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EMERGENCY FOR NATURAL DISASTERS PREVENTION AND MANAGEMENT

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1.Abstract

This paper wants to sum up and complete another study recently presented at the Bangalore Congress, laying emphasis on co-operation, which is the only strength in emergency situations due to natural disasters.
After having established which advantages may be gained, especially in the management of catastrophes, through the aids offered by modern observation, communication and meteorological space technology, attention turns to the carrying out of international co-operation, suggested by international rules of great importance. These rules include both the Principles on Remote Sensing of the Earth from Outer Space and the International Charter on Space and Major Disasters. These two set of rules, though having different legal value, both promote a high co-operation.
A great contribution to co-operation is made by United Nations, and on local level, by a European project: the EUR-OPA Major Hazards Agreement.
When facing the problem of prevention and management of natural disasters, there is, first of all, the need to mention the *"geological risk"* implications which can lead to the disastrous event. It is therefore possible to notice the fundamental connection between disaster and development of a country, this connection being at the base of the programs concerning prevention and management policies carried out by the States.

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2. Geological risk and prevention of disasters

Mankind lives and operates in that portion of the Earth's surface where the effects of some complex evolution processes are developed and felt. These processes are connected to the actions of *endogenous* agents (seismic and volcanic phenomena, etc.) and *exogenous* agents (wind, thermal excursions, icing, rains, etc.) which are responsible for the continuous changes which the earth's surface undergoes in geological times.
The geological phenomena and their effects on the earth's surface represent what can be defined as the *geological danger*; instead, the portion of the earth's surface where human communities live and operate represents the *potential human vulnerability* of a certain territory in respect of geological events. The *geological risk* is the combination of geological danger and of the potential human vulnerability of a territory, in relation to the predictable events of geological danger, their intensity and frequency and their relevant interference with human activities[1].
Therefore, geological risk is closely connected to human activities and it can be reduced by acting not so much on the geological phenomena, which are hardly controllable, but most of all through mankind's careful and rational use of the territory.
The risks and catastrophes which most loom over Earth are mostly deriving from three great categories of phenomena: *seismic, volcanic and hydro-geological.*
In order to identify the *seismic risk* it is necessary to refer to different and not homogenous parameters, of physical and

economic nature. The first include those concerning the seismic source, the propagation of the perturbation from the site and the amplification of the signal; to these we must add the types and vulnerabilities of the buildings and the economic parameter determined by the exposed value, associated to the buildings and to the potential victims.

Despite *volcanic events* at times causing more impression than other natural phenomena, in actual fact they create less problems compared to other more frequent, and at times more predictable, catastrophes. This does not lessen the destruction capacity of an eruptive event, but it stresses how the consequences are especially connected to the presence of human settlings close to volcanic apparatus whose areas are, however, relatively small if compared to those exposed to floods, landslides and earthquakes.

The external actions which have a strong incision over rapid changes in the earth's surface are: phenomena of strong erosion, floods, landslides, evolution of coast areas. These processes which so disrupt the physical environment and territory are included in the phenomena of the so-called *hydro-geological risk*; this includes high risk events, even with catastrophic consequences, mainly deriving from superficial waters in especially vulnerable geological and morphological situations. Hydro-geological risk also includes those processes connected to man-made actions which might derive from an inconsiderate use of the territory.

To complete the picture of the possible catastrophes which could afflict the Earth and consequently mankind, we must add those catastrophes which are not so much connected to the geological risk but more probably to the modification of environment: drought, forest fires, locust invasions.

3. Role of Space Technology in Disaster Mitigation

"To reduce throughout concerted international actions, especially in developing countries, loss of life, property damage and social and economic disruption caused by natural disasters" and also "to improve the capacity of each country to mitigate the effects of natural disasters" especially by supporting developing countries and fostering "scientific and engineering endeavours aimed at closing critical gaps in knowledge in order to reduce loss of life and property" and to "develop measures for assessment, prediction, prevention and mitigation of natural disasters through programs of technical assistance and technology transfer"[2], it is necessary to intensify the study of natural disasters that include accurate prediction of the event that may cause or contribute to the cause of disaster and a rapid assessment of the location and extent of damage for quicker and more effective help interventions. This study, which is conducted on Earth by geologists and experts and, in the system of international co-operation of the U.N. program, by those entrusted with the management of disasters, can benefit and is benefiting from new terrestrial and space technologies, including Earth Observation Systems, as well as mobile and fixed satellite communication systems[3].

It must immediately be stressed that **Remote Sensing satellite systems** are not useful alone for the prevention of the disaster, because they are not able to predict natural phenomena such as the ones above mentioned, which are sudden and unpredictable. Only the meteorological ones can predict climatic variations which could lead to disastrous events, but these forecasts are only at a short time distance and the intervention time to avoid the happening of the disaster is not always enough. However, the satellite images are useful for the Earth science experts and if they help to give elements for an appropriate use by mankind of the land and of the environment. Space technology can in fact give important cartography information for the preparation of hazard related maps, such as vulnerability maps and land use or land cover maps, the key to avoid many disastrous effects of natural events. These maps can show the cultural concentrations, such as houses, in the earthquake zones, the flood plains or the landslide hazard areas. The role of Remote Sensing satellites becomes relevant in the management of catastrophes, because it allows a rapid observation of the involved

area and the transmission in real time of the data for a monitoring of the natural disasters, for the mitigation of their effects and for an accurate assessment of losses.

The meteorological systems, especially the geo-synchronous ones, are used to follow strong storms and the distribution of weather patterns. These systems (GEOS, EUMSTSAT, GMS and INSAT) are operational. They are useful to pre-warn about disastrous events looming over the Earth and, by low-resolution operational instruments they give data to estimate rain, drought and locust invasions.

The satellite communication systems offer an important support for the diffusion in real time of information on the disaster when the local communication network is usually broken down. Information and Communication Technologies (ICT) have a crucial role during the management of emergencies by providing the right information, at the right time and at the right place in order to take appropriate decisions to mitigate the situation. The large bandwidth provided by telecommunications satellites allows users to implement advanced broadband emergency applications and services (videoconferencing, file transfer, image sharing, etc.).

The fixed satellites have a variety of applications for the management of the catastrophe, but they also have some limitations. For example, they need large-sized reception and transmission antennas which slow down the reply to the involved areas. With the recent application of Very Small Aperture Terminals and Ultra Small Antennas the fixed satellites will be much more useful. Mobile satellite communication systems are more practical, due to their low cost and because they can be used from Earth and from the naval and air transportation means. The need for food, water and medicines may be immediately notified[4]. This service is offered by the global mobile satellite communications system INMARSAT which, apart from the local communication infrastructures, has a flexible, mobile and reliable way of operating. Today, research and rescue operations are managed by an international satellite system named COSPAS-SARSAT Program, consisting in a constellation of six polar satellites and of a network of stations on Earth[5]. With this program 2030 persons have been rescued in the major disaster areas over the world between 1982 and 1991[6].

4. International Rules in Prevention and Management of Natural Disasters

a) The Principles on Remote Sensing of the Earth from Outer Space

The main legal reference on an international level is the Resolution 41/65 of the General Assembly of the United Nations, adopted on December 4th 1986 on "The Principles on Remote Sensing of the Earth from Outer Space". Detailed studies on the principles having been carried out in other occasions, we shall therefore only examine the principles directly or indirectly concerning the prevention and management of natural catastrophes[7]. The problem is closely connected to the more general problem concerning a wider and easier diffusion of the data concerning environmental protection. The satellite data can be useful for Earth science researches which must be taken into consideration in a correct policy of the States for the construction of urban settlements and for the protection of environment from pollution which can lead to disastrous consequences, especially in "geological risk" areas.

With Remote Sensing the States will pursue the purpose of improving natural resources management, land use and environment protection (principle 1,a). The offset of the principle, which is remarkably controversial, is found in principle II where it is stated that Remote Sensing activities shall be carried out for the benefit and in the interest of all countries and in principle V where the States, carrying out Remote Sensing activities, are asked to promote international co-operation. The principles do not impose any obligation to gratuity or mutual exchange of data. The rules have been imposed by practice by the single States or by the ESA or they are

included in some national regulations where an increasing opening in favour of research may be noticed[8].

Two dispositions face the problems of environment more directly. Principle X establishes that Remote Sensing shall promote the protection of the Earth's natural environment[9]. 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 shall disclose such information to the States concerned. Principle XI indicates that Remote Sensing shall promote the protection of mankind from natural disasters. The States participating in Remote Sensing activities shall transmit data and information in their possession to the States affected by natural disasters or likely to be affected by impending natural disasters. No mention is made of the conditions for disclosing such information; however, because both cases involve information concerning environmental protection and therefore relevant to a public heritage it would be logical for the information to be disclosed free of cost[10].

Some authors[11] define the principles as "fair balance between the interests of the sensing States, i.e. States possessing the necessary space capabilities, and the needs of sensed States, many of them Developing countries,....a most compromise that paved the way to the final adoption on this document".

The United Nations resolution has become a sort of compromise, indicating a **"code of conduct"** to follow when using the satellites and when disseminating the obtained data [12].

The efforts of the United Nations have focused primarily on allowing that as many subjects as possible benefit from the advantage of remote sensing, determining access to data on a non discriminatory basis and at reasonable cost terms.

The Resolution 41/65 was accepted without vote according to the **consensus** procedure [13].

The nature of the United Nations' resolutions is not binding by itself except for those rules, included in it, that are of customary nature, and, as a consequence, are generally accepted and binding. The resolution, moreover, makes no mention of the possible violations of the principles. Some of the regulations it implies, though, (equal rights for the States, self-determination of the people, non interference) and some of the ones it recalls (permanent sovereignty on resources), are part of common law and for this reason they are imperative. In this respect the resolution is merely an **act of acknowledgement**, its **recommendation nature** being confirmed, the obligation not being the effect of the purviews but of the international system.

One last observation is to be made on the compulsory value of the United Nations Resolution of the principles on remote sensing. In actual fact it has a recommendation value even though, having been adopted by "consensus", it expresses the legal opinion of the whole community[14].

Another rule of general nature seems to be included in the Declaration of principles, which reflects the trend of the general international law to acknowledge the global need of protecting environment, whose loss or deterioration would cause a damage for Humanity as a whole and that could also cause serious danger, as well as natural disasters. The rule establishes the **duty of information** on any eventual dangers for the Earth's natural environment, on any threats of eventual dangers of natural disasters taking place, for all States participating in remote sensing. On the other side, all damaged Countries have the duty of information on the crisis taking place, especially in case of danger for other States.

The promotion of international co-operation, including technical assistance and co-ordination in the area of remote sensing (principle VIII) is entrusted to the United Nations and the relevant agencies.

The United Nations play a role of co-operation and co-ordination in the area of remote sensing in the Earth. State conducting activities in the field of remote sensing of the Earth should notify the Secretary-General thereof, in compliance with Article XI of the Space Treaty[15].

An opening towards a help policy is offered by the second part of principle XII where it is

stated that when giving access to the observed States to the primary data and the processed data concerning the territory under their jurisdiction, the State participating in remote sensing activities must take into particular account the needs and interests of the developing countries. In this case the reasonable cost terms must be particularly favourable[16].

After all, this principle had already been stated in art I of the Space Treaty, that, setting the guiding principles to be observed in any activities involving the use of outer space, establishes that these activities "shall be for the benefit of and in the interests of all nations". This same principle has been developed and broadly expressed in the following "Declaration on International Cooperation in the Exploration and use of Outer Space for the Benefit and in the Interests of All States, Taking into Particular Account the Needs of Developing Countries", on 1996[17].

The Declaration of Remote Sensing principles explicitly refers to other binding rules, in art III, where it explicitly states that: "Remote sensing activities shall be conducted in accordance with International Law, including the Charter of the United Nations, the Treaty on Principles...., and the relevant instruments of the International Telecommunication Union".

b) International Charter on Space and Major Disasters

The World's Space Organisations have awakened to the need for collectively putting together space resources for global disaster management and environment protection. In July 1999, during the UNISPACE III conference held in Vienna, the French Space Agency (CNES) and European Space Agency (ESA) announced their intent to set co-ordinated efforts for disaster management and on June 20, 2000 the International Charter on Space and Major Disaster was signed by these two agencies[18]. In September 2001, Indian Space Research Organization (ISRO) and National Oceanic and Atmospheric Administration (NOAA) also joined as members of the Charter. The Argentina Space Agency (CONAE) also joined the Charter in July 2003.The Japan Aerospace Exploration Agency (JAXA) became a member in February 2005.

The International Charter aims at providing unified system of space data acquisition and delivery to those affected by natural disasters[19] through Authorised Users (AU)[20]. Each member agency has committed space and ground resources to support the provisions of the charter and thus is helping to mitigate the effects of disasters on human life and property. Those eligible to become members of the Charter include space agencies and national or international space system operators. The only bodies authorised to request the services of the Charter are the Authorised Users, who have been given the single confidential phone number. An authorised user is a civil protection, rescue, defence or security body from the country of a Charter member.

The Charter is open to all space agencies and satellite operators ready to commit significant and relevant satellite/ground resources (art.III,3,2). The parties develop their co-operation on a voluntary basis and without transfer of funds among them (art.III,31). Data and information are provided free-of-charge for the end user[21].

In the event of a crisis, or in the event of an alert or potential crisis, the parties shall use their best endeavours to plan the availability of space facilities. This happens according to an already planned program, in view of the fact that the parties are bound to together analyse recent crises for which space facilities could have provided for or did provide for effective assistance to the authorities and the rescue services concerned. A report, structured according to the crises identified and the types of situation encountered, and highlighting possible contributions by existing facilities, shall be prepared by the Secretariat in consultation with the associated bodies. Moreover, the parties shall keep abreast of new methods being developed in applied research for warning of, anticipating and managing disasters (art. IV.4,2,4). The Charter cooperates with The European Union,

the UN Bureau for the Coordination of Humanitarian Affairs and other recognised national or international organisations, whether governmental or non-governmental. The Board shall maintain a regularly updated list of cooperating bodies (art.III,3,5).

On December 26th 2004, a major earthquake occurred off the west coast of northern Sumatra, 10 kilometres under the Indian Ocean seabed. It was followed by aftershocks and triggered a **powerful tsunami** that hit coastlines of 16 countries including Indonesia, Thailand, India and Sri Lanka, swept the Maldives and affected the eastern coast of Africa, Kenya and Somalia.

Reported casualty and injured figures are increasing daily. At present, the latest estimated deaths are over 280,000, with over 600,000 injured, close to 5,000,000 displaced, and many hundred thousands more rendered homeless.

Three separate activations of the Charter have taken place – by the Indian Space Research Organisation, by the French civil protection agency (DDSC) for relief in Sri Lanka and by UN Office of Outer Space Affairs (UN-OOSA) for Thailand/ Indonesia. ESRIN was the focal point for initiating the acquisition of data from all Charter members in the first instance.

The Charter has been successfully invoked here for the provision of data. In addition, organizations and companies such as SERTIT, JRC and UNOSAT have been very active in providing high level information products to relief agencies, on an ad hoc basis. The Charter support could be significantly enhanced if there were guaranteed and identified underpinning support from each agency firstly for the provision of full time support for activations of the Charter (currently on an ad-hoc basis), and secondly to support the provision of information services[22].

The last date of Charter Activation is 8 October 2005. An earthquake of magnitude 7.6 struck on the India-Pakistan border in the Kashmir region. The epicenter was located about 95 kilometres to the northeast of Islamabad. Shocks were felt over a radius of some 300-400 kilometres, in northwest India, northern Pakistan, and Afghanistan. The Charter Requestor was UNOOSA, French civil protection for Pakistan and ISRO for India. On 9th October, Pakistani authorities estimated casualties at 20,000 dead and over 40,000 injured. Indian authorities estimate some 400 dead in the regions of Jammu, Baramulla, Kupwara, Srinagar, Poonch, et Udhampur.

The Charter cannot be considered an International Agreement, since it was not signed and ratified by States, but only by Space Agencies, which are its members. Other bodies, even without becoming members, may be called to be co-operating or associated bodies to contribute in giving and receiving data and other correlated information and services.

The Charter sets an alternative method of international co-operation, and it represents a first step, which might be followed by other governmental agreements of more binding nature. Together with other alternative methods of international co-operation in space activities, it avails the co-operation process' consolidation itself[23].

These alternative methods are welcome, since, if we take a look at space law's trend in time, we just can't help noticing that after the Moon Agreement, the United Nations have no longer been able to bring States to the stipulation of Agreements, but at the most – for new Space activities – the General Assembly has issued some principle resolutions, often with the non-voting procedure, that is to say per consensus[24], whose value is not as strictly binding, but only an exhortation. This occurred for the resolutions on the principles of remote sensing, on direct television, on nuclear use, on co-operation and exploration of Space for the benefit of all States, taking into particular account the needs of developing countries[25]. It seems that during the initial phase of Space activities States were more inclined to entrust the regulation of the subject to obligatory international law instruments, determined under the aegis of the United Nations, but in time this attitude has changed. States do not want to give up, by delegating to International

Organisations, their exclusive competency on the subject, if not for non-binding resolutions. However, in order not to slow down Space activities any further they more and more often prefer to regulate situations in specific agreements among parties or through these alternative not binding co-operation methods.
It would then seem that the Charter is a document without any binding effect and that implies no liability of States. The Charter, in the same way as the Remote Sensing Principles, includes a rule binding in itself due to the fact that it has taken the status of a customary rule: **duty of information** on any eventual dangers for the Earth's natural environment, on any threats of eventual dangers or natural disasters taking place, for all States participating in remote sensing. States and the correlated Agencies cannot avoid fulfilling this duty of information, deriving from the functional aerospace environment system, that we are going to examine in the next paragraph. Eventual aid actions of hit population are included, instead, in the voluntary aspect of co-operation.

5. Intervention of the United Nations on the subject of natural disasters

The attention of the United Nations had already turned to the fight against natural disasters in the Development Program (UNDOP) instituted in 1965 with resolution n. 2029 XX of the General Assembly. The Program manages the aspects involving the development if the States more seriously afflicted by disasters. It also gives its support during the rehabilitation and reconstruction phase which follows the disastrous event, by formulating new development strategies which take into consideration measures for the reduction of risks. Furthermore, the UNDP finances the technical and operational assistance to support the reduction of risk levels in the long term and all those measures for the prevention and preparation in case of disasters which are to be placed in the normal development plans of a country. The management costs and the operational expenses of the Program are extremely high, but the will of the States parties has excluded these expenses from the framework of application of art. 17 of the Charter on the expenses to be obligatorily shared among states parties, considering them to be expenses sustainable with the voluntary contribution of the States.
The effort of the Organisation has been strengthened by the creation in 1971 of the United Nations Disaster Relief Office (UNDRO), by resolution of the General Assembly 2816 XXVI. Until 1991, when it was absorbed by the new DHA by resolution of the General Assembly 46/182, its role was to co-ordinate and manage all the rescue activities, stimulating international assistance in co-ordination with the Agencies of the U.N., the specialised institutions and the International Red Cross.
The Department for Humanitarian Affairs (DHA)[26], a specialised office of the Secretary General of the United Nations responsible for all disaster-related matters is the most specific organisation. One of the main purposes of this office is to mobilise, direct and co-ordinate external assistance provided by the United Nations system in response to disasters. The DHA helps to prevent potential catastrophes by studying and forecasting them. The Department acts in co-ordination with other international organisations, most of which belong to the United Nations. Finally, the DHA participates in the International Emergency Readiness and Response Information System (IERRIS), a system uniting a growing number of international organisations for crisis management[27].
An insufficient level of the funds to be designated to the assistance, and an excessive independence of the various agencies with often conflicting competencies have been the more general problems weighing on the Organisation of the U.N. The co-ordination, and therefore the efficiency, is extremely difficult, also because it should be extended to the other decisions taken on an international level. For example, the World Bank, being convinced that the effective mitigation of the disaster depends upon the long term planning of a society with a sustainable development and also less vulnerable, is increasing programs in this direction[28]. The Public

Service Satellite Consortium (PSCC) facilitates frontier crossing and assignation of frequencies for disaster relief teams.
The International Telecommunication Union, beyond offering equipment for emergency communications, also suggests an increased standardisation and compatibility. It would like to foresee the installation of emergency equipment in risk zones, involving the population in training drills and assessing the degree of vulnerability of the existing communication system of those areas[29].
The Resolution adopted by the General Assembly 58/214 "International Strategy for Disaster Reduction"[30]decided to convene a World Conference on Disaster Reduction in 2005 to be held at Kobe, Hyogo, in Japan.
The World Conference on Disaster Reduction (WCDR) was held from the 18th to the 22nd of January 2005 in Kobe, attended by about 4000 participants[31]. Two official documents, adopted during the Conference, were the Hyogo Declaration and Hyogo Framework for actions. The Declaration and framework for actions represent a statement of good will from the UN Member States and relevant organisations. However they are not legally or financially binding and they do not propose a coordinated approach, in spite of the many ambitious proposals from different Member States (e.g. US, Germany, France), in particular for what regards the development of a Global Tsunami Early Warning System .
A special session on the tsunami was held during the conference, emphasising the importance of cooperation, and delegates supported the creation of a regional tsunami warning system in the Indian Ocean, making use of the existing Pacific Ocean system and of the planning process of GEOSS (Global Earth Observation System of System).
The **International Early Warning Programme (IEWP)** was officially launched during the WCDR conference by UN organisations (ISDR, WMO, WFP, FAO, UNESCO). The German Disaster Reduction Committee has already joined this initiative (presented at the second international Conference on Early Warning, held in Bonn, Germany, on the 16th-18th of October 2003). Early Warning is an intervention program in multi-hazards (tsunami, typhoons, hurricanes, earthquakes, volcanic eruptions, landslides, flash floods, wildfires, el Niño, droughts and famines) and intends to develop risk knowledge, warning service, dissemination and response capacity. The IEWP coordination is done by the UN/ISDR platform for the promotion of Early warning (PPEW)[32]. Another initiative that was launched at the WCDR was the International Flood Initiative. ESA should decide whether to join or not these initiatives, for instance via GMES, and in the framework of GEOSS

6. The European regional initiative: the EUR-OPA Major Hazards Agreement

Since 1987 the European Council has been carrying out an open Inter-governmental Agreement concerning the management of natural and technological risks: the EUR-OPA Major Hazards Agreement.
The partial open agreement concerning prevention, protection and the rescue organisation against major natural and technological risks was adopted on March 20th 1987 by the Committee of Ministers of the Council of Europe[33]. The Agreement has the advantage of reuniting the representatives of the European countries and those of the Mediterranean area.
To date it has 25 members States[34]. The European Commission, UNESCO, The World Health Organisation (WHO), the International Strategy for Disaster Reduction (ISDR) of the U.N. and the Office for the Co-ordination of Humanitarian Affairs of the United Nations (OCHA) participate in the Agreement.
The main objectives of the Agreement are:
- reinforce and promote cooperation between members States in a multidisciplinary context to ensure deter risk management: knowledge, prevention, forecasting, warning, crisis management, post-crisis analysis, rehabilitation;
- use the Agreement as a suitable platform for cooperation between Central and Eastern Europe, the South of the Mediterranean and Western Europe in the field of major natural and technological disasters.

Significant European programmes have been implemented since 1987, through a network of 26 specialised European Centres, the aims being: research, training, information and expertise[35].

7. Conclusions

The attention towards the importance of co-operation, especially in favour of developing countries, is increasing.
The United Nations must absolutely guarantee the leadership of the international system for the prevention and management of calamities, but, at the same time, they must also encourage regional initiatives, such as the EUR-OPA Major Risk Convention which is trying to achieve this co-operation in a more concrete way.
It is impossible to leave out of consideration the ideal and concrete support of all the States parties whose work must be addressed towards some fundamental goals if an attempt is to be made, if not communication and telecommunications satellites must be previously co-ordinated with, the to avert disastrous phenomena, at least to prevent them by reducing their effects.
During the catastrophes' management phase, the support of the systems of observation, communication and telecommunications satellites must be previously co-ordinated with the agreement of all the existing organisms and with the organisation of exercise drills also involving the population of the risk zones.

Modern space technology is of little use if it does not support the technical State services concerned with the knowledge of the problems of the physical environment, the basic assessments, the reconstruction of evolutionary models and any other technical and scientific contribution which will allow to reach rational forecasts in an objective and qualified way.

On a more global level it is necessary that the States follow an essential methodological principle for disasters: help in emergencies and prevention interventions (also by means of pre-arranged alert systems) must be organised within the wider framework of the development program of a country, where the safeguard of environment is fundamental. On the other hand, attention towards disasters and the vulnerability of a country must be present during the phase of the elaboration of the programs and plans for the development of the country itself.
Human rights and sustainable development are inextricably linked. Development is unsustainable when the rule of law and equity are absent. Therefore all Organisation approaches sustainable development not only in terms of technical aspects of environment preservation, but also in terms of building cohesive societies in which every individual can fully enjoy his civil, political, social, economic and cultural rights.

NOTES

[1]For example, should there be a strong possibility of a seismic event of great intensity in a desert zone, the geological risk would be practically null, due to the absence of human works, in presence of a high geological danger; on the contrary a slight seismic event, taking place in a low seismic risk zone, whose epicentre should be in a town with a high population density, is a high seismic risk, due to the remarkable human vulnerability potential of the city. MAURO, Calamità naturali, mutazioni ambientali, sviluppo sostenibile, Napoli 1993

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[17] Declaration adopted without vote on 13 December 1996 (General Assembly resolution 51/122); see http://www.un.org/documents /ga/res/51/a51r122.htm
[18] For the Charter test: http://www.disasterscharter.org/main_e.html
[19] Art. II – Purpose of Charter: "..the Charter seeks to pursue the following objectives: - supply during periods of crisis, to States or communities whose population, activities or property are exposed to an imminent risk, or are already victims, of natural or technological disasters, data providing a basis for critical information for the anticipation and management of potential crises; - participation, by means of this data and of the information and services resulting from the exploitation of space facilities, in the organisation of emergency assistance or reconstruction and subsequent operations."
[20] Authorized Users (AU): They are the only bodies authorized to Request the services of the Charter - They receive the single (ODO) phone number - They represent the civil protection, rescue, defence and security bodies of the country to which the Participating Agencies belong - They are recognized to be a co-operating body acting in partnership with an Associated Body
[21] Art.IV, 4.5. The following activities on data are possible:
- access to data archives
- merging of the data to aid understanding of pre-crisis situations
- access to data acquired at the time of the crisis
- merging of those data to report on the crisis
- routing of information to the user
- access to all the technological resources available -telecommunications, data collection, navigation
[22] For more detailed information on the Charter and his running in the event of Tsunami Disaster see CATALANO SGROSSO, Natural Disaster Management, IISL Space Law Conference 2005 "Bringing Space Benefits to the Asia-Pacific Regional Conference", organised by Astronautical Society of India (ASI), June 26-29,2005, Bangalore, India
[23] FERRAZZANI, Alternative Approaches to the International space Cooperation, in ESA bulletin 110, May 2002
[24] The *consensus* is becoming an institutionalised legal resource to approving G.A. resolutions
[25] *The Principles Governing The Use By States Of Artificial Earth Satellites For International Direct Television Broadcasting*, adopted on 10 December 1982 (res. 37/92)
The Principles Relating To Remote Sensing Of The Earth From Outer Space, adopted on 3 December 1986 (res. 41/65)
The Principles Relating To Remote Sensing Of The Earth From Outer Space, adopted on 3 December 1986 (res. 41/65), adopted on 14 December 1992 (res. 47/68)

The Declaration On International co-operation In The Exploration And Use Of Outer Space For The Benefit And In The Interest Of All States, Taking Into Particular Account The Needs Of Developing Countries, adopted in December 1996
all found in *United Nations Treaties and Principles on Outer Space*, A/AC.105/722, A/CONF.184/BP/15, United Nations Vienna, 1999

[26] The DHA was created to « mobilize and coordinate the collective efforts of the international community, in particular those of the UN system, to meet in a coherent and timely manner the needs of those exposed to human suffering and material destruction in disasters and emergencies. This involves reducing vulnerability, promoting solutions to root causes and facilitating the smooth transition from relief to rehabilitation and development" G.A.Res. 46/182

[27]SCOTT, Natural disasters, in Actes du Colloque de Strasbourg, 2-4 1993 « Droit Télédétéction et Environment 1994, ed. by COURTEIX

[28]Colloquium on the Environment and Natural Disaster Management, sponsored by THE WORLD BANK, Washington D.C., USA, June 27-28 1990; World Bank, World Development Report 1992, Development and the environment, Oxford University Press

[29]International Telecommunication Union, Statement before UNDRO International Conference on Disaster Communications, Geneva, Switzerland, March 1990

[30] A/RES/58/214, 22 Feb. 2004, Agenda item 94(e)

[31] About Conference: http://www.unisdr.org/wcdr

[32] More information on IEWP can be found at http://www.unisdr.org/wcdr/other-meetings/iewp/iewp.htm

[33]Among the countries signing the agreement we find Western Europe countries (Belgium, Spain, France, Italy, Luxembourg, etc.), Eastern Europe countries (Bielorussia, Georgia, Lituania, Russia, etc.) and countries of the Maghreb (Algeria, Morocco); many international organisations are involved (UNESCO, European Commission and Red Cross); Germany, Austria and Switzerland are observers; ESA/C (94) 143, ann. 1-2, Dec. 1st 1994

[34] Albania, Algeria, Armenia, Azerbaijan, Belgium, Bulgaria, Cyprus, Croatia, France, Georgia, Greece, Lebanon, Luxembourg, Malta, Moldova, Monaco, Morocco, Portugual, San Marino, Romania, Russia, Spain, "the former Yugoslav Republic of Macedonia", Turkey, Ukraine

[35] As examples: the programme to assist in decision making in the management of risk and emergency situations. The European Warning System enabling member States concerned by earthquakes to be informed in real time of technical data under the responsibility of the Euro-Mediterranean Seismological Centre (EMSC) in Bruyères-le-Châtel , France. See BATTAINI DRAGONI, Contribution of the EUR-OPA Major hazards Agreement to the International Strategy for Disaster Reduction, in U.N. World Conference on Disaster Reduction, Kobe, Japan 18-22 January 2005, http://www.coe.int/T/E/Cultural_Co-operation/Disasters/