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## SPACE JOINT VENTURES: THE UNITED STATES AND DEVELOPING NATIONS\*

CARL Q. CHRISTOL†

**T**WO DEVELOPMENTS STAND OUT as one looks at man's involvement with space. First, in all of his continually expanding activities, man has placed himself at the focal point. He has always considered that space activities must serve the needs and interests of mankind. Second, there has never been any doubt that man's activities in space are subject to the rule of law.

Moreover, all of the forces of the social complex have allowed man by the mid-1970's to move beyond mere exploration and into an era of beneficial and man-oriented exploitation of the space environment. The natural consequence was the birth of a host of new and challenging personal interrelationships—the grist of the lawyer's mill.

### CHARACTERISTICS OF THE SPACE ENVIRONMENT JOINT VENTURE

At the outset it is necessary to ask: What is meant by the term space environment joint venture (SEJV)? For present purposes, it can be considered as a form of international cooperation which involves more than the provision by one state of opportunities to foreign states for participation in space activities planned and implemented by the providing state. Thus, a general invitation by the United States to a single foreign state or to foreign states to provide suggestions concerning space activities or experiments to be conducted on a United States space object would not constitute a SEJV. Rather, a SEJV requires substantial participation by way of planning, and implementation of those plans based on a formal or informal agreement, in which the parties seek collective mobilization of a portion of their respective capabilities, resulting in the exploration and use of the space environment for peaceful purposes. Such an approach emphasizes more than casual collaborative efforts in practical space oriented undertakings.

A SEJV may result from bilateral arrangements between two states or between a state and a public international organization. It may also be the product of a multilateral arrangement, whereby the members of a public international organization are given the special function of allocating time, efforts, and resources to a specific space venture, or by the creation of a public international organization to engage in generalized space activities. The role of the United Nations Development Program (UNDP) in supporting and assisting a state in the development and

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conduct of its space program offers an excellent example of such multilateral and multinational activities. A second illustration would be the multi-membered European Space Research Organization (ESRO), which is now being replaced by the European Space Agency (ESA).<sup>1</sup>

#### THE HISTORY

Proposals for bilateral SEJVs date back to 1962. In March of that year, President Kennedy and Premier Khrushchev considered a United States-Soviet joint venture to the moon; the proposal<sup>2</sup> was later repeated by Ambassador Adlai Stevenson in the United Nations on December 2, 1963.<sup>3</sup> This first moon proposal was followed by an intergovernmental agreement in Geneva, on June 8, 1962, between A. A. Blagonravov of the Soviet Academy of Science and Hugh L. Dryden of NASA. This agreement covered joint cooperation in three space activities, namely meteorology, a world geomagnetic survey, and satellite telecommunications.<sup>4</sup>

#### INVENTORY OF BILATERAL AND MULTILATERAL SPACE ENVIRONMENT AGREEMENTS

An inventory of international agreements affecting major space resource states has disclosed, so far as SEJVs are concerned, an interesting

<sup>1</sup>The United States, through the National Aeronautics and Space Administration (NASA), entered into an agreement with ESRO on August 14, 1973, for cooperative activities concerning the development of Spacelab and a space shuttle system. Bearing the title *Memorandum of Understanding Between the National Aeronautics and Space Administration and the European Space Research Organization for a Cooperative Program Concerning Development, Procurement and Use of a Space Laboratory in Conjunction with the Space Shuttle System*, the agreement in its 16 articles identifies the contractual obligations of the respective parties, i.e.: "Objectives" (Article I); "Respective Responsibilities" (Article V); "Funding" (Article VII); "Principles Concerning Access to and Use of Shuttle/SL" (Article XI), and, with attention given to the legal rights of flight crews, "Patents and Proprietary Information" (Article XIII), and "Statement of Disputes" (Article XIV). See *Hearings on Space Missions Payloads and Traffic for the Space Shuttle Era Before the Senate Committee on Aeronautical and Space Sciences*, 93d Cong., 1st Sess. at 121-134 (1973), as cited in 2 J. SPACE L. 31, 40-52 (1974). This agreement is based on the principle of no exchange of funds between agencies. See *Hearings on S. 2955 on NASA Authorization for Fiscal Year 1975 Before the Senate Committee on Aeronautical and Space Sciences*, 93d Cong., 2d Sess. 835 (1974) [hereinafter cited as *NASA Authorization Hearings for 1975*].

The *Memorandum of Understanding between the United Kingdom Secretary of State for Trade and Industry and the United States National Aeronautics and Space Administration Concerning the Furnishing of Satellite Launching and Associated Services*, approved Dec. 18, 1972, T.I.A.S. No. 7544, as cited in 2 J. SPACE L. 31, 32-38 (1974), also identifies the contractual obligations of the respective parties. The agreement deals with "Responsibilities" (Article I); "Implementation" (Article II); "Financial Principles" (Article III); "Liability" (Article IV); "Documentation and Reports" (Article V), and "Confirmation" (Article VI). Attached to the agreement was a statement entitled "United States Policy Governing the Provision of Launch Assistance." *Id.* These agreements identify some of the legal issues which are likely to need resolution in future SEJVs.

<sup>2</sup>46 DEP'T STATE BULL. 537 (1962).

<sup>3</sup>49 DEP'T STATE BULL. 1011 (1963).

<sup>4</sup>U.N. Doc. A/C.1/800 (1962). See also C. CHRISTOL, *THE INTERNATIONAL LAW OF OUTER SPACE* 482-88 (1966); M. Whiteman, 2 DIGEST INTL. LAW 1320 (1963).

pattern. Such international agreements make provision for fairly intensive international cooperation in a variety of fields, including joint launches, joint scientific and technological activities, as well as supporting activities frequently restricted to ground involvements (*e.g.*, agreements relating to tracking facilities). Leaving aside the historically numerous international agreements relating to tracking facilities, which have involved as many as 100 bilateral commitments, the most universal of the space agreements have been:

- (1) The Agreement Relating to the International Telecommunications Satellite Organization of August 20, 1971,<sup>5</sup> which had entered into force among 86 states as of January 1, 1974;
- (2) The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies of January 27, 1967,<sup>6</sup> which had been signed by 90 states as of May, 1974;
- (3) The Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space of April 22, 1968,<sup>7</sup> which had been signed by 79 states as of May, 1974;
- (4) The Convention on the International Liability for Damage Caused by Space Objects of March 29, 1972,<sup>8</sup> which had been signed by 71 states as of May, 1974.

Aside from the tracking facilities agreements, a current count indicates that the United States is now a bilateral treaty partner with only 17 other nations in space matters. These are Argentina, Australia, Brazil, Canada,<sup>9</sup> Denmark, France, Federal Republic of Germany,<sup>10</sup> India,

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<sup>5</sup> 14 U.S.T. 1278, T.I.A.S. No. 5431.

<sup>6</sup> 18 U.S.T. 2410, T.I.A.S. No. 6347.

<sup>7</sup> 19 U.S.T. 7570, T.I.A.S. No. 6599.

<sup>8</sup> T.I.A.S. No. 7762. *See also* 68 DEP'T STATE BULL. 949 (1973); 1 J. SPACE L. 86 (1973).

<sup>9</sup> Two projects are being conducted by the United States and Canada. The first is a Communications Technology Satellite (CTS), which has also been identified as the Cooperative Applications Satellite (CAS-C). This program was undertaken to develop broadcasting technology, which will make satellite communications with small ground stations feasible in the 12 GHz frequency band. The second is the Transmitter Experiment Package (TEP), which has been in development since 1971. Canada is responsible for the space object and NASA is responsible for the basic technology. NASA also has the responsibility for the Delta launch vehicle, and for placing the space object into geostationary orbit. Canada has the responsibility for the operations of the object after launch. *NASA Authorization Hearings for 1975, supra* note 1, at 676-78.

<sup>10</sup> In 1966, the United States and Germany entered into an agreement for the Helios solar probe. Under the terms of this agreement, the United States supplied a part of the science instrument payload, provided technical support, and undertook to launch two space objects. The United States and Germany have also agreed to cooperate in the launch and use of the Aeros-B space object, which is designed for aeronomy experiments. *NASA Authorization Hearings of 1972, supra* note 1, at 741.

The Aeros-B space object was proposed, designed, built, instrumented and funded by Germany. It was one of the ten NASA 1972 international space missions

Italy, Japan,<sup>11</sup> Malagasy Republic, the Netherlands, Norway, Spain, Sweden, the United Kingdom,<sup>12</sup> and the U.S.S.R.<sup>13</sup> In some instances there is more than one such bilateral arrangement with such countries.

The United States has entered into special multilateral agreements with 29 national treaty partners.<sup>14</sup> The United States has also entered into a multilateral agreement where its partners are a nation, *e.g.*, Canada, and an international organization, *e.g.*, ESRO. This particular venture calls for the use of the Application Technology Satellite-F (ATS-F) space

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in which "both sides assumed financial responsibility for their contributions to joint projects." H. Reis, *U.S. Reviews Year's Activities of the United Nations in the Field of Outer Space*, 69 DEP'T STATE BULL. 231 (1973) [hereinafter cited as Reis]. For recent statements concerning United States cooperative efforts in the space field, *see* M. Evans, *U.S. Cosponsors Resolution Setting 1974 Work Program for U.N. Outer Space Committee*, 70 DEP'T STATE BULL. 64 (1974); W. Bennett, Jr., *United States Discussed Major Issues Before U.N. Outer Space Committee*, 71 DEP'T STATE BULL. 323 (1974).

<sup>11</sup> In 1969, the United States and Japan entered into a Space Cooperation Agreement involving the supply by the United States to Japan of space hardware and technology so that Japan could develop a space launch vehicle allowing for scientific and applications satellites by 1975. *See NASA Authorization Hearings for 1975, supra* note 1, at 740.

<sup>12</sup> *Supra* note 1.

<sup>13</sup> Agreements between the United States and the Soviet Union have taken the form of: The Agreement with the Union of Soviet Socialist Republics Concerning Cooperation in the Exploration and Use of Outer Space for Peaceful Purposes, May 24, 1972, T.I.A.S. No. 7347, *reprinted* 66 DEP'T STATE BULL. 924-25 (1972); The Agreement with the Union of Soviet Socialist Republics on Exchanges and Cooperation in Scientific, Technical, Educational, Cultural, and Other Fields, Apr. 11, 1972, T.I.A.S. No. 7343. *See* Summary of Results of Discussions on Space Cooperation Between the Academy of Science of the Union of Soviet Socialist Republics and the United States National Aeronautics and Space Administration, Jan. 21, 1971, 10 INT'L LEG. MAT. 617 (1971).

These discussions and the agreements subsequently arrived at, resulted in the joint Apollo-Soyuz Test Project (ASTP), which is scheduled for a July, 1975, launch date. Since 1972, this United States-Soviet Union group on space has dealt with medical research, on-board equipment and regimens, common laboratory and pre-flight and post-flight procedures for determining the physical condition of flight crews. Moreover, in the space science and application areas, there has been:

Continuing exchange of operational and scientific weather data, coordinated oceanological studies, a joint experiment in coordinated microwave measurements in the Bering Sea, efforts to define projects in the study of the national environment, interplanetary data exchanges, physiological data obtained from manned spacecraft exchanges, lunar sample scientist visits, and a joint meeting of lunar cartographic experts to consider basic principles for compiling lunar maps.

*NASA Authorization Hearings for 1975, supra* note 1, at 740.

<sup>14</sup> The combinations include: (1) *two other nations*—Australia and Italy; Canada and Mauritania; (2) *five others*—India, France, Japan, the Federal Republic of Germany, and the Soviet Union; (3) *six others*—Argentina, Australia, Brazil, France, Italy, and the Federal Republic of Germany; Australia, the Federal Republic of Germany, France, Indonesia, Japan, and the Netherlands; Argentina, Australia, Brazil, France, Japan, and Spain; (4) *seven others*—Denmark, the Federal Republic of Germany, France, Norway, Sweden, the United Kingdom, and the Soviet Union; (5) *nine others*—Belgium, Denmark, the Federal Republic of Germany, France, Italy, the Netherlands, Spain, Switzerland, and the United Kingdom, and (6) *eighteen others*—Argentina, Bolivia, Brazil, Canada, Colombia, Dominican Republic, Ecuador, France, Guatemala, Guyana, Haiti, Mexico, Paraguay, Peru, Spain, the United Kingdom, Uruguay, and Venezuela. *See* 2 J. SPACE L. 53-63 (1974).

object in order to demonstrate the practicality of real time communications among central ground stations, aircraft, and maritime vessels by satellite. The experiment has been designated the Position Location and Communication Experiment (PLACE).<sup>15</sup>

In addition to the August, 1973, spacelab-space shuttle treaty between ESRO-ESA and the United States,<sup>16</sup> there are agreements between the United States and other international organizations. In 1972, for example, NASA "[l]aunched six satellites for international organizations and other governments on a nonprofit cost basis."<sup>17</sup>

A number of treaty arrangements exist among states relating to space activities to which the United States is not a party. There are special separate agreements between the Soviet Union on the one hand and France, Poland, and Romania<sup>18</sup> on the other. The Soviet Union's multilateral treaty partners include Czechoslovakia, the Democratic Republic of Germany and Poland.<sup>19</sup> India has as separate treaty partners Australia and France, and also the Federal Republic of Germany and France.<sup>20</sup> India, as will be mentioned later, has entered into a space oriented agreement with UNDP. Hungary's space partners consist of France, the World Meteorological Organization (WMO), Intercosmos, and Intersputnik.<sup>21</sup> Colombia also has an agreement with WMO.<sup>22</sup> ESRO had entered into bilateral agreements with Canada, the Federal Republic of Germany, India, Israel, and the United Kingdom.

#### NATURE OF UNITED STATES COMMITMENTS

The United States has entered into international agreements containing general principles of space law, the principles of which have made it more feasible to formulate specific agreements involving joint ventures. Before proceeding to a more detailed analysis of the commitments contained in these specific joint venture treaties, it is advisable to identify the critical provisions of the 1967 Principles Treaty<sup>23</sup> which set the tone for the more particularized agreements.<sup>24</sup>

International cooperation in space activities is mandated by Article I of the treaty. This article establishes as a norm of positive international

<sup>15</sup> *NASA Authorization Hearings for 1975*, *supra* note 1, at 671.

<sup>16</sup> T.I.A.S. No. 7722; 2 J. SPACE L. 53 (1974).

<sup>17</sup> *See* Reis, *supra* note 10.

<sup>18</sup> U.N. Doc. A/AC.105/123 (1973).

<sup>19</sup> *NASA Authorization Hearings for 1975*, *supra* note 1, at 789-90.

<sup>20</sup> U.N. Doc. A/AC.105/123 (1973).

<sup>21</sup> *Id.*

<sup>22</sup> Members of the United Nations are called upon to make annual reports to that organization on their respective space activities. *See e.g.*, U.N. Doc. A/AC.105/123 (1973).

<sup>23</sup> 1818 U.S.T. 2410, T.I.A.S. No. 6347.

<sup>24</sup> M. MARCOFF, *TRAITÉ DE DROIT INTERNATIONAL PUBLIC DE L'ESPACE* (1973).

law, the proposition that "[t]he 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 and scientific development, and shall be the province of mankind."<sup>25</sup> This is a new and challenging concept and its operational import is just now beginning to be seen.

The foregoing provision is linked to other provisions contained in the treaty which mandate, as in Article III,<sup>26</sup> that parties carrying on activities in the exploration and use of the space environment, will act "in the interest of . . . promoting international cooperation and understanding," and in Article IX, which provides that the "[p]arties shall be guided by the principle of cooperation and mutual assistance. . . ."<sup>27</sup>

Moreover, Articles X and XI provide for the promotion of international cooperation by allowing parties to observe the flight of space objects launched by a state or to be made aware of the "nature, conduct, locations and results" of a state's peaceful exploration and use of the space environment.<sup>28</sup> At the very least these provisions suggest the duty of international cooperation in order that all countries may benefit in man's increasing exploitation of the space environment. Additionally, these provisions contain the expectation that such gains will flow to countries irrespective of their degree of economic and scientific development.

When one takes into account the foregoing commitments relating to cooperation and sharing in the results of space activity, as well as the political expressions contained in the United Nations General Assembly Resolutions relating to national sovereignty over natural resources,<sup>29</sup> there may be some reason to believe that even the non-space resource states have an inchoate interest in a share of the benefits derived from space activity. One way for such states to obtain such benefits is through the implementation of the general concept of "international cooperation."

#### SPECIAL PROBLEMS OF THE LESS DEVELOPED COUNTRIES (LDCs)

The United States has cooperated with states in an effort to share the scientific and technological information gathered in its space activities. Some 50 foreign investigators were invited to participate in the lunar sample program, and some of these were from the LDCs. Indeed, when plans were being made for the Earth Resources Technology Satellite

<sup>25</sup> 1818 U.S.T. 2410, T.I.A.S. No. 63647.

<sup>26</sup> *Id.*

<sup>27</sup> *Id.*

<sup>28</sup> *Id.*

<sup>29</sup> See G.A. Res. 3016, 27 GAOR Supp. 30, at 28, U.N. Doc. A/8963 (1972); G.A. Res. 1803, 17 GAOR Supp. 17, at 15, U.N. Doc. A/5217 (1962). See also 12 INT'L LEGAL MAT. 226 (1973); 57 AM. J. INT'L L. 710 (1963). Resolution 3016 was adopted by a vote of 102, no dissenting votes and 22 abstentions. The United States and a majority of the Western European nations abstained.

(ERTS-1),<sup>30</sup> requests were affirmatively solicited from many nations concerning the gathering of data. Among the experiments proposed by scientists from the LDCs were land use and soil erosion in Guatemala and the hydrologic cycle of the Santa River Basin in Peru. In addition to the requests received from the more advanced nations, the following additional LDCs also submitted proposals: Brazil, Chile, Colombia, Ecuador, India, Republic of Korea, Peru, and Venezuela. Some 23 countries supplied more than 100 participating scientists for the ERTS-1 program, with each country obliged to fund its own experiments.

The United States has established few SEJV treaty contacts with the LDCs. The participation by the United States with 18 other states, identified in the preceding inventory,<sup>31</sup> consisted of a joint evaluation of natural resources in Argentina. When one turns to an identification of the LDCs with which the United States has embarked on SEJVs, it is possible to find but seven such arrangements. The nations involved are Brazil, the Dominican Republic, Guatemala, Guyana, Haiti, India, the Malagasy Republic, and Mauritania. Moreover, the areas of joint involvement are relatively unsophisticated and extremely restricted. For example, the principal purpose of the treaty with the Malagasy Republic was to allow for the installation of a tracking station for Skylab. Yet, the United States may be viewed as having taken the lead in such activities since, by comparison, none of the space treaty partners of the Soviet Union are developing states.

#### JOINT VENTURE BETWEEN INDIA AND THE UNITED STATES

The interest of the United States in perfecting the use of space objects for educational purposes has resulted in a specific and pragmatic international agreement with India.<sup>32</sup> Undoubtedly India, through its own preparatory efforts, made it possible for these two nations to embark upon a mutually beneficial SEJV. India, as well as a few other developing nations, realizing their own limited capabilities in the space field, looked first to international organizations for guidance and assistance in the development of national space activities. World institutions taking an interest in the exploration and use of the space environment have principally been the United Nations Development Program (UNDP) and UNESCO, but also include FAO, ITU, WMO, IBRD, IDA, IFC, IAEA, the United Nations Environmental Program (UNEP), and the United Nations itself.<sup>33</sup>

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<sup>30</sup> *NASA Authorization Hearings for 1975*, *supra* note 1, at 25-26, 110-15, 741.

<sup>31</sup> *Supra* note 14.

<sup>32</sup> *NASA Authorization Hearings for 1975*, *supra* note 1, at 768.

<sup>33</sup> See generally REPORT OF TYPES OF ASSISTANCE EXTENDED BY THE UNITED NATIONS SYSTEMS TO DEVELOPING COUNTRIES IN THE FIELD OF PRACTICAL APPLICATIONS OF SPACE TECHNOLOGY, U.N. Doc. A/AC.105/124 (1974). By General Assembly Resolution, G.A. Res. 3182 (XXVIII), Dec. 18, 1973, it was decided to increase membership of the Committee on Peaceful Uses of Outer Space from 28 to 37 nations. Prior to



Since India and UNDP have collaborated extensively in the practical mobilization of their respective space interests, attention will be concentrated on their space relationships. However, it should be noted that India and UNESCO have carried on important discussions focusing on UNESCO's interest in broadcasting from satellites and remote sensing.<sup>34</sup> UNESCO's space related activities have resulted in the preparation of studies and reports on space experiments; conducting seminars and the preparation of feasibility studies concerning the potential of regional cooperation; holding space-oriented seminars involving developing nations; conducting survey missions dealing with the prospective use of satellites for education and development; conducting simulation exercises relating to potential use of satellites for educational purposes, and coordination with other specialized agencies of the United Nations. UNESCO and ITU, for example, have jointly compiled data relevant to the use of satellites for educational purposes. Such data will have utility for nations having to make financial, organizational, and operational decisions concerning the use of such space objects for both national and regional areas. The joint effort is intended to provide data on the practical and technical characteristics of the systems offering optimum broadcast coverage.<sup>35</sup>

UNESCO's general interest in the use of the space environment for broadcast purposes is reflected in the *UNESCO Declaration of Guiding Principles on the Use of Satellite Broadcasting for the Free Flow of Information, the Spread of Education, and Greater Cultural Exchange*.<sup>36</sup> The Declaration was adopted by a vote of 55 to 7, with 22 abstentions. The United States opposed the Declaration. The reasons for the United States' opposition are set forth in a Department of State communication to the

the appointment of the nine new members by the President of the General Assembly, who took into account the principle of equitable geographical distribution, the Committee was composed of Albania, Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chad, Czechoslovakia, Egypt, France, Hungary, India, Iran, Italy, Japan, Lebanon, Mexico, Mongolia, Morocco, Poland, Romania, Sierra Leone, Sweden, the Soviet Union, the United Kingdom, and the United States. The newest members are Chile, the German Democratic Republic, the Federal Republic of Germany, Indonesia, Kenya, Nigeria, Pakistan, Sudan, and Venezuela.

<sup>34</sup> India played an important role in the formulation of UNESCO's *Declaration of Building Principles on the Use of Satellite Broadcasting for the Free Flow of Information, the Spread of Education and Greater Cultural Exchange*, *NASA Authorization Hearings for 1975*, *supra* note 1, at 769-71.

<sup>35</sup> *Space Activities and Resources: A Review of the Activities and Resources of the United Nations, of the Specialized Agencies and of other Competent International Bodies Relating to the Peaceful Uses of Outer Space*, U.N. Doc. A/AC.105/100/Add. 2, at 22-23 (1974); United Nations/UNESCO African Regional Seminar on Satellite Broadcasting Systems to Education and Development Final Report, U.N. Doc. A/AC.105/120, at 14-16 (1973) [hereinafter cited as United Nations/UNESCO Final Report].

<sup>36</sup> U.N. Doc. A/AC.105/104 (1972), *reprinted in* 1 J. SPACE L. 161 (1973).

Chairman of the Committee on Aeronautical and Space Science Committee of the United States Senate, dated April 3, 1974.<sup>37</sup>

With this background, it will be possible to understand the more active role of UNDP in supplying tangible resources to India as the two jointly ventured to improve India's practical space capabilities. In focusing on this particular joint venture, the fact that other international organizations have provided financial assistance to nations interested in the development of telecommunications facilities should not be overlooked. The World Bank, IDA, and IFC have assisted such LDCs as Ethiopia and Yugoslavia in such efforts.

But, in 1964, India was the first beneficiary of UNDP's involvement in the space field. India proposed the establishment of a Center for Research and Training in the Use of Satellite Communications to be implemented with the assistance of the ITU. This proposal has resulted in three programs.

The object of the first project was "to track satellites in orbit, participate in practical tests and conduct training and investigation in satellite communication techniques. The Center has provided training to Indian engineers, scientists and technicians both in all phases of the design, construction, operation and maintenance of a communication satellite earth station and in the technology of the communication satellite systems."<sup>38</sup>

The second project contemplated "an experiment on mass education . . . whereby television programs would be beamed via the satellite" which was to be known as the Experimental Satellite Communications Earth Station (ESCES). In proposing UNDP financial assistance for such a project, India pointed out that "though the experiments using communication satellites would be conducted in India, the experience gained will be made available for the benefit of all other developing countries and may well provide very useful guidelines for the widespread application of direct broadcast satellite techniques to the problems of mass education throughout the world."<sup>39</sup>

The third project was India's proposal to UNDP "for assistance in establishing and operating a Television Production and Studio Technical Training Center."<sup>40</sup> This phase would provide trained personnel and program material for the educational program. It was India's view that it would be able to contribute \$600,000 to this effort if it could be assured of receiving \$1 million from UNDP.

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<sup>37</sup> *NASA Authorization Hearings for 1975*, *supra* note 1, at 766-67.

<sup>38</sup> Review of the Activities and Resources of the United Nations, of Its Specialized Agencies and of other Competent International Bodies Relating to the Peaceful Uses of Outer Space—United Nations Development Program and the Peaceful Uses of Outer Space, U.N. Doc. A/AC.105/77/Add. 1, at 4 (1970).

<sup>39</sup> *Id.* at 4-5.

<sup>40</sup> *Id.*

By 1970, UNDP viewed the proposal as having a profound impact on "education, agricultural training, family planning and many other aspects of development."<sup>41</sup> In 1970, UNDP reported its desire to "continue to do all it can to promote the development of direct broadcast satellite techniques and their application for the benefit of developing countries."<sup>42</sup>

The results of the above projects were so favorable that NASA concluded that a profitable joint venture with India might be undertaken. Thus, in September, 1969, NASA and India entered into an agreement whereby the ATS-F would be made available to India for broadcast purposes. The title given the project was Satellite Instructional Television Experiment (SITE).<sup>43</sup>

The United States-Indian joint venture foresaw the launching by the United States of ATS-F in May of 1974, with the expectation that the SITE project would be operating for the benefit of India by mid-1975. The plan is for India to have the benefit of the satellite for nine to 12 months. While serving Indian educational needs, this space object will be positioned over Lake Victoria in central Africa, where it will be "visible" to the Indian sub-continent. NASA has been charged with providing the use of the 860 megahertz transponder and will operate transportable ground control facilities situated in Western Europe. India has assumed the responsibility for providing the ground transmitter receivers and software, including the programming of the television broadcasts.<sup>44</sup> Program content will emphasize agricultural techniques, family planning and hygiene, school instruction and cultural integration.

India's plan calls for the use of direct reception community receivers in 2,000 villages, with benefits accruing to an additional 3,000 villages. The broadcasts will last from four to six hours a day. The community receivers would be situated in schools, community centers, and other local institutions. By March, 1974, India had successfully completed the qualification testing for engineering models of ground receiving stations, and production had been initiated for the quantity delivery of such stations by early 1975. Moreover, India had completed the full receiver deployment plan, including the selection of all site locations. Software production has gotten underway, and logistic support planning is moving forward.<sup>45</sup>

India is also considering the possibility of developing home receivers in anticipation of a direct or individual, as opposed to community, reception. It should be noted that the legal and practical aspects of direct satellite broadcasts, both with and without the consent of a receiving nation

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<sup>41</sup> *Id.* at 5.

<sup>42</sup> *Id.* at 5. This document also declares that the United Nations Development Program (UNDP) maintains resident representatives in over 90 developing countries.

<sup>43</sup> *NASA Authorization Hearings for 1975, supra* note 1, at 670-72, 742.

<sup>44</sup> *Id.* at 670.

<sup>45</sup> *Id.* at 671, 768.

when the broadcast emanates from the space object of another nation, has received much attention at the United Nations, UNESCO, and at the International Telecommunications Union. Since in the SITE project India will control the content of the broadcasts, and since the broadcasts will be received only in India, the foregoing problem has not arisen. Technical experts now generally hold the view that the state of the art for direct-to-the-home broadcasts will not allow for such broadcasts until the late 1970's or early 1980's.<sup>46</sup> However, when it is feasible to provide greater satellite power and when low cost augmentation devices which attach to the family TV set have been developed, the larger legal and political problem of direct satellite broadcasts will have to be met.<sup>47</sup>

In 1973, the United Nations appraised the proposed joint venture between India and the United States as follows:

Under an extension of the earlier mentioned UNDP Indian telecommunications project, UNDP is providing assistance in the modification of ESCES to enable it to play its part with the ATS-F satellite expected soon to be launched by the United States National Aeronautical and Space Administration. The ESCES is presently being modified to enable it to transmit and receive television signals. Television transmitting and studio equipment are being added to it and development work is being carried out on the production of television receivers suitably modified to accept signals from the satellite. It has been pointed out by the Indian Government that the experiments using communication satellites which are conducted in India will provide experience which can be made available for the benefit of all other developing countries and may well provide useful guidelines for the widespread application of direct broadcast satellite techniques to the problem of mass education throughout the world.<sup>48</sup>

UNDP engaged itself to "do all it can to promote the development of direct broadcasting techniques and their application for the benefit of developing countries."<sup>49</sup> UNDP also noted that it was aware that

<sup>46</sup> *Id.* at 722. Other experts have set the date for the mid-1980's.

<sup>47</sup> A considerable amount of literature has developed on this subject. Aside from the discussions in the foregoing international organizations the International Institute of Space Law at its Amsterdam meeting in October, 1974, considered papers from J. Busak, *La Radiodiffusion Directe par Satellite*; M. Dausès, *La Liberté de l'Information en Matière de la Télévision Directe par Satellites*; E. Galloway, *Direct Broadcast Satellites*; J. Gehrig, *Broadcasting Satellites—Prospects and Problems*, and S. Lay, A. Gribble, R. Copeland and K. Kind, *Preliminary Draft Study of Censorship Provisions of a Proposed Telecommunications Satellite Treaty and the Constitution of the United States of America*. These papers will be published in the PROCEEDINGS OF THE XVII<sup>TH</sup> COLLOQUIUM ON THE LAW OF OUTER SPACE (M. Schwartz ed., 1975). Compare the contributions contained in the XV<sup>TH</sup> COLLOQUIUM, published in 1973, with the XVI<sup>TH</sup> COLLOQUIUM, published in 1974.

<sup>48</sup> Space Activities and Resources: A Review of the Activities and Resources of the United Nations, of the Specialized Agencies and of other Competent International Bodies Relating to the Peaceful Uses of Outer Space, U.N. Doc. A/AC.105/100/Add. 1, at 12 (1973).

<sup>49</sup> *Id.* at 13.

training in the use of computers was essential to the handling of communications data. Thus, it was willing, together with its cooperating agencies, to provide "practical training in computer programs and operations in developing countries on every continent."<sup>50</sup>

By 1974, UNDP was able to report that it had been able to make available to India for the expansion of the ESCES project the sum of \$1,043,300; India, in turn, had contributed the sum of \$1,066,514.<sup>51</sup>

One means employed by the United Nations to assure itself of the progress being realized through such ventures was the appointment of an expert on space applications, H. G. S. Murthy. He has assisted in seminars and workshops held in many parts of the world. One such program of meetings was held in India, in December of 1972, at which time very careful attention was given to technical problems involved in the use of space objects for the purposes of communication. All the meetings related to the operational phase of the Indian Experimental Satellite Communication Earth Station.<sup>52</sup> Thus, UNDP has assisted in feasibility studies for satellite communications. It has provided technical assistance in the form of seminars and workshops. It has also funded fellowships and scholarships.

While the hope has been expressed that the Indian project would be of help to other developing countries, the United States has indicated that:

[O]pportunities for experiments by other nations with ATS-F after its use by India are very limited. The current [1974] expectation is that the satellite will be returned to the Western Hemisphere so that the U.S. can realize an additional return on its investment by utilizing the satellite for further experiments. Thus, any additional opportunities will have to fit into planned U.S. uses in the Western Hemisphere.<sup>53</sup>

#### UNDP, THE UNITED STATES AND DEVELOPING COUNTRIES

UNDP has endeavored to facilitate international cooperation in the development of regional communications satellite systems as well as to assist in other joint ventures. In 1973, it assisted eight Latin American countries in making a feasibility study of a regional system. The proposed

<sup>50</sup> *Id.*

<sup>51</sup> Report on Types of Assistance Extended by the United Nations System to Developing Countries in the Field of Practical Applications of Space Technology, U.N. Doc. A/AC.105/124, at 5 (1974) [hereinafter cited as Report on Types of Assistance].

<sup>52</sup> Report on the United Nations Panel Meeting in India on Satellite Instructional Television Systems, U.N. Doc. A/AC.105/114, at 7-8 (1973).

<sup>53</sup> *NASA Authorization Hearings for 1975*, *supra* note 1, at 769. The inability of the United States to extend this particular project should not be construed as a general unwillingness to share space-derived benefits with the lesser developed countries. For example, during 1974, ERTS and other United States remote sensing technologies were used to assist the West African states of Mali, Niger, and Upper Volta. During and following the extended drought in these countries, the United States provided immediate and accurate information to them concerning their natural resources. They were thus enabled to "expedite an expanded resource management program." *Id.* at 735.

system would attempt to accelerate educational and cultural development.<sup>54</sup> Because of the many inaccessible mountain regions, conventional educational methods are impractical in the Andean area. As a result of this factor and the sparsity of teachers, the rate of illiteracy is high in this sector. UNESCO and ITU have, therefore, undertaken investigations of teaching opportunities. According to the 1973 United Nations review:

The project report will enable the Governments concerned to make decisions on the financing, ownership, organization and operation of educational television broadcasting systems on both a national and a regional basis. They will also be provided with a wealth of data on the most practicable technical characteristics of the system needed to provide adequate coverage of the region.<sup>55</sup>

As a result of the foregoing reports, UNDP has contributed \$913,786 to the feasibility study of the Latin American regional educational television satellite system, and the affected nations have contributed \$360,000. By 1974, UNDP had contributed \$4,042,440 to projects in 11 developing countries and the nations involved had contributed \$4,519,955 of their own funds.<sup>56</sup>

As ATS-F continues to demonstrate its significant capabilities, there is an encouraging possibility that the United States will enter into bilateral joint ventures for ATS-F use. Brazil requested approximately 50 hours of satellite time for educational broadcast experiments during 1974-1975 and NASA viewed the proposal favorably. The agreement calls for Brazil to be responsible for providing ground transmitters, ground receivers, and to engage in the programming for the experiment. This joint venture will provide for audio-video broadcasts to approximately 500 schools in the Rio Grande de Norte region of Brazil.<sup>57</sup> Indonesia has indicated informally that it has an interest in sharing in the use of the ATS-F. Since plans have been made for the return of the ATS-F to be used by India during 1975 to the Western Hemisphere, the United States Department of State has suggested that it might be able to find another satellite suitable for a joint venture with Indonesia.<sup>58</sup> However, such potential users are obliged "to pay for the planning, execution and analysis of results of their experiments as well as the cost of experimental ground equipment."<sup>59</sup>

#### REASONS FOR SEJVS WITH THE LDCs

Effective joint space ventures between the space resource nations and the LDCs give promise of substantial common benefits. The LDCs can be strengthened in their capacity to communicate those very ideas which

<sup>54</sup> *Supra* note 48.

<sup>55</sup> *Id.*

<sup>56</sup> Report on Types of Assistance, *supra* note 51, at 5.

<sup>57</sup> *NASA Authorization Hearings for 1975*, *supra* note 1, at 768.

<sup>58</sup> *Id.* at 769.

<sup>59</sup> *Id.* at 672. The United States investment in the Application Technology Satellite-F is approximately \$35 million.

have heretofore prevented their development. The space resource states will have the opportunity to further maximize the myriad capabilities of present-day space objects. For the LDCs, any thought of proceeding unilaterally in the development of a space program is confronted with the problem of prohibitive cost and the need for an enormous reservoir of highly trained specialists. Just as the average individual cannot afford a \$33,500 Rolls Royce automobile, it would be a mistake for an LDC to commit its limited resources to an extensive space program. For their general involvement, they can participate in broad and unspecific cooperative activities. However, more direct space benefits will unquestionably follow if they are able to participate in particularized bilateral or multilateral efforts.

One of the advantages to the LDCs' participation in joint ventures includes the choice by the LDC of the areas of action best suited to their needs. As noted in the case of India, such action has been directed toward essential educational, developmental, and social programs. With the space resource state being willing to take the principal responsibility for the construction and launch of the space object, the LDC will be permitted the opportunity to move into soft-ware manufacture and applications. They would additionally be able to embark on ground-based projects which would produce specific expertise at relatively low costs. Such commitments would permit the development of enormous motivation and would contribute to the ultimate success of the joint venture.

In addition, the commitment by an LDC to a joint venture would greatly increase the probability of assistance from UNDP, UNESCO, ITU and other international bodies. So equipped, the LDCs might find that the space resource states would be more inclined to supply scholarships and fellowships to deserving nationals of the LDCs. With an enlarging technical expertise on the part of the LDCs the advanced states would make data collected through such national efforts as ERTS more readily available to deserving LDCs. This kind of information exchange, when coupled with the data received through the ATS-F type space object, would also help to fortify the LDCs in their ability to grow in the areas of education, communications, and the manufacture of software items, as well as the perfection of their capacity to provide logistic support for ground-based activities. Moreover, such collaborative efforts could inculcate confidence and contribute to rational decisions on the part of government officials.

The advantages which are made available to the space resource nations as the result of such a joint venture with LDCs are equally impressive. The space resource states could receive the benefits of suggestions and proposals relevant to future space activity and, in addition, the LDCs would share the monetary and scientific resources and responsibilities in these particular activities. As a result of such collaborative efforts, the advanced nations would be relieved of the

assertions—particularly in the area of data collection relating to earth resources—that such collection and subsequent dissemination constituted an interference with the sovereignty of the sensed nations. This type of understanding and cooperative consultation could contribute to the molding of a firm policy by the United States regarding an open and unimpeded exchange of space object information on an international basis. The bilateral SEJVs would serve as cautionary advice to those international organizations which may wish to become involved in fixing the substantive content of data which can be transmitted via space objects.

This pooling of special talents and capabilities would have a valuable impact upon the identification of new ideas and processes. Through the widening of the list of participants and the sharing of costs incident thereto, there would also be a reduction in costs to the principal actor. Moreover, United States space objects will be able to contain components manufactured or assembled in other nations. The United States would also be able to derive immediate benefits from an agreement with an LDC allowing the United States to employ, on a cooperative basis and during the lifetime of the joint venture, a radio frequency assigned to the foreign nation.

There is a general awareness that radio emissions from space objects have produced interference with emissions from other satellites. The seriousness of this situation has been reflected in the statement relating to ERTS-1 that “fortunately, no mission failures have occurred, but the chances of this happening will increase as the number of satellites, sensors and ground emitters increase.”<sup>60</sup> Such interference has resulted in a charge in September, 1974, that the ATS-6, while situated over the Galapagos Islands in the Pacific, west of Ecuador, and the Synchronous Meteorological Satellite (SMS), while situated over the Atlantic, east of Brazil, had blocked parts of the heavens from more than a dozen radio telescopes situated in the United States, Canada, and the United Kingdom. Both of the United States satellites were situated at an altitude of 22,400 miles, allowing them to orbit the earth at the same rate of speed as the rotation of the earth. Through the sharing of assigned radio frequencies it may be possible for joint venturers to reduce or eliminate such interferences.

Through joint ventures, the United States would be able to use an orbit position on a cooperative basis for the term of the agreement, an orbit which might be assigned to a nation by the effective instrumentality of the world community. NASA has seen the importance of clarifying its future orbit position needs. In commenting on both the matter of radio frequencies and orbit positions, NASA has indicated

[W]e will also examine NASA's future frequency allocation, bandwidth and orbit position needs and, where necessary, find ways of

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<sup>60</sup> *NASA Authorization Hearings for 1975*, *supra* note 1, at 680-81.



sharing existing frequency allocations more efficiently and strive to open up higher frequency bands, particularly above 10 GHZ, to alleviate radio frequency and orbital space crowding problems.<sup>61</sup>

National competition for these valuable assets is already a lively issue. As early as 1973, the United Nations/UNESCO African Regional Seminar on Satellite Broadcasting Systems recommended that the ITU be made aware of the "future requirements for satellite positions on the geostationary orbit for satellite broadcasting in Africa. In particular, the orbital positions between 15°E and 15°W longitude are of interest for the African continent."<sup>62</sup> The Report also noted that "the Seminar recommended that all African nations be made aware of the need to reserve the frequency band 2500-2690MHz for the possible future use of satellite broadcasting in Africa."<sup>63</sup> If assignments of these or similar orbital positions or frequency bands were to be made to the LDCs, the need for joint ventures would become exceedingly clear. The preceding reasons for establishing mutually beneficial SEJVs between an advanced state and an LDC would also seem to apply with equal force to joint ventures between space resource states and between such states and international organizations.

The successful negotiation of bilateral agreements will allow for an increase of experience and insight as to the possible benefits derivable from multinational space operations. From the perspective of the LDCs it is entirely possible that they will derive advantages from creating regional programs. The advanced nations of Western Europe have found it more expedient to proceed by way of an international organization consisting of 10 countries than to go it alone or rely exclusively on bilateral agreements. Perhaps the LDCs could establish their own equivalent of ESA.

As the LDCs consider their space future, they may wish to direct inquiries to ESA concerning the likelihood of the formation of "associate" or some other subsidiary form of membership in that body. In looking toward the future they will be aware that ESA is likely to be highly performance oriented, whereas both the United Nations and UNESCO have demonstrated that they possess more politically directed capabilities and characteristics. On the other hand, attention should be given to the fact that ITU, up to the present, has been more technically oriented. Thus, the options of the LDCs are many. Presumably they will find situations and combinations of situations in which they will be able to derive maximum benefits from the wonderful innovations of the space age.

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<sup>61</sup> *Id.* at 681.

<sup>62</sup> United Nations/UNESCO Final Report, *supra* note 35, at 15.

<sup>63</sup> *Id.*

## CONCLUSION

Unquestionably as man seeks to maximize the exploration and exploitation of the space environment for peaceful and beneficial purposes, there will be a need to engage in an enormous variety of cooperative activities. A pattern allowing for the assumption of specific obligations has already emerged. This consists of agreements between nations, between a nation and an international organization, and among several nations and an international organization or organizations. Such agreements now exist between space resource states, and to a lesser degree between a resource state and a non-resource state. The non-resource states have been assisted in their efforts to advance their genuine national interests by a number of international organizations. Of particular help to them at this time have been the United Nations, especially through the UNDP, and UNESCO. The non-resource states, as it turns out, are essentially the less developed countries.

All of the cooperative activities which have been taking place—whether taking the form of general programs of cooperation or more specific joint ventures—have produced benefits to the participants. So far the benefits have varied depending on whether a nation is a space resource state, an advanced state, or an LDC. Thus, the space resource states and the advanced states have been able either to engage in, or plan, for a number of activities having wide-ranging aspects; the launching of a wide variety of space objects, complex scientific and technological experiments, medical tests, applications involving broadcasting and sensing, and the preparation of multinational crews with diverse backgrounds, with the attendant need to work out legal codes to govern the manning of multinational space missions.

While the space resource and advanced states were much concerned with the activities of man in space, the LDCs have concentrated on space applications designed to improve the quality of life on the surface of the globe. Thus, they have sought out cooperative activities and ventures which would allow for higher educational, health, and living standards, which can be realized through improvements in communications. On the part of some of the LDCs there has been a disposition to question the unilateral activities of space resource states, particularly where the latter have had the capacity to broadcast into the LDC or to obtain data from within the LDC by way of sophisticated sensing procedures. At the same time, some of these non-resource states were deriving benefits from the highly practical space programs being pursued by the resource states.

In order that the fears of some nations may be alleviated concerning the capabilities of the space resource states, there is a need to make use of the joint venture process to achieve mutually desirable results. Experience with this process has demonstrated that it is one means to ameliorate fearful concerns on the part of some nations. It is a process for realizing mutually beneficial gains for countries willing to embark on

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such ventures. As states embark more intensively upon the exploitation of the space environment, both the specific joint venture and the more generalized cooperative efforts of nations will have to be utilized so that there will be a suitable distribution of the benefits of the space environment—the newly found “province of all mankind.” Law and the legal process have the capacity to provide an infinite number of principles, standards, and rules so that genuine national interests can be satisfied and world community values can be assured. As with a number of major issues now confronting the welfare of man, the principal need is to find the political will to obtain such values.