia), where action was triggered based on a National Strategy on Energy Efficiency and on one of the first dedicated pieces of legislation

⁵⁹⁸ <https://www.eui.eu/projects/internationalheritagelaw/documents/nationallegislation/slovenia/environmentprotectionact.pdf>

⁵⁹⁹ Widmer, K., Beloconi, A., Marnane, I., Vounatsou, P., (2022). Review and Assessment of Available Information on Light Pollution in Europe (Eionet Report – ETC HE 2022/8), ISBN 978-82-93970-08-8, ETC HE c/o NILU, Kjeller, Norway.

⁶⁰⁰ See: Decree on limit values due to light pollution of environment Issued in March 2007118, amended in 2007, 2010119 and 2013, (2023. update in preparation), Uredba o mejnih vrednostih svetlobnega onesnaževanja okolja (Uradni list RS, št. [81/07](#), [109/07](#), [62/10](#), [46/13](#) in [44/22](#) – ZVO-2), <http://www.uradni-list.si/1/objava.jsp?urlid=200781&stevilka=4162>

⁶⁰¹ <https://www.ecolex.org/details/legislation/light-pollution-law-lex-faoc084337/>

⁶⁰² <https://www.ecolex.org/details/legislation/light-pollution-law-lex-faoc084337/>

⁶⁰³ Widmer, K., Beloconi, A., Marnane, I., Vounatsou, P., (2022). Review and Assessment of Available Information on Light Pollution in Europe (Eionet Report – ETC HE 2022/8), ISBN 978-82-93970-08-8, ETC HE c/o NILU, Kjeller, Norway.

⁶⁰⁴ Widmer, K., Beloconi, A., Marnane, I., Vounatsou, P., (2022). Review and Assessment of Available Information on Light Pollution in Europe (Eionet Report – ETC HE 2022/8), ISBN 978-82-93970-08-8, ETC HE c/o NILU, Kjeller, Norway.

⁶⁰⁵ See: Javni posvet Sprememba uredbe o mejnih vrednostih svetlobnega onesnaževanja okolja, Republika Slovenija, gov.si, Sept 2023, <https://www.gov.si/dogodki/2023-09-14-javni-posvet-sprememba-uredbe-o-mejnih-vrednostih-svetlobnega-onesnazevanja-okolja/>

on light pollution.⁶⁰⁶ The [Dark Sky Association](#) from Slovenia switched to nature-friendly lighting of cultural heritage sites⁶⁰⁷ through installing a new type of reflectors developed within a [LIFE+ project](#), to illuminate cultural heritage sites properly but sparingly.⁶⁰⁸ Additionally, Technical Guidelines on Nature-Friendly Lighting of Objects of Cultural Heritage (churches),⁶⁰⁹ which contain recommendations for public authorities and the managers of cultural heritage sites, have been drafted with the Slovenian National Commission for UNESCO.⁶¹⁰ The project contributed to improving the nature conservation status of protected species of nocturnal animals and preserving biodiversity in Slovenia and the entire EU.⁶¹¹ Recommendations for nature-friendlier lighting are a good basis for international standardization of lighting of cultural heritage, and Dark Sky is planning activities to stimulate international consideration of the lighting of cultural heritage through connecting UNESCO and ICOMOS Slovenia.⁶¹² Slovenia also has other brochures, such as the one on the 2011. Brochure on Lighting of advertising objects.⁶¹³

When it comes to dark sky parks, Triglav National Park (TNP), was established in 2013. in Slovenia, is responsible for the sustainable development of the national park area and for the preservation of the biodiversity in the park, and along with the Ski resort Vogel has decided to organise observations and nights of the night sky.⁶¹⁴

- **Protection of quiet skies**

In April 2024, Slovenia signed the Artemis Accords and became the 39th signatory to the Artemis Accords on April 19 in Ljubljana as part of the U.S.-Slovenia Strategic Dialogue.⁶¹⁵

The National Regulatory Authority in Slovenia is the Agency for Communication Networks and Services of the Republic of Slovenia (AKOS), as an independent body that regulates and supervises the electronic communications market, performs tasks related to radio and television, and regulates and supervises postal services and railway traffic in Slovenia.⁶¹⁶ In accordance with paragraph 3 of Article 24 of the Electronic Communications Act, the Agency is obliged to prepare a Radio Frequency Spectrum Management Strategy, and the strategy in Slovenia exists for the

⁶⁰⁶ <https://www.interregeurope.eu/find-policy-solutions/stories/night-light-the-unexpected-potentials-of-a-dark-night-sky>

⁶⁰⁷ https://lifeslovenija.si/wp-content/uploads/LIFE09_NAT_SI_000378_ANG.pdf

⁶⁰⁸ <https://www.interregeurope.eu/find-policy-solutions/stories/night-light-the-unexpected-potentials-of-a-dark-night-sky>

⁶⁰⁹ See: Naravi prijaznejša razsvetljava objektov kulturne dediščine (cerkva), Projekt LIFE+ Življenje ponoči v sodelovanju s Slovensko nacionalno komisijo za UNESCO Priporočila, 2014, http://www.temnonebo.si/images/pdf/naravi_prijaznejša_razsvetljava_brosura_web.pdf

⁶¹⁰ Ibid., <https://www.interregeurope.eu/find-policy-solutions/stories/night-light-the-unexpected-potentials-of-a-dark-night-sky>

⁶¹¹ Ibid.

⁶¹² https://lifeslovenija.si/wp-content/uploads/LIFE09_NAT_SI_000378_ANG.pdf

⁶¹³ See: Osvetljevanje objektov za oglaševanje, Brochure, 2011, http://www.temnonebo.si/images/pdf/brosura%20osvetljevanje%20objektov%20za%20oglasovanje_splet.pdf

⁶¹⁴ <https://www.interregeurope.eu/good-practices/night-sky-observations-in-triglav-national-park>

⁶¹⁵ <https://www.state.gov/united-states-welcomes-slovenias-signing-of-the-artemis-accords/#:~:text=Slovenia%20became%20the%2039th%20signatory%20to%20the%20Artemis,practical%20set%20of%20principles%20to%20guide%20space%20exploration>

⁶¹⁶ <https://www.akos-rs.si/en/about-akos>

period 2021-2023.⁶¹⁷ Radio communications includes electronic communications over radio waves and refers to communications from mobile, broadcast, microwave, satellite and other services.⁶¹⁸ The regulation of the plan for the allocation of radio frequency bands determines the use of individual frequency bands. Radio frequencies are used on the basis of general approval or on the basis of a decision on the allocation of radio frequencies.⁶¹⁹ More detailed conditions for the allocation and use of radio frequencies in individual radio frequency bands are specified in the plan for the use of radio frequency bands. The AKOS transparently and clearly provides various registries⁶²⁰ on its website, such as the list of telecom and internet operators,⁶²¹ as well as the radio-amateur⁶²² and the frequency⁶²³ search engines. Moreover, the AKOS website provides a clear list of applicable laws,⁶²⁴ such as:

- Act on Electronic Communications -ZEKom-2 (Official Gazette of the RS, no. 130/22- and 18/23 - ZDU-1O)
- Postal Services Act (Official Gazette of the Republic of Slovenia, no. 51/09, 77/10, 40/14 – ZIN-B and 81/15);
- Media Act - ZMed (Official Gazette of the RS, No. 110/06 – official consolidated text, 36/08 – ZPOMK-1, 77/10 – ZSFCJA, 90/10 – odl. US, 87/11 – ZAvMS, 47/ 12 and 47/15 – ZZSDT, 22/16, 39/16, 45/19 – dec. US, 67/19 – dec. US and 82/21)
- Act on Audiovisual Media Services (ZAvMS) (Official Gazette of the RS, no. 87/11, 84/15 and 204/21);
- Law on Radiotelevision Slovenia (Official Gazette of the Republic of Slovenia, no. 96/05, 109/05 – ZDavP-1B, 105/06 – odl. US, 26/09 – ZIPRS0809-B and 9/14)
- Act on the Ratification of the European Convention on Cross-Border Television and the Protocol Amending the European Convention on Cross-Border Television (Official Gazette of the Republic of Slovenia, No. 57/99), Official Gazette of the Republic of Slovenia – International Agreements, No. 18/99)
- Act on Ratification of the Regional Agreement on the Use of the Band 87.5-108.0 MHz for FM Sound Broadcasting (Area 1 and Part of Area 3) (Official Gazette of the RS - International Agreements No. 5/97)
- Regional agreement on radio broadcasting in the European region for the use of frequencies in the range of hectometer, meter and decimeter waves, signed in Stockholm on 23 June 1961 - Act on the succession of conventions of the United Nations Commission on International Trade Law and international treaties of the International Telecommunication Union (Official Gazette of the Republic of Slovenia, no. 65/93)
- Act on the Ratification of the Chester Multilateral Coordination Agreement from 1997 on Technical Criteria, Principles of Coordination and Procedures for the Introduction of

⁶¹⁷ [Strategija upravljanja z radiofrekvenčnim spektrom 2021–2023](#)

⁶¹⁸ <https://www.akos-rs.si/radijski-spekter/raziscite/strategija-upravljanja-z-radiofrekvencnim-spektrom>

⁶¹⁹ <https://www.akos-rs.si/radijski-spekter/raziscite/strategija-upravljanja-z-radiofrekvencnim-spektrom>

⁶²⁰ <https://www.akos-rs.si/registri/seznam-registrov>

⁶²¹ <https://www.akos-rs.si/registri/seznam-registrov/operaterji>

⁶²² <https://www.akos-rs.si/registri/seznam-registrov/radioamaterji>

⁶²³ <https://www.akos-rs.si/registri/seznam-registrov/frekvence>

⁶²⁴ <https://www.akos-rs.si/zakoni-in-priporocila/zakoni>

Terrestrial Digital Video Broadcasting (Official Gazette of the RS - International Agreements (Official Gazette of the RS, No. 12/05)

- Act on technical requirements for products and on conformity assessment (Official Gazette of the Republic of Slovenia, No. 17/11)

As per the ITU Explorer, Slovenia has issued approximately 10 notifications up until 2023 (satellites: TRISAT, TRISAT-S, TRISAT-R, NEMO-HD, and SVN14800).⁶²⁵ However, as per the UNOOSA Registry, Slovenia has by now submitted only one Note Verbale regarding Information Furnished in Conformity with the Convention on Registration of Objects Launched into Outer Space, only for NEMO-HD (international designator 2020-061F), TRISAT (international designator 2020-061J) and TRISAT-R (international designator 2020-080D).⁶²⁶

• Satellites regulations

The National Space Activities Act has been adopted by the parliament on 16 March 2022.⁶²⁷ As per the UNOOSA Report, a Decree Implementing Space Activities Act is in the process of adaptation, and there is currently no need for any change of legislation.⁶²⁸ The Act lays down the conditions and procedure for issuing licences to conduct space activities and governs the registration of launched space objects, the obligations of the operator, liability for any damage caused by space objects and the supervision of the implementation of the Act.⁶²⁹ All objects launched into space must be entered into the registry of space objects.⁶³⁰ The permit for carrying out any space activities in Slovenia may be granted for activities that are safe and do not cause any harm to either Earth or space.⁶³¹ According to the Act, to request a licence to conduct space activities, the operators will have to provide initial information on the space object.⁶³² Additionally, operators will have the obligation to report the orbital data at the time of entry in the Register of Space Objects and all the changes during the operational phase, while the ministry is responsible for forwarding this information to the UN.⁶³³

⁶²⁵ <https://www.itu.int/itu-r/space/apps/public/spaceexplorer/networks-explorer/space-stations>

⁶²⁶ <https://documents-dds-ny.un.org/doc/UNDOC/GEN/V22/189/92/PDF/V2218992.pdf?OpenElement>

⁶²⁷ European Union joint contribution on the implementation of the Guidelines for the Long-term Sustainability of Outer Space Activities 2023, [European Union joint contribution on the implementation of the Guidelines for the Long-term Sustainability of Outer Space Activity](#)

⁶²⁸ European Union joint contribution on the implementation of the Guidelines for the Long-term Sustainability of Outer Space Activities 2023, https://www.unoosa.org/res/oosadoc/data/documents/2023/aac_105c_12023crp/aac_105c_12023crp_12_0.html/AC105_C1_2023_CRP12E.pdf

⁶²⁹ Ibid. European Union joint contribution on the implementation of the Guidelines for the Long-term Sustainability of Outer Space Activities 2023, [European Union joint contribution on the implementation of the Guidelines for the Long-term Sustainability of Outer Space Activity](#)

⁶³⁰ [SCHEMATIC OVERVIEW OF NATIONAL REGULATORY FRAMEWORKS FOR SPACE ACTIVITIES](#)

⁶³¹ Ibid.

⁶³² Ibid. European Union joint contribution on the implementation of the Guidelines for the Long-term Sustainability of Outer Space Activities 2023, [European Union joint contribution on the implementation of the Guidelines for the Long-term Sustainability of Outer Space Activities](#).

⁶³³ Ibid. European Union joint contribution on the implementation of the Guidelines for the Long-term Sustainability of Outer Space Activities 2023, [European Union joint contribution on the implementation of the Guidelines for the Long-term Sustainability of Outer Space Activities](#)

The operators will also be liable to provide the ministry information regarding all changes during the operation and will have to demonstrate that space activities envisage the space debris generation limitation measures, in accordance with the applicable UN Space Debris Mitigation Guidelines.⁶³⁴ Similarly, the operators will need to provide evidence that the space object is designed in a way so as not to cause additional space debris, along with a plan for the safe termination of its operation in outer space and/or its return to Earth.⁶³⁵ However, the definition of space activities as per the Space Activities Act doesn't explicitly subsume all types of astronomical activities under its scope (if not earth-based), as it defines space activities as including launch, operation, operational control in outer space, controlled termination, return to Earth, and procedures for limiting space debris unless subsumed under space debris limiting procedures. Additionally, Slovenia also supports and implements all of the activities in the EU (and ITU) to protect radiocommunications harmonised for equitable, rational and efficient use for the Long-term Sustainability of Outer Space Activities of the UN Committee on the Peaceful Uses of Outer Space.⁶³⁶

However, within the national framework, no specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

⁶³⁴ Ibid.

⁶³⁵ Ibid.

⁶³⁶ Ibid.

62. South Africa (Andrew Falle & Yana Yakushina)

- **Protection of dark skies**

While South Africa has no protection of astronomy from interference of space objects, they do explicitly protect astronomy from light pollution and radio interference on the ground. In 2008, South Africa passed the *Astronomy Geographic Advantage Act*⁶³⁷ which aims to “provide for the preservation and protection of areas within the Republic that are uniquely suited for optical and radio astronomy; to provide for intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas; and to provide for matters connected therewith”.⁶³⁸ Among other things, this Act allows the government to designate areas as ‘astronomy advantage areas’ which affords them protection from light pollution (defined as “any effect from artificially created or harnessed light that is visible to the naked eye or can be detected with astronomical instrumentation at night”)⁶³⁹ and radio frequency interference (defined as “the emission, transmission or reception of any radio frequency signals which have the ability to interfere with or inhibit radio astronomy or any device used to undertake radio astronomy”).⁶⁴⁰ So far there have been three areas that have been designated as astronomy advantage areas.⁶⁴¹

One of these sites, the Karoo Central Astronomy Advantage Areas, had further regulations placed on it in 2017 by the Department of Science and Technology.⁶⁴² These regulations “prohibit and restrict the use of certain radio frequency spectrum, certain radio activities and restrict interference due to electrical activities in the area”.⁶⁴³

- **Protection of quiet skies**

The protection of radio-quiet zones in South Africa is relatively strong and continues to move in a positive direction. The Astronomy Geographic Advantage (AGA) Act (2007)⁶⁴⁴ enables the Minister of Science and Technology to designate certain areas as Astronomy Advantage Areas (AAA), which then allows the introduction of restrictions on activities that cause radio interference.⁶⁴⁵ Designated AAAs used for radio astronomy include The Northern Cape Province (excluding some areas), Karoo Core AAA, and the Karoo Central AAAs.⁶⁴⁶ The abundant radio-quiet deserts areas in South Africa and the ability to designate protected radio-quiet zones make South Africa an ideal co-host of the Square Kilometre Array (SKA) radio telescope.

At the 2023 WRC, the South African Radio Astronomy Observatory (SARAO) brought a proposal for the ITU to conduct studies on the impact of LEO satellites on radio astronomy

⁶³⁷[https://www.sarao.ac.za/about/astronomy-geographic-advantage-act/#:~:text=The%20Astronomy%20Geographic%20Advantage%20\(AGA,astronomy%20and%20related%20scientific%20endeavours](https://www.sarao.ac.za/about/astronomy-geographic-advantage-act/#:~:text=The%20Astronomy%20Geographic%20Advantage%20(AGA,astronomy%20and%20related%20scientific%20endeavours)

⁶³⁸ 21/2007 Astronomy Geographic Advantage Act.

⁶³⁹ 21/2007 Astronomy Geographic Advantage Act.

⁶⁴⁰ 21/2007 Astronomy Geographic Advantage Act.

⁶⁴¹ <https://www.sarao.ac.za/about/astronomy-geographic-advantage-act/>

⁶⁴² <https://www.dst.gov.za/images/KCAAA-RegulationsV2.pdf>

⁶⁴³ <https://www.dst.gov.za/images/KCAAA-RegulationsV2.pdf>

⁶⁴⁴ <https://www.gov.za/documents/astronomy-geographic-advantage-act>

⁶⁴⁵[https://www.sarao.ac.za/about/astronomy-geographic-advantage-act/#:~:text=The%20Astronomy%20Geographic%20Advantage%20\(AGA,astronomy%20and%20related%20scientific%20endeavours](https://www.sarao.ac.za/about/astronomy-geographic-advantage-act/#:~:text=The%20Astronomy%20Geographic%20Advantage%20(AGA,astronomy%20and%20related%20scientific%20endeavours); <https://www.gov.za/documents/astronomy-geographic-advantage-act>

⁶⁴⁶[https://www.sarao.ac.za/about/astronomy-geographic-advantage-act/#:~:text=The%20Astronomy%20Geographic%20Advantage%20\(AGA,astronomy%20and%20related%20scientific%20endeavours](https://www.sarao.ac.za/about/astronomy-geographic-advantage-act/#:~:text=The%20Astronomy%20Geographic%20Advantage%20(AGA,astronomy%20and%20related%20scientific%20endeavours)

observations in “designated Radio Quiet Zones (RQZs)”, which was ultimately adopted.⁶⁴⁷ The study groups will explore the implications of radio interference from LEO satellites on existing radio astronomy sites, and how to safeguard them from such interference.

- **Satellites regulations**

The Independent Communications Authority of South Africa (ICASA) is the official regulator of the South African communications, broadcasting and postal services sectors.⁶⁴⁸

ICASA develops regulations for these sectors, issues licences to telecommunications and broadcasting service providers, monitors licensee compliance with rules and regulations, plans and manages the radio frequency spectrum, and protects consumers against unfair business practices and poor-quality services.

ICASA falls under Schedule 1 of the Public Finance Management Act No. 1 of 1999. Our mandate is set out in the Independent Communications Authority of South Africa Act, Act No. 13 of 2000, the Electronic Communications Act, Act No. 35 of 2005, as amended, the Postal Services Act No. 24 of 1998 and the Broadcasting Act No. 4 of 1999 for the regulation of electronic communications, broadcasting and the postal sectors in the public interest.

ICASA adopted several Radio Frequency Spectrum Assignment Plans (RFSAPs) which provide information on the requirements attached to the use of frequency bands in line with the allocation and other information in the National Radio Frequency Plan (NRFP).⁶⁴⁹

The current regulatory framework, however, does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

⁶⁴⁷ <https://www.dst.gov.za/index.php/media-room/latest-news/4131-south-africa-s-proposal-for-the-protection-of-radio-quiet-zones-was-adopted-and-approved-at-the-world-radiocommunication-conference#:~:text=The%20RQZs%2C%20referred%20to%20as,those%20emitted%20by%20broadcasting%20transmitters>.

⁶⁴⁸ <https://www.icasa.org.za/>

⁶⁴⁹ <https://www.icasa.org.za/legislation-and-regulations/radio-frequency-spectrum-plans>

63. Spain (Yana Yakushina & Christopher L. Martin)

- **Protection of dark skies**

Spain has adopted various acts to address light pollution. The Law on Air Quality and Protection of the Atmosphere⁶⁵⁰ defines light pollution as a source of atmosphere pollution and the associated Royal Decree on energy efficiency in outdoor lighting installations⁶⁵¹ specifies the lighting requirements. The purpose of the Decree is to establish the technical conditions for the design, implementation, and maintenance of outdoor lighting installations to improve energy efficiency, reduce greenhouse gas emissions, mitigate nighttime glare or light pollution and reduce intrusive or disturbing light. The latter is ensured by several measures, set per different categories of outdoor lighting installations, such as road lighting, lighting of parks and gardens, parking, etc.

Moreover, Spain has an important piece of legislation aimed at protecting the quality of dark skies for astronomical activities in the Canary Islands: The Law on Protection of the Astronomical Quality of the Observatories of the Institute of Astrophysics of the Canary Islands,⁶⁵² together with its accompanying regulation,⁶⁵³ protect the significant public investments made by Spain and other nations on astronomical facilities located in the Canary Islands. This legislation has the goal of preserving the quality of the night sky in that area, mainly by imposing very strict rules on outdoor lighting by setting several requirements, such as: (1) prevention of light emissions above the horizon; (2) lighting control; (3) curfews; (4) control of lighting spectrum; (5) luminaires and lamps certifications. The Law also restricts activities that might be a source of atmospheric pollution and degrade the quality of the local atmosphere, controls all potential sources of radioelectric contamination, and regulates air traffic over the Observatories, avoiding overflights. The Law sets up a Technical Office (OTPC) which is tasked with daily supervision and ensuring compliance with the rules. Implementation is also assured thanks to the support of the Spanish Government and the local municipalities. Spain has some other pieces of legislation on light pollution prevention at the regional level, such as in Cantabria⁶⁵⁴ and Navarra.⁶⁵⁵

- **Protection of quiet skies**

Spain has two radio quiet zones to protect astronomical observations at its two major radio telescopes, IRAM on Pico Veleta and the Yebes Observatory in Guadalajara. For IRAM, in 2009 the Spanish National State Secretariat for Telecommunications established Order 1679, “In order to ensure the efficient reception of signals from outer space and to provide protection of the instrument from radio interference”, which established various limitations on nearby property rights and electromagnetic emissions. Specifically these restrictions restrict radio transmitters

⁶⁵⁰ Ley 34/2007, de 15 de noviembre, de calidad del aire y protección de la atmósfera <https://www.boe.es/eli/es/l/2007/11/15/34/con>

⁶⁵¹ Real Decreto 1890/2008, de 14 de noviembre, por el que se aprueba el Reglamento de eficiencia energética en instalaciones de alumbrado exterior y sus Instrucciones técnicas complementarias EA-01 a EA-07 <https://www.boe.es/eli/es/rd/2008/11/14/1890>

⁶⁵² Ley 31/1988, de 31 de octubre, sobre Protección de la Calidad Astronómica de los Observatorios del Instituto de Astrofísica de Canarias. <https://www.boe.es/eli/es/l/1988/10/31/31>

⁶⁵³ Real Decreto 243/1992, de 13 de marzo, por el que se aprueba el Reglamento de la Ley 31/1988, de 31 de octubre, sobre protección de la calidad astronómica de los observatorios del Instituto de Astrofísica de Canarias. <https://www.boe.es/eli/es/rd/1992/03/13/243>

⁶⁵⁴ Ley 6/2006, de 9 de junio, de prevención de la Contaminación Lumínica. <https://www.boe.es/eli/es-cb/l/2006/06/09/6/con>

⁶⁵⁵ Ley Foral 10/2005, de 9 de noviembre, de ordenación del alumbrado para la protección del medio nocturno. <https://www.boe.es/eli/es-nc/lf/2005/11/09/10/con>

from being used within 1-5km of the telescope (depending on frequency), noise sources (e.g. high-voltage powerlines and railways) from being installed within 1km, and coordination for all transmitters over 25W within 10km.⁶⁵⁶ Similar restrictions were imposed for Yebes in the Spanish National State Secretariat for Telecommunications Order CTE/1444 of 2003. Finally the General Telecommunications Law of 2022⁶⁵⁷ has established general restrictions covering existing and future radio telescope sites that vary by frequency.

- **Satellites regulations**

While Spain has long been a member of the European Space Agency (ESA) and has had a registry of space launches since 1995, in 2023 it established⁶⁵⁸ its own independent space agency (Agencia Espacial Española, AEE). This agency is charged with coordinating the various ministries and industries that participate in the space economy, but there appears to be no particular charge for it to consider light pollution or radio frequency contamination as an issue.

⁶⁵⁶ https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-RA.2259-1-2021-PDF-E.pdf

⁶⁵⁷ Ley 11/2022, de 28 de junio, General de Telecomunicaciones
<https://www.boe.es/buscar/act.php?id=BOE-A-2022-10757> see specifically Bloque 144

⁶⁵⁸ Real Decreto 158/2023, de 7 de marzo, por el que se aprueba el Estatuto de la Agencia Estatal "Agencia Espacial Española". <https://www.boe.es/eli/es/rd/2023/03/07/158>

64. Sri Lanka (Tamara Blagojevic)

- **Protection of dark skies**

The successful launch of Sri Lanka's first communication Satellite (Supreme SAT) in 2012, from Xichang Launching center at China, has been marked the first step of Sri Lanka to enter the space sector.⁶⁵⁹ However, "Raavana 1", a cube satellite designed and developed by a team of Sri Lankan engineers, that was successfully carried to the International Space Station from NASA's Wallops Flight Facility on Wallops Island, Virginia, in February 2019, is also labelled as Sri Lanka's first satellite.⁶⁶⁰ Sri Lanka is a member of the International Academy of Astronautics.⁶⁶¹ In 2016, UNITAR's Operational Satellite Applications Programme (UNOSAT) in collaboration with the National Building Research Organisation (NBRO) of Sri Lanka conducted a training programme on "Integrated Satellite Applications for Urban Disaster Risk Reduction" with the purpose of enhancing Sri Lanka's capacity in Earth Observation applications for urban disaster risk reduction.⁶⁶² There are some government organizations and non-government Astronomical Societies which have given a hand to the rise of the Astronomy and Space Science sector that organize workshops, such as Night camps, Astronomy Quiz Competitions, and Water Rocket Competitions, to popularize Astronomy among public and students.⁶⁶³ Such organizations are the Astronomy and Space Study Centre in Sri Lanka (ASSC), the Sri Lanka Astronomical Association (SLAA),⁶⁶⁴ the Astronomical Research Institute (ARIS)⁶⁶⁵ and the Institute of Astronomy in Sri Lanka (IOAS) and some other school-based Astronomical Societies. IOAS, founded in 2018, has built Sri Lanka's modern astronomical observatory in Colombo, which includes 14" Ritchey–Chrétien telescope and is equipped with "Coronado SolarMax II 60mm" H Alpha solar telescope and the 8" Schmidt–Cassegrain telescope equipped with 8" white light solar filter.⁶⁶⁶ The 14th Sri Lankan Astronomy and Astrophysics Olympiad and the 10th Sri Lankan Junior Astronomy Olympiad were organized in 2022, by the Institute of Physics in Sri Lanka in collaboration with the Department of Physics, the University of Colombo in association with the Sri Lanka Astronomy Olympiad Association.⁶⁶⁷

Since Sri Lanka has by now ratified three main space treaties (OST, Rescue Agreement and the Liability Convention),⁶⁶⁸ along with the Nuclear Test Ban Treaty, Convention on the International Mobile Satellite Organization (IMSO), Agreement Relating to the International Telecommunications Satellite Organization (ITSO) and ITU Constitution and Convention,⁶⁶⁹ there is no visible nor clear indication of a developed national regulation of astronomical activities and

⁶⁵⁹ <https://spacegeneration.org/regions/asia/sri-lanka>

⁶⁶⁰ <https://www.srilankabusiness.com/news/raavana-1-1st-sri-lankan-satellite-to-the-space.html>

⁶⁶¹ https://www.unoosa.org/documents/pdf/copuos/2023/Statements/7_AM/13_IAA_7_June_AM.pdf

⁶⁶² <https://unitar.org/about/news-stories/news/enhancing-sri-lankas-capacity-integrating-earth-observation-applications-urban-disaster-risk>

⁶⁶³ <https://spacegeneration.org/regions/asia/sri-lanka>

⁶⁶⁴ <http://archive.astronomerswithoutborders.org/my-awb/our-current-affiliates/network.html?id=337>

⁶⁶⁵ <https://astronomers.lk/#about>

⁶⁶⁶ <https://ioas.lk/view/city-observatory>

⁶⁶⁷ <https://ipsi.lk/astronomy-olympiad/>

⁶⁶⁸ <http://ir.kdu.ac.lk/bitstream/handle/345/1396/law-044.pdf?sequence=1&isAllowed=y>

⁶⁶⁹ https://www.unoosa.org/res/oosadoc/data/documents/2023/aac_105c_22023crp/aac_105c_22023crp_3_0.html/AC105_C2_2023_CRP03E.pdf

earth observation. However, due to OST ratification, along with other space treaties, it can be said that outer space is considered an environment. Additionally, aside from acknowledging the existing risk from space debris and the Kessler syndrome in 2022, Sri Lanka hasn't yet made any statements to UNCOPUOS regarding the dark and quiet skies.⁶⁷⁰

Sri Lanka's National Environmental Act No. 47 of 1980. defines pollution as "any direct or indirect alternation of the physical, thermal, chemical, biological, or *radioactive* properties of any part of the environment by the *discharge, emission, or the deposit of wastes (...)*", and waste as "any matter prescribed to be waste and any matter, whether liquid, solid, gaseous, or *radioactive*, which is discharged, emitted, or deposited in the environment in such volume, constituency or manner as to cause an alteration (...)". Having in mind the scope of these definitions, which have not been amended by either of the subsequent Acts (National Environmental (Amendment) Act, No. 56 of 1988; and National Environmental (Amendment) Act, No. 53 of 2000.),⁶⁷¹ and neither of which explicitly mentions light pollution, light pollution can be subsumed under the umbrella of such norms solely by interpretation. The only mention of the usage of light in terms of the environment is related to unprotected animals outside protected areas, where it is prohibited to use a "light at night to dazzle or attract an animal in order to capture or hunt it".⁶⁷² Additionally, as the "environment" means the physical factors of the *surroundings* of human beings including the land, soil, water, *atmosphere*, climate, sound, odors, tastes and the biological factors of animals and plants of every description, and having in mind that Sri Lanka has ratified the OST, it can be said that outer space falls under the scope of this definition at least by interpretation. While the main National Environmental Acts remain intact, there are provisions authorizing specified government agencies to issue environmental quality criteria, standards and norms, however, only in terms of the control of air, water and waste pollution.⁶⁷³ Similarly, the 2003. National Environmental Policy and Strategies do not include or mention light pollution, rather only industrial wastes, noise, water and air pollution.⁶⁷⁴

The *National Heritage Wilderness Areas Act* (No. 3 of 1988) provides for a restriction of entry into National Heritage Wilderness Areas and prohibited acts in those areas (sect. 3),⁶⁷⁵ which, however also do not mention light pollution (including glow, glare, light trespass or excessive artificial light). Despite that, the fact that Sri Lanka has set up national parks, nature reserves and sanctuaries to prevent the destruction of forest areas,⁶⁷⁶ is a positive step towards a possible acknowledgement of dark sky reserves in the future.

Sri Lanka has a 2021 *Energy Efficiency Building Code* (EEBC) which considers lighting in building elements such as equipment, and light intensity in design, as well as covers building lighting alterations, and defines decorative, general and emergency lighting, as well as luminaries,

⁶⁷⁰ https://www.un.int/srilanka/statements_speeches/statement-mr-sugeeshawara-gunaratna-deputy-permanent-representative-sri-lanka

⁶⁷¹ <https://www.cea.lk/web/en/acts-regulations>

⁶⁷² <http://www.sacep.org/pdf/Reports-Technical/2002-UNEP-SACEP-Law-Handbook-Sri-Lanka.pdf>

⁶⁷³ <http://www.sacep.org/pdf/Reports-Technical/2002-UNEP-SACEP-Law-Handbook-Sri-Lanka.pdf>

⁶⁷⁴ <https://policy.asiapacificenergy.org/sites/default/files/National%20Environmental%20Policy%20and%20Strategies.pdf>

⁶⁷⁵ <https://faolex.fao.org/docs/pdf/srl28858.pdf>

⁶⁷⁶ <http://www.sacep.org/pdf/Reports-Technical/2002-UNEP-SACEP-Law-Handbook-Sri-Lanka.pdf>

visual light transmission and lighting power density.⁶⁷⁷ Similarly to Egypt, the objective of building envelopes are thermal considerations and natural light prioritization and the reduced need for artificial light.⁶⁷⁸ Some provisions referring to lighting requirements provide that all spaces shall meet the required illuminance levels, and that interior lighting of buildings larger than 500 m² shall be controlled by an automatic control device with manual override to shut off lighting in all spaces based on time-of-day or automatic alarm or security system signal, providing for a space control device to independently control space lighting (e.g. manually or timer control installed to shut off lights within 15 minutes after all occupants leave listed public space), and automatic daylighting control, that the exterior lighting shall be controlled by an automatic lighting controller based on a timer or daylight sensor, providing for the allowable exterior building lighting power, prescribing interior lighting power allowance, and so on.⁶⁷⁹ When it comes to lamps for general lighting compliance with minimum energy performance specified by Sri Lanka Standards Institute (SLSI) standards,⁶⁸⁰ is required.⁶⁸¹ However, neither the EEBC nor other earlier programmes and initiatives (listed in 2009).

Sri Lanka Country Report on Energy Efficiency Improvement & Conservation⁶⁸²) focus directly on light pollution mitigation, and mainly still prioritize CFL and LED-related lighting solutions and energy efficiency. Despite the mentioned, the new 2022. Green Building Rating System version 2.0 (GREENSL), does account for light pollution reduction in sustainable sites, and considers light as a factor for lighting and comfort controls in terms of indoor environmental quality, daylight views, public safety and health, and acknowledges fluorescent lighting as a sort of mercury-containing hazardous waste, for which appropriate measures for storage and disposal are provided.⁶⁸³ The GREENSL defines the intent for reducing light pollution as to minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce development impact on nocturnal environments.⁶⁸⁴ It also provides requirements for interior and exterior lighting and distinguishes the latter per specific light zones (LZ).⁶⁸⁵

⁶⁷⁷ *Energy Efficiency Building Code of Sri Lanka*, Sri Lanka Sustainable Energy Authority No. 72, Ananda Coomaraswamy Mawatha, Colombo 07, Sri Lanka, 2021, <https://www.energy.gov.lk/images/resources/downloads/energy-efficiency-building-code.pdf>

⁶⁷⁸ Ibid page 17.

⁶⁷⁹ Ibid. page 73 – 80.

⁶⁸⁰ See, for example, Energy Labeling, Sri Lanka Standards Institute (SLSI), <https://slsi.lk/web/services/energy-labeling/>

⁶⁸¹ Ibid page 76.

⁶⁸² Harsha Wickramasinghe, *SRI LANKA COUNTRY REPORT ON ENERGY EFFICIENCY IMPROVEMENT & CONSERVATION*, <https://www.saarcenergy.org/wp-content/uploads/2016/02/SriLankaCountryReport.pdf>

⁶⁸³ *GREENSL® RATING SYSTEM FOR NEW CONSTRUCTIONS*, Version 2.1, Green Building Council of Sri Lanka, Feb 2022, <https://www.srilankagbc.org/wp-content/uploads/2022/08/Green-Building-Rating-System-Version-2.1-FINAL-25-02-2022-1.pdf>

⁶⁸⁴ Ibid, pages 27 and 28.

⁶⁸⁵ Ibid. page 28.

- **Protection of quiet skies**

When it comes to spectrum planning, TRCSL takes into account the changing needs of society and secure opportunities that match existing demands with new ones through innovative uses of technology when formulating the spectrum plans.⁶⁸⁶ The spectrum planning supports the development of radio communication services by enabling new forms of use of radio frequencies and allowing current users to optimize the benefits gained from the available.⁶⁸⁷ The Sri Lankan National Frequency Allocation Table (NFAT) is derived from the international frequency allocations of Article 5 of the International Telecommunication Union (ITU) Radio Regulations. and is also consistent with regional allocations.⁶⁸⁸ As per data available from the Telecommunication Regulatory Commission (TRCSL), the current NFAT in force in Sri Lanka dates from 2023, and it provides provisions that protect against harmful interference.⁶⁸⁹ The TRCSL is responsible for developing the policies and criteria for the assignment of radio frequency spectrum.⁶⁹⁰

However, within the national framework, no other specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

Frequency coordination is a technical and regulatory process which is intended to remove /mitigate radio frequency interference between different radio systems which utilise the same frequency for operations.⁶⁹¹ TRCSL carries out national frequency co-ordination to ensure harmonious sharing of frequencies by various users and services. It also performs international and regional frequency co-ordination to avoid harmful interference of frequency users in different administrations.⁶⁹² Frequency assignments, which are capable of causing interference to neighboring countries, are regularly submitted to the ITU's Radiocommunication Bureau for purposes of coordination with other countries and then registered in the Master International Frequency Register.⁶⁹³ The telecom services that require license are specified in the Table No.4 "Frequency Licence" - The use of radio equipment requires a license under Section 22 of the Sri Lanka Telecommunications Act.⁶⁹⁴ Other rules on frequency licensing are provided on the TRCSL website.⁶⁹⁵ The deployment of Outdoor Wireless Local Area Networks (WLAN) in 2.4GHz and 5GHz is governed by Regulatory Guidelines for the Use of 2.4 GHz and 5GHz Bands to Deploy Outdoor Wireless Local Area Networks (WLAN).⁶⁹⁶

When it comes to Fixed Satellite Communication Service specifically, the TRCSL provides the following:

⁶⁸⁶ [Spectrum Planning \(trc.gov.lk\)](https://www.trc.gov.lk/spectrum/planning)

⁶⁸⁷ [Spectrum Planning \(trc.gov.lk\)](https://www.trc.gov.lk/spectrum/planning)

⁶⁸⁸ https://www.trc.gov.lk/spectrum/pages_e.php?id=111

⁶⁸⁹ [FINALRadioFrequencySL.pdf](#)

⁶⁹⁰ [Frequency Assignments \(trc.gov.lk\)](https://www.trc.gov.lk/frequency/assignments)

⁶⁹¹ [Frequency Assignments \(trc.gov.lk\)](https://www.trc.gov.lk/frequency/assignments)

⁶⁹² [Frequency Assignments \(trc.gov.lk\)](https://www.trc.gov.lk/frequency/assignments)

⁶⁹³ [Frequency Assignments \(trc.gov.lk\)](https://www.trc.gov.lk/frequency/assignments)

⁶⁹⁴ <https://www.trc.gov.lk/2014-06-09-09-55-30/2014-07-15-04-54-15/2014-05-13-12-24-49.html>

⁶⁹⁵ [Frequency Licensing \(trc.gov.lk\)](https://www.trc.gov.lk/frequency/licensing)

⁶⁹⁶ <https://www.trc.gov.lk/content/files/spectrum/RegulatoryGuidelinesForOutdoorWLAN.pdf>

- The equipment of the Fixed Satellite Communication Service shall comply with the technical requirements of the satellite operator and the NFAT of the Commission.
- The deployment of fixed satellite communication systems in areas around the airports may not be permitted in order to protect airport avionics.
- The transportable satellite communication system shall comply with ITU radio regulations, the technical requirements of the satellite operator and the NFAT of the Commission.⁶⁹⁷

Additionally, the current regulatory framework does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

⁶⁹⁷ [Satellite Services \(trc.gov.lk\)](http://trc.gov.lk)

65. Sweden (Andrew Falle)

- **Protection of dark skies and astronomy**

Sweden's Act on Space Activities (1982:963) provides a narrow definition of "space activity" that would likely exclude astronomical activities. Section 1 of the Act states that it "applies to activities in outer space (space activities)," and in addition to that "the launching of objects into outer space and all measures to maneuver or in any other way affect objects launched into outer space." Activities that "merely receive signals or information in some other form from objects in outer space" are excluded.⁶⁹⁸

Protective measures for astronomy are present to a degree. The astronomy research at the Onsala Space Observatory (the Swedish National Infrastructure for Radio Astronomy), located in western Sweden, is protected from outside interference under the *Act of Protection of Research to Disturbance (2006:449)* by the authority of the Country Administration of Halland.⁶⁹⁹ Under the law "it is prohibited for outsiders to use radio transmitters, drive motorized vehicles or use other technical equipment in a way that interferes with research"⁷⁰⁰. Furthermore, access to the area is limited to employees, invited guests, deliveries, and those with permission.⁷⁰¹

In terms of other legislation, Sweden's *Planning and Building Act (2010:900)* and *Environmental Code (2000:61)* empower municipalities and the Swedish government to regulate light pollution to some degree, including during construction, with transportation, and as a means of protecting the environment.⁷⁰² Chapter 4, Section 12 of the Planning and Building Act (2010) allows municipalities to determine the maximum permissible value of disturbance from light during construction within development plans.⁷⁰³ Chapter 6 of the Act covers "building permits for outdoor signs and light source facilities",⁷⁰⁴ enabling restrictions to be implemented for the setting up, relocating or changing of "outdoor signs or light source facilities within an area that constitutes a valuable environment."

Sweden's Environmental Code (2000) was established to protect human health and the environment against "damage and detriment" from environmentally hazardous activities. Chapter 9 of the Code defines "any use of land, buildings or structure that may cause a detriment to the surroundings due to noise, vibration, light, ionizing or non-ionizing radiation or similar impact" as "environmentally hazardous activities."⁷⁰⁵ Furthermore, Chapter 5 of the Code empowers the government to enact environmental quality standards that clarify acceptable levels of pollution or disturbance, which includes the "maximum levels for noise, vibration, light, radiation or other such

⁶⁹⁸ https://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/sweden/decreed_on_space_activities_1982E.html

⁶⁹⁹ https://www.riksdagen.se/sv/dokument-och-lagar/dokument/svensk-forfattningssamling/lag-2006449-om-skydd-for-storningskanslig_sfs-2006-449/

⁷⁰⁰ https://www.riksdagen.se/sv/dokument-och-lagar/dokument/svensk-forfattningssamling/lag-2006449-om-skydd-for-storningskanslig_sfs-2006-449/

⁷⁰¹ <https://www.chalmers.se/en/infrastructure/oso/about-onsala-space-observatory/restricted-access/>

⁷⁰² [https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/\\$FILE/Light_pollution_reduction_measures.pdf](https://www.mzp.cz/C1257458002F0DC7/cz/news_20221027-/$FILE/Light_pollution_reduction_measures.pdf)

⁷⁰³ https://cdn.climatepolicyradar.org/navigator/SWE/2010/planning-and-building-act-2010-900_20b0e9f222ed5977ddd444ed9ee07e7b.pdf

⁷⁰⁴ https://climate-laws.org/documents/planning-and-building-act-2010-900_aed7

⁷⁰⁵ <https://www.government.se/contentassets/be5e4d4ebdb4499f8d6365720ae68724/the-swedish-environmental-code-ds-200061/>

impacts”.⁷⁰⁶

Consideration of light pollution is also present in the Swedish transportation decree. Standards for road lighting and design contain light pollution mitigation requirements.⁷⁰⁷ Section 4, Part 7, of the Swedish Transport Agency's regulations and general advice on property requirements for roads, streets, tramways and subways (building regulations) (2021)⁷⁰⁸ includes suggestions for limiting light pollution to protect animal life that is particularly sensitive: *“In order to reduce negative effects on animal life, lighting must be designed such that light pollution (artificial light that produces an unwanted effect) is limited. Common advice Light pollution that affects light-sensitive and endangered or protected species should be limited in particular.”*⁷⁰⁹

- **Protection of quiet skies**

Sweden's *Act on Protection for Interference-Sensitive Research* (2006)⁷¹⁰ includes protections for research that could be impacted by radio interference. The Act states that individuals conducting activities that may cause “interference with research” are required to “take reasonable precautions to counteract such interference.” Specific to radio interference, the Act notes that “(i) a research area with interference protection, it is prohibited for outsiders to use radio transmitters, drive motorized vehicles or use other technical equipment in a way that interferes with research, without permission...”

- **Satellites regulations**

Satellite operators broadcasting in Sweden are likely restricted under some requirements in the Act on Electronic Communications (2003).⁷¹¹ Operators are required to receive Licenses which are issued by the Swedish Post and Telecom Authority (PTS).⁷¹²

Further research into national regulations and policies is necessary to identify specific norms related to the prevention of interference of satellites in astronomical observations.

⁷⁰⁶ <https://www.government.se/contentassets/be5e4d4ebdb4499f8d6365720ae68724/the-swedish-environmental-code-ds-200061/>

⁷⁰⁷ <http://trafikverket.diva-portal.org/smash/get/diva2:1621302/FULLTEXT03.pdf>

⁷⁰⁸ https://www.transportstyrelsen.se/TSFS/TSFS%202021_122k.pdf

⁷⁰⁹ From translation

⁷¹⁰ https://www.riksdagen.se/sv/dokument-och-lagar/dokument/svensk-forfattningssamling/lag-2006449-om-skydd-for-storningskanslig_sfs-2006-449/

⁷¹¹ https://www.riksdagen.se/sv/dokument-och-lagar/dokument/svensk-forfattningssamling/lag-2003389-om-elektronisk-kommunikation_sfs-2003-389/

⁷¹² <https://www.pts.se/contentassets/9c36a82ef432455181925b1d47bd3746/ansokan-med-bilaga---eng---jordstation.pdf>

66. Switzerland (Tiffany Nichols)

- **Protection of dark skies**

Switzerland currently does not have a national law governing light pollution. Since the country lies in the middle of major light-producing countries, the government has expressed concern for light pollution. This resulted in a report entitled “Recommendations for avoiding light pollution” (*Empfehlungen zur Vermeidung von Lichtemissionen*). The report does list concerns for preserving astronomy-related observations, but the examples are focused on ground-based light pollution.⁷¹³

- **Protection of quiet skies**

Further research into national regulations and policies is necessary to identify specific norms applicable to protecting quiet skies for astronomical observations.

- **Satellites regulations**

Further research into national regulations and policies is necessary to identify specific norms related to the prevention of interference of satellites in astronomical observations.

⁷¹³ Vollzugshilfe «Empfehlungen zur Vermeidung von Lichtemissionen», https://www.bafu.admin.ch/dam/bafu/de/dokumente/elektrosmog/uv-umwelt-vollzug/empfehlungen-zur-vermeidung-von-lichtemissionen.pdf.download.pdf/UV-2117-D_Lichtemissionen.pdf

67. Thailand (Rayan Khan)

- **Protection of dark skies**

Thailand has a comprehensive legal framework in place for the enhancement and conservation of environmental quality, as outlined in the *National Environmental Quality Act, B.E. 2535 (1992)*.⁷¹⁴ This act provides a clear definition of pollutants, encompassing a wide range of substances and environmental factors that could impact environmental quality and public health.

"Pollutant" means wastes, hazardous materials, and other polluting substances as well as residues, sediments or the remainder of such matters, which are discharged from sources of pollution or naturally occur in the environment, that produce or may produce impacts on environmental quality or cause poisonous or harmful conditions to the health and the hygiene of the population, and shall include radiation, heat, *light*, noise, odour, vibration or other nuisances emanated or discharged from sources of pollution.

Based on the provided definition, it can be concluded that within the regulatory framework, "pollutant" encompasses a broad range of substances, including wastes, hazardous materials, and other polluting substances, as well as residues, sediments, or any remnants discharged from sources of pollution or occurring naturally in the environment. This definition extends to factors such as radiation, heat, light, noise, odor, vibration, or other nuisances emanating from sources of pollution, all of which have the potential to impact environmental quality and create conditions detrimental to the health and hygiene of the population.

However, no specific regulations on light pollution reductions were identified.

- **Protection of quiet skies**

The *National Spectrum Management Handbook for Thailand*⁷¹⁵, 2012 edition, provides guidance on frequency allocations within the country. It highlights the importance of coordination for the use of the 2 483.5-2 500 MHz band by mobile-satellite and radiodetermination-satellite services to prevent harmful interference to the global radio astronomy service, particularly from second-harmonic radiation reaching the 4 990-5 000 MHz band.

Additionally, administrations are urged to protect the band 1 660.5-1 668.4 MHz for future radio astronomy research by phasing out air-to-ground transmissions in the meteorological aids service within the 1 664.4-1 668.4 MHz band. Mobile earth stations operating in the 1 660-1 660.5 MHz band must ensure they do not cause harmful interference to stations in the radio astronomy service, as mandated by WRC-97 regulations.

However, within the national framework, no specific provisions that directly or indirectly address issues related to the protection of quiet skies were identified.

- **Satellites regulations**

No specific provisions on regulating satellite activities relevant to the protection of D&QS were identified.

⁷¹⁴ http://web.krisdika.go.th/data/document/ext809/809866_0001.pdf

⁷¹⁵ [Thailand Table of Frequency Allocation \(2012\)](#).

68. Tunisia (Anne-Sophie Martin)

- **Protection of dark skies**

Tunisia adopted different laws and decrees providing technical specifications for lamps, luminaires and power regulators for public lighting installations.⁷¹⁶

Luminaires must comply with Tunisian Standards NT 87.82 (General requirements and tests) and NT 87.31 (Special rules for public lighting). If the installation of a public lighting network creates risks for the environment or heritage, the following laws apply: a) Law no. 91-362 of 13 March 1991 on environmental impact studies,⁷¹⁷ amended and supplemented by decree no. 2005-1991 of 11 July 2005 on environmental impact studies and setting out the categories of units subject to specifications; b) Heritage Code (Art. 68 and 69 of law 94-35 on the protection of historic monuments and natural and urban sites).

In 2022, Tunisia established minimum energy performance standards (MEPS) and labels for energy-efficient lighting with the Tunisian National Agency for Energy Management, and the United Nations Environment Programme's United for Efficiency (UNEP-U4E).⁷¹⁸

There are various astronomical communities in Tunisia in addition to the Tunis Science City, Monastir Sciences Palace and various astronomical clubs which organise various events such as The Night of the Stars, Asteroid Day, Astrophotography Training, Workshops, Symposiums, and more for the science community and the general public.

- **Protection of quiet skies**

Tunisia has adopted the Law n.2001-1 of 15 January 2001 promulgating the Telecommunications Code,⁷¹⁹ modified in 2008.⁷²⁰ It is also worth mentioning Decree No. 95-2082 of 23 October 1995, amending and supplementing Decree No. 88-2001 of 12 December 1988⁷²¹ laying down the procedures for issuing authorisations and the conditions for the installation and operation of individual or collective earth stations for the reception of satellite television signals.

In 2002, the country adopted the Order of the Minister for Communication Technologies of 11 February 2002,⁷²² approving the national radio frequency plan. The Act deals with satellite frequency regulation.

However, within the national framework, no other specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

In 2021, Tunisia launched its first satellite through the *Tunisian Space Association* (TUNSA). However, there are no specific rules on satellite regulation or registration requirements. So, it is necessary to put in place an appropriate legal and institutional framework to effectively manage and regulate the national space programme. Additionally, current legislation does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

⁷¹⁶ https://www.res4med.org/wp-content/uploads/2017/11/Country-Profile-Tunisia-Report_05.12.2016.pdf

⁷¹⁷ http://www.marchespublics.gov.tn/onmp/upload/documents/decret_362_fr_1991.pdf

⁷¹⁸ <https://united4efficiency.org/tunisia-moves-closer-to-a-50-saving-on-lighting-energy/>;

⁷¹⁹ https://www.mtc.gov.tn/fileadmin//user_upload/Loi2001_1.pdf

⁷²⁰ https://www.researchictafrica.net/countries/tunisia/Completant_Code_des_Telecommunications_no_1_2008.pdf

⁷²¹ https://www.mtc.gov.tn/fileadmin//user_upload/Journal0871995.pdf

⁷²² http://www.intt.tn/upload/txts/fr/arrete_102.pdf

69. Türkiye (Rayan Khan)

- **Protection of dark skies**

There is no specific regulatory framework dedicated to addressing light pollution in Türkiye. Instead, the prevailing regulations primarily pertain to energy savings and efficiency.⁷²³ In accordance with Türkiye's environmental protection regime, individuals or entities engaging in activities with the potential to cause harm to the environment are obligated to implement suitable measures to avert environmental damage.

In a study conducted by the *Turkish Healthy Cities Association*, it was revealed that excessive and unnecessary illumination of unoccupied areas results in a wastage of approximately TL 400 million worth of energy annually. Moreover, within the province of Bursa alone, this figure amounts to TL 21 million. Consequently, to address this issue, Metropolitan Mayor Alinur Aktaş initiated the "*Bursa Light Pollution Research Project*".⁷²⁴

- **Protection of quiet skies**

*Türkiye's Information and Communication Technologies Authority*⁷²⁵, emphasizes the importance of protecting the radio astronomy service from harmful interference. It highlights the need for administrations to safeguard against interference, particularly from emissions of spaceborne or airborne stations, in specified frequency bands. Measures include taking steps to mitigate interference in mobile-satellite and maritime mobile-satellite service frequency bands, as per Recommendation ITU-R RA.769.

- **Satellites regulations**

No specific provisions relevant to the protection of D&QS, such as technical requirements for satellites, were identified.

⁷²³ Mondaq. (2021). Environment and Climate Regulation: Comparative Guide. Retrieved from <https://www.mondaq.com/turkey/environment/1131032/environment-and-climate-regulation-comparative-guide#:~:text=There%20is%20no%20specific%20regulation,any%20damage%20to%20the%20environm ent>

⁷²⁴ Daily Sabah. (2023). Enlightened: Light Pollution Costs Turkey TL 400M Yearly. Retrieved from <https://www.dailysabah.com/life/environment/enlightened-light-pollution-costs-turkey-tl-400m-yearly>

⁷²⁵ <https://www.btk.gov.tr/uploads/pages/itu-rr-dipnotlari-23012023.pdf>

70. Ukraine (Oleksandra Ostapenko)

- **Protection of dark skies**

Light pollution is equated with other types of pollution such as noise, heat, radiation pollution, etc. The light pollution assessment is regulated by Ukrainian law about environmental impact assessment.⁷²⁶ Illumination in Ukraine is controlled by the Order of the Ministry of Regional Development, Construction and Housing and Utilities of Ukraine 03.10.2018 No. 264.⁷²⁷

Astronomical activity is not explicitly mentioned in this context however protection of dark skies can be considered as a part of green areas (parks, squares, forest parks) and light regulations. Also, since 2008 there has been a governmental scientific and technical program "Development and implementation of energy-saving LED light sources and lighting systems based on them".⁷²⁸ Moreover, there are ongoing initiatives to protect D&QS. The biggest one is the Nature Protecting Group (NPG),⁷²⁹ a public organization that creates protected areas, works on improving legislation, identifies cases of illegal destruction of nature, and conducts educational work. One of the directions of NPG work is mitigation of light pollution.

- **Protection of quiet skies**

Ukraine has a National Commission for State regulation in the fields of electronic communications, radio frequency spectrum and the provision of postal communication services which regulates the access to radio frequency spectrum.⁷³⁰ The legal act of allocation of radio frequency bands to radio services in Ukraine determines the special and general use of radio frequency bands.⁷³¹ Also, Ukraine is a member of the International Union of Radio Science that supports activities on the protection of radio astronomical observations from harmful interference.⁷³²

However, within the national framework, no specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

Space activity in Ukraine is regulated based on the law on Space activity.⁷³³ In 2019, the document was modified to provide that subjects of space activity can be enterprises, institutions and organizations of any form of ownership and organizational and legal form. From that time, according to the law, private entities that want to carry out space activities must submit a declaration of economic activity to the relevant central executive body. The law provides for the introduction of permits for certain types of space activities. Such as, in particular: tests and launches of carrier rockets, and control of spacecraft in Earth orbit or in outer space. The draft law is aimed at ensuring development, increasing investment attractiveness, as well as creating a competitive environment for the development of the space industry in Ukraine alongside the state sector of privately owned enterprises.

⁷²⁶ Law of Ukraine on Environmental Impact Assessment <https://zakon.rada.gov.ua/laws/show/2059-19#Text>

⁷²⁷ Order of the Ministry of Regional Development, Construction and Housing and Utilities of Ukraine 03.10.2018 No. 264 <https://zakon.rada.gov.ua/laws/show/z1111-20#Text>

⁷²⁸ <https://www.kmu.gov.ua/npas/145204787>

⁷²⁹ <https://uncg.org.ua/riven-svitlovoho-zabrudnennia/>

⁷³⁰ <https://nkrzi.gov.ua/index.php?r=site/index&pg=55&language=uk>

⁷³¹ <https://www.kmu.gov.ua/npas/25976178>

⁷³² <https://www.ursi.org/commission.php?id=i>

⁷³³ https://www.unoosa.org/documents/pdf/spacelaw/national/law_on_space_activityU.pdf

Although there is no mention about outer space as the environment in the law of Ukraine about environmental protection⁷³⁴, Ukrainian lawyers and law researchers emphasized that outer space should be included in environmental regulations⁷³⁵. Space debris mitigation is also considered. Thus, State Enterprise "Pivdenne Design Bureau Named By M.K. Yangel" is developing a prototype of a space debris disposer.^{736 737}

Additionally, current legislation does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

⁷³⁴ <https://zakon.rada.gov.ua/laws/show/1264-12#Text>

⁷³⁵ [Outer space as the environment.](#)

⁷³⁶ https://space.com.ua/wp-content/uploads/2023/10/AKV-2023-3_.pdf

⁷³⁷ <https://www.mao.kiev.ua/biblio/jscans/knit/2021-27/knit-2021-27-3-04-vasiliev.pdf>

71. United Arab Emirates (Tamara Blagojevic)

- **Protection of dark skies**

As per the news article from 2013, In Abu Dhabi, the environmental services team at the Tourism Development & Investment Company (TDIC) monitors and audits properties on Saadiyat Island so that lights do not cause endangered Hawksbill sea turtles to head away from the sea.⁷³⁸ Additionally, during nesting season, lighting at night is dimmed to facilitate the conservation of baby turtles that hatch along Saadiyat Beach, and certain manufacturers have also spent years trying to minimize light pollution with their fixtures within urban centers.⁷³⁹ Light pollution is also considered as one of the factors in the Marine Policy Brief.⁷⁴⁰ The UAE Federal Law No. 24 of 1999 on environmental protection and development, explicitly lists *glare* among other pollutants (Polluting materials and factors that this law defines: Any solid, liquid, gaseous, smoke, vapor, odor, noise, *radiation*, heat, *glare (glow)*, or vibration produced naturally or by human action that lead directly or indirectly to pollution and deterioration of the environment or harm to humans or living organisms).⁷⁴¹ Additionally, this law aims to ensure the protection and conservation of the quality and natural balance of the environment as well as to control all forms of pollution and avoid any immediate or long-term harmful effects resulting from economic, agricultural and industrial developments, which allows for scope to include light pollution.⁷⁴²

More recently, and as per the UAE Green Building Regulations (applicable to buildings built or renovated after 2018), there are specific rules prescribed on Neighbourhood Pollutions, regarding Exterior Light Pollution and controls.⁷⁴³ The UAE National Climate Change Plan 2017-2050⁷⁴⁴ notes results in improvements in energy efficiency as a priority. Dubai is implementing its Clean Energy Strategy 2050, with its key initiatives in energy efficiency revolving around, among else, green building regulations and retrofits, and standards and labels for appliances and lighting systems.⁷⁴⁵ When it comes to public lighting, Abu Dhabi has issued the first specifications for public lighting in the Middle East, with estimated energy savings of 67% and carbon savings of 80% compared to current practices and technologies.⁷⁴⁶ As per the Abu Dhabi Lighting Manual, all project submissions at the Detail Design Stage are required to include the Light Pollution Mitigation Report and prove compliance with the applicable set limits for the project zone and

⁷³⁸ <https://www.thenationalnews.com/business/time-to-switch-approach-to-light-pollution-1.596160>

⁷³⁹ Ibid.

⁷⁴⁰ <https://www.moccae.gov.ae/assets/download/2898d594/Red%20List%20of%20Herpetofauna%20-%20Policy%20Brief%202019.pdf.aspx>

⁷⁴¹ https://elaws.moj.gov.ae/UAE-MOJ_LC-Ar/00_%D8%A8%D9%8A%D8%A6%D8%A9/00_%D8%AD%D9%85%D8%A7%D9%8A%D8%A9%20%D8%A7%D9%84%D8%A8%D9%8A%D8%A6%D8%A9%20%D9%88%D8%AA%D9%86%D9%85%D9%8A%D8%AA%D9%87%D8%A7/UAE-LC-Ar_1999-10-17_00024_Kait.html?val=AL1

⁷⁴² <https://www.iea.org/policies/12299-uae-federal-law-no-24-of-1999-on-the-protection-and-development-of-the-environment>

⁷⁴³ https://www.dm.gov.ae/wp-content/uploads/2018/01/05_ENG_DCL_LawsLegislation_EngineeringSection_GreenBuildingRegulation.pdf Chapter 3.

⁷⁴⁴ <https://www.moccae.gov.ae/assets/30e58e2e/national-climate-change-plan-for-the-united-arab-emirates-2017-2050.aspx>

⁷⁴⁵ Ibid.

⁷⁴⁶ Ibid.

evening/night time periods.⁷⁴⁷ This Manual includes information on the purpose and impacts of roadway lighting levels, acceptable arrangements of lighting poles and fixtures, priority and associated aspects of roadway lighting such as designing with reducing light pollution in mind.⁷⁴⁸

When it comes to remote sensing, environmental, and Earth Observation satellites, UAE has several projects and initiatives: DubaiSat-1, DubaiSat-2, KhalifaSat, MeznSat, DMSat, and MBZSat (currently being developed).⁷⁴⁹ The UAE also has 6 planetariums, with 3 in Dubai (Children's City Science Center, Dubai Mall, and the GEMS World Academy School), and 3 in Sharjah (Sharjah Center for Astronomy and Space Sciences, Sharjah Planetarium, and the Sharjah Science Museum Sharjah).⁷⁵⁰ Al Sadeem Astronomy Observatory is the first Observatory built in UAE, located in the desert (heart) of Al Wathba South in the capital - Abu Dhabi.⁷⁵¹ However, there are also the Al Sadeem, and Kamal Observatories in Abu Dhabi, the Sharjah Observatory,⁷⁵² and a list indicating that there is a total of 20 observatories across UAE.⁷⁵³

- **Protection of quiet skies**

The Telecommunications and Digital Government Regulatory Authority (TDRA) is the body responsible for managing and regulating the Radio Spectrum in the UAE as per the Telecom Law. Regulations of the Radio Spectrum include: Allocating and assigning spectrum for all Radio services; Coordinating the spectrum and applying enforcement on the spectrum; and Representing the UAE in all international and regional forums related to the telecommunications sector.

The UAE had its National Frequency Allocation Chart,⁷⁵⁴ and its National Frequency Plan, both dating from 2020.⁷⁵⁵

The Space Services Policy regulates the Space Sector Management in its Article (4) 4.1 which provides that the TRA, as the national ICT regulator, facilitates the space sector through, among else, the registration of Satellite Networks and Systems and orbital positions in the ITU; frequency coordination with different entities and international administrations; fulfilling operators' requirements for spectrum authorizations within the UAE; providing the required regulatory framework for Space Services in the UAE; taking appropriate action to remedy instances of Harmful Interference; providing clarity and direction regarding the applicable regulations/processes that apply to Space Services; ensuring an open and transparent consultation and decision process for any amendments or new proposals for the regulation of the

⁷⁴⁷ <https://jawdah.qcc.abudhabi.ae/en/Registration/QCCServices/Services/STD/ISGL/ISGL-LIST/PR-402.pdf>

⁷⁴⁸ Ibid.

⁷⁴⁹ https://www.unoosa.org/documents/pdf/copuos/2022/Statements/7JuneAM/12_UAE_6_June_PM.pdf

⁷⁵⁰ <https://www.go-astronomy.com/planetariums-global.php?Country=UAE>

⁷⁵¹ https://www.tripadvisor.com/Attraction_Review-g294013-d12423223-Reviews-Al_Sadeem_Astronomy-Abu_Dhabi_Emirate_of_Abu_Dhabi.html

⁷⁵² <https://airmass.org/observatories>

⁷⁵³ <https://www.fastbase.com/countryindex/United-Arab-Emirates/O/Observatory>

⁷⁵⁴ <https://tdra.gov.ae/-/media/About/Licensees---Licenses/Updated-spectrum-and-radiation-documents/National-Frequency-Allocation-Chart.ashx>

⁷⁵⁵ <https://tdra.gov.ae/-/media/About/regulations-and-ruling/EN/UAE-National-Frequency-Plan-new-2020-En-pdf.ashx>

space services; adopting approaches that will, as far as possible, allow for future developments in Space Services, including new frequency bands.⁷⁵⁶

However, within the national framework, no other specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

- **Satellites regulations**

Under the UAE Federal Law No. 12 of 2019, on the Regulation of the Space Sector, certain space activities are enumerated, such as navigation, remote sensing and earth observation, space object monitoring and tracking, as well as specifically scientific space exploration, experiments and participating in astronomical activities are included.⁷⁵⁷ Additionally, results of potential space collisions and space debris are also considered in planning and space debris mitigation measures.⁷⁵⁸ According to the law, no one may own a space object, carry out or participate in space activities, or establish, use or possess related space facilities without obtaining a permit from the UAE Space Agency. The law covers the role of the UAE Space Agency as the federal entity in charge of regulating the space sector.⁷⁵⁹

[UAE National Space Policy](#) also has a special section on the promotion of a safe and stable space environment and sustainable space activities, while also acknowledging the threat created by the proliferation of space debris, which could also imply that outer space is accepted as a type of environment. The policy also recognizes that environment, climate and desertification monitoring are essential for the sustainable development of the UAE. Additionally, the important role of earth observation and astronomy is recognized in the section on conducting scientific space missions. The Policy also includes a section on “Active Management of Radiofrequency and Satellite Orbital Resources”. The allocation of radiofrequency and orbital slots is essential for space operations and services. The UAE Space Agency, in collaboration and coordination with the relevant government authorities and domestic space industry, shall: Promote radiofrequency spectrum allocation and orbital assignments that support UAE's present and future needs of governmental, scientific and commercial space activities; Support international cooperation, research and technology that support efficient and rational use of radiofrequency spectrum and orbital slots; and Develop capabilities and procedures to resolve the issues of radio frequency interference, locate its origins and mitigate its impacts.

The UAE [National Space Strategy](#) focuses on implementing the policy and is concerned with the UAE space industry and space activities (including scientific) for the period from 2018-2030. The UAE Space Agency ensures compliance with the UAE Federal Law no 12, its Regulations and the Space Debris Mitigation Plan, from the side of the operators.⁷⁶⁰ The Space Debris Mitigation Guidelines appear to apply to the listed space activities from the UAE Federal

⁷⁵⁶ <https://tdra.gov.ae/-/media/About/regulations-and-ruling/EN/Space-Services-Policy-V1-0-pdf.ashx>

⁷⁵⁷ As per article 4.

⁷⁵⁸ <https://www.moj.gov.ae/assets/2020/Federal%20Law%20No%2012%20of%202019%20on%20THE%20REGULATION%20OF%20THE%20SPACE%20SECTOR.pdf.aspx>

⁷⁵⁹ <https://www.moj.gov.ae/assets/2020/Federal%20Law%20No%2012%20of%202019%20on%20THE%20REGULATION%20OF%20THE%20SPACE%20SECTOR.pdf.aspx>

⁷⁶⁰ <https://space.gov.ae/Documents/PublicationPDFFiles/POLREG/SpaceDebrisMitigationGuidelines-EN.pdf>

Law no12.⁷⁶¹ The UAE has launched several satellites which are currently orbiting around the world. Some of them are DubaiSat 1 (launched in 2009); DubaiSat 2 (launched in 2013); Al Yah 1 (launched in 2011); Al Yah 2 (launched in 2012); Al Yah 3 (launched in 2018); KhalifaSat (launched in 2018) and Nayif-1 (launched in 2017).

A publication on the regulatory framework on the registration of space objects contains the definition of space activities: “Activities that target the Identified Area, including its discovery, making an impact thereon, using, or utilizing it, in accordance with the provisions of Article (4) of the Law”.⁷⁶² This regulation also defines operators as “A Person who carries out Space Activities, Space-Support Flight activities, High-altitude Activities, Space data management and dissemination activities, or any other relevant activities subject to this Law”. It also includes provisions on establishing the national registry as well as obligations of operators, among which, aside from providing updated and accurate information under Article 4 to the Registry, informing the Registry (...) of any information related to the potential risks to the Space Object, are also included.⁷⁶³

Additionally, the current regulatory framework does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

⁷⁶¹ <https://space.gov.ae/Documents/PublicationPDFFiles/POLREG/SpaceDebrisMitigationGuidelines-EN.pdf>

⁷⁶² <https://space.gov.ae/Documents/PublicationPDFFiles/POLREG/SpaceObjectsReg-EN.pdf>

⁷⁶³ <https://space.gov.ae/Documents/PublicationPDFFiles/POLREG/SpaceObjectsReg-EN.pdf>

72. United Kingdom (Tiffany Nichols)

- **Protection of dark skies**

Light pollution in the United Kingdom is mainly protected through the *Clean Neighbourhoods and Environment Act of 2005* under the concept of “statutory nuisance lighting.”⁷⁶⁴ The standards implementing such protection are found in the *Society of Light and Lighting (SLL) Code for Lighting 2022*. This form of nuisance can either be *light trespass* or *sky glow*. The limitations of light trespass come in that claims can only be made through individuals in specification locations. The typical source is road lighting shown into home spaces that are typically designated as dark spaces at night. These claims are usually avoided by planning and remedied by shielding of the light. Claims involving separation distance from the source and the affected party are permitted in sky glow claims. These sky glow claims are rooted in a group of individuals with a “professional interest” in dark skies. The specific group example given is optical astronomers. Amateur astronomers can also make such claims. Under sky glow, “light pollution is caused by the multiple scattering of light in the atmosphere, resulting in a diffuse distribution of luminance.” The underlying reasoning is that luminance contrast is reduced and thus the ability to discern features of the night sky is reduced. The SLL Code stresses that the difficulty in bringing sky glow claims is that there is a lack of agreement on solutions.⁷⁶⁵ However, this may be an avenue for regulating LEOSats.

When “artificial light” becomes more than it is necessary, it is considered light pollution or obtrusive light. Annoyance, harm to wildlife, enjoyment of the countryside, and viewing of the dark skies are provided as justifications for addressing light pollution and obtrusive light. The UK has also developed a term for spaces unobstructed by artificial light as “intrinsically dark landscapes.” The policy guidance emphasizes planning to avoid unnecessary lighting. In this regard, it specifically calls attention to prisons and airports which are exempt from nuisance claims for intrusive lighting and stresses this exemption as a need for careful planning of lighting at these facilities.⁷⁶⁶

- **Protection of quiet skies**

Further research into national regulations and policies is necessary to identify specific norms applicable to protecting quiet skies for astronomical observations.

- **Satellites regulations**

Further research into national regulations and policies is necessary to identify specific norms related to the prevention of interference of satellites in astronomical observations.

⁷⁶⁴ Clean Neighborhood Act and Environment Act 2005 c. 16, Part 9, Statutory Nuisance, Section 102, <https://www.legislation.gov.uk/ukpga/2005/16/section/102>.

⁷⁶⁵ *The SLL Code for Lighting* (London, 2022), www.cibse.org, 1.4.4.

⁷⁶⁶ Department for Levelling Up, Housing and Communities and the Ministry of Housing, Communities & Local Government, “Guidance: Noise” (March 6, 2014), <https://www.gov.uk/guidance/noise--2>.

73. United States of America (Sarah Thiele & Roohi Dalal)

- **Protection of dark skies**

While a number of US states have enacted laws to address light pollution⁷⁶⁷, there are no explicit legal protections against light pollution at a federal level. However, an implicit protection of the night sky can be found in a number of federal acts. The basis of this implicit protection is in the federal system of protected lands, which are preserved for the benefit and enjoyment of all people. A natural night sky, unaffected by light pollution, is a key aspect of the preservation of these areas.

There are a number of national acts and policies relevant to dark sky protection. The *Antiquities Act (1906)* created legal protection of national monuments and historically/culturally important sites, multiple of which include specific discussion of the value of preserving a natural dark sky environment. The *Organic Act (1916)* created the National Park Service (NPS) and prioritized resource protection. The *Wilderness Act (1964)* was enacted to preserve wilderness areas across the U.S, having since created 800+ wilderness areas for protection and preservation. To support the Wilderness Act, the NPS has a set of Management Policies⁷⁶⁸ that includes mitigating light pollution. Section 4.10 states that the NPS will restrict the use of artificial lighting in parks and shield any lighting that is implemented, and practice “minimal-impact lighting techniques”.⁷⁶⁹ The NPS recognizes light pollution as a problem, advocating for preserving the night sky for the aforementioned reasons and recognizing the night sky as a natural, cultural, and economic resource.⁷⁷⁰ The NPS now has a Natural Sounds and Night Skies division, which has data collection sites across the US to measure light pollution metrics like diffuse sky glow. They work with local governments and communities near national parks to protect the natural landscape and sky conditions and promote scientific research on the impacts of light pollution on the natural ecosystem. NPS is one of multiple organizations with dark sky initiatives (e.g. DarkSky International, U.S. Fish & Wildlife Service, DOE, as well as astronomical bodies like NASA and NSF. Astronomical bodies concerned with light pollution approach initiatives from the angle of protecting astronomy and scientific research).

The US national environmental policy, enacted through NEPA in 1970, requires the federal government “to use all practicable means to create and maintain conditions under which man and nature can exist in productive harmony”.⁷⁷¹ Title I of the Act requires federal agencies to complete Environmental Impact Statements (EIS) or Environmental Assessments (EA) for any actions that affect the environment. Title II established the Council on Environmental Quality (CEQ) which works to ensure NEPA compliance.⁷⁷² It has been an ongoing debate in recent years (discussed in DQSII) whether space should be considered a component of Earth’s “environment”, meaning federal agencies that oversee commercial space activities — the FCC, FAA, and NOAA e.g. — would be required to conduct EIS/EA’s for the space activities they regulate. There has been advocacy in particular for an overhaul in how the FCC, which licenses satellite operations, implements NEPA (discussed in DQSII). Federal agencies are required to revise their NEPA rules

⁷⁶⁷ 19 states, as well as the District of Columbia and Puerto Rico, have laws in place aimed to reduce light pollution through measures such as specifying the direction of light, shielding, maximizing energy conservation, etc. See e.g. <https://www.ncsl.org/environment-and-natural-resources/states-shut-out-light-pollution>

⁷⁶⁸ https://www.nps.gov/policy/mp/policies.html#_Toc157232813

⁷⁶⁹ *ibid.*

⁷⁷⁰ <https://www.nps.gov/subjects/nightskies/index.htm>

⁷⁷¹ [https://www.epa.gov/nepa/what-national-environmental-policy-act#:~:text=The%20National%20Environmental%20Policy%20Act%20\(NEPA\)%20was%20signed%20into%20law,actions%20prior%20to%20making%20decisions.](https://www.epa.gov/nepa/what-national-environmental-policy-act#:~:text=The%20National%20Environmental%20Policy%20Act%20(NEPA)%20was%20signed%20into%20law,actions%20prior%20to%20making%20decisions.)

⁷⁷² *ibid.*

by September 2023 (see for example [NASA's submission](#) for NEPA revisions submitted in July 2023), providing an opportunity for the FCC to address the effects of light pollution from satellites on astronomical activities and the night sky. The US Governmental Accountability Office released a report advocating for the FCC to “reexamine its environmental review process for large constellations of satellites”.⁷⁷³ The potential environmental concerns they list include sunlight reflection from satellites, which is becoming an area of increasing interest with the increased deployment of satellite megaconstellations. Furthermore, on regulation reform, there have been five recently proposed bills related to satellites and electromagnetic spectrum allocation involving the FCC.⁷⁷⁴ Two of these are H.R. 682 (the Launch Communications Act) and H.R. 1338 (the Satellite and Telecommunications Streamlining Act). H.R. 682 has moved through the House, but H.R. 1338 was rejected, and the debates within the latter highlighted tension and disagreement over the extent to which agencies like the FCC should be able to regulate the space industry.⁷⁷⁵

- **Protection of quiet skies**

Additional US laws pertaining to the maintenance of dark and quiet skies include Section 50911 of Article 51 of the US Code, which restricts space activities that lead to “obtrusive space advertising”, defined as advertising in outer space that is visible to the naked eye on Earth. The FCC established the United States National Radio Quiet Zone in 1958, creating a geographical area within which there is a restriction of radio frequency usage in order to minimize interference with scientific research and military intelligence gathering. This area contains the Green Bank

⁷⁷³ <https://www.gao.gov/assets/gao-23-105005.pdf>

⁷⁷⁴ <https://spacenews.com/house-subcommittee-advances-five-satellite-related-bills/>

⁷⁷⁵ Bill H.R. 682 [1] dictates that the FCC must “facilitate access to specified broadband spectrum frequencies for commercial space launches and reentries,” [5] which will help streamline the process for private companies to complete space launches and reentries without having to apply for special temporary authority of a designated frequency band. Bill H.R. 1338 [2] directed the FCC to revise its procedures for licensing and granting US market access of GSO and NGSO satellites. The bill implements deadlines from the time of application submission by which the FCC must reach a verdict, as well as requirements to be held by the FCC regarding electromagnetic spectrum licensing - the FCC “must (1) require licensees and grantees to make a good faith effort to coordinate their use of the spectrum with others, and (2) establish a quantifiable level of protection from harmful interference for other authorized users of the spectrum”. [3] The aforementioned aims have been largely supported by legislators. The point of contention was over another aspect of the bill which stated that the FCC’s regulations must now “include performance objectives for space safety and orbital debris that are specific, measurable, and technology-neutral.” [3] A letter by Congressional leadership raised concerns over how much authority the FCC should be given in regulating space situational awareness given that this is currently out of the scope of their role as a federal agency and they want to avoid the FCC becoming “space traffic cops” [4]. This highlights current tensions surrounding how to regulate the growing space industry. For further details, also see [6].

[1] https://docs.house.gov/billsthisweek/20230724/H682_SUS_xml.pdf

[2] https://docs.house.gov/billsthisweek/20230724/H1338_SUS_xml.pdf

[3] <https://www.congress.gov/bill/118th-congress/house-bill/1338>

[4] <https://spacenews.com/house-rejects-satellite-spectrum-licensing-bill-because-of-space-safety-provisions/>

[5] <https://www.congress.gov/bill/118th-congress/house-bill/682?q=%7B%22search%22%3A%5B%22-H.R.682%22%5D%7D&s=1&r=1>

[6]

<https://www.nationalacademies.org/documents/embed/link/LF2255DA3DD1C41C0A42D3BEF0989ACAEC3053A6A9B/file/D9624556F73F2C29A8C17F1D532C958AA315479FDEB4?noSaveAs=1>

Observatory, which now oversees the Quiet Zone, as well as the antennas and receivers of the US Navy's Information Operations Command (NIOC).

- **Satellites regulations**

Satellite licensing in the United States is run through the FCC under the Communications Act of 1934.⁷⁷⁶ A license is required for all commercial satellite communications within and to/from the U.S.⁷⁷⁷ See the last paragraph of the dark sky section above and footnote 533 for a discussion of recent bills related to satellite regulations.

⁷⁷⁶<https://bja.ojp.gov/program/it/privacy-civil-liberties/authorities/statutes/1288#:~:text=The%20Communications%20Act%20of%201934%20combined%20and%20organized%20federal%20regulation,oversee%20and%20regulate%20these%20industries>

⁷⁷⁷<https://www.fcc.gov/general/satellite#:~:text=The%20Communications%20Act%20requires%20a,space%20stations%20and%20earth%20stations>

74. Uruguay (Christopher L. Martin)

While there are no national laws protecting dark and quiet skies in Uruguay, the advocacy of the astronomers at the *Instituto de Fisica de la Facultad de Ciencias (IFFC)* has led to local light pollution grassroots advocacy in a few municipalities. For instance in Villa Serrana in 2021, local residents objected to the installation of bright lights in order to protect their dark skies for astrotourism.⁷⁷⁸ In addition, nationwide energy efficiency standards for light bulbs don't make specific mention of light pollution, but until 2017 there was a web page reminding people to turn off their lights to reduce pollution on its webpage.⁷⁷⁹ Radio astronomy and quiet skies are unmentioned on any sites found with Google searches, but Uruguay is beginning to consider a space agency to promote commercial interests and a bill is currently under consideration.⁷⁸⁰

⁷⁷⁸ <https://www.eltelegrafo.com/2021/04/rechazo-a-alumbrado-publico-por-contaminacion/>

⁷⁷⁹ https://web.archive.org/web/20110407023241/http://www.eficienciaenergetica.gub.uy/cons_iluminacion.htm

⁷⁸⁰ <https://www.riotimesonline.com/uruguays-space-agency-plan-aligns-with-u-s-sparks-debate/>

75. Uzbekistan (Yana Yakushina)

● Protection of dark skies

The regulation of space activities in Uzbekistan is currently under active development. From 2019, the Uzbek Government has been working on the regulatory framework for space activities, including the laws on Space Activities and Navigation, and organizing space monitoring for various areas of the national economy⁷⁸¹. It is still difficult to say what place will be given to astronomy in the new space legislation. However, according to the draft Law on Space Activities,⁷⁸² space activities are defined as *"activities aimed at the exploration and use of outer space to achieve scientific, economic, environmental, information, commercial and other goals, as well as strengthening the defence and security of the Republic of Uzbekistan."* Such a definition can lead to a potential interpretation of astronomy as a type of space activity.

There are no special norms that provide for reducing light pollution, as well as protecting dark and quiet skies in Uzbekistan. Nevertheless, it is important to draw attention to Suffa International Radio Astronomy Observatory. Back in 1995, the Republic of Uzbekistan and the Russian Federation signed an agreement on the creation of the International Radio Astronomy Observatory "Suffa" with the purpose to create a radio observatory for fundamental scientific research in outer space and the development of effective cooperation on international programs in this area.⁷⁸³ However, only recently, in 2021, an additional protocol to the agreement was signed.⁷⁸⁴ The main goal of the protocol is the creation of the International Radio Astronomy Observatory "Suffa" (IRAO "Suffa"), which will become the customer of all work on the creation of a complex of radio astronomy instruments on the Suffa Plateau, including antennas of the millimetre and submillimeter ranges, the RT-70 radio telescope and systems for receiving and pre-processing information. On the basis of the observatory, scientists will conduct large-scale long-term studies aimed at understanding the structure of the Universe and the nature of the occurrence of astrophysical objects.

The most interesting provision of this agreement is the requirement to prevent radio interference within a radius of 50 km in the area where the observatory is located by Uzbekistan.⁷⁸⁵ Despite the focus on radio interference, it is likely that further developments and amendments of the regulations of Observatory "Suffa" will have norms related to light pollution prevention.

Beyond that, the environmental legislation of Uzbekistan can be potentially applied to light pollution regulations, such as the Law of the Republic of Uzbekistan No. 754-XII on Nature Protection of 1992.⁷⁸⁶

● Protection of quiet skies

The primary regulatory document governing the use of the radio frequency spectrum in the Republic of Uzbekistan is the Radio Frequency Allocation Table.⁷⁸⁷ This table adheres to international recommendations, particularly those provided by the International Telecommunications Union (ITU). It outlines the allocation of radio frequency bands among

⁷⁸¹ <https://lex.uz/docs/4494502>; <https://lex.uz/uz/docs/6291456#6292306>; <https://cis-legislation.com/document.fwx?rgn=128869>

⁷⁸² <https://regulation.gov.uz/ru/document/2583>

⁷⁸³ http://www.pravo.gov.ru/proxy/ips/?docbody=&link_id=16&nd=102036195

⁷⁸⁴ <http://publication.pravo.gov.ru/document/0001202208010029?index=29>

⁷⁸⁵ Art. 16 of the Agreement between the Government of the Russian Federation and the Government of the Republic of Uzbekistan on the establishment of the International Radio Astronomy Observatory "Suffa" 1995; http://www.pravo.gov.ru/proxy/ips/?docbody=&link_id=16&nd=102036195

⁷⁸⁶ <https://lex.uz/ru/docs/7065>

⁷⁸⁷ <https://www.mitc.uz/media/53cdbc20-645b-63de-dfe5-db88d0028f0b.pdf>

various radio services within Uzbekistan, including astronomical activities. This table, however, does not incorporate specific measures to shield radio astronomy from potential harmful interference.

Nevertheless, Uzbekistan's legislation does include provisions for preserving quiet skies. As per the Agreement between the Government of Uzbekistan and the Government of the Russian Federation, dated July 27, 1995, which established the International Radio Astronomy Observatory on the Suffa Plateau,⁷⁸⁸ Uzbekistan is committed to maintaining a low level of radio interference as a fundamental condition for the observatory's operation. To achieve this, Uzbekistan pledges to take necessary measures to prevent the installation of active sources of radio interference within a 50-kilometre radius of the observatory, creating a designated "quiet zone" aimed at ensuring the required astroclimate. Notably, this requirement does not include measures to mitigate satellite interference. The absence of such legal requirements may present challenges to the protection of radio astronomy from satellite-related disruptions in the future.

- **Satellites regulations**

The current state of legislation in the Republic of Uzbekistan concerning space activities is in the development phase. As of now, no specific laws or regulations have been enacted to govern activities related to the use of satellites. The draft law on space activities, while under development, does include provisions for certification, licensing, and registration of space objects. However, it lacks requirements for analyzing potential adverse impacts on both near-Earth and outer space. Additionally, no specific provisions are developed to protect D&QS. The absence of such provisions underscores the potential need to address and regulate the preservation of the sky and outer space for astronomical research and environmental well-being in the future.

⁷⁸⁸ Art. 16 of the [Agreement](#) between the Government of Uzbekistan and the Government of the Russian Federation on dated July 27, 1995 on the Establishment of the International Radio Astronomy Observatory on the Suffa Plateau.

76. Venezuela (Christopher L. Martin)

- **Protection of dark skies**

While numerous private individuals have written articles in the Venezuelan press about the problems with light pollution, as of the present date there are no particular laws or regulations that have been formulated to address their concerns. Similarly, astronomers in Venezuela operate the *Llano del Hato Observatory* in a mountainous area 50km northeast of Merida, but there appear to be no particular local or national regulations that protect its dark skies.

- **Protection of quiet skies**

Venezuela appears to have no particular regulations that protect the usage of radio frequencies used by astronomers.

- **Satellites regulations**

Despite this lack in regulation, Venezuela does have an active space program in place and a law⁷⁸⁹ aimed to create the Venezuelan Space Agency (ABAE), which was passed in October 2007.⁷⁹⁰ ABAE focuses on developing missions and expanding international cooperation, and while the law gives it the authority to regulate all Venezuelan space activities, it appears to have no specific programs or regulations relevant to the protection of D&QS.

⁷⁸⁹ <https://www.asambleanacional.gob.ve/leyes/sancionadas/ley-de-la-agencia-bolivariana-para-actividades-espaciales>

⁷⁹⁰ <http://www.abae.gob.ve/>

77. Viet Nam (Tamara Blagojevic)

- **Protection of dark skies**

The concept of space is still not defined in Vietnamese law, and Vietnam has not yet promulgated a national law on space, rather current regulations concerning airspace issues are scattered in various specialized legal documents.⁷⁹¹ Since 2006, Vietnam has only issued several specialized legal documents to regulate legal issues related to space technology, such as the *Law on Technology Transfer 2006*, *Law on High Technology 2008*, *Law on Atomic Energy 2008*, *Law on Telecommunications 2009*, *Law on Radio Frequency 2009*, *Law on Intellectual Property 2005*, and the *Law on Cybersecurity 2018*.⁷⁹² In addition, some common problems about the use of outer space have not been resolved by Vietnamese law, such as environmental protection issues, space waste, legal responsibilities, rights, and obligations of organizations and individuals in space activities.⁷⁹³ However, *Decision No. 169/2021/QĐ-TTg* of the Prime Minister promulgating the Strategy for the development and application of space science and technology through 2030, emphasizing, among else, research and form legal bases for Earth observation data and use of Earth observation data and ensure conditions for the implementation of international treaties on outer space to which Vietnam is a member to.⁷⁹⁴ As we can see the development of Vietnamese space law is at a nascent stage, and cannot be said to yet include definitions or specific provisions regulating astronomical activities or light pollution mitigation directly or explicitly.

The *Vietnamese Law on the Protection of the Environment* includes certain measures to minimize and treat dust and gaseous waste and fumes, limiting noise, light and heat that adversely affect the surrounding environment, in Article 37.⁷⁹⁵ Similarly, Article 40 addressing construction works in residential areas, requires measures to ensure that the dispersion of dust, noise, vibration and light does not exceed permissible limits.⁷⁹⁶ Article 85 addresses the control and treatment from the side of organizations and individuals, and the measures to restrict and reduce noise, vibration, light and radiation to permissible levels not affecting the life and health of the community.⁷⁹⁷ As per the same article, measures to reduce must also be taken in the case of roads of high traffic density or construction works causing noise, vibration, light or radiation in excess of permissible levels.⁷⁹⁸ Additionally, the production, import, transportation, trading and use of firecrackers are prohibited and should comply with the regulations of the Prime Minister of the Government. Vietnam also has two technical manuals with award certification point systems, one for New Construction,⁷⁹⁹ and the other for Buildings in Operation,⁸⁰⁰ which account for

⁷⁹¹ http://adastra.im.edu.pl/wp-content/uploads/2022/09/Ad-Astra_Nr5_2022_Vietnam_artykul.pdf

⁷⁹² https://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.ojs-doi-10_53261_adastra20220502

⁷⁹³ Ibid.

⁷⁹⁴ Ibid.

⁷⁹⁵ <https://haiduong.eregulations.org/media/Law%20on%20Enviroment.pdf>

⁷⁹⁶ Ibid.

⁷⁹⁷ Ibid.

⁷⁹⁸ Ibid.

⁷⁹⁹ Lotus New Construction V3, 2019 <https://vgbc.vn/wp-content/uploads/2019/08/LOTUS-NC-V3-Technical-Manual-Requirements.pdf>

⁸⁰⁰ Lotus Buildings in Operation V1, 2019,

introducing natural light instead of artificial light, mention light trespass and provide for light pollution minimization.

AccuWeather claims that cloud cover, sky clarity and transparency, and the stability of the atmosphere, are the main factors affecting stargazing.⁸⁰¹ Although stargazers and travel blogs advertise Phu Quoc, Ha Long Bay,⁸⁰² Lan Ha Bay and Cat Ba Island National Park⁸⁰³ for astrotourism, there are currently no officially and internationally designated dark sky reserves or parks in Vietnam. However, most of the islands in Hả Long Bay, which was named a [UNESCO World Heritage site](#) in 1994, are uninhabited and unaffected by humans.⁸⁰⁴ Additionally, there are certain observatories, such as the Hoa Lac Observatory of the Vietnam National Space Centre (VNSC) commissioned in June 2018, hosting a 50 cm (f/8) Ritchey-Chrétien reflecting telescope equipped with a CCD array in the focal plane.⁸⁰⁵ The observatory is located at Lang - Hoa Lac Hi-tech Park, 30km from the centre of Hanoi, in the complex of works including the Vietnam Space Museum, and the Cosmic Projection House invested in the Vietnam National Space Center.⁸⁰⁶ In 2018. There have been indications of an initiative to build an observatory which includes a 40 cm optical telescope at Tay Nguyen University (TNU), Daklak Province, Vietnam, and in that regard organizing observational nights at the International Center for Interdisciplinary Science and Education, Qui Nhon in 2017 and at the Nha Trang Observatory,⁸⁰⁷ in 2018, as well as the annual Exploration Program in Astrophysics Research (EPAR) at TNU, and finally, conducting a joint research project between TNU and Kyoto astronomical observatory of Kyoto university for preparing technical details of the observatory.⁸⁰⁸

- **Protection of quiet skies**

Vietnam's first remote sensing satellite is VNREDSat-1, providing high-resolution imagery to serve social and economic development, as well as environmental protection and natural disaster monitoring.⁸⁰⁹ The target of the "LOTUSat-1, Equipment and Capacity Development" package for the Vietnam Space Center Project is to develop and put into use successfully the Earth observation satellite LOTUSat-1, making use of synthesized aperture radar.⁸¹⁰

Vietnam is a member of the ITU and as such follows radio frequency harmonisation principles according to ITU-R Region-3.⁸¹¹ The regulatory body governing communications policy

⁸⁰¹<https://www.accuweather.com/en/vn/hanoi/353412/astronomy-weather/353412#:~:text=Cloud%20cover%20is%20the%20most,a%20significant%20role%20in%20stargazing.&text=Conditions%20for%20stargazing%20are%20poor>.

⁸⁰²https://www.tripadvisor.com/ShowTopic-g293921-i8432-k5407447-Star_gazing_Vietnam-Vietnam.html

⁸⁰³<https://www.lonelyplanet.com/articles/best-stargazing-spots-in-asia>

⁸⁰⁴<https://earthobservatory.nasa.gov/images/149803/the-emerald-isles-of-ha-long-bay>

⁸⁰⁵<https://www3.astronomicalheritage.net/index.php/heritage/places-connected-to-the-sky?place=hoa-lac-vietnam>

⁸⁰⁶<https://vast.gov.vn/web/vietnam-academy-of-science-and-technology/tin-chi-tiet/-/chi-tiet/experiencing-hoa-lac-observatory-10308-871.html>

⁸⁰⁷<https://www.go-astronomy.com/observatory-global.php?ID=582>

⁸⁰⁸<https://arxiv.org/pdf/1812.00941.pdf>

⁸⁰⁹<https://www.airbus.com/en/products-services/space/earth-observation/earth-observation-portfolio/vnredsats-1>

⁸¹⁰https://www.nec.com/en/press/202004/global_20200423_02.html

⁸¹¹<https://halberdbastion.com/intelligence/itu-regions/region-3>

is the Ministry of Information and Communications (MIC), over its Frequency Assignment and Licensing Division (ARFM), and the Viet Nam Telecommunications Authority (VNTA)⁸¹² is charged with regulating the country's radio frequency spectrum activities such as planning, allocations, and licencing.⁸¹³ The Authority of frequency management⁸¹⁴ controls the radio frequency management in Vietnam.⁸¹⁵ In Vietnam, based on the recommendations of the FCC, the Radio Frequency Directorate (RFD) assigns spectrum to licensed holders, also known as primary users, on a long-term basis.⁸¹⁶ The current Vietnamese National Frequency plan is labelled/named as “AS923-925 (“AS2”)” by “The Things Network”.⁸¹⁷ Additionally, within the national framework, no other specific provisions that directly or indirectly can be applied to the protection of quiet skies were identified.

● **Satellites regulations**

Some of the available resources lists data on the following regulation⁸¹⁸ as relevant to electromagnetic communications, telecommunications and/or the spectrum:

- The 2019. Circular 08/2018/TT-BTTTT - National Technical Regulation on Electromagnetic compatibility of multimedia equipment - emission requirements.⁸¹⁹
- The 2019. Circular 06/2018/TT-BTTTT - National technical regulation on base stations for W-CDMA FDD.⁸²⁰
- The 2019. Circular 21/2017/TT-BTTTT on provision and use of telecom data.⁸²¹
- On October 10, 2023, the Minister of Information and Communications of Vietnam issued Circular 12/2023/TT-BTTTT stipulating the spectrum planning for 1920-1980 MHz and 2110-2170 MHz for the IMT mobile communication system in Vietnam.⁸²²
- The Draft National Technical Regulation on Short Range Device - Radio Equipment to Be Used in the 1 GHz to 40 GHz Frequency Range is based on ETSI EN 300 440 V2.2.1 (2018- 07) Short Range Devices (SRD); Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Harmonised Standard for access to radio spectrum. This draft National technical regulation specifies essential performance radio requirements and

⁸¹² [Page- Home page \(vnta.gov.vn\)](http://vnta.gov.vn)

⁸¹³ [Vietnam - HB Radiofrequency \(halberdbastion.com\)](http://halberdbastion.com)

⁸¹⁴ [Compilation Error \(rfd.gov.vn\)](http://rfd.gov.vn)

⁸¹⁵ [Slide 1 \(itu.int\)](http://itu.int)

⁸¹⁶ [Vietnam Spectrum Occupancy Measurements and Analysis for Cognitive Radio Applications | Vo Nguyen Quoc Bao - Academia.edu](http://VoNguyenQuocBao-Academia.edu)

⁸¹⁷ [Frequency Plans by Country | The Things Network](http://TheThingsNetwork.com)

⁸¹⁸ [Document \(vnta.gov.vn\)](http://vnta.gov.vn)

⁸¹⁹ Circular 08/2018/TT-BTTTT, 2019, <https://english.vnta.gov.vn/quanlyvienthong/Trang/VanBan/chitietvb.aspx?Iname=QuanLyVanBan&loai=Legal%20Document&itemID=1069>

⁸²⁰ <https://english.vnta.gov.vn/quanlyvienthong/Trang/VanBan/chitietvb.aspx?Iname=QuanLyVanBan&loai=Legal%20documents&itemID=1067>

⁸²¹ <https://english.vnta.gov.vn/quanlyvienthong/Trang/VanBan/chitietvb.aspx?Iname=QuanLyVanBan&loai=Legal%20Document&itemID=1068>

⁸²² [Spectrum planning for 1920-1980 MHz and 2110-2170 MHz for the IMT mobile communication system in Vietnam from November 27, 2023 in Vietnam \(lawnet.vn\)](http://lawnet.vn)

conformance test procedures for licence exempt Short Range Devices (SRDs) intending to use frequency bands within the range of 1 GHz to 40 GHz.⁸²³

The current Vietnamese legislation does not include any provisions on satellite technical requirements to reduce impacts on D&QS.

⁸²³ [Vietnam - Draft National Technical Regulation on Short Range | TÜV Rheinland \(tuv.com\)](#)

Table 01: Examples of national acts relevant to the protection of D&QS for astronomical observation

This table includes examples of national regulatory acts relevant to the protection of D&QS. This list is not exhaustive. For more detailed information, including possible legal interpretations or other national provisions applicable to this issue, please consult the section dedicated to each specific country.

Country	Name of the Act	Date	Relevant Provisions
Algeria	Democratic and People's Republic of Algeria, Prime Minister, Commission for Renewable Energy and Energy Efficiency, Public lighting in Algeria, CEREFÉ , 2021, 79	10 March 2021	Report in 2021 by the CEREFÉ, Commissariat aux énergies renouvelables et à l'efficacité énergétique, on "Public lighting in Algeria - National standards for high-quality, energy-efficient lighting". It mentions the negative impact of public light on night skies
Belgium	Belgian Law of 17 September 2005 on the Activities of Launching, Flight Operation or Guidance of Space Objects (English version)	17 September 2005	Space activities - activities of launching, flight operations and guidance of space objects carried out by natural or legal persons in the zones placed under the jurisdiction or control of the Belgian State or using installations, personal or real property, owned by the Belgian State or which are under its jurisdiction or its control. Considering this, astronomy can be viewed as an activity that supports launching, flight operations and guidance of space objects.
	Royal Decree of 19 March 2008 on implementing certain provisions of the Law of 17 September 2005 on the activities of launching, flight operations and guidance of space objects (English version)	19 March 2008	Art.8 The impact on the environment of all activities covered by this law shall be assessed by one or more experts designated for that purpose by the Minister. Such an assessment may be carried out at different stages of the activities.
	Commission Implementing Decision (EU) 2018/661 of 26 April 2018 amending Implementing Decision (EU) 2015/750 on the	26 April 2018	Among these provisions is an objective to promote the coexistence of radio astronomy and passive earth exploration satellite services within the 1,400-1,427 MHz frequency band. The EU member states are required to submit biennial reports on the implementation of these measures, reflecting the EU's desire to facilitate the protection of radio astronomy.

	harmonisation of the 1 452-1 492 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Union as regards its extension in the harmonised 1 427-1 452 MHz and 1 492-1 517 MHz frequency bands (notified under document C(2018) 2286)		
Brazil	Bill PL 1975/2021	Provides for a certification and dissemination program for sites with preserved night skies for rural ecotourism.	
	Bill PL 1400/2021	Defines light pollution and brings additional amendments with regard to legal recognition of light pollution as an environmental problem.	
Cameroon	Law No 96 / 12 of 5 August 1996 . Relating to environmental management	5 August 1996	Protection and the rational management of the resources which concern mostly the geosphere, the hydrosphere, the atmosphere, their material and immaterial content, as well as the social and cultural aspects they comprise.
Chile	New Lighting Standard (2023) Decree 43 on Establishing Emission Standards for the Regulation of Light Pollution Decree 2 on Declaring Areas of Scientific and Research Value for Astronomical Observation Law 21162 on Amending Law No. 19.300, Which Approves the Law on the General Bases of the Environment, to Require the Preparation of an	<p>Established emission standards for the regulation of light pollution across the country.</p> <p>Decree 43. This regulation applied only in the Atacama, Antofagasta and Coquimbo regions (north), and began to operate officially in 2014.</p> <p>Decree 2. Declares as astronomical areas - and, therefore, protected - the skies of 39 communes of the country in the regions of Antofagasta, Atacama and Coquimbo (north).</p> <p>Law 21162. Established the concept of the astronomical areas.</p>	

	Environmental Impact Study for Projects That May Generate Light Pollution in the Areas Indicated		
Peru	Law to Prevent and Control Light Pollution	17 June 2021	LED billboards cannot be placed in residential areas, or within 500m of beaches, parks, or protected or fragile ecosystems. In addition, they must be turned off between 11 pm and 6 am except in certain permitted areas. Streetlights must be low-light and energy-saving. Sports stadiums and industrial facilities will be subject to light restrictions.
Spain	Law 34/2007 on Air Quality and Protection of the Atmosphere and the associated Royal Decree 1890/ 2008 , of November 14, which approves the Regulation on Energy Efficiency in Outdoor Lighting Installations and its Complementary Technical Instructions EA-01 to EA-07	15 November 2007	Establishes national standards for the design, implementation, and maintenance of outdoor lighting installations to improve energy efficiency, reduce greenhouse gas emissions, mitigate nighttime glare or light pollution and reduce intrusive or disturbing light. The latter is ensured by several measures, set per different categories of outdoor lighting installations, such as road lighting, lighting of parks and gardens, parking, etc.
	Law 31/1988 on the Protection of the Astronomical Quality of the Observatories of the Institute of Astrophysics of the Canary Islands and the associated Royal Decree 243/1992 , which approved the Regulation of Law 31/1988, on the Protection of the Astronomical Quality of the Observatories of the Institute of Astrophysics of the Canary Islands	31 October 1988	Specifically protects the area around the astronomical observatories on the island of La Palma in the Canary Islands by imposing very strict rules on outdoor lighting by setting several requirements, such as: (1) prevention of light emissions above the horizon; (2) lighting control; (3) curfews; (4) control of lighting spectrum; (5) luminaires and lamps certification and other.
Mexico	Amendment on the topic of Light Pollution to “The	Amendments from 18 January 2021	Astronomical observations and observatories are explicitly mentioned as requiring protection from light pollution.

	General Law of Ecological Balance and Environmental Protection		
France	Decree setting the list and the perimeter of exceptional astronomical observation sites in application of Article R.583-4 of the Environmental Code	27 December 2018	List and perimeter of exceptional astronomical observation sites
	Decree relating to the prevention, reduction and limitation of light pollution	27 December 2018	Reducing and preventing light pollution, specifying requirements for the design and operation of outdoor lighting installations and regulations for public and private owners.
	Report on "Reconquering the night - Light pollution: current situation and proposals"	2018	Report released by the Ministry of Ecological Transition and Solidarity
Italy	Italy represents one of the first countries to have adopted laws and policies concerning light pollution dating back to 1942. At the regional level, 15 regions have approved laws against light pollution including Lombardy 31/15 (ex 17/00) , Emilia-Romagna 19/03 , Marche 10/02 , Lazio 23/00 , Campania 13/02 , Veneto 17/09 , Toscana 37/00 , Piemonte 31/00 , Valle d'Aosta 17/98 , Basilicata 41/00 , Abruzzo 12/05 , Umbria 20/05 , Puglia 15/05 , Friuli-Venezia Giulia 15/07 , Liguria 22/07 , thus covering a large part of the Italian population and major cities (Milan, Rome, Venice, Florence, Bologna, Naples).		
	<p>Draft law "Provisions for the sustainable management of public lighting and for the contract of light pollution" under discussion since 2019 sets out the necessary requirements to reduce light pollution and mitigate its consequences.</p> <p>Three technical standards refer directly or indirectly to light pollution (UNI10819, UNI10439, UNI9316). The 2021 standard UNI 10819:2021 "Light and lighting - External lighting systems" defines methods for calculation and verification of the upwards-directed luminous flux from outdoor artificial light sources.</p>		
Kenya	Kenya Space Agency , Strategic Plan 2020-2025	20 October 2020	Astronomy programme as part of the Kenya Space Agency, Strategic Plan 2020-2025 adopted in October 2020.
Lebanon	Law 78/2018 on the Protection of Air Quality	19 April 2018	Protection of air pollution, monitoring air pollutants and levels in the atmosphere, prevention, control and surveillance of the ambient air pollution resulting from human activities.

	Law 444 on the Protection of the Environment	29 July 2002	Defines the basis and norms for environmental protection – notably for water, soil, use of chemicals and resource management – as well as institutional, administrative and technical aspects.
Nigeria	National Space Policy	2001	Astronomy is part of the National Space Policy approved in 2001 by the Federal Government.
Romania	Law No.104 on Ambient Air Quality	15 June 2011	Ambient Air Quality which aims to protect human health and the environment by providing requirements to maintain ambient air quality and combating air pollution
Senegal	Decree No. 2006-1252	15 November 2006	Laying down minimum requirements for the prevention of certain physical environmental factors refers to light pollution.
Tunisia	Law No. 91-362 amended and supplemented by Decree No. 2005-1991 of 11 July 2005	13 March 1991	Environmental impact studies in particular in the case of public lighting causing risks to the environment or heritage
	Law 94-35	24 February 1994	Protection of historic monuments and natural and urban sites
USA	Act for the Preservation of American Antiquities (Antiquities Act)	8 June 1906	Created legal protection of national monuments and historically/culturally important sites. Multiple monuments include specific discussions of the value of preserving a natural dark sky environment.
	The Organic Act	25 August 1916	Created the National Park Service (NPS) and prioritized resource protection. The NPS now has a Natural Sounds and Night Skies division.
	The Wilderness Act	3 September 1964	Not in the Wilderness Act directly, but to support the Act, the NPS has a set of Management Policies (created in 2006 and modified ongoing) that includes mitigating light pollution. Section 4.10 states that the NPS will restrict the use of artificial lighting in parks and shield that must be implemented, use “minimal-impact lighting techniques”. Has created 800+ wilderness areas for protection and preservation.
	51 U.S. Code § 50911	Amendments of 30 October 2000	Restricts space activities that lead to “obtrusive space advertising”, which is defined as advertising in outer space that is visible to the naked eye on Earth.
	Federal Communications Commission (FCC) in Docket No. 11745 ,	19 November 1958	Restriction of radio frequency usage in order to minimize interference with scientific research and military intelligence gathering. The zone contains the National Radio Astronomical Observatory (NRAO).

	establishing the United States National Radio Quiet Zone		
	The Communications Act of 1934	19 June 1934	Regulation of satellite communications and dictates the role of the FCC in these regulations.
Czech Republic	Amendment to the Act of the Czech National Council on Nature and Landscape Protection (No. 114/1992)	20 April 2017	Set out conditions for introducing light sources into national parks to prevent light pollution.
Netherlands	Environmental Activities Decree	3 July 2018	Artificial lighting for growing crops must not disturb local residents through the creation of light nuisance and to protect the night sky. Includes putting up light screens and curtains. Lighting on sports grounds must be switched off whenever no sports are practiced, when no maintenance is taking place, and between 11pm-7am.
Republic of Korea	Artificial Light Pollution Prevention Act (No. 11261)	1 February 2012	Creates Light Pollution Prevention Committee within the Ministry of Environment and a Light Pollution Prevention Plan. Regional authorities must designate areas as “lighting environment management zones” with classifications that have specific lighting conditions. Every 3 years, regional authorities must report light pollution evaluations to the Ministry of the Environment.
	Space Development Promotion Act	3 May 2005	Intended to promote “the peaceful use and scientific exploration of outer space” as well as “raise the national standard of living through the systematic promotion of space development and the effective use and management of space objects.” Astronomy could fall under “space development” and/or “space development projects” in the Act. General scope of the Act covers astronomy.
South Africa	Astronomy Geographic Advantage Act (21/2007)	11 June 2008	Preserves and protects areas that have been designated as valuable for optical and radio astronomy. These areas are called ‘astronomy advantage areas’ and measures can be implemented to protect them from light pollution and radio frequency interference.
	Regulations on the Protection of the Karoo Central Astronomy Advantage Areas in terms of	15 December 2017	These regulations “prohibit and restrict the use of certain radio frequency spectrum, certain radio activities and restrict interference due to electrical activities in the area”. For one year after its regulation takes effect, no one (unless needed by radio astronomy) shall use the radio frequency spectrum of 100 MHz - 25.5 GHz. This year-long limit can be extended by the Minister.

	the Astronomy Geographic Advantage Act, 2007		
Norway	Neighbourhood Act (No. 15)	16 June 1961	"No one must have, do or implement something that is unreasonable or unreasonably harmful or inconveniencing on neighbouring property". Light pollution can exceed this limit.
	Biodiversity Act (No. 100)	19 June 2009	Conservation measures in this Act can be applied to light pollution based on the precautionary principle and taking a holistic approach to environmental impact assessments. These measures can be applied to the protection of the night sky and wildlife.
	Planning and Building Act (No. 71)	27 June 2008	Lighting must blend into the surrounding environment. Limits on lighting for illuminated signs and construction sites. Lighting regulations for building permits.
Finland	Environmental Protection Act (No. 527 of 2014)	18 February 2000	Prevent the pollution of the environment through the reduction of all harmful emissions (including light)
	Environmental Protection Act (86/2000)	18 February 2000	Light pollution must be reduced if it is seen as a form of environmental pollution
	Nature Conservation Act (1096/1996)	20 December 1996	Light pollution that can be interpreted as threatening wildlife and/or the landscape must be limited.
	Land Use and Construction Act (132/1999)	10 September 1999	Illuminated signs require a permit and cannot endanger public safety or dazzle the public.
	Health Protection Act (763/1994)	1 January 1995	Health hazards that arise from artificial lighting are under the municipality's health protection authority to prohibit.
	Neighbourhood Relation Act (26/192)	13 February 1920	The use of a building or property must not cause an unreasonable burden on a neighbour. Light pollution falls under this.
Australia	Environment Protection and Biodiversity Conservation Act (No. 91)	16 July 1999	Light pollution must obtain environmental approval.
Sweden	Act on Protection of Research Sensitive to Disturbance (2006:449)	24 May 2006	"If it is necessary to protect research ... against interference, the county administrative board may ... decide that an area shall constitute a research area with access protection or, if it is sufficient to protect the research, a research area with interference protection." "In a research area with access protection, it is prohibited for outsiders to enter the area without permission according to section 12."

			"In a research area with interference protection, it is prohibited for outsiders to use radio transmitters, drive motorized vehicles or use other technical equipment in a way that interferes with research, without permission according to section 12."
	Planning and Building Act (2010:900)	1 July 2010	Chapter 4, Section 12: municipalities can determine maximum permissible values from light during construction within development plans Chapter 6: enables restrictions for outdoor signs or light sources in areas that are designated as valuable environments
	Environmental Code (2006:61)	11 June 1998	Chapter 5: empowers the government to enact environmental quality standards to clarify acceptable levels of pollution or disturbance which includes light Chapter 9: designates light as a source of possible detriment and thus an 'Environmentally Hazardous Activity'
	The Swedish Transport Agency's regulations and general advice on property requirements for roads, streets, tramways and subways (building regulations)(TSFS 2021:122)	2 January 2022	Section 4, Part 7: "In order to reduce negative effects on animal life, lighting must be designed such that light pollution (artificial light that produces an unwanted effect) is limited. Common advice Light pollution that affects light-sensitive and endangered or protected species should be limited in particular. Lighting should be designed so that barrier effects that make it difficult for animals to natural movement patterns are minimized. It can be done, for example, by reducing the spatial dispersion from light sources, or by reducing the power of the lighting during off-peak traffic."
Denmark	Nature Conservation Act (No. 951 of 2013)	14 June 2013	Prohibits the placement of "illuminated advertisements" in the "open country".
	Building Act (No. 1185 of 2010)	1 June 2010	Empowers municipal boards to construct lighting conditions of buildings in relation to the existing surroundings to ensure a good overall impact. Other signage and light installations must not disadvantage or appear "disfiguring" (or unsightly) to existing surroundings.
New Zealand	Outer Space and High-altitude Activities Act	10 July 2017	Decisions on Launch Permits can include an assessment of risks to national interests, which might include dark sky issues. For instance, the Aoraki Mackenzie International Dark Sky Reserve is legally protected at the local level but is considered nationally a tourist destination.
Ecuador	Organic Law of the Public Electricity Service	16 January 2015	States that electric companies must work to prevent and reduce negative environmental impacts associated with their activities (e.g. Art 74 discusses reducing burning of fossil fuels, energy efficiency, etc.). LOSPEE also created the National Plan for Energy Efficiency to increase energy efficiency and reduce impacts like oil imports

	Systems of Protected Areas (SNAP)	18 July 1976	Aims to protect the terrestrial, marine and coastal-marine environments of each protected land area. One study mentioned that one of the goals is preserving “aesthetic value”
	Constitution of Ecuador 2008’s Article 10 and its Rights of Nature, Art. 71-74	24 July 2008	<p>Gives Nature constitutional rights that can be acted upon legally.</p> <p>“Art. 10.- Individuals, communities, towns, nationalities and groups are entitled to and will enjoy the rights guaranteed in the Constitution and international instruments. Nature will be subject to those rights recognized by the Constitution.”</p> <p>“Art. 71.- Nature or Pacha Mama, where life is reproduced and realized, has the right to have its existence and the maintenance and regeneration of its life cycles, structure, functions and evolutionary processes fully respected. Any person, community, town or nationality may demand that the public authority comply with the rights of nature. To apply and interpret these rights, the principles established in the Constitution will be observed, where appropriate. The State will encourage natural and legal persons, and groups, to protect nature, and will promote respect for all the elements that make up an ecosystem.”</p> <p>“Art. 72.- Nature has the right to restoration. This restoration will be independent of the obligation that the State and natural or legal persons have to compensate individuals and groups that depend on the affected natural systems. In cases of serious or permanent environmental impact, including those caused by the exploitation of non-renewable natural resources, the State will establish the most effective mechanisms to achieve restoration, and will adopt appropriate measures to eliminate or mitigate harmful environmental consequences.”</p> <p>“Art. 73.- The State will apply precautionary and restriction measures for activities that may lead to the extinction of species, the destruction of ecosystems or the permanent alteration of natural cycles. The introduction of organisms and organic and inorganic material that could definitively alter the national genetic heritage is prohibited.”</p> <p>“Art. 74.- Individuals, communities, towns and nationalities will have the right to benefit from the environment and the natural wealth that allows them to live well. Environmental services will not be susceptible to appropriation; Its production, provision, use and exploitation will be regulated by the State.”</p>
	Organic Telecommunications Law; Law 439	10 February 2015	Affirms equal access to the radio frequency spectrum in public and private sectors
Nicaragua	Regulations of the Satellite Signals Protection Law; Law No. 322	14 December 1999	Dictates ownership rights and protections, and registration requirements for telecommunications like satellite broadcasting (registration for example requires a TELCOR permit to operate and a description of the signal on which the authorization is granted, as well as other requirements).

	Decree No. 55-90 on Use of the Radio Electrical Spectrum	13 December 1990	Relevant to quiet skies are Articles 24 and 25, which pertain to frequency interference. They state that ANDER will avoid interference between National and International Stations, including determining “the limits of the bands of the different services, the tolerance or frequency deviation and the width of the emission frequency bands for all types of broadcasters when they were not specified in the treaties in force.” They do not consider sporadic interference from “radio propagation phenomenon” as interference.
	Decree No. 20-2017 (System for Environmental Assessment)	29 November 2017	Creates the System for Environmental Assessment which implements requirements for environmental impact assessments on projects that might impact the environment
	Law No. 217 : General Law of Environment and Natural Resources and Law 647 of 2008	1996/2008	Amendments included Article 4, addition of the precautionary principle as the prevailing principle to manage private and public environmental systems. Art. 17 created the <i>Sistema Nacional de Áreas Protegidas</i> (<i>National System of Protected Areas</i> ; SINAP), protecting 78 areas as of the present, each with their own management plan. Many of these plans include aims to protect aesthetic and visual beauty and monuments with spiritual significance.
Oman	Royal Decree 40/2019	8 May 2019	A natural reserve named “Western Hajar Starlight Reserve in the Governorate of Dakhiliyah” is hereby established, and the area, of which the dimensions are specified in the attached annex and map, is hereby designated to it.
India	2010 National Lighting Code (NLC)	2010	Aims to encourage good lighting practices and systems which would minimize light pollution, glare, light trespass and conserve energy while maintaining safety, security, utility and productivity. NLC also contains good practices for departments and public bodies, as well as technical guidance in respect of light products and methods of lighting designs, for professionals.
Japan	Ibara City Light Prevention Ordinance to Protect the Beautiful Starry Sky (美しい星空を守る井原市光害防止条例)	1989 (amended in December 25, 2020)	This ordinance draws justification from the region's indigenous history of shooting stars and the region's astronomical observatories. The purpose balances dark skies for astronomical observation with the need for lighting for daily life with the goal of preventing increased brightness from year to year.
	Light Pollution Prevention Ordinance to Protect the Beautiful Starry Sky of Kozushima Village (神津島村)	4 December 2019	The justification for the ordinance includes the following results from light pollution: 1) difficulty in sky viewing; 2) adverse effects on plants and animals; 3) human life; and 4) wasteful energy use. Provides for a number of limitations.

	の美しい星空を守る光害防止条例)		
Mexico	General Law of Ecological Balance and Environmental Protection	28 January 1988	Mexico's environmental laws were explicitly amended to define light pollution as an environmental contaminant and that astronomical observations and observatories were in need of special protection (focus on terrestrial light pollution).
Russian Federation	The Council of People's Commissioners of the USSR Order dated March 11, 1945 N 4003r	11 March 1945	The Leningrad City Executive Committee has mandated the allocation of a land plot, up to 150 hectares in size, to be designated for construction and the creation of a park adjacent to the Pulkovo Observatory. The boundaries of this plot are to be coordinated with the Presidium of the USSR Academy of Sciences. Additionally, a protective park zone is to be established within a 3-kilometre radius around the Pulkovo Observatory. Industrial and large residential construction within this zone is prohibited, and any construction plans must be approved by the Pulkovo Observatory's management.
	Regulations on the astroclimate: Scientific Council of the Russian Academy of Sciences Rules for making decisions on the coordination of economic and construction activities in the protective park zone of the observatory 2015	25 December 2015	The protective park zone surrounding the Pulkovo Observatory extends to a radius of 3 km. Within this zone, there are special regulations governing economic activities to ensure a favorable astroclimate for astronomical observations. Any activities or construction within this zone must be approved by the observatory's management.
Pakistan	Pakistan Environmental Protection Act (PEPA) 1997	3 September 1997	Section 2(iii) defines light as a substance responsible for air pollution.

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