

Natural Disasters: The Duty to Warn

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Space technologies, specifically remote sensing and telecommunications, play an essential role in the field of natural disaster prevention and management. Nevertheless, it is not clear whether a State has the legal obligation to transmit to States affected by natural disasters, or likely to be affected by impending natural disasters, the relevant data in its possession. This study aims to verify the existence of an international duty to warn in case of natural disasters, taking the relevant international instruments into consideration. Afterward, the research focuses on the remote sensing regime, analyzing how the restrictions to sensed data diffusion, usually foreseen by international agreements and by national space legislations, even the recently adopted ones, can interact with such duty.

1 Introduction

After the Chernobyl disaster, the existence in international law of an early warning duty in case of man-made disasters is rather consolidated. It is *inter alia* foreseen by many international instruments such as the *Convention on the Law of the Sea*¹ and, specifically regarding to nuclear disasters, the *Convention on the Early Notification of a Nuclear Accident*² and the *Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency*³. On the contrary, the international legal order addressing natural disasters is both relatively

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1. Art. 198 Convention on the Law of the Sea, 10 December 1982, 1833 UNTS 396.
2. Convention on the Early Notification of a Nuclear Accident, 26 September 1986, 1439 UNTS 275.
3. Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, 26 September 1986, 1457 UNTS 133.

undeveloped in practice and unexamined in the legal literature⁴. Therefore, this study aims to help fill this scholarly gap, by clarifying the existence of the early warning duty also in case of natural disasters⁵.

2 Normative Basis of the Early Warning Duty

2.1 The Outer Space Treaty

From the point of view of international space law, only the thesis of the existence of an early warning duty is consistent with the principle contained in Art. I of the Outer Space Treaty⁶, i.e. the necessary prearrangement of all space activities to the benefit of the whole mankind⁷.

The doctrinal discussion on the value of the common benefit principle is quite complex.

Some authors radically deny the legal relevance of expressions such as “common benefit”, therefore, according to them, these expressions would only have political value⁸. In contrast, other authors defend the juridical compulsoriness of the principle and they even affirm its imperative nature⁹.

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4. The distinction between natural and man-made disasters is based on their cause and has a legal acknowledgement in many international instruments, for instance in Art. 196 (Title XXIII “*Civil protection*”) of the Treaty on the Functioning of the European Union (TFEU), in the UNGA resolution 61/110, United Nations Platform for Space-Based Information for Disaster Management and Emergency Response, adopted on 15 January 2007 and in the *International Charter on Space and Major Disasters*. See <www.disasterscharter.org/home>.
 5. In order to solve this question, L. Peyrefitte exclusively refers to Art. I of the Outer Space Treaty according to which “*the exploration and use of outer space . . . shall be carried out for the benefit and in the interests of all countries*”. He holds that this disposition is not sufficient to provide a right to be warned in case of natural disasters because it contains nothing more than a “*moral or humanitarian ideal*”, using the words of the International Court of Justice in the *Southwest African Case* (Ethiopia v. Liberia, 18 July 1966). L. Peyrefitte, *The Legal Regime of Remote Sensing of the Earth from Space*, Proceedings of the 34th Colloquium on the Law of Outer Space, Montreal, 1991, p. 293.
 6. *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, done at Washington, London and Moscow, January 27, 1967; 610 UNTS 205, entered into force October 10, 1967.
 7. “*Disaster losses can be reduced through observations relating to hazards such as: wildland fires; volcanic eruptions; earthquakes; tsunamis; subsidence; landslides; avalanches; ice; floods; extreme weather; and pollution events*”. The Global Earth Observation System of Systems (GEOSS) 10-Year Implementation Plan, as adopted 16 February 2005.
 8. L. Peyrefitte, *op.cit.*, p. 293.
 9. M.G. Marcoff, *Sources de Droit International de l’Espace*, Recueil des Cours, Vol. 168, 1980, p. 40.

In order to support the first thesis some authors recall the positions of various States expressed before and after the adoption of the Outer Space Treaty. For example, the US State Department declared that the function of Art. I was to “*serve as a guide for space powers in developing their programs and conducting their activities in space*”, without creating a precise obligation upon the United States¹⁰.

Nevertheless, that declaration and others of the same tenor arouse perplexity from the legal point of view.

Indeed, it is one of the two: either they are and remain obligations despite the discretion the States enjoy in their concrete implementation, or no obligations stem therefrom.

Nevertheless, if the latter is the conclusion deducible from the above mentioned declaration and from similar ones, they assume the value of reservations, forbidden by Art. 19 c) of the Vienna Convention on the Law of Treaties¹¹ because it is incompatible with the object and purpose of the Outer Space Treaty and primarily in contrast to the general principle of law that forbids the apposition of mere potestative conditions to obligations.

Generally, the simple fact that a rule is so general to be considered as a principle does not degrade it to a merely symbolic or rhetorical disposition and does not deprive it of its normative character¹².

Therefore, it is feasible to conclude that the wide discretion the States enjoy in the application Art. I of the Outer Space Treaty, because of its generality, does not deprive the norm of any content: the fundamental principle of good faith in the fulfillment of international obligations would be otherwise prejudiced¹³.

Art. I illuminates and clarifies the extent and the content of other principles of space law¹⁴, in accordance with the importance of the Outer Space Treaty in the *corpus iuris spatialis*¹⁵.

10. Treaty on Outer Space: Hearings before the Committee on Foreign Relations, US Senate, 90th Congress, 1st Sess. 70 (1967).

11. Vienna Convention on the Law of Treaties, done at Vienna on 23 May 1969, entered into force on 27 January 1980, UNTS Vol. 1155, p. 331.

12. R. Jakhu, *Legal Issues Relating to the Global Public Interest in Outer Space*, *Journal of Space Law*, vol. 32, 2006, p. 38. According to the statement of the Soviet delegation Art. I did not represent “*a mere statement of the rights of States*”, but was aimed “*to guarantee that the interests, not only of individual States, but of all countries and of the international community as a whole, would be protected*”. UN Doc. A/AC.105/C.2/SR.57 (20 October 1966).

13. See also Art. 31 par. 1 of the Vienna Convention on the Law of Treaties, done at Vienna on 23 May 1969, entered into force on 27 January 1980, UNTS Vol. 1155, p. 331.

14. The freedom of exploration and use of outer space itself was recognized in Art. I of the Outer Space Treaty as long as it was functional to the common benefit principle. M.G. Marcoff, *Sources de Droit International de l'Espace*, *op.cit.*, p. 63.

15. *Ex pluribus* M. Lachs, *Le Vingt-Cinquième Anniversaire du Traité Régissant les Principes du Droit de l'Espace Extra-Atmosphérique*, *Revue Française de Droit Aérien et Spatial*, 1992, p. 365; R. Jakhu, *op.cit.*, p. 108.

In particular, in order to demonstrate the existence of an early-warning duty, Art. I has to be coordinated with Art. XI of the Outer Space Treaty that obliges States Parties conducting space activities in outer space to “*inform the Secretary-General of the United Nations as well as the public and the international scientific community, to the greatest extent feasible and practicable*”, *inter alia* of the results of such activities.

Finally UNGA Resolution 46/182 *Strengthening of the coordination of humanitarian emergency assistance of the United Nations* stresses that early warning information should be made available in an unrestricted and timely manner, even if the conditional “should” weakens this disposition already in its wording¹⁶.

2.2 The Telecommunications Regime

A further confirmation of the existence of an early-warning duty stems from the special regime drawn for satellite telecommunications in the context of natural disasters.

Art. 40 of the International Telecommunication Union (ITU) Constitution obliges international telecommunications providers to give absolute priority to all telecommunications concerning safety of life. Consistently, Art. 46 foresees a special regime for “*distress calls and messages*”, as “*radio stations shall be obliged to accept, with absolute priority, distress calls and messages regardless of their origin, to reply in the same manner to such messages, and immediately to take such action in regard thereto as may be required*”.

Moreover, the ITU resolution n. 36, adopted in Marrakesh in 2002, with its emblematic title “*Telecommunications in the Service of Humanitarian Assistance*” underlines that the use of telecommunications and of related services is indispensable for an effective and appropriate humanitarian assistance.

Finally, Art. 3 of the Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations specifies that the use of terrestrial and satellite telecommunication shall be aimed *inter alia* to the transmission and sharing of information concerning natural hazards, health hazards and disasters not only among the State parties, but also with other States, non-State entities, and intergovernmental organizations, and to the dissemination of such information to the public¹⁷.

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16. UNGA resolution 46/182, *Strengthening of the Coordination of Humanitarian Emergency Assistance of the United Nations*, adopted on 19 December 1991, par. 20. See also Resolution 4, *Adoption of the Guidelines for the Domestic Facilitation and Regulation of International Disaster Relief and Initial Recovery Assistance*, 30th International Conference of the Red Cross and Red Crescent, Geneva, Switzerland, 26-30 november 2007, Art. VII.
 17. Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations, Tampere, 18 June 1998, UNTS vol. 2296, p. 5.

2.3 The Remote Sensing Regime

Considering the remote sensing regime, principle XI of the UNGA Resolution 41/65 establishes that “*remote sensing shall promote the protection of mankind from natural disasters. To this end, States participating in remote sensing activities that have identified processed data and analysed information in their possession that may be useful to States affected by natural disasters, or likely to be affected by impending natural disasters, shall transmit such data and information to States concerned as promptly as possible*”¹⁸. It is well-known that General Assembly resolutions do not have binding value, therefore it is necessary to verify from time to time whether their principles correspond to customary law¹⁹. Nevertheless the absence itself of controversy during the *travaux préparatoires* of principle XI suggests that its content was widely accepted by States. Moreover, principle XI is a specification of the obligations established by Art. IX of the Outer Space Treaty, among them the obligation to conduct space activities with due regard to the interests of all other States, guided by the principle of mutual assistance²⁰ and of the above recalled Art. XI. The corollary of these considerations is the following: the transmission of sensed data relevant for disaster prevention and management shall be free or, in any case, at a price not higher of the production cost also because, if their availability is exclusively lead by the market logic, their price would prevent developing Countries of benefitting therefrom, in clear contrast with the principle of common benefit contained in Art. I of the Outer Space Treaty. In this regard, it is worthy to recall another international instrument, the Second Declaration of Tunis adopted on 27-28 April 2005 which “*notes that the tsunami of 26 December 2004 has prompted reflection on data pricing*

18. UNGA resolution 41/65, Principles Relating to Remote Sensing of the Earth from Space, adopted on 3 December 1986, 95th Plenary meeting, principle XI.

19. Therefore it is not possible to pass over this question by saying “*a UN Resolution of the General Assembly is not a binding document and, therefore, it may not be considered as setting up an obligation to communicate data concerning a natural disaster*”. F. Tronchetti, *Space Treaties and Disaster Management*, Proceedings of the 50th Colloquium on the Law of Outer Space, Hyderabad, 2007, p. 680.

20. In this sense also R.J. Lee, S.R. Freeland, *The Crystallisation of General Assembly Space Declarations into Customary International law*, Proceedings of the 46th Colloquium on the Law of Outer Space, Bremen, 2003, pp. 127-128.

*policy and a shift towards no charge, regarding which continuity would be desirable in the case of major disasters*²¹.

2.4 Further Confirmations of the Existence of the Duty to Warn

The above outlined international space law regime applicable to natural disaster prevention and management has to be coordinated with some principles of international environmental law such as the principles of cooperation and prevention. These principles find concrete expression in principle XVIII of the Rio Declaration that expressly foresees a duty to notify impending natural disasters to potentially affected States²².

Under the perspective of human rights it is important to remind that Art. 6.1 of the Covenant on Civil and Political Rights recognizes the right to life as a right of every human being (*inherent right to life*)²³. Even if, following Art. 2.1, the protection of human rights is primarily owed by the territorial State, the international community is not exonerated therefrom and shall be active in this delicate matter²⁴. Indeed, Art. 55 of the United Nations Charter, combined with Art. 56, establishes that Member States shall take joint and separate action in co-operation with the Organization, to reach conditions of stability and well-being *inter alia* through the promotion of “*a. higher standards of living, full employment, and conditions of economic and social progress and development; b. solutions of international economic, social, health, and*

21. “*The pricing of GEOSS data, metadata and products should be based on the premise that the data and information within GEOSS is a public good for public-interest use in the nine societal benefit areas [the number one is “Disasters: Reducing loss of life and property from natural and human-induced disasters”]. GEO, together with its GEOSS data providers, should work to set standards for the full and open exchange of data based on this premise, with the only allowable cost for data being either that of reproduction and distribution, or the marginal cost of fulfilling the user request*”. GEOSS Data Sharing Action Plan Document 7 (Rev. 2), as accepted at GEO-VII, 3-4 November 2010, p. 6. See also p. 7.

“*Disaster reduction is but one of the global concerns that demand greater sharing of data from activities under the GEOSS umbrella*”. GEOSS Data Sharing Action Plan Document 7 (Rev. 2), Annex 2, p. 2.

22. Rio Declaration on Environment and Development, 31 ILM 874 (1992). UNEP *Workshops on implementation of and compliance with Environmental Conventions*. UNEP *Biannual Bulletin of Environmental Law*, vol. 3, July 1995.
23. According to Art. 6.1 of the Covenant on Civil and Political Rights “*every human being has the inherent right to life. This right shall be protected by law. No one shall be arbitrarily deprived of his life*” and, following Art. 4.2 “*no derogation from articles 6, 7, 8 (paragraphs 1 and 2), 11, 15, 16 and 18 may be made under this provision*”. International Covenant on Civil and Political Rights, adopted and opened for signature, ratification and accession by UNGA resolution 2200° (XXI) of 16 December 1966.
24. The *Humanitarian Charter* adopted by the Red Cross and other humanitarian agencies establishes as fundamental principles the right to life with dignity and the right to protection and security. The *Sphere Project Handbook*, 2011 Edition, p. 21.

related problems (. . .); c. universal respect for, and observance of, human rights and fundamental freedoms for all . . .". Since natural disasters fundamentally undermine these objectives and cause failure in sustained efforts to reach them, the duty to adopt the necessary measures to prevent and mitigate natural disasters results as corollary of the mentioned obligations.

Some authors have drawn the same conclusions considering Art. 11 of the Covenant on Economic, Social and Cultural Rights, according to which every human being has the right "to an adequate standard of living . . . including adequate food, clothing and housing, and to the continuous improvement of living conditions". This article obliges Member States "to take appropriate steps to ensure the realization of this right"²⁵ and, to reach this goal, the cooperation against natural disasters seems to be indispensable.

Shifting the focus to the praxis of space operators, it is possible to point out that their data policies usually distinguish between certain categories of users: the data relevant in the scientific research as the data addressed to organizations operating for the public interest, and therefore with non-commercial aims, usually have a peculiar treatment.

For example, when analyzing the World Meteorological Organization (WMO) and EUMETSAT data policies, it is possible to sketch out a special regime relating to data relevant for natural disaster prevention, mitigation and management. Indeed, in the WMO data policy they are included in the first category of data, therefore they have to be distributed freely and without restrictions²⁶, while the EUMETSAT data and relevant products in the context of the *Global Monitoring for Environment and Security* (GMES) and of the *Global Earth Observation System of Systems* (GEOSS) are immediately and freely available in case of natural disasters²⁷.

These considerations are confirmed by the *Resolution on Principles of Satellite Data Provision in Support of Operational Environmental Use for the Public Benefit*, adopted by the *Committee on Earth Observation Satellites* (CEOS) in 1994, which declares in its preamble "that Earth observation data, especially satellite data, are essential. . . in fulfilling certain mandates, such as the protection and preservation of human life, the Earth, and property from the effects of natural disasters". It has no binding character for CEOS members, nevertheless it emphasizes several times the public benefit associated to the diffusion and

25. R.M.R.B. Nawinne, *The Principles of State Responsibility and Humanitarian Assistance in the Context of Disaster Management*, Proceedings of the 50th Colloquium on the Law of Outer Space, Hyderabad, 2007, p. 743.

26. WMO Res. 40, World Meteorological Congress (CG XII, 12th Meeting), WMO Policy and Practice for the Exchange of Meteorological and Related Data and Products Including Guidelines on Relationships in Commercial Meteorological Activities, October 26, 1995.

27. Furthermore, see the Implementing Rules for Meteosat Data and Products (originally adopted as Annex I of Resolutions EUM/C/98/Res. IV and EUM/C/99/Res. VI and amended in Annex I of Resolution EUM/C/70/10/Res. III) Section 7 on Conditions of Access to Non-essential Meteosat Data by NMSs of non-Member States, points 4 and 5.

sharing of sensed data relevant for environmental protection with the following “*common goal of providing data for operational environmental use for the public benefit from all appropriate missions*”²⁸.

The data policies adopted by the international organizations operating in the environmental field go in the same direction since they univocally incorporate principles of free access and necessary sharing of environmental data, qualifying them as public goods²⁹.

Moreover, the number of international programs and cooperation systems for early warning is continually increasing. They are designed to share information relevant for natural disaster prevention and management, such as the United Nations-SPIDER program³⁰. Within the system created by the *International Charter on Space and Major Disasters* and, on the regional level by the *Sentinel Asia Program*³¹, the data useful for disaster prevention and management are shared on a free of charge basis. In particular, in the occurrence of the Indian tsunami of 2004, the *National Oceanic and Atmospheric Administration* (NOAA) *Pacific Centre* tried to warn other potentially affected countries of the impending tsunami³², even if it was useless because of the lack, in those countries, of necessary receiving and disseminating systems³³.

2.5 The Enforcement of the Duty to Warn

When considering all the above, combining the humanitarian principles with the principle of international cooperation, in the light of the principle of good faith, taking into account the international praxis that reflects a growing *opinio iuris*, it is reasonable to conclude that there is an early warning duty also in case of natural disasters³⁴.

28. Resolution on Principles of Satellite Data Provision in Support of Operational Environmental Use for the Public Benefit, adopted at the eighth CEOS Plenary meeting held in Berlin on 26-28 September 1994, CEOS Yearbook, 1995.

29. <www.codata.org/data_access/policies.html>.

30. See also The Global Earth Observation System of Systems (GEOSS) 10-Year Implementation Plan, as adopted 16 February 2005, pp. 1, 3. Within the China-Brazil Earth Resources Satellite (CBERS) sensed images are available on line free of charge, also for environmental applications.

31. Sentinel Asia is an initiative led by the Asia-Pacific Regional Space Agency Forum (APRSAP). Members and non-members of Sentinel Asia can download the data from the Sentinel Asia website, free of charge. <https://sentinel.tksc.jaxa.jp/sentinel2/MB_HTML/About/About.htm>; <www.jaxa.jp/article/special/sentinel_asia/index_e.html>.

32. A. Ito, *Legal Aspects of Satellite Remote Sensing*, Leiden, Boston, 2011, p. 191.

33. W.C. Nicholson, *Legal Issues: Warning Systems*, <https://www.riskinstitute.org/peri/images/file/PERI_Symposium_Nicholson.pdf>, p. 1.

34. *Contra*, but in an axiomatic and not demonstrated way. V. Balakista Reddy, D. Banerjee according to whom “*current international law does not impose a clear duty upon nations to warn other nations of impending disasters*”, V. Balakista Reddy, D. Banerjee, *The Disaster Charter: Formulating a Common Space Policy for the Asian Region, Proceedings of the 50th Colloquium on the Law of Outer Space*, Hyderabad, 2007, p. 19.

Hence, the *opinio iuris* of the compulsoriness of the duty to warn was gradually reached in the sector of man-made disasters thanks to the contribution of important conventional instruments. Nevertheless, through a virtuous process, it exists now also in the context of natural disasters³⁵.

The fact that many States do not have any space capabilities to collect information and to transmit them is not relevant and cannot be used as an argument to deny the existence of a duty since those States are free from blame in virtue of the ancient principle *ad impossibilia nemo tenetur*.

The point is to verify if it is possible to affirm the international responsibility of the remote sensing State in case of its violation.

The informative duty contained in principle XI of UNGA Resolution 41/65 (hereinafter the Resolution) because of the aforementioned reasons *in abstracto* founds the responsibility of the sensing State in case of violation: it is well-known that an international unlawful act can be positive or negative, moreover the omission can consist in the violation of a duty imposed by a conventional or customary rule.

The real problem is the configurability *in concreto* of the responsibility of the sensing State, particularly because of the difficulty to fulfill the burden of proof (*onus probandi*). Indeed, raw data are not significant because they are unfit to announce an impending natural disaster. Data need to be processed and interpreted through a pre-established program and in any case a complete evaluation through suitable instruments is necessary. Moreover, data and information furnished by satellites can be compared to weather forecast, which is largely based on scientific probability and therefore unfit to establish with absolute certainty if and how a disaster will happen.

It is true, principle XI is formulated so vaguely and largely that the duty to warn exists even if it is only likely that a disaster takes place.

Nevertheless, even if principle IX of the Resolution foresees the duty to inform the affected States and the Secretary-General about the program of remote sensing, it is not supported by such a uniform practice to correspond to customary law. Moreover the sensed State does not benefit from the right to access the sensed data concerning its territory because the rule contained in principle XII of the Resolution does not seem to have customary value.

Therefore, if the State hit by a natural disaster does not know about remote sensing programs concerning its territory and carried out by other States, and does not benefit from the right to have access to the data collected, it cannot know that a space mission concerning its territory was in progress and *a fortiori* it is not able to prove that the sensing State, aware of the impending disaster, had omitted to transmit the relevant information in its possession.

35. A. Moreno, *La Commercialisation des Images Satellites. Approche Juridique*, Travaux du Centre de recherche sur le droit des marchés et des investissements internationaux, Université de Bourgogne CNRS, Volume 18, 1999, p. 154.

In conclusion, the non-fulfilment of the early warning duty can be *in abstracto* source of responsibility, but *in concreto* it may be difficult to enforce³⁶.

3 Restrictions to Data Diffusion in International Agreements

The principles incorporated in the Agreement concluded between EUMETSAT and NOAA in 1998 on the distribution of meteorological data stemmed from the European-American Integrated Satellite System seem to contradict the existence of an unconditioned early warning duty³⁷.

According to these principles the access to data can be denied to an adversary during a crisis or war and these concepts are extensively interpreted in *Annex I* as including “*a peacemaking or peacekeeping operation involving US and Allied personnel and resources*”.

Moreover, in the United States and in other countries there is a clear tendency to merge the civil/climate remote sensing systems with those of the military. This tendency leads to the adoption of more and more restrictions to free access. Indeed the fundamental principle of the convergence in the United States is to selectively deny environmental critical data to the adversary during “*crisis or war*”, in clear contrast to the well-established praxis of sharing meteorological data freely and without restrictions among States.

On the interpretive level, a solution must be presented to the problem of the coordination between the existing duty to warn and that restrictive regime. The only plausible solution is the following: if an impending disaster is deducible from sensed data, all restrictions become ineffective and no exception can be affixed to the duty of transmission.

In order to defend this thesis some considerations done by the International Court of Justice in the advisory opinion “*Legality of the Threat or Use of Nuclear Weapons*” become relevant. In this case, the Court noticed that the right to not be arbitrarily deprived of life cannot be suspended in case of national emergencies as the right to life is inherent to every human being in both times of war and peace³⁸.

36. F. Tronchetti, after having wondered which rules of liability can be applied for the damages it was possible to avoid by warning (c.d. omissive causality), concludes: “*the answer is rather easy: there are no specific rules dealing with a similiar scenario. This means that a legal vacuum concerning liability issues, which may arise as a result of disaster management activities, exists*”. F. Tronchetti, *op.cit.*, p. 679.

On the contrary, the lack of a specific regime does not mean that a legal vacuum exists or, using the words of the author, “*the absence of a liability regime in case of failure to warn*”: it implicates the application of the general regime.

37. Agreement between the United States National Oceanic and Atmospheric Administration and the European Organization for the Exploitation of Meteorological Satellites on an Initial Joint Polar-Orbiting Operational Satellite System, 19 November 1998.

38. See footnote n. 23. *Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion*, 1. I.C.J. Reports 1996, par. 25.

However, according to the Court, to verify the signification of “*arbitrary deprivation of life*” in circumstance of war, the *lex specialis* of the law of armed conflict must be applied. Obviously, in the event of war, the loss of human lives is unavoidable, physiological, connatural to the type of operations that it regulates, therefore the right to life seems to be “less protected”. In any case, through a simple application the law of armed conflict, some vital rules of humanitarian law become relevant such as the ban causing unnecessary suffering, defined in the advisory opinion as “*harm greater than that unavoidable to achieve legitimate military objectives*”, and the duty to distinguish civilians from combatants.

Moreover, the International Court of Justice defines certain humanitarian principles in the field of armed conflicts, which are typical man-made disasters, as intransgressible principles of customary law, due to the incommensurable value of human life³⁹.

These norms are necessarily violated if the sensing State intentionally omits warning and therefore does not enable the hostile State to properly face an impending disaster⁴⁰. In other words, a natural disaster, because of its dimensions and its unpredictable consequences, *ex definitione* causes unnecessary sufferings to a considerable number of human beings, without distinguishing between combatants and civilians. Therefore, the States that intentionally refrain from warning potentially affected adverse States violate those rules of humanitarian law⁴¹.

Besides, an additional confirmation of the existence of the duty to warn in time of peace can be deduced from these arguments since, according to the International Court of Justice, “*elementary considerations of humanity*” are more exacting in peace than in war⁴².

4 National Restrictions to Data Diffusion

The adoption of restrictions to data collection and diffusion could only have a basis on principle IV of the Resolution, in so far as these restrictions are necessary for the protection of sovereignty of the sensed State and of its “*legitimate rights and interests*”, while the Resolution does not provide a similar protection for the sensing State itself.

39. *Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, ibidem*, par. 79.

40. Art. 1, par. 2, Protocol Additional to the Geneva Conventions of 12 August 1949 and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 8 June 1977.

41. *Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, ibidem*, par. 78.

42. “*Elementary considerations of humanity, even more exacting in peace than in war*”. The Corfu Channel Case (United Kingdom v. Albania), ICJ Reports 1949, pp. 4, 22. The principle was repeated in the case Military and paramilitary activities in and against Nicaragua (Nicaragua v. United States of America), ICJ Reports 1986, p. 14.

Nevertheless, the remote sensing legislations adopted by an increasing number of sensing States, such as the United States, Germany and France foresee the possibility to restrict the distribution, the access, sometimes even the collection of sensed data, conditioning them to considerations concerning their national security, foreign policy, international obligations⁴³. In parallel, the right to collect data without the consent of the sensed State is unprejudiced.

In particular, even if the United States has always affirmed the principle of freedom of collection and diffusion sensed images on a non-discriminatory basis (*open skies policies*), they have paradoxically adopted the national legislation with the most complex and extended limits to those very freedoms. Moreover, these limits have to be applied not only by American remote sensing operators, but also by foreign operators that are somehow linked with the US⁴⁴. Nevertheless, the US is part of the Outer Space Treaty which obliges to inform the Secretary General of the United Nations, the public and the international scientific community on “*nature, conduct, locations and results*” of space activities⁴⁵. The US remote sensing regulation is no doubt in open conflict with the formal interpretation given to this article⁴⁶.

Maybe, this trend is referable to a certain US doctrine and policy that is explicitly aimed to achieve superiority through the abstention of information on the adversary, defined as “*the capability to collect, process, analyze, and disseminate information while denying an adversary the ability to do the same*”⁴⁷.

In any case what some authors had acutely foreseen, that “*influenced by the US example, other countries could also be expected (or “encouraged” or “lured” or “forced”) to follow a similar approach in the future*”⁴⁸, factually happened. The described tendency seems to be in contrast to principle XII of the Resolution which foresees with no exceptions the right of the sensed State to have access on a non-discriminatory basis and on reasonable cost terms to data concerning the territory under its jurisdiction, and to principle XI, according to which

43. Art. 24 LOI n° 2008-518 du 3 juin 2008 relative aux opérations spatiales; Art. 17 of the Gesetz zum Schutz vor Gefährdung der Sicherheit der Bundesrepublik Deutschland durch das Verbreiten von hochwertigen Erdfernerkundungsdaten, BGBl 2007 I, Seiten 2590 ff.

44. Sec. 960.1. NOAA Regulations, 15 C.F.R. Part 960 (Docket no. 951031259-9279-03) RIN 0648-AC64.

45. Art. XI Outer Space Treaty.

46. United States, Office of the White House Press Secretary, Presidential Directive, 14, 26 June 1978, p. 1135. Operational Remote Sensing Legislation: Hearings before the Subcommittee on Commerce, Science and Transportation, 96th Cong, 1st Session, Serial Doc. N. 96-39, 1979.

47. The Air Force and Joint Vision 2010, <www.fas.org/jirp/congress/1997_hr/h970305f.htm>.

48. R. Jakhu, *op.cit.*, p. 79; P. B. Larsen, *Limited Right of Access to Remote Sensing Data for the Prevention and Mitigation of Disasters*, Proceedings of the 50th Colloquium on the Law of Outer Space, Hyderabad, 2007, pp. 711-712, 718.

relevant processed data and analyzed information shall be unconditionally transmitted in case of natural disasters. Some authors suggested a pragmatic solution to smooth out the divergence between the Resolution and national space laws, affirming that by simply delaying the supply of data the risk for security would be removed in most cases, respecting at the same time the right to access in favor of the sensed State⁴⁹. Nevertheless, according to principle XII, the sensed State shall have access to primary and processed data as soon as they are produced, and to analyzed information as soon as they are available. Therefore, to allow delayed access after the demand is already in contradiction with the Resolution.

In conclusion, in the light of international practice, the customary value of principle XII seems to be excluded. On the contrary, regarding principle XI other considerations have to be developed, particularly by taking into account the real nature of data relevant for natural disaster prevention and management.

5 The Environmental Information Regime

The Aarhus Convention on access to information, public participation in decision-making and access to justice in environmental matters⁵⁰, implemented in the EU by the directive 2003/4/EC⁵¹, defines a new environmental governance model, founded on three pillars: the access to environmental information, the participation of the public in decision-making and the access to justice.

The Convention acknowledges in the preamble that public authorities hold environmental information in the public interest and on this premise it charges them with specific obligations. In fact, they have to play a passive role, by conforming to the demands of citizens, and an active role, by collecting and diffusing environmental information.

Insofar as sensed data and analyzed information meet the conditions to be considered environmental information, they are regulated by this Convention and therefore benefit of its special regime of free access. This is certainly applicable to information relevant for natural disaster prevention and management.

The point is that this international instrument provides a broad, but not absolute right to access, as specific exceptions are foreseen to protect *inter alia* international relations, public security and national defense. Nevertheless

49. E. Wins-Seemann, *Das Satellitendatensicherheitsgesetz aus industrieller Sicht- Angemessener Rahmen fuer die Kommerzielle Nutzung von weltraumgestuetzten Fernerkundungssystemen?*, Zeitschrift fuer Luft und Weltraumrecht, 1, 2008, p. 59.

50. Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, Aarhus, Denmark, 25 June 1998, UNTS vol. 2161, p. 447.

51. Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on Public Access to Environmental Information and Repealing Council Directive 90/313/EEC, OJ L 41, 14.2.2003, pp. 26–32.

these exceptions have to be strictly interpreted, in the light of public interest characterizing the distribution of environmental information, which in this context plays a balancing and limiting role⁵².

Furthermore, the EU has adopted the directive 2007/2/EC to specifically regulate space data⁵³. Through this normative instrument the EU has created an *Infrastructure for Spatial Information in the European Community* (INSPIRE)⁵⁴, in order to foster environmental protection and to solve problems such as the absence of uniform standards in data collection and the lack of coordination among European authorities. With an appreciable normative choice, the list of exceptions to access contained in Art. 13.1 of the INSPIRE directive corresponds perfectly to the list contained in Art. 4 of the directive 2003/4/EC. Therefore, antinomies in the EU system are avoided in this matter.

The normative framework outlined above constitutes the environmental information regime and is characterized by the *favor* for diffusion and access to environmental information. This *favor* is concretely expressed in many rules of the Aarhus Convention, of the directive 2003/4/EC and of the INSPIRE directive. For example, environmental information held by or for public authorities, which have been requested by an applicant, shall be made available in part where it is possible to filter any information for which access and diffusion are prohibited from the rest of the requested information⁵⁵. Moreover, it seems of value to underline the duty to interpret restrictively the grounds for limiting access⁵⁶ and the price regime set forth by Art. 5 of the directive 2003/4/EC and by Art. 14.1 of the INSPIRE directive: in principle the access to and the examination *in situ* of environmental information are free of charge.

The true *punctum pruriens* of this complex system of rules and exceptions is probably the definition of the notion of “public interest”.

Indeed, the public interest counterbalances the interests protected time and time again by the exceptions to access, restricting their sphere of applicability, as clearly and expressly foreseen by Art. 4.2 of the directive 2003/4/EC⁵⁷.

52. Art. 4.4, Access to environmental information. Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters.

53. The notion of space data is specified in Art. 3 n. 2 of the INSPIRE directive as following “*“spatial data” means any data with a direct or indirect reference to a specific location or geographical area*”. Remote sensed data perfectly fall into this definition as they always identify an area on the Earth surface.

54. Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 Establishing an Infrastructure for Spatial Information in the European Community (INSPIRE), 25.04.2007, OJ L 108/1; M. Craglia, K. Fullerton, A. Annoni, *INSPIRE: an Example of Participative Policy-Making in Europe*. Geoinformatics, 2005, pp. 43-47.

55. Art. 4.4 of the directive 2003/4/EC.

56. Art. 13.2 of the INSPIRE directive.

57. See also Art. 13.2 of the INSPIRE directive.

The public interest can also be used in order to correct and limit the private initiative whenever a limitation appears to be necessary to satisfy pre-eminent demands. In other words, it can and shall play a function of mitigating commercial policies carried on in ambits that cannot be completely commercialized, through the prevalence of the logic of solidarity on that of profit⁵⁸.

For these reasons a definition of the general concept of public interest seems to be necessary, even if its elaboration is difficult, as it is deducible from the extension of the related doctrine⁵⁹ and confirmed by the fact that existing legal systems, such as the one of the EU, tend to relegate its determination to the jurisprudence, rather than formulating a legislative definition.

Provided the aforesaid, it is possible to highlight how the public interest can play a counterbalancing role on the matter in point, taking into consideration the most recent trends of development of international environmental law⁶⁰.

The starting point of the evolution of international environmental law was Principle XXI of the Stockholm Declaration that already embraced in its protective intent the areas beyond national jurisdiction, exceeding the traditional approach according to which the only limit to the action of a State was constituted by the spheres of sovereignty of other States⁶¹. While the protection predisposed on the conventional level was initially fragmentary and sectorial, *id est* related to specific interests or goods, it has afterwards and gradually assumed a wider ambit, coherently with a different conception of the environment as a synthesis of factors which allow and favour the life of living beings on Earth.

Presently, specific international conventions identify and protect global goods representing the conditions themselves of the continuation of life on Earth like biodiversity, climate and forests.

Also, the International Court of Justice in judgment Gabcikovo-Nagymaros⁶² has underlined “*the great significance it attaches to respect for the environment, not only for States but for the whole mankind*”. In this regard, images collected from space have played an essential role since they revealed the existence of the ozone hole and of phenomena such as the ice receding, the progressive deforestation and *El Niño*, which inspired the conception of the terrestrial environment⁶³ as a *unicum* to protect⁶⁴.

58. C. Leys, *Market Driven Politics: Neoliberal Democracy and the Public Interest*, London, 2001, p.3.

59. M. Feintuck, *The Public Interest in Regulation*, Oxford, 2004, p. 179.

60. T. Scovazzi, *Considerazioni sulle norme internazionali in materia di ambiente*, *Rivista di diritto internazionale*, 1989, p. 591.

61. F. Marcelli, *Il regime internazionale della ricerca scientifica, tecnologica e spaziale*, CNR, Roma, 1996, p. 52.

62. Gabcikovo-Nagymaros (Hungary v. Slovakia), 25 September 1997, ICJ Reports 1997, pp. 1-88.

63. For a definition of “environment” see Council of Europe Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment, June 21, 1993, 32 I.L.M. 1228, 1232, Art. 2.10.

64. M. Onoda, *Satellite Earth Observation as “Systematic Observation” in Multilateral Environmental Treaties*, *Journal of Space Law*, 2005, p. 340.

No doubt the challenge represented by environmental protection is emblematic of the deep changes of the international order that demonstrates a gradual erosion of the areas traditionally surrendered to State sovereignty on the premise of the insufficiency of unilateral answers to demands which objectively require integrated interventions. In particular, only the adoption of common measures on the international level can constitute an effective strategy in order to face phenomena like natural disasters and thus assure a safer “environment Earth”⁶⁵. Simply stated, the environment is a fundamental value of the international community. The conservation thereof corresponds to an interest of all States. As long as only the synergistic action of the members of the international community could satisfy the expectations of wellbeing and of quality of life in correlation to environmental protection, Earth observation plays a “social function” on the international level, entrusted *in primis* to States, and also to international organizations.

In general, it seems of value to underline that the functioning of modern society depends on the availability of information, as it is the indispensable precondition to public participation in the decision-making process. In particular, sensed data and analyzed information derived therefrom should be considered public goods in so far as they are useful in natural disaster prevention and management, since they are functionally directed to the protection of the environment.

Hence, in order to make effective the right of all States and of their citizen to be aware what is occurring on Earth and to participate in the process directed to the sustainable development, the access to and the diffusion of these data should be seen as an essential service⁶⁶.

For these reasons, when balancing public interest with the interests protected by restrictions to access and diffusion, public interest should prevail whenever sensed data are relevant in disaster prevention and management, with the consequent prevalence of the obligation to allow access and to transmit them.

In conclusion, insofar as sensed data are functional to disaster prevention and management, they are not submitted to the relevant national space legislation, and therefore to the possibility of restrictions, but to the “strong regime” of environmental information. This regime also provides some grounds of refusal to access, nevertheless the interests protected by restrictions are always dialectically connected and balanced with the public interest and, considering

65. According to A. Cassese in the decision *Trail Smelter* a new approach in respect to environmental matters was adopted on the assumption that environment is a good of general interest. Cfr. A. Cassese, *International Law*, New York, 2001, p. 382. *Trail Smelter* case (United States v. Canada), Reports of International Arbitral Awards, 16 April 1938 and 11 March 1941, vol. III, pp. 1905-1982.

66. Indeed sensed data constitute an important element to stimulate the public debate that more and more transcends national borders and engrave on the international decision-making process, making it gradually more participated. See the point n. 16 of the Preamble of the directive 2003/98/EC of the European Parliament and of the Council of 17 November 2003 on the re-use of public sector information, OJ L 345, 31/12/2003 pp. 90 – 96.

the unquestionable pre-eminence of the public interest in the field of disaster prevention and management, all the exceptions and limits to access and diffusion must be ignored⁶⁷.

6 Analysis of the Present Trend of National Space Legislations

Certainly, the protection of national security is an inherent right of any State: according to Art. 346 of the Treaty on the Functioning of the European Union (ex Art. 296 TEC) “*the provisions of the Treaties shall not preclude the application of the following rules: (a) no Member State shall be obliged to supply information the disclosure of which it considers contrary to the essential interests of its security. . .*” and Art. 36 TFEU (ex Art. 30 TEC) declares that prohibitions or restrictions on imports, exports or goods in transit are not precluded if they are justified *inter alia* on grounds of public security.

In this perspective, the restrictions to diffuse sensed images foreseen by national space legislations and grounded on public security reasons seem to be in accordance with international law.

The fact is that the concept of national security as the other ones usually invoked for adopting restrictions are ambiguous, generic, vague, so that they can be applied arbitrarily depending on the changing political suitability⁶⁸.

On the contrary the limitations to diffusion and, correlatively, to the freedom of information, should be formulated in a specific manner, in real terms necessary, proportional to the goal to be achieved, effective and not self-serving. The potential damage to the protected interests should be serious, immediate and irreparable. Finally, if these requirements are met, the restrictions should be the most limited geographically and temporally.

The trend of national space legislations upsets the balance of interests laboriously reached in the Resolution: the availability of sensed data *de facto* depends on the mere discretion of the sensing State and not on the principle of non-discrimination. This tendency is in clear contrast to the principle of common benefit for which space activities have to be carried out, according to Art. I of the Outer Space Treaty, in particular considering that, from the beginning of the space era, the international community has always recognized the public interest underlying space activities, with the corollary of its superiority over the exclusive interests of every single State.

The point is that the freedom to use outer space cannot be interpreted as a license to abuse it, by drafting national policies and legislations without taking into account the interests of other States. In any case, it is doubtful whether the requirement of effectiveness related to the restrictive measures is satisfied insofar as other foreign operators can collect and distribute the same images, whose collection and diffusion are forbidden to the national operators.

67. *Contra* P. B. Larsen, *op.cit.*, p. 718.

68. The consequent lack of predictability obviously does not stimulate private investment in the space sector.

It is true that a State can adopt instruments such as the shutter control to regulate sensed images collection and diffusion, but these restrictions can be obviously reinforced only upon operators of the licensing State, while foreign space operators can collect and sell images of any region to any user, even to the companies and media of the restricting State⁶⁹.

Consequently, the secret which applied to maps for military or commercial reasons in the past is no longer feasible. Thus, national legislators should take cognizance thereof, by eliminating dispositions which are not adherent to reality or at least taking into account the state-of-the-art of space technologies when applying them.

The imposition of vague limits to space operators in sensed data collection and diffusion is *icto oculi* an inefficient legislative choice because, if it is indeed necessary to avoid certain uses of sensed data, this issue does not concern the providers, but rather those on the other extremity of the chain, the users. Therefore, it is absurd to pretend to regulate the use of sensed data by imposing a limit on their collection and diffusion⁷⁰.

Besides, to refer to the safeguard clause of national security only to military security represents a one-dimensional and shortsighted approach because national security is also political, economic and environmental security⁷¹. Hence, if the concept of security encompasses environmental security, when taking into account the *ratio* of the clause that allows to adopt restrictions to sensed data collection and diffusion, it can be deduced that they cannot be adopted whenever they lead to goals contrary to the ones they were preordained, in particular when they would obstacle the diffusion of sensed data relevant for disaster prevention and management, prejudicing national security. Since environment is a common good, those data are pertinent to the protection of environmental security of the entire world and, therefore, of the sensing State as well⁷².

The risk to be avoided is that the abuse of concepts like national security, invoked to forbid sensed data collection and diffusion, restricts *inter alia* the freedom of information and as a result sterilize an essential instrument for natural disaster prevention and management like remote sensing.

69. R. Jakhu, *International Law Governing the Acquisition and Dissemination of Satellite Imagery*, *Journal of Space Law*, 29, 2003, pp. 65-85; G.M. Kramer, *The First Amendment Viewed from Space: National Security versus Freedom of the Press*, *Annals of Air and Space Law*, 1989, pp. 339-367; J. Monserrat Filho, *Commentary Paper on "Remote Sensing Images and GI Information: Policy and Legal Perspectives"*, ISRO-IISL Space Law Conference 2005, Bringing Space Benefits to the Asian Region, Bangalore, 2006, p. 5-34.

70. See also M. Gerhard, B. Schmidt-Tedd, *Germany Enacts Legislation on the Distribution of Remote Sensing Satellite Data*, Proceedings of the 50th Colloquium on the Law of Outer Space, Hyderabad, 2007, p. 412.

71. S.E. Doyle, *Civil Space Systems: Implications for International Security*, Dartmouth, 1994, pp. 1-271.

72. F. Marcelli, *op.cit.*, p. 207.

7 Final Remarks

Probably the fact that numerous States have adopted national space legislations with exclusive consideration of their interests is referable to the lack of a definite and sufficiently developed international regime aimed to implement Art. I of the Outer Space Treaty. That is the reason why it would be necessary to elaborate, even on the national level, a regulation of space activities taking into account the advantages that can stem from transparency, in the awareness that common and global problems such as the identification of illegal transnational activities, environment monitoring and protection can be solved or at least mitigated only with a wider international consent.

A solution could be the elaboration of compensation mechanisms by the State to space operators to allow scientific institutions and, in relation to natural disasters, humanitarian organizations and concerned States, to have access to data. In France, for example, *Spot Image* is entrusted with the distribution of sensed data and, as it is a commercial company, it charges their price and it sells them all around the world on the terms and conditions laid down in its catalogue. Nevertheless, a mechanism of external compensation permits research institutes and States hit by natural disasters to have access to sensed data which, otherwise, would not be within their reach⁷³.

In this manner, private participation in the sector would be stimulated, which is necessary considering the limited capability of the space agencies to satisfy the growing demand for sensed data. Meanwhile, in the field of disaster prevention and management, the prevalence of public interest in the logic of profit would be guaranteed.

In short, the objective is to extend the public good regime, that is all along the regime of meteorological data, to the data relevant for natural disaster prevention and management, so that their access can be configured as a public service of the international community, in accordance with the conclusions of the Rio Conference on Sustainable Development which started a global and systematic process, strengthened by the Aarhus Convention, of increasing sharing of environmental information. All the above is in line with the *ratio* of the Resolution, the principles thereof were elaborated “*to contribute to a higher degree of transparency so that mankind might improve its understanding of the universe including outer space and the Earth*”⁷⁴.

73. CNES, in range of the program called I.S.I.S. (*Programme d'incitation à l'utilisation à des fins scientifiques des images SPOT*), started in 1990, is entrusted to pay to *Spot Image* the delta price of the images supplied for research projects which satisfy the established requirements, with the clear goal of extending their use and favouring the scientific progress. Moreover, CNES is one of the founding members of the *International Charter* and also within this system it pays to *Spot Image* the delta price of the images freely supplied in case of disaster.

74. C.Q. Christol, *Remote Sensing in an Era of Global Warming*, Proceedings of the 50th Colloquium on the Law of Outer Space, Hyderabad, 2007, p. 409.

The progressive establishment of a new system among all States participating to the chain of the remote sensing activities, founded on the sharing of data relevant for disaster prevention and management, could represent a useful alternative to the proposal made within the Conference UNISPACE 82 of an internationalization of space systems on the basis of their common property. In any case it would be in accordance with the principle of the common benefit to which space activities have to be oriented and from which their regime must be inspired.