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### **PUBLIC AND PRIVATE INTEREST IN REMOTE SENSING ACTIVITIES: THE NEED FOR AN EFFECTIVE LEGAL ENVIRONMENT**

Dr. Marianna Morelli

CORILA

Consortium for Coordination of Research Activities Concerning the Venice Lagoon System  
Venezia, Italy, [morelli@corila.it](mailto:morelli@corila.it) - [marianna\\_morelli@yahoo.it](mailto:marianna_morelli@yahoo.it)

#### **ABSTRACT**

Space technology provides mankind with the potential tools for economic, social and cultural development. Earth observation systems are powerful tools to guarantee an information control on many key indicators that are closely related to many interdependent and trans-boundary issues such as industrial policies, economic strategies, environmental protection agreements and local development plans. Today, remote sensing is an important instrument to recognize major environmental changes, water and soil quality and to manage natural resources. During the last decades, however, the practice of remote sensing has largely changed, private interests have been stimulated disregarding the public interests.

This paper aims to analyse the international legal framework of remote sensing. International space law does not cover many of organizational and legal issues emerging from the new practices of remote sensing. The need for the widest availability of data to all interested users, the growing expansion of remote sensing commercial services, the international and scientific cooperation and the emerging of the private operators of satellite systems must be duly considered in a proper regulating environment. The paper takes into consideration the aspect of the open access to data combining the obligations of space law with the need of environmental law while the private interest in data control is introduced by the national data policies. The emerging approach of cooperation represents, in this context, a new way to find a real synergy between public and private interests.

#### **INTRODUCTION**

“In the middle of the 20<sup>th</sup> century we saw our planet from space for the first time”<sup>1</sup>. It was the view of the Earth, dominated by a pattern of clouds, oceans, greenery and soils, that inspired the world to see the environment as a whole, and to move forward to protect it. Since then, the collection of data and images acquired by remote sensing satellites has offered information on the Earth’s system. Earth observation from space has permitted to point out and to understand phenomena such as the greenhouse effect and the global warming, the global climate change and the loss of biodiversity, the deforestation and the

desertification of land in arid regions and various other environmental features. Space technologies also represent valuable tools for disaster prevention and management.

Data have been used in the past, and will be used in the future, to address issues of social and economic importance in areas such as the land use management, the management of renewable and non-renewable resources, global health and agricultural and fishery management<sup>2</sup>.

During the last decades, however, the practice of remote sensing has largely changed: the

number of states active as remote sensing actors has increased. The technical possibilities of sensing specified areas have greatly advanced and consequently opened an unlimited commercial access to raw data and analysed information.

Even if satellite remote sensing activities are far from being a business attractive as telecommunications, the private interests have been strongly stimulated disregarding the public interests involved in these specific space activities.

The balance between public and private interests constitutes today the central political and legal question of current space activities.

This paper will analyse how this relation is regulated under the existing remote sensing regime, not only on the basis of the 1986 UN Principles, but also taking into account the new approach to cooperation in remote sensing activities and the information required under the rules of international environmental law.

The focus of the paper is to analyse one of the most prominent issues connected to the public and private interests in the recent remote sensing activities: the access to data and the legal protection of these data.

## **1. DATA ACCESS AND PRIVATE CONTROL**

Article 19 of the 1948 UN Universal Declaration of Human Rights affirms the everyone's "right to seek, receive and impart information and ideas through any media and regardless of frontiers". This principle, ascertaining the freedom of flow of information, is frequently invoked in order to refute any restrictive effect of State sovereignty and to promote the unlimited dissemination of information and non-discriminatory access to it<sup>3</sup>.

If the freedom of use of satellites for acquiring remote sensing data from anywhere in the world is generally recognized, and the interest of State to protect data concerning their own territory is decreasing, today the main focus of the debate concerns the distribution of remote sensing imagery acquired with the use of satellites.

In the absence of a uniform and clear international legislation covering Earth observation in all its aspects, the problem can be analysed from two different points of view:

1. the respect of the widest availability of data to all interested users in conformity of the Resolution 41/65, approved in the United Nation framework in 1986, and in view of the international environmental legal regime, which promotes the open access to environmental information for the benefit of all citizens.

2. the respect of ownership over the remote sensing data pertaining to private rather than to public international law, involving principles such as privacy, intellectual property rights, and standards.

### **1.1 PUBLIC INTEREST AND DATA ACCESS: THE INTERNATIONAL SPACE LAW**

Article 1 of the Outer Space Treaty of 1967 introduces to the international space regime the idea of global public interest in space activities. It states that "the exploration and use of Outer Space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind"<sup>4</sup>.

Furthermore, the Outer Space Treaty calls for international cooperation establishing that all space activities fall under general norms of international law, including the Charter of the United Nations, and shall be carried out in the interest of maintaining international peace and security and promoting international cooperation and understanding<sup>5</sup>.

The same concepts are announced in principles II and III of the UN Resolution relating to the Sensing of the Earth from Outer Space.

The significance of the Remote Sensing Principles, adopted by consensus by the General Assembly in its resolution 41/65 of 3 December 1986<sup>6</sup>, was the attempt to

coordinate two antipodal concepts: the freedom of actions of the sensing State, on the one part, and the sovereignty over the natural resources of the sensed State, on the other, as well as the legitimate rights and interests of any State and its entities.

The compromise of the two interests has been achieved by Principle XII, which provides the sensed State with a right of access to primary and processed data relating to the territory under its jurisdiction, on a “non-discriminatory basis” and on “reasonable cost terms”<sup>7</sup>. The sensed State shall also have access to the available analysed information, concerning the territory under its jurisdiction, in the possession of any State participating in remote sensing activities.

In this way the right of the sensing State to acquire satellite imagery without the consent of the sensed State and, at the same time the interest of the sensed State in having non-discriminatory access to satellite imagery of its territory, have been fully recognized<sup>8</sup>.

Principle XII does not exclude the commercialisation of the data, access to data should be assured on a non discriminatory basis and on reasonable cost terms, taking particularly into account the needs and interests of the developing countries.

This principle of access right to data and information, on an equal and equity basis, applies both to the protection of the “Earth’s natural environment” and to the protection of “mankind from natural disasters”.

Principle X<sup>9</sup> indicates that remote sensing promotes the protection of the Earth’s natural environment. For this purpose, States participating in remote sensing activities that have identified information in their possession that is capable of averting any phenomenon harmful to the Earth’s environment have the obligation to disclose such information to the State concerned.

In the same way, Principle XI<sup>10</sup> establishes the role of remote sensing in the protection of mankind from natural disasters. For this purpose, States 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, have

the obligation to transmit such data and information to the State concerned as promptly as possible.

Since the adoption of the 1986 UN Remote Sensing Principles, the practice of the States and the international community has changed. In the beginning of space activities, States constituted the primary category of players. As a consequence, the legal regime dealing with remote sensing activities is a public legal regime, providing for rights and obligations of States. Nowadays, with the tendency towards the privatisation of data retrieval, raw data processing, data analyses and data sales, it may become more difficult to guarantee reliable access to data, especially by developing countries.

Even if Principle XII provides that the sensed State can have access to data and information on a “non discriminatory access and at reasonable cost terms” there is no clear interpretation which could possibly make it an effective right<sup>11</sup>. The pricing policies are of crucial importance, especially with regard of environmental information and the interests of the less developed countries.

Therefore, the privatisation of activities implies the necessity to protect data rights, where the State has to provide non-discriminatory access, at no cost, for certain environmental and disaster applications, as provided in Principles X and XI.

The balance between commercial activities and non-discriminatory access in the pricing policy is quite open and is often left to the discretion of national legislation.

However, as mentioned in the last paragraph, the Resolution 41/65 seems to give a special status to the data and information concerning environmental harm and the protection of humankind from natural disasters.

The first tool put in place to cope with disaster prevention and mitigation was the International Charter on Space and Major Disasters. The purpose of the Charter, announced at the UNISPACE III in 1999, is to support, by means of space assets and the associated information and services, the organization of emergency assistance or subsequent operations<sup>12</sup>.

Concluded in October 2000, among the main national and international space agencies and institutions of public nature, such as the European Space Agency, the French Space Agency (CNES), the Indian Space Research Organisation (ISRO), the Canadian Space Agency (CSA), and the US's NOAA, the Charter offers a unified and co-ordinated system of space data acquisition and data delivery to those countries affected by disasters. In other words, it provides timely and critical data at no cost.

In this sense, the Charter gives full implementation of the UN Principle XI and recalls the Principle 18 of the UN Declaration on environment and development adopted at Rio de Janeiro in 1992, where it is established that "States shall immediately notify other States of any natural disasters or other emergencies that are likely to produce sudden harmful effects on the environment of other States. Every effort shall be made by the international community to help States so afflicted"<sup>13</sup>.

## **1.2 PUBLIC INTEREST AND DATA ACCESS: THE IMPACT OF THE INTERNATIONAL ENVIRONMENTAL LAW**

The increasing awareness towards environmental issues has led to an expanding need for global observations. In this context, the capability of satellites has been perceived as a great opportunity to monitor Earth's system and its processes. Remote sensing technologies, enabling the detection of alterations of the environment status (atmosphere, oceans, biodiversity and other parameters) with extreme accuracy, at different times of the year and in different points of the Earth, constitute an essential tool in order to obtain a systematic observation of our planet.

If we look at State practice, in recent years international environmental treaties have frequently envisaged the use of remote sensing to supervise the compliance with obligations embodied in their text.

The proliferation of multilateral environmental agreements has led to an increased need for a larger availability of spatial data for the scientific community as well as for the public decision makers. Most of these agreements require continuous monitoring of a number of different parameters concerning the land surface, the oceans and the atmosphere.

In order to make some examples, we recall the Convention on Wetlands, signed in Ramsar - Iran in 1971 (commonly referred as Ramsar Convention)<sup>14</sup>, which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

This objective requires that each contracting party has access to information in order to better understand wetland areas, their processes and their significance in the global environment, to efficiently manage wetland areas and promote their conservation and protection. In order to prevent any changes in ecological character brought by human interference, art.3 of the Ramsar Convention establishes that all the national and international bodies involved in the implementation of the Convention shall arrange to be informed at the earliest possible time about any detrimental changes<sup>15</sup>. Earth observation images can be useful to inform at the early possible time of any changes and represent a viable tool to provide detailed and continuous wide areas views of individual wetlands to aid national and local conservation efforts.

The same interest in the distribution of information in a timely manner is also mentioned in the Convention on Biological Diversity<sup>16</sup>, where article 17 requires that all contracting Parties exchange and share information relevant to the conservation and sustainable use of biological diversity, taking particularly into account the special needs of developing countries<sup>17</sup>. Information gathered by remote sensing, according to the Convention on Biological Diversity, contributes to the development and implementation of plans or other management strategies finalised to rehabilitate and restore degraded ecosystems and promote the

recovery of threatened species. Data should be used to “develop, where necessary, guidelines for the selection, establishment and management of protected areas”<sup>18</sup>.

In the same way, within the context of the United Nations Framework Convention on Climate Change (UNFCCC)<sup>19</sup>, many articles recognise the importance of establishing systematic observation and data archives, in order to understand the climate change phenomenon in all its complexity. Countries’ information requirements under the UNFCCC can be divided into two categories: national inventories and global climate observations. The first category covers the information needs related to land use, land use changes and forests. Art. 4.1 establishes that all parties have to publish yearly national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases<sup>20</sup>.

The second category covers the need for global climate change observation systems in order to improve climate forecasts and impact of climate change<sup>21</sup>.

Earth observation can be used for the two categories of information, providing a number of measurements, including concentration of atmospheric trace gases, rise in sea level, the extent and evolution of sea ice cover and the dynamics of the atmosphere and oceans.

The Kyoto Protocol, which contains specific binding commitments to limit or reduce greenhouse gas emissions in the atmosphere, identifies a number of areas where the support of remote sensing is essential, such as the detection and spatial quantification of change in land cover, the quantification of above – ground vegetation, biomass stocks and associated changes therein, the systematic observation of relevant land cover, the mapping and monitoring of anthropogenic sources<sup>22</sup>.

In conclusion, the World Summit on Sustainable Development adopted the Johannesburg Declaration in September 2002, which identifies a series of environmental and development issues for the coming century. The Plan of Implementation<sup>23</sup> indicates satellite Earth observation as a crucial information source for a number of

disciplines relevant to sustainable development.

This short excursus stresses the global public interest in access to environmental information and in a large exchange of data and information between public authorities, the scientific community, intergovernmental organizations and non-governmental entities. In this way, access to information is not only reinforced by remote sensing law by means of principles X and XI of the Remote Sensing Resolution, but also by the environmental law and through several other Conventions such as the Aarhus Convention of 1998<sup>24</sup> on access to information, public participation in decision-making and access to justice in environment matters. The Convention, which represents a new kind of environment agreement, calls for an open access to the environment information for the benefit of citizens. It links environmental rights with human rights, having particular attention to the interaction between public and private authorities.

All these provisions regarding the collection and sharing of information on the global environment underline the international common interest in protecting by international cooperation the different ecosystems. Satellite observation, monitoring the large areas without regard to territorial borders of State, represents, in the frame of monitoring for environment a very powerful tool.

### 1.3 PRIVATE CONTROL AND NATIONAL DATA POLICIES

Having analysed the international rights and obligations contained in the international space law and environmental treaties, it is clear that there are still many issues to be solved. If the international public law recognises the public interest in the widest availability of data and in a large cooperation among countries to exchange information, the problem of data policies and the legal framework under which they are carried out still remains open<sup>25</sup>.

The lack of a clear provision in international law necessitates the development of national Earth observation data policies.

Data policies differ among countries and regions depending on many economic, social and political factors. These policies, based on the concept of ownership, copyright, licence and managing issues such as access, pricing, and privacy rights, offer the best chance for the economic development in the use of outer space benefits. Therefore they include many implications for the relationship between the public sector and the emerging private sector.

In fact, the common aim of any data policy is the promotion of the data market in accordance with commercial criteria. The intention is to be able to invest in remote sensing activities and generate a possible stream of revenues with the control over data entitlements. The main question today is how to guarantee public interest and, at the same time, find incentives for the development of a market for remote sensing products.

By now the balance of these interests depends upon the discretion of the sensing state. Depending on the socio-political and legal system of certain States, there is a clear contrast between the developed and developing countries, as the latter are almost exclusively sensed States.

In Europe many space systems are developed within the framework of the European Space Agency, which has established a policy in the distribution of data resulting from these activities.

We would like to outline the ERS (European Remote Sensing Satellite) missions. The original objectives established for ERS-1 were both scientific and economic, allowing a versatile use of their capabilities, including the commercial potentials. The ESA data policy for ERS-1 and 2<sup>26</sup>, as well as for the ENVISAT (advanced polar-orbiting Earth observation satellite) mission, aims to stimulate a balanced development of science, public and commercial applications, consistent with the mission objectives. This purpose defines the ESA approach regarding access to data and pricing of data. ESA implements differential access to data

classifying different user's categories in accordance with the use of the data<sup>27</sup>:

1. the scientific users category for research, including research on long term issues of the Earth system. In this category ESA promotes non discriminatory access to data for global environmental studies

2. the economic users category for commercial and operational applications with reference to the promotion of the remote sensing sector and to the meeting of returns on investments covering the costs of programmes development and operations. The data policy concerning these data is based on the respect of ownership.

The consequence of this idea of ownership is the act of licensing the use or the reproduction of the data. ESA retains full ownership of rights to data and while access is open for the first category, the licences to use data for the second category prohibit the redistribution of data.<sup>28</sup>

In the same way, SPOT Image, the first company set up in France in order to distribute data coming from Spot satellites, bases its data policy on the concept of copyright. The copyright belongs to the CNES, the Centre National d'Etudes Spatiales, while Spot Images has a licence for the distribution of data.

In addition, the protection of data in Europe is also foreseen in the EU Directive on the Protection of Electronic Databases of 11 March 1996<sup>29</sup>, which is of relevance also for Remote Sensing data. The directive provides that space data can be defined as the collection of independent data arranged in a systematic or methodical way and individually accessible by electronic or other means. The directive introduces two different rights to protect: the copyright of the database and "sui generis" rights in order to prevent extraction and/or reutilization of the whole or of a substantial part of the content of that database<sup>30</sup>.

## 2.2 EMERGING NEW FORMS OF INTERNATIONAL COOPERATION

As we have seen in the previous paragraphs, space based Earth observation technology, first carried out as individual national programs, has developed into a worldwide harmonized effort in monitoring the global environment.

One of the first examples of international cooperation in space activities is the Committee on Earth Observation Satellites (CEOS), created in 1984, on the initiative of the US Government. The Committee has become the major forum for the exchange of information and the harmonization of space programmes<sup>31</sup>.

During the time the efforts to harmonize the individual national Earth observation projects into a global multilateral system of systems have greatly increased<sup>32</sup>. The aim of this new model of cooperation is to integrate different available data and information (i.e. remote sensing sources, in situ measurement networks and socio-economic data sources).

This is, for example, the case of the Global Climate Observing System, sponsored by the World Meteorological Organization (WMO), the United Nations Educational Scientific and Cultural Organization (UNESCO) and its Intergovernmental Oceanographic Commission (IOC), the United Nations Environment Programme (UNEP) and the International Council for Science (ICSU).

The Scientific Community is also developing a plan for the Global Ocean Observing System (GCOS) and the Global Terrestrial Observing System (GTOS).

Furthermore the third Earth Observation Summit, held in Brussels in 2005, starting the creation of a Global Earth Observation System of Systems (GEOSS). The purpose of GEOSS is to achieve comprehensive, coordinated and sustained observations of the Earth system, in order to improve the monitoring of the state of the Earth, increase the understanding of Earth processes, and enhance the forecasting of future changes of the Earth system<sup>33</sup>.

At European level, the contribution to the Global Earth Observation System of Systems is constituted by the Global Monitoring for Environment and Security, GMES. The programme is a joint ESA/EU initiative, launched in 1998 with the "Baveno Manifesto", and adopted by the European Council in 2001. The common objective is to develop and bring into operational service a European independent capacity for the global monitoring of environment and security. GMES has to support European policies and strategies in the fields of environment, transport, agriculture, development and foreign policy.

By now GMES has reached a rather advanced stage. The Fourth GMES Forum, held again in Baveno in November 2003, marked the end of the GMES Initial Period and the beginning of the implementation phase. The last Communication of the European Commission to the Council and the European Parliament of 10 November 2005, "GMES From Concept to Reality", defines three candidate services for fast track introduction: land monitoring, marine services and emergence responses.

At the moment, the main challenge of GMES is to develop a real market for GMES services in Europe. This objective requires a great effort in order to find a balance between "non discriminatory access", economic viability and the necessary incentives for private services providers to invest in the development of such capability<sup>34</sup>.

The discussion occurred in the GMES Forum held in Graz on 19- 20 of April 2006, has shown that "the long-term sustainability of GMES service development can only be achieved through a user-driven approach"<sup>35</sup>.

In this stage of GMES development, the involvement of the regional dimension can represent a fundamental gear in order to collect users' requirements and consequently define public and private interest in the use of services. In fact most European regional governments deal with a number of issues in areas linked to the environment, emergency and security, agricultural and fishery management, air quality monitoring, integrated management of coastal areas as well the economic development and the

promotion of innovation system. In these different priority areas they could represent the public interest having also the equal interest in the economic growth increasing the value of their industries.

In line with these reflections, the European Union is promoting a strong involvement of Regions at both ends of the space chain, from infrastructures and technology development to applications<sup>36</sup>.

## CONCLUSIONS

The need for the widest availability of data to all interested users, the growing expansion of remote sensing commercial services, the effects of the international and scientific cooperation, as well as the emergence of the first private operators of remote sensing satellites represent today the main changes in the field of remote sensing activities and they pose a series of legal and institutional questions.

How to balance public and private interests? How to guarantee non discriminatory access at reasonable cost and at the same time to find incentive in order to develop adequate rules for remote sensing market? How the new approaches to cooperation provide solutions for the main legal issues in the field of Remote Sensing?

The key questions are those of access and consequently of private control.

The perspective, proposed in this paper, takes into consideration the aspect of the open access to the data combining the obligations of space law with the need of environmental law and human rights while the private interest in data control is introduced by the national data policies that are different among countries.

The emerging approach of cooperation represents, in this context, a new way to find a real and efficient synergy between public and private interests. These new forms of relations and institutions take into consideration first of all the public interest connected to the remote sensing activities, almost in the field of environmental protection, and have the same interest to actively stimulate private participation and commercial distribution.

The European objective to involve Regions in the GMES organizational structure aims to consider the final users needs in the realization of GMES services, following a subsidiarity principle.

Even though many questions still remain open, a new perspective is emerging that looks upon space law from a different point of view, taking into consideration the environmental treaties, the scientific community and the economic development.

## References

<sup>1</sup> Brundtland Report, "Our Common Future: The World Commission on Environment and Development", Oxford, 1987, p.18.

<sup>2</sup> Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, 19 – 30 July 1999, A/Conf.184/6, United Nations, pp. 23-24.

<sup>3</sup> Back - Impallomeni E., "Legal Protection through Agreements, Contracts of Scientific Information and Data", Proceedings of the International Conference: Satellite Remote Sensing in Aid of Development, Legal Considerations, CRETEAN (Centre Régional de Télédétection des Etats de l'Afrique du Nord), Tunis, 26-27 September 2002, p. 58.

<sup>4</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, 610 UNTS 205, 27 January 1967.

<sup>5</sup> Ibidem, Art. III.

<sup>6</sup> Principles Relating to Remote Sensing to the Earth from Outer Space, UNGA Resolution 41/65, 3 December 1986.



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<sup>7</sup> Ibidem, Principle XII: "As soon as the primary data concerning the territory under its jurisdiction are produced, the sensed State shall have access to them on a non discriminatory basis and on a reasonable cost terms. The sensed State shall also have access to the available analysed information concerning the territory under its jurisdiction in the possession of any State participating in remote sensing activities on the same basis and terms, taking particularly into account the needs and interest of the developing countries."

<sup>8</sup> Jakhu R., "International Law Governing the Acquisition and Dissemination of Satellite Imagery", *Journal of Space Law*, Volume 29, 2003, pp.65-91.

<sup>9</sup> Principle X of UNGA Resolution 41/65 December 1986: "Remote Sensing shall promote the protection of the Earth's natural environment. To this end, States participating in remote sensing activities that have identified information in their possession that is capable of averting any phenomenon harmful to the Earth's natural environment shall disclose such information to States concerned."

<sup>10</sup> Principle XI of UNGA Resolution 41/65 December 1986: "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."

<sup>11</sup> Jakhu R., "International Law Governing the Acquisition and Dissemination of Satellite Imagery", *op.cit.*, p.88.

<sup>12</sup> Béquignon M.J., "The International Charter 'Space and Major Disasters'", in *Proceedings of the International Conference: Satellite Remote Sensing in Aid of Development, Legal Considerations*, CRETEAN (Centre Régional de Télédétection des Etats de l'Afrique du Nord), Tunis, 26-27 September 2002, p.62.

<sup>13</sup> Rio Declaration on Environment and Development, Rio de Janeiro, 19 June 1992, 31 ILM 874 (1992).

<sup>14</sup> Convention on Wetlands of International Importance especially as Waterfowl Habitat, Ramsar - Iran, 2 February 1971, 996 UNTS 245.

<sup>15</sup> Ibidem, Art.3.2: "each contracting party shall arrange to be informed at the earliest possible time if the ecological character of any wetland in its territory and included in the List has changed, is changing or is likely to change as the result of technological developments, pollution or other human interference. Information on such changes shall be passed without delay to the organization or government responsible for the continuing bureau duties specified in Article 8."

<sup>16</sup> United Nations Convention on Biological Diversity, Rio de Janeiro, 5 June 1992, 1760 UNTS 79.

<sup>17</sup> Ibidem, Art. 17: "Contracting Parties shall facilitate that exchange of information, from all publicly available sources, relevant to the conservation and sustainable use of biological diversity, taking into account the special needs of the developing countries".

<sup>18</sup> Ibidem, Art. 8: "Each Contracting Party shall, as far as possible and as appropriate: (a) Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity; (b) Develop, where necessary, guidelines for the selection, establishment and management of protected areas or areas where special measures need to be taken to conserve biological diversity;"

<sup>19</sup> United Nations Framework Convention on Climate Change, New York, May 1992, 1771 UNTS 107.

<sup>20</sup> Ibidem, Art. 4.1(a): "All parties (...) shall develop, periodically update, publish and make available to the Conference of Parties (...) national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by Montreal Protocol, using comparable methodologies to be agreed upon by the Conference of the Parties".

<sup>21</sup> Ibidem, Art. 4.1 (g) and (h): "All parties(...)shall: g) promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response

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strategies; h) Promote and cooperate in the full, open and prompt exchange of relevant scientific, technological, technical, socio-economic and legal information related to the climate system and climate change, and to the economic and social consequences of various response strategies;”

<sup>22</sup> Kyoto Protocol to the Framework Convention on Climate Change, 10 December 1997, 37 ILM 22.

<sup>23</sup> Report of the World Summit on Sustainable Development, Plan of Implementation of the World Summit on Sustainable Development, UN Doc. A/Conf. 199/20 (2002), available at [http://www.Johannesburgsummit.org/html/documents/summit\\_docs.html](http://www.Johannesburgsummit.org/html/documents/summit_docs.html)

<sup>24</sup> Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters, Aarhus 25 June 1998, EMut 998,48.

<sup>25</sup> Dunk von der F. “Private Enterprise and Public Interest in the European ‘Spacescape’ – towards Harmonized National Space Legislation for Private Space Activities in Europe”, Leiden, 1998, pp.12-13.  
Monserrat Filho J., “Why and How to Define ‘Global Public Interest’”, Proceedings of the 43<sup>rd</sup> Colloquium on the Law of Outer Space of IISL, Rio De Janeiro, 2000, pp. 22-33.

<sup>26</sup> The first European Remote Sensing Satellite (ERS-1), launched on 17 July 1991, was ESA’s first Earth observation satellite. ERS-2 which overlapped with ERS-1 was launched in 1995 with an additional sensor for atmospheric ozone research. ERS data used with complementary geospatial data have stimulated European companies to initiate commercial applications, serving particularly the marine, agricultural and oil and gas industries in home markets and overseas. SP -1228 “ERS Further Achievements”, ESA Publications, The Netherlands, 1998, p. V.

<sup>27</sup> SP -1228 “ERS Further Achievements”, ESA Publications, The Netherlands, 1998, p. 1-5.

<sup>28</sup> Ferrazzani M., “ESA Rules and Practices”, Project 2001 Working Group on Remote Sensing: Legal Framework for Commercial Remote Sensing Activities, Proceedings of Project 2001 – Workshop on Legal Remote Sensing issues, Toulouse, October 1998, p. 43.

<sup>29</sup> Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the Legal Protection of Databases.

<sup>30</sup> Dufresne L., “Protection of Space Data Products under the European Directive on the Legal Protection of Databases”, Proceedings of the 44<sup>th</sup> Colloquium on the Law of Outer Space of IISL, Toulouse, 2001, p.265.

<sup>31</sup> Ferrazzani M., “Alternative Approaches to International Space Cooperation”, 110<sup>th</sup> ESA Bulletin, May 2002, p.77.

<sup>32</sup> Onoda M., “Satellite Earth Observation as “Systematic Observation” in Multilateral Environment Treaties”, Journal of Space Law, Volume 31, Number 2, 2005, pp.339-411.

<sup>33</sup> The Global Earth Observation System of Systems (GEOSS) 10 - Years Implementation Plan, Brussels adopted the 16 February 2005, p. 1.

<sup>34</sup> Marchisio S., “Legal aspects of disaster management: European efforts including GMES”, IISL and ECSL Space Law Symposium 2006: Legal Aspects of Disaster Management and the Contribution of the Law of Outer Space, Vienna, 3 April 2006, <http://www.unoosa.org/oosa/en/COPUOS/Legal/2006/symposium.html>

<sup>35</sup> Report from the Presidency to the Council, “A Market for GMES in Europe and its Regions – the Graz Dialogue 19 20 April 2006, Graz, Austria”, presented in Brussels on 15 May 2006.

<sup>36</sup> Ibidem p.7, the roadmap designed by the European Presidency mentions a future European Region’s Conference on GMES Use.