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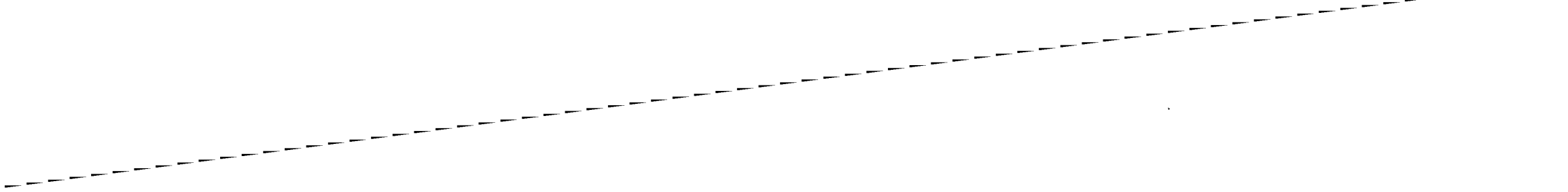

OUTER SPACE ACTIVITIES,

INTERNATIONAL COOPERATION

AND THE

DEVELOPING COUNTRIES

by

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ABSTRACT

This thesis begins with the examination of the five multilateral space law treaties from perspectives of the developing countries.

Next, the genesis and scope of international cooperation in space activities, in relation to the expectations of the developing countries is explored.

In the following two chapters the content of the principle of the common heritage of mankind in space law as well as the transfer of space technology to the developing countries is analyzed in the context of the 1982 U.N. Convention on the Law of the Sea, as amended in 1994.

The legal regulation of remote sensing by satellite and the 1996 U.N. Declaration on International Cooperation are critically examined in the following two chapters.

The thesis ends with a comprehensive survey of specific requirements of developing countries in the field of space technology , with special emphasis on the needs, and possible ways to satisfy those needs, of Bosnia –Herzegovina.

RÉSUMÉ

La thèse présente commence par l'exploration des cinq traités multilatéraux du droit de l'espace dans la perspective des pays en voie de développement.

Ensuite, on explore le développement et le champ d'application des collaborations multilatérales dans les activités spatiales des pays en voie de développement.

Le contenue des principes de l'héritage de l'humanité dans le domaine du droit de l'espace est analysé dans les deux chapitres suivants, ainsi que le transfert de la technologie spatiale vers les pays en voie de développement dans le contexte de la Convention du Droit de Mer de 1982, telle qu'amendée 1994.

Dans les deux chapitres suivants, on examine la régulation légale de l'observation de la terre par satellite et aussi La Déclaration de la coopération internationale de l'O.N.U. de1996.

Cette thèse finit par un résumé complet des besoins spécifiques des pays en voie de développement dans le domaine de la technologie spatiale, avec l'accent sur les besoins de la Bosnie et Herzégovine et les moyens nécessaires dans le but de satisfaire ces besoins.

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INTRODUCTION

"At a time when large masses of mankind have reached a status of national dignity and political equality, we have witnessed the growing inequality between those who have inherited the fruits of science and technology and those who remain on the outside, looking in. To be aware of emerging technological abundance in the midst of famine, squalor and disease adds a dimension of bitterness and cruelty for those increasingly conscious of the ideals of equal rights and opportunities. Thus, science ironically widens the great fissure which now splits the globe and threatens our precarious international order. There is poignancy as well in the widespread feeling that science, in reaching for planets and in probing into the genetic code, has somehow lost contact with the needs and aspirations of common humanity."[1]

Oscar Schachter

The above assessment although written thirty years ago, is regrettably, still to a large degree applicable today. Despite enormous progress in technology in general, and space technology in particular, much of mankind, notably those in greatest need, have benefited little, if at all, from this progress. The great expectations placed in the emergence of a new concept of international law - the Common Heritage of Mankind - remains, as far as the developing countries[2] are concerned, in the realm of hope and expectation. In fact, in one important area, as will be documented later, in the new legal regime of the oceans, this concept

has suffered a serious setback. The much heralded Declaration on the Establishment of a New International Economic Order, embodied in a 1974 resolution of the United Nations General Assembly, has for all practical purposes been forgotten. The companion resolution incorporating the Charter of Economic Rights and Duties of States fared no better[3].

After two UNISPACE conferences (1968 and 1982) on "Space Exploration and its Applications", convened on the initiative of the developing countries, and following several years of negotiations in the Legal Sub-committee of the U.N. Committee on the Peaceful Uses of Outer Space (COPUOS), on 13 December 1996, a "Declaration on International Cooperation" in space uses for the benefit of all states, particularly developing ones, was adopted by the U.N. General Assembly.[4]

Relatively few treaties and one U.N. General Assembly resolution represent the international legal cornerstones upon which the future regime of international cooperation in the uses of outer space between space powers and developing countries will likely be based. These documents are, in chronological order, the Outer Space Treaty of 1967, the Moon Agreement of 1979, U.N. Convention on the Law of the Sea of 1982, as amended in 1994, and the 1996 Declaration. While there are, of course, other legal texts relevant to the subject-matter of this work, such as the ITU Convention and the U.N. General Assembly

resolution on remote sensing from space, to be later examined, those four documents merit special attention because they will almost certainly play a crucial role when the question of legal obligations imposed by international law upon states as opposed to their moral obligations involves space cooperation with developing nations.

The study will first briefly examine, especially from perspectives of developing countries, the treaties which make the backbone of the legal regime for outer space (chapter one). Next the genesis and scope of international cooperation in relation to the expectations and needs of the developing countries will be explored (chapter two). In the following two chapters, the principle of the "common heritage of mankind" and the transfer of space-related technology will be analyzed in the context of the 1982 U.N. Convention on the Law of the Sea, as amended in 1994. The technology, use, and regulation of remote sensing from space, a technology potentially of greatest practical benefit to developing nations, is the subject matter of the next chapter (five). The 1996 "Declaration on International Cooperation" is critically examined in chapter seven, followed by a survey of specific requirements of developing countries in the field of space technology and possible ways to satisfy their genuine needs.

CHAPTER I

EVOLUTION OF A LEGAL REGIME TO GOVERN SPACE ACTIVITIES

Since the advent of space age, the United Nations has had a unique role in the development of an entirely new body of law governing the exploration and use of outer space. A year after the launching of Sputnik I, in 1958, the U.N. General Assembly included on its agenda the item "Question of the peaceful uses of outer space" and established an Ad Hoc Committee on the Peaceful Uses of Outer Space" with a membership consisting of 18 states. Among them were four developing states (India, Iran, Mexico and United Arab Republic). Next year, in 1959, a permanent Committee on the Peaceful Uses of Outer Space (COPUOS) was created with 24 members (among the new additions were Albania and Lebanon) eventually expanded to 61 in 1994, including 28 developing states. From its very beginning, the center of codificatory activity relating to outer space has been the Legal Subcommittee of COPUOS. Its work has led to the adoption of five multilateral agreements and five major U.N. General Assembly resolutions regulating various space uses.

By far the most important among the five space law agreements is the "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies" (Outer Space Treaty), adopted on 19 December 1966, opened for signature on 27

January 1967, and entered into force on 10 October 1967 [5]. As of March 1997, this Treaty has received 95 ratifications, including those of all the major space powers. This document is deservedly regarded as the constitution of outer space for it enunciates all the fundamental principles governing the use of space environment. These principles stipulate, inter alia, that: outer space is free for exploration and use by all states (Article I); there shall be free access to all areas of celestial bodies (Article I); outer space is not subject to national appropriation by claim of sovereignty, by means of occupation or by any other means (Article II); international law and the U.N. Charter apply to the activities of states in outer space (Article III); states shall not place nuclear weapons and other weapons of mass destruction (i.e., chemical, biological and radiological weapons) anywhere in outer space (Article IV); all military activities on the moon and other celestial bodies are prohibited (Article IV); states bear international liability for national activities in outer space, whether carried out by governmental or private entities (Article VI); and that states must conduct their activities in space in a manner that will prevent environmental contamination and harmful interference with the lawful activities of other states (Article IX).

The very first sentence in the Outer Space Treaty aroused great expectations in the developing countries of the world for it reads: "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." Many developing countries assumed that these words included in such an important treaty amounted to a legal obligation on the part of space powers to share the benefits of their activities in space with the poor nations of the world. Referring to the words "the province of all mankind" former president of the International Court of Justice and an active participant in the drafting of the Treaty, Manfred Lachs, criticised those who claim that these words are of a purely moral character, without any legal consequences. On the contrary, he was of the opinion that "there is more in it [Article I], though further precision on the subject would be desirable.[6] " As will be amplified later, the position taken by the U.S. Department of State in regard to the term in question is today the prevailing one. According to this view, the provisions of Article I do not create "legal obligations with respect to the terms of international cooperation on any existing or future space projects"; it is up to the United States "to determine how it shares the benefits and results of its space activities".[7]

The preparations for the first manned landing on the Moon provided the stimulant for the conclusions of "The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space" (opened for signature on 22 April 1968, entered into force on 3 December 1968). The essence of this Agreement is contained in its preamble which quotes Article V of the Outer Space Treaty's call on states to render "all

possible assistance to astronauts in the event of accident, distress or emergency landing" and to promptly and safely return them to the launching authority. Astronauts are designated "envoys of mankind" (Article V, Outer Space Treaty) and are accorded immunity equal to that of ambassadors; the duty to return them is unconditional. In contrast, the return of objects is not automatic; the state on whose territory a foreign space object is found may make conditional its return upon receiving satisfactory identifying data from the launching authority, as well as compensation for the expense incurred in the recovery and return of the object (Article 5(3) and (5)). Needless to say that this Agreement, as far as the developing countries are concerned, imposes upon them obligations (search and rescue of astronauts; search for and recovery of objects) without any corresponding benefits.

A significant step in the evolution of space law was the adoption of "The Convention on International Liability for Damage Caused by Space Objects" (opened for signature on 29 March 1972, entered into force on 1 September 1972). The Convention has adopted a dual system of liability; for damage caused by a space object on the surface of the earth or to aircraft in flight, the launching state is "absolutely liable" (Article II). However, if the damage is caused in the airspace or in outer space to a spacecraft or persons on board such spacecraft by a space object of another state, liability will be based on fault (Article III). The Convention defines damage as "loss of life, personal

injury or the impairment of health, or loss of or damage to property" (Article I(a)). The launching state can be exonerated from absolute liability only if it can be established that the damage has resulted from the gross negligence or from an act or omission done with intent to cause damage on the part of the claimant state (Article VI(1)). No limit is placed on the launching state's liability - the claimant state must be restored to the condition that would have existed if the damage had not occurred (Article XII).

The Convention is the first multilateral treaty that imposes the regime of absolute liability directly on states. Its main relevance for the developing countries is that it assures such countries of a compensation in the event they suffer damage from a space activity of another country.

The question of registration of spacecraft and spacecraft launchings has been the object of much interest from the very advent of space age. The first landmark U.N. General Assembly resolution (1721 (XVI), 1961) devoted to outer space invited states "launching objects into orbit and beyond" to register promptly their launchings in a "public registry" to be maintained by the U.N. Secretary-General. The fact that the Outer Space Treaty contained explicit reference to the "State of registry" (Article V), and made every state responsible for its national activities in outer space, led to the conclusion of "The Convention on Registration of Objects Launched into Outer Space" (opened for signature on

14 January 1975, entered into force on 15 September 1976). The Convention provides for dual registration of "space objects" - national and international. Each launching state is obliged to maintain a national registry of space objects launched into Earth orbit and beyond (Article II(1)). The U.N. Secretary-General is responsible for maintaining a register in which information furnished by the launching states is recorded (Article III(1)). Article IV contains the key provision of the Convention prescribing the nature of information states must report to the Secretary-General. This treaty is of importance mainly to those developing states which have a satellite in outer space (e.g., India, Indonesia, Mexico).

The desire primarily on the part of the developing countries to prevent the spacepowers from monopolizing the acquisition of resources of the celestial bodies, led to the conclusion of "The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies" (opened for signature on 18 December 1979, entered into force on 11 July 1984). While most articles of this Agreement repeat the provisions of the Outer Space Treaty, adding little of consequence, Article 11 introduced for the first time in a multilateral treaty the concept of the common heritage of mankind.

The Article in paras. 1 and 3 declares that:

"The Moon and its natural resources are the common heritage of mankind; ...neither the surface nor the subsurface of the

Moon nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person."

The parties to the Agreement undertake to establish an international regime to govern the exploitation of the natural resources of the moon (para. 5). The purposes of the international regime should include, inter alia, the "rational management of lunar resources", the "expansion of opportunities in the use of those resources" and an "equitable sharing by all State Parties in the benefits derived from those resources whereby the interests and needs of the developing countries...shall be given special consideration" (para. 7). According to Article 6(2), the state parties are allowed to remove from the moon only "samples of its mineral and other substances".[8]

Manfred Lachs hailed the provisions of the Agreement which declare resources of the moon to be the "common heritage of mankind" as representing important progress in the evolution of the law of outer space. However, he called for "more precision" to be given to the terms "province of all mankind" and "common heritage of mankind" and that "a distinction between them (if any) should be clarified."[9]

Article 11, especially its para. 7, was the main reason that this Agreement failed to attract the support of a single space power. Moreover, 18

years since its opening for signature, the Agreement has only nine ratifications. Some day, in the not too distant future, if this Agreement is to survive, Article 11 will require much elaboration and it is safe to predict that in that endeavour, the regime of the common heritage established in the U.N. Law of the Sea Convention (as amended), will provide ample guidance when the need for an international regime to govern the exploitation of celestial resources arises. Indeed, it is fairly certain that that regime will in all essential aspects resemble the arrangements for the maritime area.

The addition of a large number of developing nations to COPUOS has had only limited effect on the direction of legislative work within the Committee. While it is true that complaints about still modest benefits accruing to developing countries from space activities were heard more often, that did not result in any major decision in their favour.

Two issues on the priority agenda of the Legal Subcommittee for many years and still unresolved - the question of boundaries between sovereign airspace and free outer space (officially designated as "The Definition and Delimitation of Outer Space") and the legal status of the geostationary orbit must also be mentioned because of their considerable importance to a number of developing countries. The question of boundaries was raised immediately after the launching of Sputnik, in October of 1957. Ten years later, the question was added to the agenda of the Legal Subcommittee on the initiative of France,

supported by several other members of COPUOS.

The only two spacepowers of the day, the USSR and the United States, opposed the suggestion claiming that satellite technology was still in its infancy and that drawing such a boundary could only interfere with the technical developments. Since all decisions in COPUOS had to be reached by consensus, no agreement was possible, especially given the dominating status of the two spacepowers in the Committee and its Legal Subcommittee. After 30 years of debates no agreement is in sight, primarily because of the strong opposition on the part of the United States, supported by the United Kingdom, Germany, Canada and several other, mainly industrial states, or allies of the U.S. The U.S. position was very clearly recently reiterated by its representative in the Legal Subcommittee: "...despite the lack of a definition of outer space, enormous strides had been made in the exploration and use of outer space over the past 30 years...To seek to establish an arbitrary line separating airspace from outer space would engender the risk of confusion, and perhaps hinder the peaceful exploration and use of outer space".[10]

It appears that the majority of the developing countries feel, some very strongly, that such a boundary is indeed necessary. Typical of their arguments are the following statements made by their COPUOS representatives. "The definition and delimitation of outer space was necessary because of the different legal regimes that should cover space and outer space respectively."

(Romania); "...it was necessary to define and delimit outer space in order to guard against unhindered violation of national airspace." (Pakistan); "...questions concerning the definition and delimitation of outer space...should be resolved as quickly as possible...the inner perigee of satellites in orbit should be the lower limit of outer space, confirming the rule of law that all satellites in Earth orbit were in outer space." (Mexico). Apparently, reflecting the new relationship between the United States on the one hand, and China and Russia on the other hand, these two spacepowers at this time appear to be non-committal on the issues.[11] One of the earliest non-scientific uses of outer space was for purposes of communications. Satellite communications represent today the most important commercial exploitation of outer space and are used by virtually all countries of the world. The United States, followed by a few industrial nations, was the first to begin placing in the geostationary orbit (at 35,786 kilometres altitude) communications satellites to serve its domestic and international telephone, radio and television needs.

Since that particular orbit is a scarce natural resource that can at this time simultaneously accommodate only a limited number of satellites, many less developed states voiced early their fears that when they become ready to place their own national satellite in that orbit, the best location for their satellite will be already occupied by the satellite of another country.

At the initiative of Colombia, in 1976, seven equatorial countries meeting in Bogota adopted a "Declaration" which asserted that the geostationary orbit is not part of outer space and that "the segments of geostationary synchronous orbit are part of the territory over which Equatorial states exercise their national sovereignty."[12] The countries that signed the Declaration were Brazil, Colombia, Congo, Ecuador, Indonesia, Kenya, Uganda and Zaire. This item too has been on the priority agenda of COPUOS for the last twenty years. During that time, some of the signatories of the Bogota Declaration abandoned their original position, including Colombia, having encountered strong opposition on the part of all major space powers. The current position of the countries seeking special legal regime for the geostationary orbit was enunciated by Colombia at the 1997 session of the Legal Subcommittee in these words: "in view of the special characteristics of the geostationary orbit there was a need to establish a sui generis legal regime regulating access to and use of that orbit...and that such a regime should guarantee actual and future equitable access to the geostationary orbit to all States, taking into particular account the needs of developing countries, including the equatorial countries, because of their special geographic characteristics....since outer space had not so far been delimited, it could not be affirmed that the geostationary orbit was part of outer space."[13]

The opposite position, shared by virtually all industrial member states of COPUOS, and at least several other states, has always been that the legal

regime established by the Outer Space Treaty adequately covered activities in and related to the geostationary orbit and that that orbit was no different from any other point in space and therefore was not subject to a sui generis regime and that no preferential rights for any state in the orbit could be justified. Furthermore, in this view, the issue should be left to the International Telecommunication Union which has been successful in regulating the use of that orbit.[14]

When agreement is finally reached on this question, there can be no doubt its substance is going to be much closer to the view held by the affluent states than even to modified claims by the equatorial and some other developing states. Apparently, the addition of a number of less developed nations to COPUOS has not tangibly augmented their influence in this body.

CHAPTER I – NOTES

1. »Scientific Advances and International Lawmaking », (1967), 55 California L. Rev., p. 423, at 429.

2. Out of 185 member states of the United Nations, well over 100 would qualify as « developing countries ». While there are significant differences among them in size, degree of industrialization, population, rate of economic growth, education and resources, most of them share certain typical characteristics : their per capita income is low, their level of industrialization is low; a large part of their labor force is engaged in agriculture; their educational facilities are inadequate; and they all want to modernize their economies.

At the 34-ty session of the Legal Subcommittee of the U.N. Committee on the Peaceful Uses of Outer Space(COPUOS), several delegations expressed the view that term « developing country » needed to be legally defined and the criteria used to distinguish those countries clarified.They felt that the U.N. Secretariat should provide an authoritative answer to that question. In response, the Secretariat stated that there was no officially recognized definition of the term in the U.N. practice. U.N. Doc. A/AC 105/607 (19 Apl. 1995), Report of the Legal Subcommittee on the Work of its 34th session (27 March-7 Apl..1995).

3. U.N. G.A. res. 3201 (May 1, 1974); U.N. G.A. res. 3281 (Dec. 12, 1974).

4. « Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries », U. N. G.A. A/RES/51/122 (4 Feb. 1997). The full text of the resolution appears as Annex I.

5. For the text of this and other space law treaties, see U.N. Doc. United Nations Treaties and Principles on Outer Space (1997).

6. « Some Reflections on the State of the Law of Outer Space », J. Space L. (1981), 9, p. 3, at 9.

7. C. Christol, *Space Law : Past Preent and Future*, p. 67 (1991).

8. For an up –to-date assessment, see C. Christol, « The Moon Treaty and the Allocation of Resources », Annals of Air & Space L. (1997-II) 22, p. 31. For an interesting proposal designed to govern future exploitation of lunar resources, see D. O'Donnell & P. Harris, « Legal Strategies for a Lunar Economic Development Authority », *Annals of Air & Space Law* (1966-I), 21, p. 121.

9. *Supra*, note 6, *ibid.*

10. U.N. Doc. A/AC. 105/C. 2/SR. 575, p. 7. 33 rd session of the Legal Subcommittee of COPUOS (March 31, 1994).

11. *Id.*, Russia, p. 4; China, p.7.

12. Text of the Declaration in I. Vlasic, *Space Law and Institutions* p. 174. (1997).

13. U.N. Doc. A/AC. 105/674, p. 13 Report of the Legal Subcommittee on its 36th session (1-8 Apl., 1997).

14. *Id.*, at p. 13.

CHAPTER II

THE SCOPE OF INTERNATIONAL SPACE COOPERATION AND THE NEEDS OF DEVELOPING COUNTRIES

Addressing the U.N. General Assembly on November 17, 1958, U.S. Senate Majority Leader, Lyndon B. Johnson (as of November 23, 1963, U.S. President) placed heavy emphasis on the need for international cooperation in space activities. He stressed that the U.S. sees only one course which the nations of the world may intelligently pursue - "the course of full and complete and immediate cooperation to make the exploration of outer space a joint adventure." Noting that the opening of space is "the concern of all mankind", he warned that should states proceed unilaterally, "then their penetrations into space become only extensions of their national policies on Earth. By contrast, he concluded "if we proceed along the orderly course of full cooperation, we shall by the very fact of cooperation make the most substantial contribution yet made toward perfecting peace."[15] Regrettably, neither the United States nor the Soviet Union, at that time the only space capable nations, followed in practice this wise and humane recommendation.

Johnson's words found their way in the U.S. National Aeronautics and Space Act of 1958, which begins with a declaration of policy and purpose: "Sec.

102(a) The Congress hereby declares that it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind." The Act further declares in Sec. 102(c)(7) that the aeronautical and space activities of the U.S. shall be conducted so as to contribute materially to "cooperation by the United States with other nations and groups of nations in work done pursuant to this Act and in the peaceful application of the results thereof." To implement these objectives, a civilian agency was established - the National Aeronautics and Space Administration - to exercise control over non-military aeronautical and space activities sponsored by the U.S. From its very inception, NASA began entering into bilateral agreements ("Memorandums of Understanding") with an ever-increasing number of countries.

By 1965, the U.S. had such agreements with 69 states. Among them were several developing nations, including Ghana, India, Iran, Jamaica, Malagasy Republic, Nigeria and the Philippines.[16] However, arrangements with these countries were extremely modest in scope and served primarily, sometimes exclusively, U.S. space needs (e.g., satellite tracking stations and data acquisition facilities). The participation of the local sovereign was to provide appropriate location for those facilities and manual labour.

Major programs, such as the launching of sounding rockets and satellites were concluded exclusively with the developed nations. Thus, the first foreign

satellite launched by the U.S. was Canada's Alouette, placed in a near-polar orbit in September 1962. Later on, the U.S. launched satellites for the United Kingdom, France and Italy. By 1986 NASA had reportedly concluded more than 1000 space cooperation agreements with over 100 countries.[17] Yet, the Presidential Directive on National Space Policy does not explicitly mention cooperation with developing countries. Instead, it provides that the government agencies "will conduct international cooperative space-related activities that are expected to achieve sufficient scientific, political, economic or national security benefits for the nation."

The United States will seek mutually beneficial international participation in its space programs." The "Civil Space Sector Guidelines" of this document under the title "International Cooperation" repeats the above policy goals and adds that the cooperation must be "consistent with U.S. technology transfer laws, regulations and presidential directives, and "be conducted in such a way as to protect the commercial value of intellectual property developed with Federal support." Even before it had achieved full space capability, the Centre National d'Etudes Spatiales, French governmental space agency, reported that France had concluded by 1965 space-related agreements with 21 countries, ranging from exchange of scientific information to cooperative launchings (the latter with the U.S. and the Soviet Union).[18]

In the early years since Sputnik, space cooperation between the Soviet Union and developing countries somewhat lagged behind its American rival. The first bilateral agreement on space exploration concluded by USSR was with the United States, in 1962. Their cooperation was limited to few scientific programs. The first West-European state to enter into a bilateral agreement with the Soviet Union was France.

Their 1966 agreement covered a great range of projects, including space physics, meteorology, space biology, medicine and telecommunications, as well as carrying French-made instruments aboard Soviet spacecraft.

The original agreement was followed by dozens of relatively major cooperative projects, among them the voyage in 1982 of a French astronaut to the Soviet space station. Extremely close relationship in space matters developed between the USSR and India. This cooperation involved an array of scientific and technological projects and significantly contributed to making India a space power.[19] Presumably, for political reasons the Soviet Union trained and launched into space as guest-cosmonauts between 1978 and 1991, 18 foreign nationals, among them the nationals of Bulgaria, Afghanistan, Cuba, Mongolia, India, Syria and Vietnam. In contrast, during the 1983 and 1993 decade, 15 foreign nationals flew on the U.S. space shuttle, but only two were from developing countries (Mexico and Saudi Arabia).[20]

The Soviet Union also cooperated with other countries through two

Moscow-based organizations - Intersputnik and Intercosmos.[21] The "International System and Organization of Space Communications" (Intersputnik) was established by agreement in 1971, primarily to serve the needs of the Communist bloc nations. Although based on the principle of universality, the membership of this organization never exceeded 14 states. The Intersputnik system had earth stations located in most of its member states which included Algeria, Afghanistan, Cuba, Iraq and Laos. According to its report submitted to the United Nations, Intersputnik has provided to the developing countries technical consulting and other kinds of assistance in the field of earth station construction and operation, as well as in training specialists.[22]

The other Soviet-led organization - the "Council on International Cooperation in the Study and Utilization of Outer Space" (Intercosmos) - began to function in 1967 but was given legal status only in 1976 by "Agreement on Cooperation in the Peaceful Exploration and Use of Outer Space". Ten countries participated in the Intercosmos program which included research and application of space technology in the fields of physics, meteorology, biology, medicine and remote sensing. Between 1969 and 1991, 25 satellites and 12 high altitude research and meteorological rockets were launched as part of the organization's program. It is noteworthy that participants in the five explicitly mentioned scientific programs of Intercosmos in the Soviet report to the U.N., were all

advanced states (e.g., U.S., France, Germany, Sweden).[23] Whether there was and if so, what kind, of space technology transfer under this program, especially to developing countries is not known.

In June 1986, the USSR submitted to the U.N. Secretary-General a proposal for the establishment of a "World Space Organization".[24] This organization would be financed by countries with a major space potential and by other economically developed states. W.S.O. would be involved in virtually all types of space activities, including the monitoring compliance with agreements on the prevention of an arms race in space. Developing countries could participate in space projects organized by the W.S.O. on easy terms and scientific and technological assistance to such countries would be made available. M. Gorbachev, then the leader of the Soviet Union, on a visit to India, in November of 1986, urged the leading space powers to assist in setting up an international center for joint research and development on requests from developing countries, for the study of natural resources. Such a center, he added, could run a school for the training of the nationals of developing countries in space technologies including cosmonauts, and would also construct a launching site for space vehicles.[25] Unfortunately for the developing countries, this ambitious Soviet proposal received no response from the West and it vanished together with the Soviet Union.

It is quite revealing to read a recently published article by a Russian expert on the Soviet and current Russian space cooperation. The Soviet involvement in "cooperative ventures was limited mainly to scientific cooperation with Eastern European countries" he writes and from 1985, the USSR "performed all its space science and planetary missions only in cooperation with the West, notably France and some other European countries." At this time, "[t]he top priority for the Russian Space Agency is a permanently manned space station",[26] a gigantic project by 13 major industrial nations, led by the United States. Not a word in this article on cooperation with developing countries; on the contrary, the author justifies refusal to sell to India, an important political and commercial partner of Russia, a certain equipment by "anticipating greater benefits from dealing with the West than from selling space technology to India."[27]

In the early days of space age several Western European countries attempted to develop independent national programs. Having encountered considerable difficulties, in 1962 ten states of the region agreed to cooperate through a multinational organization. That year two agreements were signed, coming into force in 1964 - the European Space Research Organization (ESRO) and the European Space Vehicle Launcher Development Organization (ELDO).[28] On May 30, 1975, a Convention was signed providing for the establishment of the European Space Agency (ESA).[29] The new agency took

over all the activities and programs of ESRO and ELDO. Currently, ESA has 13 member states, including France, Germany and Britain, as well as one associate member (Finland), with Canada in special relationship as a non-member. According to Article 2 of the ESA Convention the purpose of the Agency is to provide for and to promote cooperation among European states in space research and technology, involving all aspects of space activity except those serving the military. An important function of the Agency is to coordinate the national space programs with the goal of integrating them gradually into a single European space program (Article 2(c)). While ESA cooperates with a number of developing countries, especially with the francophone African states, the scope of this cooperation is limited. As is the case with NASA, by far the most important cooperative partners of ESA are the leading space powers, the U.S. and Russia, Japan, India and Canada. The largest and most expensive form of ESA's international cooperation is its participation on behalf of all its member states in the International Space Station program.[30]

A new form of international cooperation in the field of telecommunications was inaugurated in 1964 by the signing of the Agreement Establishing Interim Arrangements for a Global Commercial Communications Satellite System. The definitive arrangements, establishing permanent International Telecommunications Satellite Organization (INTELSAT) were

concluded on May 21, 1971, and entered into force on February 12, 1973.[31] The great majority of developing countries have joined Intelsat whose current membership exceeds 170 states. Most of the global international telephone service and virtually all international television broadcasts are carried by this organization.[32] Intelsat represents by far the most important and the most commercially successful use of outer space technology. Services provided by this organization are probably the most important significant benefit that developing countries are enjoying from space activities.

The United Nations system provides various forms of assistance to developing countries through 19 of its institutions. In the fields of meteorology and remote sensing, U.N. agencies have played more significant role in bringing the benefits of satellite technology to developing countries than have the space powers. The most active among them has been Food and Agriculture Organization (FAO). This organization has been using satellite imagery regularly since 1969. In 1980, at the request of COPUOS, FAO established Remote Sensing Center to serve as clearing house for developing countries in remote sensing applications to renewable natural resources. FAO has undertaken dozens of technical assistance projects for the benefit of developing countries, involving agriculture, forestry, wildlife, marine and inland fisheries, hydrology and land use.[33]

World Meteorological Organization (WMO) is another U.N. agency which has used extensively satellite technology almost since the advent of space age. In 1963 this agency inaugurated the World Weather Watch, a world-wide system composed of the facilities and services provided by the member states of WMO and supplemented by international organizations. This network is of considerable benefit to all nations, including the developing ones. WMO has carried out extensive educational programs and training for experts from developing nations, transferring knowledge in the management and use of satellite data.[34]

The interest of the United Nations Educational, Scientific and Cultural Organization (UNESCO) in the field of space applications dates back to the earliest days of space adventure. UNESCO's services to its member states have consisted of studies, publications, conferences and seminars on the use of satellites for education, information, and culture. By using remote sensing imagery, UNESCO has conducted studies aimed at safeguarding important historical and cultural monuments.

In cooperation with the ITU, UNESCO sent several expert missions to developing countries to study the possibilities of using satellites to aid national development. Currently, UNESCO's involvement in space activities is dominated by remote sensing techniques, particularly their diffusion in developing countries and their use in environmental monitoring.[35]

The United Nations Environment Programme (UNEP) views remote sensing as an important tool for the systematic collection of data on environmental conditions. The major benefit to developing countries from space activities involving UNEP derives from the Global Environmental Monitoring System, a joint effort of UNEP, FAO, WMO, World Health Organization and interested member states. Its purpose is the gathering and dissemination of environmental data in a systematic manner. On recommendation of UNEP and ITU, to meet the pressing telecommunication needs of the Middle East and North Africa regions, the Arab Space Communications Organization (ARABSAT) was established in 1976, with the membership consisting of 21 states. Its commercial operations began in 1985, and it currently operates 2 satellites, the first launched by the French Arianne launcher and the second by the U.S. space shuttle.[36] As in the case with other U.N. specialized agencies using space technology, UNEP's principal assistance to its developing member states consists of training courses, studies and seminars.[37]

The contribution of the U.N. Office for Outer Space Affairs must also be mentioned. Its function is to implement the decisions of the U.N. General Assembly and of COPUOS. Its section on Space Applications organizes and carries out the U.N. Programme on Space Applications; since 1968, it has carried out projects designed to disseminate information and provide training in

the practical application of space technology, especially for developing countries.[38]

As early as 1959, the U.N. General Assembly called for a United Nations conference in 1960 or 1961, in order to facilitate "exchange of experience in the peaceful uses of outer space" in the interest of "the development of science and the improvement of the well-being of peoples" (U.N.G.A. res. 1472 (XIV) of Dec. 12, 1959). While this conference failed to materialize, the support for the idea continued, promoted mainly by developing nations. The Cairo Declaration of the 2d conference of non-aligned (mainly developing) nations (1964), which strongly recommended the holding of such a conference was particularly helpful. When the General Assembly eventually endorsed the conference, (U.N.G.A. resolutions 2221 (XXI) and 2261 (XXII)), there was no difficulty in agreeing that its main objective should be to seek ways and means of bringing the benefits of space technology to developing countries. The objectives of the Conference (UNISPACE I), held in 1968, were as follows: "To examine the practical benefits of space research and exploration..., and the extent to which non-space Powers, especially the developing countries, might enjoy those benefits; and (b) to examine the opportunities available to non-space Powers for international cooperation in space activities, taking into account the extent to which the United Nations might play a role."[39]

In his message to the Conference, U.N. Secretary-General U-Thant poignantly stressed that "tools of outer space are known only to a few nations" and proceeded: "The developments in space science and technology have thus far benefited most those countries which are already ahead in the economic and social time-table of the world. The space age is increasing the gap between the developed and developing areas of the world at an alarming rate."[40] A total of 188 papers were submitted to the conference by governments, U.N. specialized agencies and other international organizations, but no final resolutions or recommendations were adopted.

In 1982 the Second U.N. Conference on space was held (UNISPACE II), again in Vienna, with 94 states participating, including all space powers. In their opening statements leaders of a number of developing countries complained about the growing gap between their countries and the industrial world. The President of Sri Lanka, for example, stated that developing nations "were no longer satisfied with remaining mere spectators of the great adventure of space science and technology."[41] The Prime Minister of India in her message to the Conference noted that the "promise of gains from advanced technologies eluded the majority of humankind, whose aspirations for a better life remained unfulfilled."[42] Similarly, Professor Y. Pal, Secretary-General of the Conference, who stressed that the benefits of space technology from perspectives of humanity as a whole "had been minimal in most cases - and actually far less than their

potential."[43]

Final Report summarizing the results of the Conference included copious excerpts from the conclusions of the U.N. Conference on Science and Technology for Development, held in 1979, finding them applicable to the fields of space science and technology. Among the excerpts quoted, there was also the following: "The Conference is an integral part of the efforts of the international community for the establishment of the New International Economic Order through the adoption of decisions...aimed at the use of science and technology for the development of all countries, and particularly of the developing countries."[44] Many delegations at the conference pointed out that their countries saw the gathering in the context of ongoing efforts to promote the new international economic order.[45]

At its 51st session in 1996, the U.N. General Assembly recommended that "a special session of the Committee (COPUOS) open to all U.N. member states should be convened in Vienna in July of 1999." (UNISPACE III) (Res. 51/123). The major goal of the conference will be "to strengthen the capabilities of member states, particularly developing countries, in using the applications of space research for economic, social and cultural development." It was agreed that the title of the conference should be "Space Benefits for Humanity in the Twenty-first Century".[46]

A recent U.N. publication lists a number of bilateral arrangements between industrial states and developing countries. By way of illustration, here are several examples of major undertakings. In November 1996, a British company contracted with a Thai private company for the launching of a microsatellite. The contract worth 3 million pounds provides also for the construction of a ground station and technology transfer program. The same year, the French Arianne launched Malaysia's first privately-owned satellite which will provide direct TV broadcast and domestic communications services. On July 24, 1996, ESA and Portugal signed an agreement covering cooperation in space science, remote sensing, telecommunications and microgravity research. There are also increasing signs that the more affluent and industrialized among the developing states are beginning to enter into space-oriented partnerships with one another. Thus, in April 1996, Brazil and Argentina signed an agreement for the joint development of space technology. On October 27, 1995 India and Hungary signed a space cooperation agreement covering earth observation, astronomy and solar-terrestrial physics.[47]

To assess fully and accurately the practical benefits that developing countries have obtained through bilateral cooperation would require a major study. It is possible to say, however, even on the basis of incomplete information, that not one of these agreements envisages any major undertaking between the

space-capable nation and its developing partner, such as the participation in the launching of a satellite, or joint development and transfer of space technology. Developing countries are excluded from major space-oriented scientific programs of Western nations as well as from comparable programs organized by USSR and Russia. Joint NASA-ESA space undertakings, the Ulysses, the Hubble Space Telescope, the Spacelab, Eureca, Cassini, Pioneer, Voyager, Mars Global Surveyor, the Giotto space probe, to mention only the more recent ones, are illustrative of the exclusionary nature of these arrangements.

Similarly, among the 13 international partners (and Russia), cooperating with the United States in the development of the International Space Station there is not a single developing state.[48] ESA's report on its activities, consisting of 30 large pages in a U.N. document of 1992, hardly even mentions cooperation with developing countries.

In conclusion, by and large, through bilateral agreements developing countries have been able to secure for a limited number of their nationals access to educational and research facilities offered by their more advanced bilateral partners, modest assistance in equipment, and the launching of an occasional satellite, for a fee, of course.

CHAPTER II – NOTES

15. U.S. Congress, Senate Special Comm. On Space & Astronautics, 85 th Cong., *Space Law – A Symposium*, p. 558 (Dec, 31, 1958).

16. U.S. Congress, Staff Report, *International Cooperation and Organization for Outer Space* pp. 11 et seq. (Aug. 12, 1965).

17. K-U. Schrogl, « Legal Aspects Related to the Application of the Principle That the Exploration and Utilization of Outer Space should be Carried out for the Benefits and in the Interest of All States... », in M. Benko & K-U. Schrogol,(eds.), *International Space Law in the Making*, p. 195, at 201 (1993).

18. I.Vlasic, The Growth of Space Law, 1957-65 : Achievements & Issues », *Yearbook of Air & Space L.* (1965) p. 365,. (1967) at 394.

19. V. Glushko, *Soviet Cosmonautics : Question and Issues* pp. 11-12 (1988)

20. A. Curtis (ed.), *Space Almanac*, pp. 76-77; 124-125; (2d ed. 1992).

21. Texts of agreements creating these organizations in N. Jasentuliyana & R. Lee (eds.), 2 *Manual on Space Law* pp. 241 and 253 (1979).

22. United Nations, *Space Activities of the United Nations and International Organizations*, pp. 174-75 (1992).

23. *Id.* at 175-78.

24. For the Charter of this proposed organization, see U.N. Doc. G. A. O. R., 43rd sess. supp. no 20, (A/43/20) (1988).

25. V. Glushko, *supra* n. 19, at p. 109.

26. M. Tarasenko, Russia's place in space : a home view, *Space Policy*, p. 115, at 115-16 (May 1994).

27. *Id.*, at pp. 119.

28. Texts of ESRO and ELDO agreements in *Yearbook of Air & Space Law 1965*, pp. 440 & 477 (1967).

29. For the text of the ESA Convention , see 2 Manual on *Space Law* supra n. 21, at 259.For a recent commentary, M. Bourély, « Space Law and the European Space Agency », in N. Jasentuliyana (ed.), *Space Law – Development and Scope*, p. 87 (1992).

30. See ESA's report submitted to the United Nations, in U. N. publication *supra*, n. 22, pp. 135 *et seq.*

31. Text of the Intelsat agreement in *op. cit. supra*, n. 21, p. 159; For a commentary, see R. Colino, « International Telecommunications Satellite Organization », in *id.*, vol. I, p. 363.For an extensive analysis, F. Lyall, *Law and Space Telecommunications*, p. 74 *et seq.* (1989).

32. N. Jasentuliyana, « The Role of Developing Countries in the Formulation of Space Law », (1995-II), 20 *Annals of Air & Space L.* p. 95, at 105.

33. *Op. cit. supra*, n. 22 p. 63 *et seq.*

34. *Id.* , p. 110.

35. United Nations, *Space Activities of the United Nations and International Organizations*, p. 77 *et esq.*

36. Id., at p. 186.

37. *Id.*, p.56 *et seq.*

38. *Id.*, at p. 25.

39. *United Nations, Space Exploration and Applications*, Vienna, 14-27 Aug. 1968, vol. I , p. xv (1969).

40. *Id.*, at p. vii.

41. United Nations, *Report on the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space*, Vienna, (Aug. 9-21), 1982, p. 115.

42. *Id.*, p. 116.

43. *Id.*, p.117.

44. *Op. cit., supra* n. 41, p. 3.

45. *Id.*, p. 125.

46. U.N. Doc. A/AC. 105/662, « Matters Relating to the Planning of the Special Session of the COPUOS (UNISPACE III), (13 Dec. 1996); J. Thaker, « The Work of the Committee on the Peaceful Uses of Outer Space (COPUOS) », (1997-II), 22, *Annals of Air & Space L.* p. 295, at 297.

47. United Nations, *Highlights in Space*, pp. 36-42 (1997).

48. A. Farand, « La station spatiale et son régime juridique », (1990), 15 *Annals of Air & Space L.* p. 309.

CHAPTER III

THE PRINCIPLE OF THE COMMON HERITAGE OF MANKIND IN THE "NEW WORLD ORDER"

In 1967, Ambassador of Malta to the United Nations, Arvid Pardo, proposed in the U.N. General Assembly a revolutionary idea, namely, that the newly discovered mineral resources of the seabed and subsoil beyond the jurisdiction of any state be declared a "common heritage of mankind".[49] These resources were to be exploited by the United Nations for the benefit of all countries. His proposal envisaged the establishment by the United Nations of a special seabed agency for this purpose. The profits accruing from the exploitation of these minerals should be used, Pardo urged, primarily to aid the poorer nations of the world. A few years later, in 1970, the U.N. General Assembly adopted unanimously resolution 2749 (XXIV) which declared that the mineral resources of the deep seabed are the common heritage of mankind. The resolution also placed a moratorium on the exploitation of these resources until an international regime for the deep seabed is established. This resolution was the earliest appearance of the term "common heritage of mankind" (CHM) in an authoritative document.

According to Professor B. Cheng, the concept of the CHM incorporates "the idea that the management, exploitation and distribution of the

natural resources of the area in question are matters to be decided by the international community...and are not to be left to the initiative and discretion of individual States or their nationals."[50]

Several years after the Pardo speech, a lengthy process of negotiations began, culminating in the conclusion of an all-embracing treaty, the "United Nations Convention on the Law of the Sea" (UNCLOS), unquestionably, the greatest and most ambitious codificatory effort ever undertaken.[51] The Convention was opened for signature on December 10, 1982, in Montego Bay, Jamaica; 152 States signed the Convention during the two years it was open for signature. The Convention entered into force in 1994, having received the required minimum of sixty ratifications.

Because the provisions of Part XI, as amended, of this Convention will most likely serve as a model for the future legal regime to govern the exploitation of resources of outer space "for the benefit of all mankind", it is both necessary and desirable to examine this document in some detail.

This monumental treaty consists of 320 articles and nine annexes, prescribing the basic rules for the governance of all the oceans, including the airspace above as well as the seabed and subsoil below. It regulates, often in great detail, such activities as navigation, overflight, telecommunications,

fishing, drilling for oil and gas, oceanography, marine archaeology as well as military uses of the ocean spaces. With respect to most activities, the Convention also provides guidelines for cooperation among states.

The protracted negotiations in the process of drafting the Convention were caused by the seemingly insoluble conflict between the developing and the industrialized countries about the content of Part XI of the text. On the one side, the less developed states advocated vesting exclusive rights of exploitation of the seabed resources in an international authority in which, through their numbers, they would have a decisive voice.

On the other side, the majority of the industrialized states, led by the United States, while not opposed to the creation of an international seabed authority, objected to their "inferior" status in the authority, even though, as they claimed, the success of the operation would heavily depend on technology, skilled personnel, and risk capital they alone could provide.

Eventually the views of the developing countries prevailed and were incorporated as Part XI (Articles 133-191), and elaborated in Annexes III and IV, of the Convention. Even before the text of the Convention was opened for signature, on July 1, 1982, the United States government announced that it will not sign this treaty because a number of its provisions relating to deep sea mining are "contrary to the interests and principles of industrial nations and would not

attain the aspirations of the developing countries."[52]

In its objections to Part XI of the Convention the United States was joined by several leading industrial states, including the United Kingdom and Germany. The Soviet Union refused to ratify the Convention unless the U.S. would do the same. For no apparent reason, Canada also declined to become a party to this treaty.

Apart from the largely ignored Moon Agreement, the Convention was the first treaty of universal application to incorporate the new concept of the common heritage of mankind and give it a specific content. Article 136, one of the shortest in the Convention, declares: "The Area and its resources are the common heritage of mankind."[53] The "Area" is defined in Article 1 of the Convention to mean "the sea-bed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction".

That refers to the region beyond the continental margin, or beyond 200 miles from the baseline from which the width of the territorial sea is measured. It covers approximately 60 percent of the seabed. Article 137(2) prescribes that "[a]ll rights in the resources of the Area are vested in mankind as a whole, on whose behalf the Authority shall act". Of special importance to the poor countries of the world are provisions of Article 140 entitled "Benefit of mankind". It reads: "1. Activities in the Area shall, ...be carried out for the benefit of mankind as a whole, irrespective of the geographical location of States,

whether coastal or land-locked, and taking into particular consideration the interests and needs of developing States and of peoples who have not attained full independence or other self-governing status...."

Once it became obvious that no major maritime nation will become party to the original text of the Convention, in July 1990 U.N. Secretary-General initiated informal consultations in an attempt to meet their objections. After several years of intensive negotiations, on July 28, 1994, the U.N. General Assembly adopted resolution A/RES/248/263 (by a vote of 121 in favour, with 0 opposed and 7 abstentions) containing "The Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982".[54] The provisions of this Agreement and Part XI (as amended) are to be interpreted and applied as a single instrument. However, in the event of any inconsistency between the Agreement and Part XI, the provisions of the Agreement prevail (Art. 2, Agreement).

While reaffirming in the preamble of the Agreement that the mineral resources of the seabed beyond national jurisdiction are the common heritage of mankind, the 1994 text fundamentally changed the deep seabed mining regime of the 1982 Convention, to the disadvantage of the developing countries.

The Agreement, by restructuring the seabed mining regime along free market lines, reflects the position of the leading industrial states.[55] To administer

the seabed mining regime, Articles 156-7 of the Convention create a new intergovernmental organization - the "International Seabed Authority", consisting of three principal organs: the Assembly, the Council and the Secretariat (Article 158). In addition, as a subsidiary organ of the Council the Convention creates a 15- member Legal and Technical Commission (Article 163). Section 9 of the Agreement, in response to the demands by the industrial states, sets up a Finance Committee, composed of 15 members which must include the five largest contributors to the budget. Great power is invested in the Finance Committee, for Section 3(7) of the Agreement provides that decisions of the Council and the Assembly having financial or budgetary implications shall be based on recommendations of this Committee, which must be adopted by consensus.

The Assembly, provided for in Articles 159-160 of the Convention, is a plenary body of all member states of the Authority. Its main functions are to elect the Council and a Secretary-General, to assess contributions and to decide on the sharing of revenues from deep sea mining. Part XI requires the Assembly to make many of its decisions on the basis of recommendations from the Council. Section 3(4) of the Agreement expands this requirement to cover virtually all decisions of the Assembly. Furthermore, if the Assembly disagrees with a Council recommendation, it must return the issue to the Council for reconsideration.

The Council is the executive organ of the Authority, primarily responsible for the adminstration of the seabed mining regime, which includes approval of the plans of work for exploration or exploitation of mineral resources (Article 161 of the Convention). Because the Council is the principal decision-making body of the Authority, its composition was the main source of concern for the United States and other industrial states. In particular, the United States objected to the absence of a guaranteed seat for itself in the 36-member Council and to the fact that industrial countries were not granted influence on the Council commensurate with their interests and economic power.

Under Section 3(15) of the Agreement, members of the Council shall be elected by the Assembly in the following order:

(a) "Four members from among states parties which, during the last five years...have either consumed more than 2 percent in value terms of total world consumption or have had net imports of more than 2 percent in value terms of total world imports of the commodities produced from the categories of minerals to be derived from the Area, provided that the four members shall include one State from the Eastern European region having the largest economy in that region in terms of gross domestic product..."

(b) "Four members from among the eight States Parties which have made the largest investments in preparation for and in the conduct of activities in the Area...

(c) "Four members from among States Parties which...are major net exporters of the categories of minerals to be derived from the Area, including at least two developing States whose exports of such minerals have a substantial bearing on their economies";

(d) "Six members from among developing States Parties...to include...States with large populations, States which are land-locked or geographically disadvantages, island States, States which are major importers of the category of minerals to be derived from the Area, States which are potential producers of such minerals and least developed States"; and

(e) "Eighteen members elected according to the principle of ensuring an equitable geographical distribution of seats in the Council as a whole..."

The new voting arrangement ensures that the United States and two other consumers, or three investors or producers acting in concert, can block any

substantive decision in the Council. In fact, since section 3(15) provides the Council membership must include the state with the largest economy in terms of gross domestic product, the United States is now guaranteed a seat on the Council in perpetuity. On the other hand, consensus is required for any decision aimed at protecting developing states that are land-based producers of minerals from adverse effects of seabed mining. The requirement that these issues are made by consensus in effect gives any state party a veto in regard to them.

Article 151 of the Convention provided for an elaborate system of controls on production of minerals from the Area in order to protect land-based producers of minerals from adverse impact due to competition from deep sea mining. In an answer to the objections of industrial states, section 6 of the Agreement eliminates all such restrictions. Instead, section 6(1) bases the development of the resources of the Area on "sound commercial principles". Thus the provisions of the General Agreement on Tariffs and Trade (GATT), or superseding agreements, must apply to activities in the Area.

In particular, there can be no subsidization of seabed mining in the Area that would not be permitted under GATT rules, and no discrimination between minerals produced from deep seabed minerals extracted from other sources. Also, there shall be no preferential access to the markets from minerals extracted from the Area.

Provisions of the Convention designed to assist developing countries

which suffer serious adverse effects on their export earnings resulting from the oversupply of minerals due to the Area mining (Article 151(10)), are to be implemented under the Agreement in a manner disadvantageous to such countries. Section 7 of this Agreement contemplates the establishment of an economic assistance fund. However, such a fund may only be established when the revenues of the Authority exceed those necessary to cover administrative expenses of the Authority.

The most important symbol of the aspirations of the developing countries and their crowning achievement is the establishment of the "Enterprise", an operating arm of the Authority (Convention, Article 170). In the early phases of the 3rd U.N. Conference on the Law of the Sea, several developing countries sought a regime under which all seabed mining would be conducted directly by the Authority, with private mining enterprises relegated to the role of service contractors. This was strongly opposed by the United States and some other industrial states. Nevertheless, eventually the views of the developing countries prevailed, though not in their entirety.

The Agreement retains the Enterprise, but the scope of its operations is severely limited; it virtually makes it impotent to carry out its functions as originally contemplated in the Convention. First and foremost, now the Enterprise can only become operational following a decision of the Council, and

only if the Council concluded that the operations of the Enterprise will conform to "sound commercial principles" Section 2(2). Furthermore, the Enterprise must "conduct its initial deep seabed mining operations through joint ventures" with other commercial entities. Section 2(3) adds another blow to the hopes of the developing countries with this provision: "The obligation of States Parties to fund one mine site of the Enterprise as provided for in Annex IV, article 11, paragraph 3, of the Convention shall not apply and States Parties shall be under no obligation to finance any of the operations in any mine site of the Enterprise or under its joint-venture arrangements." In the apt assessment of an American expert, the new Agreement "trims the proposed Seabed Authority, deletes premature detail, cuts financial obligations, bars subsidies, and confines the operating arm of the Authority to market-based ventures (if that).

Controversial provisions regarding production limitations, technology transfer, and amendments are eliminated. Major industrial states, including the United States, are given the ability to prevent adverse decisions in the Seabed authority and to facilitate the grant of exclusive mining rights to all qualified applicants on a first-come first-served basis.... Existing investments in mine sites are 'grandfathered'."[56]

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49. U.N. A/6695, p.1 (1967) . For a retrospective analysis, see, L. Sohn, « Manangin the of the Sea : Ambassador Pardo's Forgotten Second Idea », *Columbia J. of Transnational* L. (1997), 36, p.285.

50. Quoted in H. Kindred et al., *International Law Chiefly as Interpreted and Applied in Canada*, p. 326 (5th ed. 1993).

51. U.N. Doc. A/CONF. 62/122, of October 7, 1982.

52. U.S. Ocean Policy, Statement by the President, March 10, 1983, quoted in C. Oliver et al., *The International Legal System* pp. 343-44 (4th ed. 1995).

53. In relation to outer space, the common heritage concept was first advanced by Ambassador A. Cocca of Argentina, who also employed the expression « res communis humanitatis » in a proposal submitted to COPOUS in 1970. C. Christol, The Moon Treaty and the Allocation of Resources », (1997-II), 22 *Annals of Air & Space* L. p. 31, at 33. According to Indian scholar Anand, « the basic tenets of the 'common heritage' principle have come to be universally accepted and have become 'ius cogens' ». Quoted in C. Oliver, supra n. 52 p. 276, at 279. Russian commentator, G. Danilenko, is on solid ground when he states that the representatives of developing countries regarded the C.H.M. provisions of the Convention as « the most significant step yet taken toward the establishment of a new international economic order. » « The Concept of the « Common Heritage of Mankind » in International Law », (1988), 13 *Annals of Air & Space L* » p. 247, at 257.

54. Text in (1994), 33 *International Leg. Materals*, p. 1309.

55. For a commentary, see B. Oxman, « The 1994 Agreement and the Convention » (1994), 88 *Am. J. Int. L.* p. 687; L. Sohn, « International Law Implications of 1994 Agreement », id., p. 696.

56. B. Oxman, « The Law of the Sea Convention », *ASIL Insight* p. 1 at 3 (No. 5, 1994).

CHAPTER IV

TRANSFER OF TECHNOLOGY FROM INDUSTRIAL STATES TO DEVELOPING COUNTRIES

A significant part of current international law consists of non-binding or incompletely binding legal instruments ("soft law"). These instruments can be found in many areas of international law, especially in the field of human rights (e.g., the Universal Declaration of Human Rights). The resolutions of the U.N. General Assembly and resolutions of various intergovernmental organizations (such as ICAO, ITU, IAEA), draft agreements prepared, e.g., by the International Law Commission or by the Committee on the Peaceful Uses of Outer Space) - all represent important sources of "soft law". The U.N. General Assembly resolutions in particular may exercise a significant influence upon the evolution of international legal norms.

From the very beginning of their emergence as independent states, the Third World countries have been labouring towards the creation of a new economic and legal order to protect their newly won independence and accelerate their economic development. To meet their aspirations, existing international law was seen by them as unable to "properly and effectively undertake its own transformations if it confines itself to its traditional sources alone, i.e. custom, treaties and general legal principles", writes Mohammed

Bedjaoui, Judge of the International Court of Justice. "...If custom, treaties and general legal principles are in danger of contributing too little, all that is left is the resolution, or, in more general terms, the legal standard elaborated in international organizations, in order to attain the sought-after goal."[57] By "resolution" or a "legal standard", Bedjaoui means "any decision taken by a deliberate body belonging to an international institution of a world-wide nature."[58] The resolution holds a real attraction for the countries of the Third World, he adds, "because of its flexibility, its rapidity and the security it gives these countries through their control of the technique as a result of their numbers." The developing countries act in the belief that international organizations, and especially the United Nations, provide an ideal context for the drafting of a new binding international economic order to serve the needs of all nations. Through its egalitarian character, its majority basis and hence its democratic origins, the resolution seems to them to present sufficient guarantee as a method for the elaboration of international norms responding to today's needs."[59]

After years of pressure, the developing countries succeeded in 1974 in persuading the U.N. General Assembly to adopt two resolutions: a "Declaration on the Establishment of a New International Economic Order" (May 1, 1974),[60] and the "Charter of Economic Rights and Duties of States" (December 12, 1974).[61] The more important of the two, the Charter, received 120 votes in

favor, 6 against with 10 abstentions. The negative votes were cast by Belgium, Denmark, Germany (West), Luxemburg, the United Kingdom and the United States. The Charter was intended to prescribe guiding principles of international economic relations, acceptable to both developing and industrial nations. However, since some provisions of the Charter diverged from certain principles of customary international law and others introduced several law principles reflecting somewhat "radical" ideas of many developing countries, the document failed to receive the approval of the majority of the industrial states.

Although the two 1974 resolutions met with hostility or indifference on the part of leading industrial nations, efforts to materially change international law in the fields of economy, science and technology did not cease. Thus, in 1986, the prestigious International Law Association, at its Seoul conference, adopted an elaborate "Declaration on the Progressive Development of Principles of Public International Law Relating to a New International Economic Order". This document included a number of controversial statements, such as, e.g.,: "The duty to cooperate in international economic relations ... should lead in particular to a reinforced cooperation in the fields of ... the transfer of technology..."; "The right to development is a principle of public international law in general and of human rights law in particular..."; "Every State has the right to benefit from the advances and development in science and technology...".

Another major attempt to shape international law in favor of developing countries by creating new obligations for industrial states was focused on the transfer of technology. Restricting the transfer of technology for national security reasons was one of the cornerstones of the Cold War. While primarily aimed at the Soviet Union and its allies, the United States in particular created an export control regime that covered most of the world's nations and applied to technologies that had only a marginal connection with security. As explained by U.S. Navy's Admiral Inman, "national security can no longer be viewed in exclusively military terms; ...where technology is concerned, it is difficult to tell where military concerns stop and economic issues begin."[62]

The U.S. export controls have been applied also to foreign subsidiaries of American companies. In cases where the foreign subsidiary does not comply with the U.S. regulations, the parent company can be subject to sanctions. The most recent example of a U.S. law with wide-ranging extra-territorial implications is "The Cuban Liberty and Democratic Solidarity Act" of 1996, better known as the Helms-Burton Act.[63]

For a number of years, under the auspices of the U.N. Conference on Trade and Development (UNCTAD), negotiations have been carried on in an attempt to adopt an international code of conduct on the transfer of technology. According to the spokesman for the "Group of 77" (developing countries, now

numbering well over a hundred), such a code was of great importance for members of this Group, "not as an instrument designed to impose any restriction on the flow of technology, to developing countries, but rather as an instrument designed to facilitate the flow of technology, as a liberalizing tool for international trade in technology...in particular the flow of technology from developed to developing countries."[64]

The efforts were largely unsuccessful, having produced in 1978 a draft code with most of its provisions lacking consensus. The Code in its preamble (uncontested) recognizes "the fundamental role of science and technology in the socio-economic development of all countries, and in particular, in the acceleration of the development of the developing countries" and the "need to facilitate an adequate transfer and development of technology so as to strengthen the scientific and technological capabilities of all countries, particularly the developing countries, and to cooperate with the developing countries in their own effort in this field" (uncontested). Most of the other provisions of the preamble are not agreed upon. That includes the definition of the key term "transfer of technology". The still controversial definition covers "transactions, arrangements or agreements between the parties, irrespective of their legal form, which have as their purpose or one of their purposes the licensing or an assignment of industrial property rights, the sale of any other type of transfer of technical knowledge, and the supply of technical services."[65]

The Draft submitted by the Group of 77 accurately reflects the aspirations of the majority of the developing nations. Therefore, its more important provisions merit quotation in full. According to para. 2.4, the "provisions of the Code of Conduct shall be universally applicable to all countries and to all transactions, agreements or arrangements, which involve implicitly or explicitly, an international transfer of technology, regardless of (a) parties involved, whether private, public, social regional, sub-regional or international; (b) the levels of development of the countries concerned; and (c) the type of economic, social or political system of the countries among which technology is transferred."

The acquiring party should be free to enter into sales, representation, or manufacturing agreements relating to similar or competing technologies (para 9/10/11); the supplying party should not have the right to require from the acquiring party to use the personnel of the former, except to the extent necessary to ensure the efficient transmission phase for the transfer of technology (para 18/19); to strengthen the scientific and technological capabilities of the developing countries, the developed countries "shall accord special treatment to developing countries", to fulfil, inter alia, the following goals:

> *"(i) facilitate access by developing countries to information regarding the availability, characteristics, cost and location of alternative*

technologies that are useful and required by them for their economic and social development;

(ii) give developing countries the fullest access to technologies whose transfer is subject to governmental decision;

(iii) give access to available scientific and industrial research data in order to enable developing countries to assess available technologies, to adapt technology to their needs, and to develop national technologies;

(iv) cooperate in the development of scientific and technological resources in developing countries, with, in particular, the growth of their innovative capacity;

(v) promote technical assistance and regional specialization, research and development, and production activities" (para. 6.1).

Furthermore, governments of developed countries should ensure that their technology supplying enterprises (i.e., private companies) extend special treatment to developing countries with respect to the cost and all other terms and conditions of transfer of technology (para 6.2). Under this draft proposal, the laws to govern technology transfer arrangements with respect to their validity, performance and interpretation, shall be those of the technology-receiving country (para. 8.1).

The above excerpts suffice to explain the extreme reluctance on the part of industrial states to agree to a code as proposed by the Group of 77. Twenty years later, by 1998, no code has been enacted, nor are any negotiations

in progress on this topic.

Another attempt by the developing countries to facilitate the acquisition of modern technology was made during negotiations on the Law of the Sea Convention. Again, owing to their numbers, developing nations were able to include in the Convention a number of provisions very favourable to their interests in acquiring new technology of seabed mining. Annex III, Article 5(8) defines "technology" to mean "the specialized equipment and technical know-how, including manuals, designs, operating instructions, training and technical advice and assistance, necessary to assemble, maintain and operate a viable system...." Whereas Article 144 of the Convention requires states parties "to initiate and promote: (a) programmes for the transfer of technology to the [Seabed] Enterprise and to developing States with regard to activities in the Area...under fair and reasonable terms and conditions", this transfer is to be implemented according to Article 5 of Annex III to the Convention. Its provisions require the inclusion in every contract for carrying out activities in the Area of an undertaking on the part of the mining company to transfer seabed mining technology to the Enterprise or developing countries if they were unable to obtain the technology on the open market. If transfer were not agreed upon, the mining company could not employ such technology in its own mining operations.

Most of the industrial states objected to the mandatory technology

transfer as per Article 5 of Annex III. Now Section 5 of the Agreement eliminates mandatory transfer provisions; instead, it prescribes that the Enterprise and developing states wishing to acquire seabed mining technology should do so on the open market or through joint ventures. However, if they are unable to obtain such technology, the Authority may request miners and their sponsoring state to cooperate with it in facilitating access to technology "on fair and reasonable commercial terms and conditions, consistent with the effective protection of intellectual property rights." (Section 5.1(a) and (b)). Thus ended the most recent major effort of developing countries to obtain modern technology on favourable terms to enable them to accelerate their slow progress toward at least partial self-sufficiency in this field.

CHAPTER IV - NOTES

57. « Towards a New International Economic Order », quoted in H. Steiner ,D. Vagts & H. Koh, *Transnational Legal Problems*, p. 325 (4 th ed. 1994).

58. *Id.* at p. 326.

59. *Ibid*

60. Among the « legal » principles upon which the New International Economic Order should be founded, the one most directly aimed at the correction of inequalities in economic standards among states is that of preferential and non-reciprocal treatment for developing countris in all fields of international economic cooperation.The resolutions of the U.N. General Assembly, UNCTAD and other organs of U. N. system, abound in calls for preferential treatment for the developing countries. For example, during a 12-year period, commencing in 1969, the U. N. General Assembly alone had adopted 826 provisions, incorporated in 135 resolutions, calling for preferential treatment of developing nations in 12 major areas of economic cooperation...trade; invisibles(including transport, shipping, and insurance); balance of payments financing; financial transfers for development; material aid; technical assistance; debt problem solution; transfer of technology and science; economic and technical cooperation among developing countries; exploitation of the common heritage of mankind; environment protection; and equitable participation for developing countries in the decision- making process with respect to economic and monetary matters. »UNITAR, *Progresive Development of the Principles and Norms of International Law Relating to the New International Economic Order* (UNITAR /DS/5, 15 August, 1982), p. 9-10

61 Text of the Declaration in *I. Legal Mat.* (1974) 13, p. 715; the Charter in (1975), 14, p. 251.

62 Quoted in J. Wall, « National Security and the Transfer of Technology » 1990 *Proceedings of the C.C. I. L.*, p. 236 Also K. Quigley, « National Security and the Transfer of Technology », *id* p. 241.

63. For a commentary, see P. Glossop & K. Harbridge, « International Law and the Private Rights of Action in Helms-Burton », in 1996 *Proceedings of C.C. I. L.*, p. 148.

64. UNCTAD, *Report of the International Group of Experts on an International Code of Conduct on Transfer of Technology...* »,Pt. II, p. 3 (1978).

65. UNCTAD, *supra* n. 64, Pt. I, (C), p. 6..

CHAPTER V

THE USE AND REGULATION OF REMOTE SENSING BY SATELLITE AND DEVELOPING COUNTRIES

In simplest terms, remote sensing is the process of taking measurements of an object from a distance. An ordinary camera is a remote sensing instrument since it measures reflected light without touching the object being photographed. Remote sensing in the context of outer space activities means the observation of electromagnetic radiation emitted or reflected from objects on or near the surface of the earth by satellite-borne sensors and transmitted either by telemetry, or in the form of electromagnetic signals, or physically, in the form of photographic film or magnetic tape.[66] The U.N. Resolution on Principles Relating to Remote Sensing of the Earth from Space (1986) defines "remote sensing" as "the sensing of the Earth's surface from space by making use of the properties of electromagnetic waves emitted, reflected or diffracted by the sensed objects, for the purpose of improving natural resources management, land use and the protection of the environment" [Principle I, (a)].[67]

In practical terms, most of the raw data acquired by satellite sensors, also known as "primary data", and sold in digital form on computer tape, is useless unless processed in appropriate technical facilities and analyzed by skilled personnel. Such analyzed and interpreted data, together with information and knowledge obtained from sources other than satellites, is known as "analyzed information" [Principle I, (d)].

Regular observation of the earth from space began with the first manned missions, when cosmonauts (the Soviet designation of persons in space) and astronauts (the U.S. designation of its spacefarers) used hand-held cameras to take photographs of the surface of the planet Earth. However, it was only with the launching of the U.S. earth resources satellite - LANDSAT I - in 1972, that satellite-acquired imagery became available for the first time in a consistent format. The subsequent launchings of LANDSAT 2 (in 1975), LANDSAT 3 (in 1978) and LANDSAT 4 (in 1984) assured repetitive coverage of the entire globe.[68] Remote sensing of the earth from space has the advantage of providing a large-scale perspective and repetitive view of the surface below, thereby making it possible to monitor the properties of the environment through all the seasons and in almost any environmental conditions. An enormous amount of data can be collected in a short period of time and at a relatively low cost. No other man-made device equals these capabilities.

While the Soviet Union lagged behind the U.S. with its PRIRODA and RESURS environmental satellites, most of its photo reconnaissance satellites performed in addition to their military tasks also civilian remote sensing functions. The rapidly growing popularity and importance of remote sensing of the earth from space can best be demonstrated by the fact that by 1983, over 30 earth observation satellites had been launched.[69]

Identified major fields of application of remote sensing include: agriculture and vegetation; water resources and hydrological studies; conservation and environmental management; geology and mineral exploitation; urban planning and industrialization; oceanography, marine resources and shipping; topographic mapping and automated cartography; atmospheric and stratospheric studies; hazard monitoring and disaster mitigation; engineering applications, glaciology and geographic information systems.

Following the example of the United States and the USSR, France was next to place in orbit, in February 1986, its SPOT satellite. India followed in 1979 with its first remote sensing satellite and in 1983 by its second. China, Japan, Israel, the European Space Agency soon thereafter also launched such satellites, as well as Canada with its multipurpose RADARSAT, in 1995.

The earliest U.S. remote sensing satellites had a ground resolution of

100 meters, eventually improved to 25 meters (by 1980s). With the launching of SPOT 1, in 1986, France achieved the resolution of 10 meters, greatly contributing to the subsequent SPOT's commercial success. Since that time, with the rapid opening of the Soviet Union, and especially after its dissolution in 1991, the ground resolution offered on the world's markets for remote sensing purposes has been steadily improving, as well as the quality of the product. Currently, Russia is reportedly marketing remote sensing images with the resolution of 1 meter.[70] Given the growing competition in this area of space activity, with new participants entering the market, the U.S. can be expected to relax its restrictions on the allowed marketing resolution and thus add to the competition.[71]

The capabilities of remote sensing satellites for purposes of mineral prospecting in the early days were somewhat exaggerated, which has led to unrealistic expectations and to unnecessarily difficult negotiations concerning the regulatory regime that should govern these activities. At this time, despite significant advances in remote sensing technology, these satellites cannot with certainty identify the location of mineral resources lying beneath the land surface, much less beneath the ocean floor; what they can do is to indicate that a certain area merits a closer look - and no more.[72] This does not mean that at some time in the not too distant future remote sensing technology will not be

capable of fulfilling even the most optimistic early expectations.

According to a recent assessment, "remote sensing data can be used to measure and map many features and phenomena of interest to resource managers as well as to inventory large areas more cost-effectively than by using ground-based techniques.[73] " Also "the cost of remote sensing inventories is usually one-third of the cost of conventional ground surveys".[74] An additional advantage of this technology makes it possible to update data more frequently than by using ground-based survey techniques.

Despite the many and varied potential applications of remote sensing, "relatively few of them" notes an expert, "are being used operationally in the management of natural resources of developing countries."[75] The reasons are numerous. Those countries seeking to use remote sensing technology for their planning and development programs are not fully prepared to use this technology. Remote sensing systems collect billions bits of data making it difficult to find out what data is available, where in what form they can be acquired. The cost of acquiring and processing satellite data is considerable; indeed, the cost of data interpretation equipment has been identified as a major obstacle to the technology transfer process. Most developing countries cannot afford digital processing equipment which is essential to make use of the available data.[76] The lack of funding for even modest remote sensing technology

transfer to developing countries is responsible for a low rate of participation from the developing world at international workshops on remote sensing.

Furthermore, in addition to the indispensable instrumentation, operating even basic remote sensing facilities requires trained personnel, the lack of which continues to be a major obstacle in the use of this technology by developing countries.[77] And the industrial nations, which own the major part of the world's remote sensing technological capacity, have not been particularly successful in finding ways of "making these methodologies accessible to most countries in the developing world."[78] As two experts recently observed, while there is an overabundance of data, "there is often a severe shortage of useful information in developing countries"; "the level of ignorance concerning the potential utility of Earth Observation...is still extremely high; ... Satellite remote sensing for the majority of people in developing countries...is seen as both expensive and difficult to access; ... in many developing countries existing data networks are decrepit and weak, the institutions concerned are unable to cope with changing needs, and information 'systems' are fragmented and slow."[79] Furthermore, much of the remote sensing data available must now be purchased from commercial sources and the price of data itself is a serious constraint on the application of remote sensing imagery to the economic problems of the developing nations.[80] In sum, the high hopes aroused with the launching of the remote sensing systems

by the United States and the Soviet Union, have largely remained unfulfilled as far as the developing countries are concerned.

Yet the early, exaggerated, claims for the potential of this type of satellites created on the part of most non-spacepowers considerable apprehension. For many states, and particularly for the developing states, the transfer of information out of state without their control or even knowledge raised problems involving economics, property rights, national security, human rights and - sovereignty. Remote sensing from space gave rise to fears that technologically advanced states may obtain valuable or essential information about other states' mineral and other resources which could result in the economic exploitation based on superior information. For example, advance knowledge of mineral deposits could lead to the staking of claims by foreigners in a manner prejudicial to the resource country. The apprehension was only augmented by the technical nature of satellite remote sensing product which to become intelligible depends heavily on computer data processing and interpretation. A country without the required technical facilities and skilled manpower could not benefit from the raw data. These fears did not diminish even ten years after the launching of Landsat I. President of Brazil, J.B. de Oliveira Figueiredo, in his message to the Second U.N. Conference on Outer Space (UNISPACE II-1982) accurately expressed the views of many developing nations regarding remote sensing satellites. He stressed that "this multiple tool

affects traditional concepts of security, violating the notion of national privacy and even...marching towards the violation of individual privacy. Remote sensing impinges on the sovereignty of States over their natural resources, and it may prejudice the capacity of countries of negotiating the sale of their agricultural products at fair and equitable prices. This is an instrument both valuable and dangerous."[81]

On the recommendation of the U.N. General Assembly contained in its resolution A/RES/2733 of 1970, within COPUOS a Working Group was created in 1972, to study the legal implications of remote sensing from space, with special attention to be given to its use in development programs of all countries, especially developing countries.[82] In 1974 the Legal Subcommittee of COPUOS commenced on the priority basis consideration of legal principles to govern this new space use. At the same session Argentina and Brazil submitted draft articles of a "treaty" to govern remote sensing. It soon became clear that, contrary to the desires of these two countries, shared by the majority of the developing member states of COPUOS, the end result of their deliberations would not be a binding instrument - a treaty. It also became obvious, from the outset, that the Subcommittee was confronted with two diametrically opposite views. One view, advocated by the developing countries, called for significant restrictions on the freedom to use this technology without consent of the country

surveyed, especially on the freedom to distribute information thus gathered; accordingly, the sensed state would have an exclusive right to information about its resources, as well as absolute control over the dissemination of this information. Some of these states (e.g., Albania) even claimed as a principle of international law that every state has sovereignty over information about its natural resources. Explaining these claims, N. Jasentuliyana, Director of the U.N. Office for Outer Space Affairs, writes: "[t]he presence of remote sensing and telecommunications satellites only a few hundred kilometres overhead reinforced the general sense of vulnerability of Third World countries to economic and cultural exploitation."[83] The western industrial states, led by the United States, rejected outright the prior consent approach and instead advocated freedom both of gathering and dissemination of satellite data on a non-discriminatory basis.

After more that 14 years of largely wasteful negotiations, the General Assembly adopted on December 3, 1986 "The Principles Relating to Remote Sensing of the Earth from Outer Space" (Res. 41/65). A number of factors contributed to the creation of a climate conducive to reaching agreement. Among them: the paucity of reported discoveries by satellite of hitherto hidden mineral resources; the absence of known instances where information obtained by remote sensing was exploited at a disadvantage of a developing country;

lukewarm support by the USSR for major restrictions; the refusal of the western countries to substantially modify their original position favouring virtually unrestricted freedom of remote sensing; and repeated appeals of an impatient U.N. General Assembly, calling upon COPUOS to adopt an agreed text.

The 15 Principles contain few concessions to the developing countries. The majority of them are either a repetition of the provisions of the Outer Space Treaty (Principles II, III, IV, IX and XIV), or merely hortatory (Principles V, VI and VIII), or expressing universal non-controversial practice of states (Principles XX, XI). The key Principles - XII and XIII - are a far cry from the original demands and expectations of the developing countries. Not only is "prior consent" to anything totally absent from these Principles, but the sensed state can have access to the primary and processed data as well as to the analyzed information concerning its territory merely "on a nondiscriminatory basis and on reasonable cost terms ... taking particularly into account the needs and interests of the developing countries" (Principles XII).

According to Principle XIII, again taking into account "the needs of developing countries, a State carrying out remote sensing of the Earth from space shall, upon request, enter into consultations with a State whose territory is sensed in order to make available opportunities for participation and enhance the mutual benefits to be derived therefrom." Thus, the only non-enforceable "obligation" (this is a U.N. resolution) this document places on the states

operating a remote sensing system is to give access to the data gathered about the sensed state, and not on a priority basis, but merely on a non-discriminatory basis, and for a price to be determined by the operator. Under Principle XIII, a developing country which wishes to participate in remote sensing of its own territory must first "enter into consultations" with the sensing state, apparently only after the sensing had already begun. In conclusion if can be said that the attempt by the developing countries to establish a set of binding norms which would protect their vital interests in security and natural resources, and at the same time enable them, through meaningful direct participation in the uses of remote sensing technology, to promote the development of their natural resources - has largely failed.[84]

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66. For an excellent, comprehensive survey of remote sensing technology and its multiple uses, see U. S. Congress, Off. of Tech. Assessment, *Internetional Cooperation in Civilian Space Activities* pp. 253-334 (1985).

67. G.A. Res. 41/65, , adopted on Dec. 3, 1986.Text in U. N. Doc. *United Nations Treaties and Principles on Outer Space*, p. 43 (1997).

68. A. Brigham, « Natural Resources : The View from Above », *J. of Air L. & Comm.*, (1989), 55, p. 505, at 522.

69. India, the champion of the use of remote sensing satellites to benefit developing countries, planned to launch in 1995-6 three satellites to monitor agriculture and provide images important for weather and climate studies. *Aviation Week & Space Technology*, p. 21 (Oct. 9, 1995).

70. J. Richerson , « Scientists in Black », Scientific American p. 48 (Feb. 1998); *Aviation Week*, p. 70 (July 5, 1993).

71. P. Salin, The Land Remote Sensing Policy Act of 1992 » (1993), 42 *Zeitschrift fur Luft-und Weltraumrecht*, p. 263.

72. Brigham, *supra* n. 68, at p. 523-24.

73. C. Matarira, Managing Small-Scale Space Projects in Developing Countries : Challenges and Problems », IN u. n. Office of Outer Space Affairs, *Seminars on the United Nations Program on Space Applications*, pp. 37-8 (1996).

74. *Ibid.*

75. K. Rasmussen, « Methodologijes and Software for Satellite Image Processing : User Needs and Development Trends », in U. N. Office of Outer Space Affairs, *Seminars of the United Nations Program on Space Applications*, p. 1, at 2 (1993).

76. C. Matarira, supra n. 73, p. 40.

77. « Developing countries, which are most in need of assistance that can be provided by space technologies, are the least equiped to acquire and use the services... The need for international cooperation in space is, today, greater than ever ». N. Jasentuliyana & K. Karnik, « « Space Futures and Human Security », *Space Policy*, p. 257, at 264 (Aug.1997). This situation is not unique to space activities. Similar shortage of qualified personnel was found at a recent conference of ICAO to be primarily responsible for serious deficiencies in aviation safety in « dozens of unnamed nations ». For that reason, « many states, in spite of their best intentations and efforts, are facing serious difficulties in fulfilling their safety oversight obligations », said A. Kotaite, ICAO Council President. *Aviation Week & Space Technology*, p. 41 (Nov. 17, 1997).

78. K. Rasmussen, *supra* n. 75, ibid.

79. J. Williams & C. Conroy, « Training and Education Issues for Improved Use of Space Systems in Developing Countries », in U.N » Off. Outer Space Affaires, *Seminars of The United Nations Program on Space Applications*, p. 27, at 28-29 (1997).

80. H. George, « Enchancing the Use of Space Technology in Developing Countries, « *op. cit. supra*, n. 79, p. 50, at 51. Jasentuliyana and Karnik note that « distribution and use of the (remote sensing) data is not nearly effective. Much data already in hand in selected countries is not being shared internationally. « *Supra* n. 77, at p. 259.

81. U.N. , Report on Unispace II, *op. cit. supra* n. 41, p. 155. These fears have not disappeared even by 1997, as reported by Jasentuliyana and Karnik. *Supra* n. 77, at 259.

82. U. N.G. A. res. 3182 (1973).

83. « The Role of Developing Countries in the Formulation of Space Law, » (1995-II), 20 *Annals of Air & Space L.*, p. 95, at 109.

84. R. Jakhu, « International Policy and Law-Making Process for Remote Sensing by Satellite » describes the Principles as « quite broad, vague, insufficient, and invariably inconsistent ». (1997-I), 22 *Annals of Air & Space L.* p. 451, at 452. For a more positive assessment, see S. *Gorove, Developments in Space Law- Issues and Policies*, p. 293 *et seq.* (1991)

CHAPTER VI

THE OUTER SPACE BENEFITS DECLARATION AND ITS ORIGINS

1. The Origins of the Declaration

The true origin of the "Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries" (hereinafter "The Benefits Declaration") can be found in the early resolutions of the U.N. General Assembly and especially in the preamble and Article I of the Outer Space Treaty.[85] Thus, the first G.A. resolution devoted to outer space, adopted on December 13, 1958 (res. 1348 (XIII), called upon member states "to promote energetically the fullest exploration and exploitation of outer space for the benefit of mankind" and noted that recent developments in respect of outer space have opened new possibilities for the...improvement of his [man's] life; it recognized "the great importance of international cooperation in the study and utilization of outer space"; and urged states to "vigorously pursue" the development of programs of international and scientific cooperation in the peaceful uses of outer space.

Resolution 1472 (XIV) of December 12, 1959, contained a phrase which was with minor changes eventually incorporated in the preamble of the

Outer Space Treaty. It read: "Believing that the exploration and use of outer space should be only for the betterment of mankind and to the benefit of States irrespective of the stage of their economic or scientific development." The resolution reiterated the "great importance of international cooperation" in the interest of "the improvement of the well-being of peoples." The trail-blazing resolution 1721 (XVI) of December 20, 1961, which recommended to states to treat outer space as *res communis omnium* and not subject to national appropriation, repeated the above quoted statements contained in the 1959 resolution.

The quasi-lawmaking "Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space", unanimously adopted on December 13, 1963 as G.A. resolution 1962 (XVIII), merits special mention because of its content, wording and drafting history which resembled treaty negotiations.

The Declaration restated the common interest of all mankind in the use of outer space and the belief of the U.N. member states that such uses should be carried out for the betterment and in the interest of all mankind and for the benefit of all states, "irrespective of their degree of economic or scientific development". The companion resolution 1963 (XVIII) invited member states to "give favourable consideration to requests of countries desirous of participating

in the peaceful exploration of outer space for appropriate training and technical assistance on a bilateral basis or on any other basis they see fit."

G.A. resolution 2130 (XX) of December 21, 1965, urged spacefaring states to carry out space activities in such a manner that all nations could "share in the adventure"; it also accorded India a U.N. sponsorship for the operation of the "Thumba International Equatorial Sounding Rocket Launching Facility", thus enabling a developing country to take part in space activities.

On the recommendation of COPUOS, by resolution 2221 (XXI) of December 19, 1966, the General Assembly decided to convene in 1967, in Vienna, a U.N. "conference on the exploration and peaceful uses of outer space", whose objectives shall be "to examine the practical benefits of space programmes on the basis of scientific and technical achievements, and the opportunities available to non-space Powers for international cooperation in space activities, with special reference to the needs of the developing countries". Resolution 2223 (XXI), adopted the same day, emphasized that "the benefits of space exploration can be extended to all States at all stages of economic and scientific development only if Member States conduct their space programmes in a manner designed to promote the maximum international cooperation and engage in the widest possible exchange of information in this field".

The next, and from the legal point of view, by far the most important-document was the 1967 Outer Space Treaty. While reiterating in the preamble "the common interest of all mankind" in the exploration and use of outer space and stressing that its use "should be for the benefit of all peoples irrespective of the degree of their economic or scientific development", these phrases acquired now a new status because they appeared in a multilateral treaty of universal application, whose architects were the two principal space powers. The authority of these provisions was further reinforced by their inclusion in Article I which also proclaimed that outer space "shall be the province of all mankind". Equally important, Article III obliges states parties to promote through their space activities "international co-operation and understanding". Whereas the majority of industrial nations, including all the principal space powers, interpreted these provisions of the Treaty as being merely hortatory, placing no specific obligations on any state, the developing countries have since the adoption of this Treaty held otherwise, calling attention to the text of the Treaty which in each instance uses the term "shall" rather than "should".

2. The Benefits Declaration - An Appraisal

Almost twenty years later, at the June 1986 session of COPUOS, the delegation of Venezuela raised the question of the equitable access by states to

the benefits derived from space technology and recommended the development of legal principles that could serve as guidance for this purpose. Next year, the Group of 77 formally proposed in the Legal Subcommittee of COPUOS that a new item be placed on its priority agenda - "Access by States to benefits of the exploration and use of outer space". The "working paper" submitted by the Group on the same occasion stressed the need for formal clarification of concepts such as "benefits" and "interests", appearing in numerous space law documents. Of surpassing importance in the Group's working paper was the issue of access to space technology. Owing to the strong opposition on the part of some space powers and a number of industrial member states, the proposal for the inclusion of the new item on the agenda of the Legal Subcommittee failed. It was only after two intervention by the U.N. Secretary-General (in 1988 and 1989), that the Subcommittee set up in 1990 a Working Group to deal with the matter and agreed to commence substantive discussions in 1991.[86]

The statement made by the delegate of India at the 1990 session of the Subcommittee is significant for it shows the prevailing feeling among developing states concerning the "benefits" they had received after 33 years of space activities. According to him, those benefits "were reaped only by a handful of developed States" whereas the majority of "the developing and newly independent countries remained curious spectators of the space revolution and

had drawn no benefits from it... [t]he principle set out in Article I of the [Outer Space] Treaty...remained a dead letter."[87]

At the 1991 session of the Subcommittee, nine developing nations (Argentina, Brazil, Chile, Mexico, Nigeria, Pakistan, the Philippines, Uruguay and Venezuela, later joined by Egypt and Iraq) co-sponsored a working paper in which they urged, *inter alia*, that the objectives of international cooperation should be development of indigenous capability, promotion and facilitation of the exchange of expertise and technology, and the transfer of technology.[88] Between 1992 and 1995 sessions, discussions revealed that a majority of industrial states would not accept any legal restriction on their freedom to choose their cooperative partners or on the content of their international cooperative arrangements. Moreover, most of them saw no need at all for a set of principles as proposed in the working paper because there already existed significant international cooperation in the space field and such principles would only limit the extent of ongoing cooperation.[89] Not even a steady lowering of claims by the developing countries, as reflected in their compromise proposals, could bring about consensus.

The prospects for an agreement suddenly improved at the 1995 session of the Subcommittee, with the introduction of a new working paper, co-sponsored by Germany and France. It soon became obvious that their proposal

would form the basis for the final draft. It is instructive to compare the two competing working papers, as put before the 1995 session. The working draft of the developing countries recommended, *inter alia*, that states should concentrate their cooperative efforts in the following areas: (a) "Promotion of the development of indigenous capability in space science and technology, particularly in developing countries; (b) Continued exchange of information, data, materials and equipment on space science and technology; ...(e) Technical cooperation to promote and facilitate the transfer of technology, taking into particular account the needs of developing countries."[90] Their proposal mentions technology no less than ten times. By contrast, the Franco-German proposal makes only one innocuous reference to technology, in para. 2, which reads: "International cooperation should strive to allocate resources efficiently. It should promote, the development of space science, technologies, and applications, taking into particular account the needs of developing countries." The very next, key provision in this draft, para. 3, reads: "States are free to determine all aspects of their cooperation in the exploration and use of outer space on an equitable and mutually acceptable basis....contractual terms in such cooperative ventures shall be fair and reasonable. They shall be in full compliance with the legitimate rights and interessts of the parties concerned as, for example, with intellectual property rights."[91]

During the 1996 session, consensus was reached in the Committee on the text of the Declaration of Principles which was adopted on December 13, 1996 by the U.N. General Assembly as an annex to resolution A/RES/51/122 (February 4, 1997). Its preamble and para. 1 are replete with the standard phrases about significance of international cooperation, including the usual reference to "the needs of developing countries". The important para. 2 repeats verbatim para. 3 of the Franco-German draft, quoted above. Para. 3 calls upon states with space capabilities to promote international cooperation on "an equitable and mutually acceptable basis", with particular attention to be given to "the benefit and the interests of developing countries". Para. 4 recommends to states to conduct international cooperation through modalities considered "most effective and appropriate by the countries concerned". Para 5 of the Declaration purports to incorporate the "aims" of cooperation as spelled out in the working paper submitted in 1995 by the developing countries (see above). However, it will be easy to see radical differences between the two texts. The Declaration states that international cooperation "should aim, *inter alia*, at the following goals: (a) Promoting the development of space science and technology and of its applications; (b) fostering the development of relevant and appropriate space cabilities in interested States; (c) Facilitating the exchange of expertice and technology among States on a mutually acceptable basis". In the final para 8 all states are "encouraged" to make contributions to the U.N. Program on Space

Applications" and to other initiatives in the field of international cooperation.

It will be readily apparent that the all-important goals of the developing countries in creating indigenous capability in space science and technology, as well as to secure the transfer of space technology are conspicuously missing in the Declaration. Note also that the term "principles" in relation to various goals has disappeared. In sum, this document adds very little, if anything, to the body of international space law and state practice. The Declaration can be seen as marking the end for some time of the efforts to implement the aspirations of developing countries as expressed in the "New International Economic Order" resolution. The international community is now governed by the (American) "New World Order".

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85. For the text of those resolutions, *Yearbook of Air & Space Law 1965*, p. 515 *et seq.* (1967).

86. M. Benko & K-U. Schlogl, « History and impact of the 1996 UN Declaration on 'Space Benefits' », *Space Policy*, p. 139 (May, 1997).

87. Quoted in J. Thaker, « the Development of Outer Space Benefits Declaration, (1997-I), 23 *Annals of Air & Space L.*, p. 537, at 545.

88. *Id.*, at 546.

89. U.N. Doc A/AC. 105/573 Report of the 33rd sess. of the Legal Subcomm. of COPUOS, p. 19 (14 Apl. 1994). The delegate of the United Kingdom made it « quite clear » that his country « did not see any need for prescriptive measures with regard to space benefits ». (p.4); The delegate of the U.S. was « not entirely convinced at this time that such a proposed declaration is necessary, given existing treaties and principles.. » (p.5), in U.N. Doc. COPUOS/T. 424 (June 6, 1996).

90. U.N. Doc. A/Ac. 105/607, p. 37 - 40. at Report of the 34th sess. of the Legal Subcomm. of COPUOS (19 Apl. 1995).

91. *Id.*, at p. 40-41.

CHAPTER VII

THE ACQUISITION OF SPACE TECHNOLOGY BY DEVELOPING COUNTRIES WITH SPECIAL EMPHASIS ON THE NEEDS OF BOSNIA-HERZEGOVINA (B-H)

As described earlier, the vast majority of states other than spacepowers, participate in some way in space activities, from building and launching, with some foreign assistance, an occasional satellite (e.g., Italy and Israel),[92] to merely using communication facilities provided by satellites (e.g., through participation in Intelsat). Between these extremes, there are a number of possibilities for profiting from space activities available to less affluent states, such as B-H, depending upon their specific circumstances.

The governments of developing countries, including that of B-H, when making choices within the vast array of possibilities about which technologies they wish to acquire, should follow the advice given by UNISPACE II conference and decide on the basis of: (a) the needs of the country; (b) its priorities (c) the feasibility of meeting these needs and priorities through the use of space technology; (d) the financial resources, the industrial infrastructure and

the technological capabilities of the country (e) the availability of personnel familiar either with space technology or with related technologies, especially electronics and computers; and (e) relevant educational facilities.[93] It is, therefore, fairly obvious that there can be no single formula to satisfy the needs of every developing country; each country's situation is unique, hence the nature of each country's involvement in space activities must also be unique. Almost any country, if determined enough, can assemble the economic and human resources to engage in some kind of modest yet meaningful space program. Many developing nations do have a nucleus of experts in the traditional fields such as physics, chemistry, mathematics, electronics and at least in some engineering disciplines, and could with only limited foreign assistance, develop a core of experts who can make rational decisions regarding the type of space technology best suited to their country. It must be re-emphasized that the development of human resources remains the most important condition for the beneficial and growing use of space technology by developing countries.[94]

Given the fact that the United Nations Organization and its specialized agencies are in a financial crisis and that any major investment in space from that source would be regarded as a luxury, to secure major assistance for its space needs the developing countries will have to turn to the international economic institutions or arrange for such assistance through bilateral agreements with spacefaring nations.

The international economic institutions with potentially the most significant impact on the economies of less developed countries, or countries such as B-H in dire need of reconstruction, are the International Monetary Fund and the World Bank. Since their inception, in December of 1945, these organizations have been influencing the internal economic and social policies of many states, with varying degrees of success.

The purposes of the I.M.F. according to Article 1 of its constitutive Agreement are, *inter alia*, the promotion of international monetary cooperation, expansion of international trade, and making available Fund's resources to enable members to improve their balance of payments. The Bretton Woods conference, in addition to establishing the I.M.F., drew up the Agreement for the creation of the International Bank for Reconstruction and Development, better known as the World Bank.

The purposes of the Bank include providing economic assistance to its member states by facilitating the investment of capital, arranging loans for what it decides are useful projects, and promoting balanced growth of international trade by the recipient country. Both the I.M.F. and the Bank are universal multilateral institutions, with membership open to all states that are willing to pay a quota to support their functions. Although each is a separate entity, the two institutions are closely related. The voting and governance of

these organizations is determined by reference to capital contributions. Hence the major industrial nations, especially the United States, totally control both the I.M.F. and the World Bank.[95]

Appraisals of their interventions in the economic policies of the recipient states are not always favorable to these institutions. To begin with, it is difficult to obtain accurate information about the nature of the conditions attached to any I.M.F. credit. I.M.F. conditions are not published and its agreements are in fact secret, although the consequences are usually visible. Since the early 1980s, according to a recent analysis, the I.M.F. and the World Bank have imposed conditions on the recipient states that "constrain the ability of peoples or their representatives to make decisions about wage levels for workers, education and health policies, social security provision, provision of services, constitutional reform, levels of unemployment and federal-state relations within federation."[96]

By way of illustration, the case of former Yugoslavia is instructive. Largely, as a result of decisions made by I.M.F. officials, the citizens of former Yugoslavia were subjected to stringent austerity regime during the 1970s and 1980s. The austerity measures demanded by the I.M.F. had a profound impact on the stability and integrity of the Yugoslav federation, requiring major institutional reforms. The implementation of changes proposed by the I.M.F. in 1987, would

have required 130 amendments to the 406 articles of the federal constitution! The I.M.F. conditions attached to its 1988 loan "required the destruction of the socialist system of worker participation in firm decision-making, the removal of procedural protection against large-scale unemployment and the cutting of public expenditures."[97] In brief, the I.M.F. in the case of Yugoslavia had insisted on drastic changes in the political and constitutional framework of the state in the name of economic assistance. No wonder that several informed commentators have concluded that the I.M.F. and the World Bank contributed in no small measure to the conditions that led to the dissolution of Yugoslavia and subsequent violence[98]

The strict fiscal policies that the Fund regularly imposes on developing nations as a condition for obtaining loans through the World Bank has often had devastating effects on those nations' infrastructures.[99] An example of the far-reaching effects of the I.M.F. on the sovereignty of states, even when very large and powerful states are involved, was provided in connection with a contract between Russia and India, involving the sale to India of Russian cryogenic rocket technology. The United States strongly objected to the sale claiming that it was for military purposes, which India denied. Eventually, Russia was forced to cancel the contract when it was threatened with the cancellation of a large loan from the World Bank.[100]

According to its own report to the United Nations, the World Bank "has assisted in developing and implementing remote sensing and geographic information systems programs in [space] projects....in many developing countries. It has utilized satellite remote sensing technology in the preparation and implementation and supervision of more than 100 individual projects."[101] While the financial assistance of the World Bank in the economic rehabilitation of B-H, including its telecommunication network, could play a significant role, given the Bank's record in providing assistance to former Yugoslavia and various developing countries, it would be wise for the B-H decision-makers to be aware of the possible negative aspects of this assistance.[102]

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92 On may 15,1996, Israel launched Amos-I comsat to be used by newsgathering agencies, cable TV operators and for business and educational communications. This small country, one-third the size of Bosnia-Herzegovina, has currently three satellites in orbit, including two remote sensing ones. U. N., *Highlights in Space*, 1996, p. 10 (1997).

93. Report on UNISPACE II, *supra* n. 41, p. 47.

94. These needs are repeatedly stressed at the U.N. conducted space seminars for the benefit of developing countries. Comp. References to those seminars in above notes.

95. See, D. Greig, *International Law* (1976). Pp. 787-90; B. Weston , R. Falk & A. D'Amato, *International Law and World Order*, p. 802 *et seq.*. (1980).

96. A. Orford, « Locating the International Military and Monetary Interventions after the Cold War, » (1997), 38 *Harv. Int'l L. J.* p. 443, at 463.

97. *Id.*, at p. 454.

98. See, e.g., Woodward, Balcan Tragedy, pp. 57-82, also Orford

99. B. Weston, R. Falk & A. D'Amato, *op. cit. supra* n. 95, at pp. 805-06.

100. Reported in J. Ferrier, *The Development of International Space Law : Cooperation in Outer Space – Meeting the Needs of the Developing Countries*, p. 19 (Institute of Air & Space Law LL.M. thesis, 1995).

101. U. N. *Space Activities of the United Nations and International Organizations* p. 91 (1992).

102. In announcing « an additional $ 30.25 million to support reconstruction and peacebuilding activities « in B-H, Foreign Minister of Canada L. Axworthy said that two- thirds of this amount will be for social and economic reconstruction Apparently, this sum is part of $1.4 billion in pledges for the 1997 international reconstruction assistance to B-H organized by the World Bank and the European Commission. Dep. of Foreign Affairs & International Trade, *News Release* no. 120 (July 23, 1997).

CONCLUSION

Before World War II, the only major industries in Bosnia-Herzegovina (hereinafter B-H) were forestry and mineral extraction. Early postwar years were devoted almost exclusively to the re-building of many destroyed towns and villages. It is important to stress that between 1941, the beginning of German invasion of Yugoslavia and 1945, B-H was the principal battleground of guerilla warfare ("partisans") on the territory of Yugoslavia. Only the three largest cities - Sarajevo, Mostar and Banja-Luka - remained largely untouched by war. Major industrial development began in the 1950s, though most of it went into the building of armament factories. Slowly, civilian industries emerged, especially in agriculture and hydro-power.

It should be emphasized that B-H, though currently disunited and much of it in ruins, is not a typical developing country. Although less industrialized than Slovenia and Croatia - the two other former members of the Yugoslav federation - it does have fairly significant industrial base not found in the majority of less developed nations. What is perhaps of even greater importance for the future of the country, are existing educational facilities (e.g., four universities) and a solid reservoir of highly skilled, well-educated

professionals. As evidence of this latent potential it suffice to recall that Sarajevo, the capital city of B-H, in 1984 organized highly successful Winter Olympic Games, a feat requiring a great deal of technical and managerial expertise.

Acquisition of outer space technology is costly and its operation complex. Outer space competence consists of an infrastructure in three principal capabilities: (a) the capability to design and manufacture launching instrumentalities such as sounding rockets, space launchers or more advanced types of space transportation; (b) their launching site installations and (c) orbiting satellites or probes. This infrastructure includes tracking, telemetering and control technologies, as well as facilities for the training of personnel. Not all states active in space possess all the above capabilities; nor do all of them have access to or indeed the need for all of these capabilities. Even after four decades since the advent of space age, only a handful of states qualify as fully independent and self sufficient space powers - United States, Russia, France, India, Japan and China.

What kind of space technology should B-H seek to acquire; should it go alone or through joint projects with another state(s) - these are the key questions that require urgent answer by the Republic's decision-makers. A survey of space activities by Portugal, a country roughly similar in size and of

comparable economic strength (when B-H economy is restored to its 1991 level), might provide useful guidance. The use of remotely sensed data obtained by foreign satellites (SPOT, Landsat) was a major space activity of that country. Its National Meteorological Institute is regularly using satellite imagery for weather forecasting and its developing projects for the application of remote sensing data to agriculture, forestry and fisheries. Remote sensed data are also used for water resource and land use assessment, dam reservoir inventory, and in production and updating of cartographic maps. The U.S. Global Position System is being employed for geodetic purposes. In 1993, Portugal launched a small scientific satellite (from a foreign launcher). One of its purposes was to define a plan for the launching of a network of mini-satellites during the next decade.[103]

All of these uses of space technology are applicable to B-H (except for fisheries). Remote sensing techniques should be particularly useful to B-H, a country rich in minerals, forests and water. Given its level of technological and industrial capability and reservoir of skilled manpower, B-H could with relative ease engage in launching of sounding rockets to conduct scientific studies of the exo-atmosphere, before embarking on a more ambitious - yet fully within its capabilities - project - that of placing in orbit mini- and micro-satellite(s). What makes these satellites particularly attractive to less affluent nations is their low cost and short term to project realization. According to a Russian designer of

such systems, "[t]he drop of design and manufacturing costs down to a few million dollars and orbiting costs (in the case of piggyback launch) down to several hundred thousand dollars, makes these satellites available to universities and medium-sized companies".[104]

The beneficial uses of small satellites are many: "solution of scientific, technological, and educational questions; carrying out experiments not requiring precise orientation in space over long intervals of time, or large fuel or energy stores; relay connection for financial centers, stock exchanges and other markets; radio amateurs; ... ecological monitoring... to name just a few."[105]

In B-H space imaging could play a key role in the prevention, detection and monitoring of forest fires, frequent occurrence in Bosnia and adjoining Croatia.[106] Meteorological satellite data, with highly repetitive and large area coverage, can be employed for monitoring vegetation, crops and agro-climatic parameters, at relatively low cost. Given the extensive destruction of many cities, towns and villages in the nation, remote sensing technology could also perform a highly useful function in urban and country planning. Through participation in global international organizations, such as the United Nations, the World Meteorological Organization, UNESCO, F.A.O, I.T.U. and Intelsat, B-H is in a position to influence their policies by acting in concert with other smaller and developing states, to make these organizations more responsive to

the needs of those states.[107]

The search for partnership with other countries has been a goal of enlightened nations throughout history. In earlier times this search was largely limited to commercial, military and diplomatic ties. While these classical modes of cooperation continue to be of great importance, in recent decades they have been reinforced by the new possibilities of strengthening partnership through joint efforts in science and technology. Many aspects of space activities are inherently global in character and the challenge of exploring and finding practical uses for outer space have provided a potentially rich field for the greatest variety of modalities in international cooperation. Exploring the universe by using an enormous mass of information gathered by artificial satellites is a monumental task for science; there is enough work to be done to employ the scientists of most countries, not only those of the advanced nations.

The relatively small territory of B-H (comparable in size to Nova Scotia) and the poor economic conditions of virtually all but one (Slovenia) of states created on the ruins of Yugoslavia, strongly suggest the desirability and need for a joint undertaking between B-H and one or more of the new states. Unfortunately, at least in the more immediate future, political antagonism between B-H and its neighbours will likely prevail over economic wisdom in the field of outer space activities as well as in other areas of potential, mutually beneficial cooperation.

As a final thought, it cannot be emphasized enough, that in this age of computers and satellites, the acquisition of space technology and participation in space activities is no longer a luxury or a matter of prestige for any state, no matter how small and whatever its level of development. Being the cutting edge of modern technology, with many collateral benefits, the acquisition and mastery of the appropriate type of space technology should be an obvious scientific and economic priority objective of every developing nation.[108]

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103. U. N. Office of Outer Space Affairs, *Seminars of the United Nations Program on Space Applications*, pp. 20-21 (1993).Bulgaria provides another useful illustration.In the context of Intercosmos program, Bulgaria's satellite was launched ; a Bulgarian cosmonaut made the crew of a Russian spacecraft ; several Bulgarian- made scientific instruments were placed in orbit aboard Russian satellites.U. N. ,COPUOS, Doc. T. 425, pp. 3-4 (June 7, 1996).

104. U. N. Office of Outer Space Affairs, *Seminars of the United Nations Program on Space Applications*, M. Ovchinikov, Small Satellite Projects in Russia », p. 192 (1997).

105. *Ibid.* Since the early 1980s Russia has been orbiting small satellites (p. 193) ;France, too launched 50 kg Cerise military intelligence microsatellite in July 1995.U. N. Doc. *Highlights in Space* 1996, p. 34 (1997).

106. « Remote sensing is a highly cost-effective technology for planning and managing natural resources such as forests. »U. N. Doc. A/AC. 105/563, Space Applications for Forest Resources Management. »(23 Dec. 1993). French SPOT I and SPOT II remote sensing satellites are reported to have played an essential role in detecting and monitoring forest fires in the south of France by transmitting high-resolution pictures of wildfires. *Av. Week & Space Tech.* p. 17 (Aug. 18, 1997).

107. On March 6, 1996, The Republic of Bosnia _Herzegovina joined Intelsat as its 138th member, with 0.05 percent share. *Highlights in Space* 1996, *supra* n. 105, p. 39.

108. An exellent study done by the Office of Technology Assessment of the U.S. Congress, provides the following catalogue of economic motives for the development of national space programs : « space research will contribute to the general advancement of national scientific

development ; efforts in space technology will contribute to building and maintaining a strong national technology base ; applications of space technology such as remote sensing or satellite communications will contribute to national economic growth ; useful products will spin off from space technology ; the space program will will foster the development of space related industries ».*International Cooperation and Competition in Civilian Space Activities* p. 70 (1985).

K. Kasturirangan, Chairman of Indian Space Commission, provides a thoughtful and persuasive argument for the use of space technology to aid economic development and environmental integrity, in « The Challeneges of Space Technology – Possibilities Enhance the Quality of Life ». *Op. cit. supra* n. 73, p. 1.

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