Remote Sensing for Public Safety

Margaret-Susan Endsley

Follow this and additional works at: http://digitalcommons.law.scu.edu/chtlj
Part of the Law Commons

Recommended Citation
Available at: http://digitalcommons.law.scu.edu/chtlj/vol3/iss1/8

This Comment is brought to you for free and open access by the Journals at Santa Clara Law Digital Commons. It has been accepted for inclusion in Santa Clara High Technology Law Journal by an authorized administrator of Santa Clara Law Digital Commons. For more information, please contact sculawlibrarian@gmail.com.
REMOTE SENSING FOR PUBLIC SAFETY

Margaret-Susan Endsley

I. INTRODUCTION

Remote sensing satellites represent one of the greatest achievements by our technologically oriented society. Beyond the obvious military and defense applications, remote sensing by satellites placed in geostationary orbit currently provide the most complete information available about natural resources. The remote sensing process identifies detailed features on the Earth's surface by monitoring the energy emitted or reflected from the sun. The different elements making up the environment are registered by the sensing equipment aboard the satellites. The satellites then define these elements by illustrating the differences through various color schemes. A printout of the color schemes is ultimately received at a satellite station on Earth. A single satellite is capable of monitoring nearly the entire world every eighteen days.\(^1\) Sensing equipment is capable of identifying objects on the Earth's surface as if one were as close as ten meters from the item.\(^2\)

The information available through remote sensing is of great economic value and enables the user to virtually control a number of markets. For example, there is an obvious advantage to the miner who has access to remote sensing information. If one knows where there are vast mineral deposits, one will set up operation in that location and virtually eliminate exploration costs. Because of the economic importance of remote sensing information, the distribution and use of the analyzed information gathered from space is an ever growing source of controversy between the United States (U.S.) and those developing countries studied by U.S. satellites. Although other countries have various renditions of sensing-capable

\(^2\) CARL Q. CHRISTOL, MODERN INTERNATIONAL LAW OF OUTER SPACE, 723 (1982).
satellites in space, the U.S. is the only country currently known to have a sophisticated system of monitoring in place known, as the LANDSAT System (Land Satellite).

The LANDSAT System provides the U.S. with the capability of monitoring other countries without first giving notice or obtaining consent. Whether it is legal to act in this manner has never been decided. The U.S. takes the position that it need not have the prior consent of the states it monitors and may actually make any information available to any buyer, even an adversary of the sensed state, and yet has no duty to inform the sensed state of any potential hazards that are discovered through the use of LANDSAT. This article explores whether any legal duty exists under international law in the remote sensing area, and if such a duty does exist, whether the U.S. is bound by such a duty.

II. BACKGROUND IN REMOTE SENSING

Use of satellites to provide data began in 1960 with the development of the TIROS weather satellite. Research was expanded to include satellite applications for military and agricultural operations. A vast number of remote sensing applications were realized. Although all applications of remote sensing data are included within the scope of this comment, the area of major emphasis will be agriculture. Some examples of remote sensing applications are included in the following:

A. Cartography: Map making was one of the initial applications of remote sensing data. Prior to the advent of remote sensing there were areas of the Earth still inaccurately mapped, which created navigational problems.

B. Military/Defense: Observation and navigation satellites provide a means for weapons verification by the United States and the Soviet Union and thus aid in the maintenance of peace. Addi-
tionally, enhanced navigational capacity allows for an increase in range and performance of high flying reconnaissance aircraft.

C. Mineral Resources: Remote sensing has made it possible to identify areas rich in mineral resources. That information enables the user to pinpoint extraction sites, minimize the economic risks inherent in mineral exploration and maximize exploitation capabilities.

D. Forestry: The spectral signature of vegetation as shown through color variants is different from that of rock, soil or water. Forest zones are particularly important to mankind because of their impact on air quality. Identification of forest zones makes it possible to monitor tree health and growth. In turn, this allows for the maintenance of a constant level of quality and quantity of lumber, wildlife and air.

E. Water Management/Oceanography: Ocean currents constantly change course and strength. Occasionally plankton and fish are killed in vast quantities because of pollutants. Ocean life has a spectral signature which shows up on remote sensing monitors. Dangers to ocean life may be recognized and protected against if identified early by a remote sensing satellite. Space sensing satellites also detect ocean pollution and the destruction of the ocean ecology. Although not a common application, remote sensing may be used to aid fisherman in pinpointing supply in order to insure a constant catch.

F. Meteorology: Aside from storm warnings, weather satellite data enable better agricultural planning based on predicted weather conditions. The satellite data can provide advanced warnings of droughts, floods and erosion.

G. Agriculture: Remote sensing satellites can evaluate specific crops under cultivation, as well as identify those crops which are diseased or infested by insects. Used in conjunction with meteorological satellites, it is possible to determine the best times to plant and harvest crops for a maximum yield. Information is illustrated through various color schemes. Because of the color differences of the imagery, each crop presents a unique signature, thus allowing for the maintenance of detailed crop inventories and acreages facilitating the formulation of crop yield estimates for major crops such as wheat.


III. LANDSAT

"The United States LANDSAT System is currently the only civilian land remote sensing system from which world-wide data are available."\(^8\) LANDSAT was developed by the National Aeronautics and Space Administration (NASA) in conjunction with General Electric. The program is now administered through the National Oceanic and Atmospheric Administration (NOAA). There have been five LANDSAT satellites launched into space. Earth Resources Technology Satellite (ERTS-A), later named Land Satellite (LANDSAT-I), was launched on July 23, 1972. LANDSAT-5 was launched in March of 1984.

NASA sells LANDSAT data to interested countries through bilateral contracts which enable these countries to establish ground stations in their own territory. Data from LANDSAT is transmitted directly to these ground receiving stations around the world. Once received, data is recorded, processed, archived and distributed to the various country users by the NOAA operating station. This procedure is governed by a Memorandum of Understanding (MOU) between the receiving country and NOAA. In exchange for access to LANDSAT data, station operators of participating countries pay an annual access fee of $600,000 and a distribution fee on each data product sold henceforth.\(^9\) There are currently eleven such ground stations in operation\(^10\) and additional ground stations are being built or have been proposed.

The development of remote sensing technology has created new legal questions. Assuming that remote sensing of other countries is in fact legal, will a country be held liable for incorrect information which it discloses? The answer revolves around a determination of whether such conduct is misfeasance, nonfeasance, or mere negligence. That determination can only be made when the legality, or non-legality of the remote sensing act itself is established. A more accurate assessment of the issue is that although the act of remote sensing itself is presumed legal, the question of how far a country may go in using a satellite to intrude upon the sovereignty of another country remains open. The same question must be dealt with in regard to this comment's inquiry; is there a duty to disclose such data at all?

---

8. See supra note 5, at 125.
9. See Supra note 5, at 165.
10. See Supra note 5, at 165. The stations are located in Argentina, Australia, Brazil, Canada, European Space Agency, India, Indonesia, Japan, South Africa, Thailand.
The United States recognizes no provision of applicable international law that restricts or inhibits remote sensing of the Earth from outer space and its subsequent dissemination and distribution to any and all buyers. Currently, the U.S. charges a standard price to any country which requests access to the data and, therefore, no country may monopolize the information for its sole advantage. The United States' practice of free dissemination of remote sensory data has caused anxiety among certain countries which view it as an infringement of national sovereignty. The practice enables countries with remote sensing technology to learn more about the resources of a sensed country than that country knows itself. Sensed states are particularly concerned with controlling activities relating to the development and exploitation of their own natural resources. These countries would like to see it stopped unless specific consent has been granted.\footnote{11}{31 U.N. GAOR Annex 15 (Agenda Items 31,32) U.N. Doc. A/AC 105/170 Annex 15, at 16 (1976).}

Support for the legality of remote sensing activities without the consent of the monitored party is derived from the several attempts made by the United Nations Working Group to define remote sensing.\footnote{12}{U.N. Doc. A/AC 105/111 at 2 (1973). Among many attempts to define "remote sensing" were those made by the United Nations General Assembly in 1973 and 1978:

"Remote sensing of the earth from space is a methodology to assist in characterizing the nature and condition of the natural resources, natural features and phenomena, and the environment of the earth by means of observations and measurements from space platforms. Specifically, at present, such methods depend upon the emission and reflection of electromagnetic radiation." U.N. Doc. A/AC 105/111, at 2, Feb. 14, 1973.


Remote sensing satellite supporters argue that if the process was not legal, the United Nations would not bother with an attempt at a definition. Countries without sensing capability disagree.\footnote{13}{U.N. Doc. supra note 11.} Sensed countries are also concerned that the United States' open-skies policy will enable an enemy or adversary of a sensed country to purchase information regarding their resources or military preparedness. The Memorandums of Understanding establishing the bilateral contracts do not limit access to the data to a particular party. Therefore, the practice of providing data to an adversary does not violate these contracts. The U.S. also claims that the open-
skies policy is in full accord with the non-discrimination reference in article one of the 1967 space treaty. The 1967 space treaty maintains that space exploration and use shall be free to all.

IV. AN INTERNATIONAL DUTY TO DISCLOSE FINDINGS

International law is based on the concept of the sovereign equality of states and rests ultimately upon agreement among them. International law provides a guide for state action and a technique for peacefully resolving disputes between states by reference to agreed norms of conduct rather than by resorting to force. Most frequently, international law is implemented by national tribunals interpreting and applying international law domestically.

The United Nations was formed to promote and maintain international peace and security. The principal judicial organ of the United Nations is the International Court of Justice (ICJ). The Court functions in accordance with its own Statute, which is annexed to the United Nation Charter. It adjudicates disputes brought before it by and against states, and it renders advisory opinions on legal questions submitted to it by other organs of the United Nations.

Article 38.1 of the Statute of the International Court is considered the authoritative guide to sources of international law. Article 38.1 describes the sources of international law as including international conventions, international custom, general principles of law, and judicial decisions and teachings. Each of the above areas will be addressed independently and applied to remote sensing data.

A. International Conventions

These Conventions include treaties or specific bilateral or multilateral agreements between the states establishing expressly recognized rules. This sort of international legislation can be written by ad hoc conferences, by regional institutions, and by international


"Outer space, including the moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies."

15. See supra note 3, at 266-267.


17. Statute of the International Court of Justice, art. 38.1 (a), 59 Stat. 1055; T.S. 993; 3 Bevans 1153 (art. 93 U.N. Charter) annexed.
organizations. A multilateral treaty is subject to ratification by signatory states, and is not binding upon a nonsignatory party.\textsuperscript{18}

Currently there are five United Nations multilateral treaties regarding the use of space.\textsuperscript{19} The first multilateral treaty, the 1967 Space Treaty, set forth the basic premise that all subsequent space law was to follow. It states that exploration and use of space is to be carried out in the interest and for the benefit of all countries and all mankind.\textsuperscript{20} Article IX of the same Treaty directed countries “to . . . conduct all their activities in outer space . . . with due regard to the corresponding interests of all other States Parties to the Treaty.” There is an additional duty imposed upon states to regulate their activities in a manner so as to avoid causing harm to other State Parties, although no comment is expressed as to whether a State Party has an obligation to warn of harm caused independent of human action. The 1967 Space Treaty also unequivocally states that State Parties will carry on all activities in accordance with international law.\textsuperscript{21} It is evident from this language that space law developed on the international level is intended as binding upon all sovereign states, and that space is not a place of unlimited freedom. The 1967 Treaty came into force on October 10, 1967. Currently eighty-seven states are parties to it, the United States among them.\textsuperscript{22}

The Convention on International Liability For Damage Caused By Space Objects (“Liability Convention”) has expanded the concept of state responsibility to include damage caused by space objects. The Convention applies a strict liability notion upon states launching space objects which subsequently cause damage on the Earth’s surface. The Liability Convention specifically refers to situations of actual impact upon the Earth’s surface. The U.S. ratified the Liability Convention on October 9, 1973. The Liability

\textsuperscript{18} The International Relations Dictionary, supra note 3, at 247.


\textsuperscript{20} Treaty on Principles, supra note 14, at art. I.

\textsuperscript{21} Treaty on Principles, supra note 14, at art. III.

\textsuperscript{22} 18 U.S.T. 2410, T.I.A.S. No. 6347.
Convention was strengthened by the adoption of the Convention on Registration of Objects Launched into Outer Space ("Objects Convention") which entered into force on September 15, 1976. The Objects Convention requires parties to register objects launched into space in order to keep track of these objects in the event of later damage or injury.

In addition to the aforementioned United Nations treaties, several other multilateral agreements lend support to the proposition that a state which uses remote sensing to gain potentially harmful knowledge about another owes a duty to warn the endangered state. The Convention of the World Meteorological Organization (WMO) promotes world-wide cooperation in the establishment of a meteorological data exchange network. Part II (d) of the Convention directs the use of such data towards aviation, shipping, water problems, agriculture and other human activities. The underlying premise of the Convention, and the Organization itself is, that the sharing of weather data will be beneficial to all countries, as it will promote accurate forecasting, thus reducing the effects of weather related disasters.

The Multilateral Food Aid Convention ("Food Aid Convention") became effective for the United States when it was signed by the U.S. on November 11, 1980. Member parties recognize the need to prevent famine and improve nutrition around the world. "The objective of this Convention is to secure, through a joint effort by the international community, the achievement in physical terms of the World Food Conference target of at least 10 million tons of food aid annually to developing countries in the form of wheat and other grains suitable for human consumption, as determined by the provisions of this Convention."23 The Convention acts upon the notion that disasters are more easily diverted before they actually happen. The recent publicity regarding the extent of the famine in Ethiopia illustrates the necessity of pin-pointing food supplies and monitoring its maintenance. The Food Aid Convention encourages members to make contributions on a forward planning basis so that recipient countries can plan ahead and allows contributing members to substitute cash for grain if grain is not available.24

The International Telecommunications Convention (ITC) came into force on January 1, 1975. The United States is one of the 155 countries which are parties to the treaty. Under the treaty, members are required to cooperate within the structure of the Inter-

24. Id. at art. III.
national Telecommunications Union (ITU) (a specialized agency of the United Nations established to facilitate all types of telecommunications) in their use of technical facilities for telecommunications. All space objects communicating with Earth require radio services which are under ITU jurisdiction. ITU proposes to “foster the creation, development and improvement of telecommunication equipment and networks in developing countries by every means at its disposal, especially in its participation in the appropriate programs of the United Nations;”25 as well as to “promote the adoption of measures for ensuring the safety of life through the cooperate of telecommunication services.”26 One of the underlying purposes for establishing the ITC was to provide a rapid and efficient means of transferring information regarding rescues and safety. “The international telecommunication services must give absolute priority to all telecommunications concerning safety of life at sea, on land, in the air or in outer space, as well as to epidemiological telecommunications of exceptional urgency of the World Health Organization.”27 Distress calls are placed at the same level of high priority and an affirmative obligation is imposed on party nations to act upon any such call or message.28

A Convention and Operating Agreement on the International Maritime Satellite Organization (INMARSAT) was adopted in September of 1976 to address navigation concerns. The INMARSAT Convention recognizes space as a valuable tool for improving maritime communications.

Although the United States is not a party to it, the European Space Agency provides yet another example of international cooperate-operation in space applications and use. European States have agreed to provide for and promote exclusively peaceful uses of operational space active systems.29

The above-mentioned treaties and conventions express the intent of the parties, including the U.S., to use the emerging space technologies in a manner that is beneficial to all nations of the world. These treaties illustrate that nearly all nations agree on the importance as well as practicality of cooperation as a means to prevent disasters and mitigate damages. The idea that a country or

26. Id. at art. 25.
27. Id. at art. 25.
28. Id. at art. 36.
agency will warn another of a potential danger is completely compatible with the aforementioned treaties.

B. Customary International Law

Certain rules of international conduct based on practices and usages are accepted by states to be obligatory. Article 38.1 of the Statute of the International Court of Justice asserts that "International Custom, as evidence of a general practice accepted as law," is one of the sources of international law to be applied by the Court. Evidence of these customary rules is found in observed practices rather than in specific international directives and agreements. Care must be taken to distinguish between legally binding customs to which a state commits itself and mere practices arrived at for the sake of convenience.

Mankind has focused much effort on the prevention of natural disasters in all areas of the world. Life is a valued commodity, and the preservation and protection of humanity is unanimously sought. The United Nations' specialized agencies, created by treaty, deal in specific areas that will serve not only to preserve, but also to improve the quality of life. Efforts are currently being made to prevent weather related disasters, assist countries in maintaining sufficient levels of food and medical aid, rescue accident victims, and provide navigation and transportation aids that will help prevent catastrophes.30

The previously mentioned WMO is a specialized agency of the United Nations. In addition to its other functions, WMO collaborates with the General Assembly of the United Nations to promote international cooperation in the peaceful use of outer space. Most meteorological data are attained through use of space satellites. The WMO Convention itself imposes no obligation for data exchange, but the sharing of meteorological data attained through satellite use has become an established custom.31 "There is a long-standing humanitarian practice that the nations of the world exchange weather data freely. No nation can forecast its weather using data collected solely within its national boundaries because all weather patterns originate outside a nation's boundaries."32

World Weather Watch: WMO established the World Weather Watch (WWW) upon which nearly all other WMO programs depend. WWW uses satellites of the European Space Agency, Japan,

31. See supra note 5, at 169.
32. See supra note 5, at 75.
India, the United States and the Soviet Union. The WWW network collects satellite data, integrates it with data collected on Earth, and disseminates the resulting analyses and forecasts to member countries, free of charge. Although all participating countries benefit from WWW, the developing, non space-active countries in particular benefit from such information. Countries without sophisticated technology are generally more dependent upon the food supply generated domestically since they do not have the financial ability to import food products. Food production and agricultural related industries are highly dependent upon accurate weather forecasts.

COSPAS-SARSAT is a multilateral program which uses satellites to aid maritime and aeronautical search and rescue activities. The United States, Canada, France and the Soviet Union developed the system under a MOU in 1980. Since that time, five additional members have joined; Bulgaria, Finland, Norway, Sweden and the United Kingdom. A revised MOU between the parties, was signed in 1984. The new memorandum establishes a firm commitment to continue with the project through 1990.

The COSPAS-SARSAT system uses satellites to detect distress signals emitted from emergency transmitters aboard ships and aircraft. After the signals are received by the satellites, they are relayed to a network of ground stations where the location of the emergency is ascertained. The information is then relayed to the appropriate search and rescue forces in the country nearest the location of the emergency. As of April 1985, 375 people had been saved from disabled aircraft and ships as a direct result of the COSPAS-SARSAT system. The system has relied heavily upon the Soviet satellites involved, because the U.S. satellites have frequently malfunctioned. Contrary to other areas, United States and Soviet Union cooperation with regard to COSPAS-SARSAT has been stable and successful. The U.S. agencies involved in the application of SARSAT are NOAA, NASA, the U.S. Coast Guard and the U.S. Air Force. COSPAS-SARSAT is a further example of American practice in the provision of measures directed at saving lives. The program's benefits are not limited to member states.

35. See supra note 5, at 80.
36. See supra note 5, at 146.
37. See supra note 5, at 46.
The International Telecommunications Satellite Organization (INTELSAT) is a coalition of nations operating on a commercial basis to develop the space segment of the global commercial telecommunications satellite network. INTELSAT provides the major source of competition to United States private industry in the provision of international communications services. Notwithstanding this, the United States as a nation, is a member of the organization. Although seemingly contradictory, it is only the U.S. private sector that is in competition with INTELSAT.

Although satellites and associated facilities are owned by INTELSAT, the earth stations and links are owned by individual countries. The INTELSAT agreement dictates that satellites launched for domestic purposes must be technically coordinated with INTELSAT and must not economically harm INTELSAT.\(^3\)

INTELSAT is a commercial entity, but operates as an international organization with non-commercial goals as well. The INTELSAT Assistance and Development Program was established in 1978. The program provides communications assistance to countries that apply on a first come, first served basis. There is generally no fee involved.\(^3\) INTELSAT has brought many areas of the developing world into the global satellite network through its Assistance Program.

INMARSAT is an offshoot of INTELSAT and provides services such as the transmission of distress messages to rescue operations and distribution of urgency and safety messages to the public.\(^4\) Future plans include the provision of safety advisory messages, navigation services, and automatic warnings of navigational hazards. INMARSAT collaborates with the United Nations and has coordinated with IMO on the development of the Future Global Maritime Distress and Safety System. Both INTELSAT and INMARSAT are excellent examples of how to provide public benefits through a commercialized agency.

International practice has shown a clear intent to protect mankind from avoidable hazards. Also relevant to the illustration of customary international law are U.S. practices in its relation to other countries. Whether the peril has been famine, flooding, drought, or drowning, states have banded together to minimize the


\(^3\) U.N. Doc. supra note 30, at 78.

\(^4\) U.N. Doc. supra note 30, at 82.
harm and the United States has been a major leader in the effort to do so. The United States plays a predominant role in the formulation of policies taken by the international organizations of which it is a party. "Since the beginning of the United States space program, the application of space research for the benefit of national and international communities has been a major objective of United States government agencies. To meet this goal, the United States encourages international cooperation and has developed a broad program of international activities open to participation by foreign space agencies, academic organizations and individuals." An emphasis on the importance of protecting life can be drawn from the United States' domestic practices and applied to the internationally shared public order. Evidence of the domestic practice of warning potential victims of devastation is illustrated through the United States' use of its own meteorological service to warn residents of weather hazards, storms, hurricanes and tornadoes. Sensing data are used to assist the U.S. farming community in its seasonal planting and harvesting schedules. When the public is taken unaware by a catastrophic event, there are numerous services in place for the alleviation of damage.

C. General Principles of International Law

The third category of sources which the International Court of Justice recognizes is "the general principles of law recognized by civilized nations." There are certain principles of private or municipal public law and procedure which are universally recognized. General principles of law are based on such notions as justice, equity, and morality recognized by civilized nations. These are principles so wide-spread as to be applicable within all systems of law that have achieved a comparable state of development. General principles of law may be ascertained from the municipal systems of individual states. In order to satisfy the definition of a general principle of law, it must be found within the primary legal systems of states involved in the dispute. An example of a general principle of law is the concept that "every violation of an engagement involves an obligation to make reparation." Res judicata is also a recognized gen-

---

41. See supra note 24, at 47.
42. U.S. Coast Guard, National Guard, Civil Air Patrol, Rocky Mountain Rescue Group, etc. . . .
43. Statute of the International Court of Justice, art. 38.1(a), 59 Stat. 1055.
eral principle of international law.\textsuperscript{45}

Recently the International Court of Justice has shown signs of including the constitutional law of international organizations within the sphere of general principles as well.\textsuperscript{46} It is a generally recognized principle that states share responsibility for even a lawful act which brings about an abuse of rights.\textsuperscript{47}

The Trail Smelter Case\textsuperscript{48} is important in helping to answer the question of whether states with the technical capacity have a duty to warn other states of imminent natural hazards. In 1941, a Special Arbitral Tribunal utilized general principles of law to decide a dispute between Canada and the United States. The case arose out of the emission of air pollution from sulfur dioxide fumes by a smelter plant at Trail, British Columbia, Canada into the Northwestern United States. It had already been established that the fumes had caused damage in Washington state from 1925 to 1937. When the Trail Smelter Case was decided, no cases involving air pollution had been addressed by an international tribunal.

The court made an analogy to water pollution and decided that “no State has the right to use or permit the use of its territory in such manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence.” Although space was not viewed in the traditional sense of territory, the same general principles of law were applied to this particular concept of territory.\textsuperscript{49} The case illustrates that universally recognized standards may be utilized by the Court and applied to newly emerging problems brought about by advancing technology. Additionally, the Tribunal prescribed measures to prevent future air pollution problems, including the maintenance of meteorological and sulfur emission records, which are easily attained through various remote sensing applications.

It is internationally recognized that a state may use reparation as a means of releasing itself from a particular responsibility.\textsuperscript{50} “Reparation must, as far as possible, wipe out all the consequences

\textsuperscript{45} Statute of the International Court of Justice, art. 38.1(a), 59 Stat. 1055.
\textsuperscript{46} Henkin, \textit{supra} note 16, at 79.
\textsuperscript{47} EAGLETON, \textit{Responsibility of State in International Law} 80 (1928).
\textsuperscript{49} Id.
\textsuperscript{50} See \textit{supra} note 3, at 188. Reparations refer to compensation demanded by victor nations from defeated states for wrongs committed by the latter before or during hostilities. Reparations constitute both a punishment levied on the defeated states, as well as a subsidy for the victor nations to aid in their reconstruction.
of the illegal act and re-establish the situation which would, in all probability, have existed if that act had not been committed." In the present situation we have a potential wrong of sensing a country without consent. Applying the reparations analysis, there is a responsibility on the part of sensing countries to atone for the wrongful act. Because the threshold question of whether sensing without first obtaining consent has not been answered as yet, the foregoing analysis has never been applied.

The United States has adopted the practice of coming to the aid of all countries which suffer disasters, whether natural or economic. The United States attempts to remedy the plights of earthquake victims, famine victims and even debtors. In essence, these aid programs function as reparations in that they attempt to place the receiving state in the position they were in prior to the injury. However, reparation implies that there was an initial wrong done. Certainly not all disaster relief is a response to a wrongful act, but in all relief cases an analogy may be drawn to a reparations situation. In this instance the states are monitored without their consent. If the United States will act upon its duty to warn other states, there will be no need for reparations in the form of aid and disaster relief later because the disasters will be averted.

**D. Subsidiary Means for Determining Rules of Law**

The final source cited by the Statute of the International Court of Justice advocates the use of "judicial decisions and the teachings of the most highly qualified publicists of the various nations as subsidiary means for the determination of rules of law." Stare decisis does not bind the International Court of Justice. International law is premised upon voluntary agreement by countries. Countries are bound only to what they have agreed to be bound by. Therefore, a country is not necessarily bound by a decision involving different parties as it might be under U.S. domestic law. The Court is respectful of judicial precedent however. International law is partly emerging, and therefore each new international decision is likely to have strong precedential value. The individual nature of most inter-

51. Permanent Court of International Justice, Series A, No. 17, p 47-49.
52. Mexico City earthquake, Sept. 19, 1985 (severe aftershock on Sept. 20th); rescue workers and supplies sent.
53. Ethiopia famine, 1984-85; food and medical aid sent.
54. Brazil, Mexico, 1970s, 80s; austerity programs and loan extensions.
56. Henkin, supra note 16. The decision of the I.C.J. has no binding force except between parties and in respect to that particular case.
national disputes makes it difficult to find previous decisions which are on point with the current fact situation. The working practice has been to look at cases arising from similar situations and analogize or distinguish the factual settings. The previously mentioned *Trail Smelter Case* is such an example.

1. Soft Law

United Nations General Assembly Declarations, Resolutions and working group activities have earned the recent label of "soft law." Recent technological advances have led to the practice of looking to additional sources of international law in order to accommodate these advances. Since its establishment, the United Nations' role in the creation of international law has grown in importance. The United Nations is the principal international organization dealing with the regulation of the space environment. The organization's primary concern is that space be used for peaceful purposes and that the benefits from space activities be shared by all nations. The United Nations claims as members, nearly every country in the world today. It provides the best opportunity to ascertain the policies and practices of the world as a whole, rather than those of individual states.

United Nations' General Assembly Resolutions and Declarations express principles of international law.

However, not all General Assembly Declarations are intended to express legal rights and obligations. Declarations recognized as statements of legal principles and adopted unanimously are viewed in three ways. One view is that these declarations interpret the United Nations Charter.

A second approach is to view the declarations as codifications of customary international law.

Finally, some view declarations as the articulation of the agreement among states regarding the role and substance of law.

Regardless of which viewpoint one accepts, declarations, resolutions and charters are all formulated as norms.

57. North Sea Continental Shelf Cases (Federal Republic of Germany v. Denmark) (Federal Republic of Germany v. Netherlands), 1969 I.C.J. 4 (where the court applied the concept of equity to the cases involved although it wasn't specifically adopted by the parties involved in the dispute decided by the I.C.J).


59. See supra note 38.


and guidelines for state behavior. The Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space was the predecessor of the aforementioned United Nations treaties.

In 1959 General Assembly Resolution 1348 (XIII) established an Ad Hoc Committee on the Peaceful Uses of Outer Space (COPUOS). COPUOS later became permanent and currently serves as the primary organ for the research and creation of international space law. COPUOS has a legal sub-committee, and a scientific and technical sub-committee. Working groups study isolated subjects, among them, the uses of remote sensing satellites. COPUOS has devoted much of its efforts to the drafting of principles arrived at through consensus of the membership.

In 1978 the legal sub-committee published seventeen principles on remote sensing. Echoing the 1967 Space Treaty, the principles encourage that the use of space in general, and remote sensing in particular, be carried out for the benefit and in the interests of all countries. Of particular importance however, is Principle V, which stresses the value of remote sensing in the protection of the natural environment of the Earth. The principle directs states participating in remote sensing activities to “identify and make available information useful for the prevention of phenomena detrimental to the natural environment of the Earth.” Principle VIII carries on this notion by directing that “[r]emote sensing of the earth from outer space should promote the protection of mankind from natural disaster. To this end, states which have identified primary data from remote sensing of the earth or analyzed information in their possession which is potentially useful to help alert states of impending natural disasters, or to assist states in dealing with natural disasters should notify those states affected, or likely to be affected, of the existence and availability of such data or information, promptly as possible.”

The seventeen principles are still in a draft phase and have not yet been adopted by the General Assembly. Principle V has not been altered since its inception in 1978. Principle VIII was modified by the addition of a priority based natural disaster alert.

COPUOS employs a consensus practice ensuring that the prin-

---

ciples are arrived at cooperatively and not by the arbitrary power of a few members. The United States has limited influence on the COPUOS staff. In June, 1984, the United States representative walked out of the COPUOS meeting in response to the increased domination of disarmament issues and the de-emphasis on scientific and technological issues.\(^\text{67}\) The United States has made efforts to cooperate since that time however, and work has continued.

The United Nations was responsible for the organization of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82). The Conference was attended by representatives of ninety-four states, and by representatives of many international organizations. UNISPACE 82 made recommendations for the use of space technology, remote sensing of the Earth by satellite, and use of geostationary orbit. UNISPACE 82 recognized not only the advantages that remote sensing could provide any state, but the Conference also stressed that sensed states should have timely and non-discriminatory access under reasonable conditions to the primary data obtained which relates to its own territory.\(^\text{68}\) At its 1982 session the General Assembly of the United Nations endorsed the recommendations.

Soft law such as the declarations and resolutions mentioned above is not legally binding, yet can, and often does carry legal effect.\(^\text{69}\) Taken on a case by case basis, soft law that is substantiated by wide representation and conformity by states such as the examples given here, may be accepted as a supplementary source of law. The Nuclear Test Case\(^\text{70}\) held that a single Presidential statement made on behalf of France regarding future nuclear testing was legally binding. The case further noted that states may choose to take up certain positions, "when it is the intention of the state making the Declaration that it should become bound according to its terms, that intention confers on the declaration the character of a legal undertaking." The reasoning is analogous to declarations made by the United Nations, whose multilateral nature should carry more weight.

2. U.S. Internal Policy

The United States encourages international cooperation in

---

\(^{67}\) See supra note 3, at 20.

\(^{68}\) See supra note 26, at 43.


\(^{70}\) Nuclear Test Case, 1974 I.C.J. 253.
space, and has developed a broad program of international activities open to the participation of foreign space agencies, international organizations and individuals. United States space policy is changing rapidly as other nations develop sophisticated space capabilities. By the beginning of the next decade, Canada, the European Space Agency and Japan expect to deploy both land and ocean as well as meteorological remote sensing systems. It would be in the United States' best interest to cooperate now in the establishment of a global remote sensory warning system.

a. Private Sector Interest

The United States is undergoing a change in its administration of NOAA's remote sensory program. In the near future, remote sensory data extraction, interpretation and distribution will be in the hands of private industry. Undoubtedly the government will retain their own operations in regards to the defense aspects of remote sensing, but other applications of remote sensory satellites will be turned over to the private sector. Moving towards this goal, Congress has taken a major step toward opening up remote sensing to the private sector by passing The Land Remote-Sensing Commercialization Act of 1984 ("The Act"). The Act outlines a plan transferring responsibility for remote sensing data dissemination and distribution to the private sector. NASA is presently negotiating with twenty companies regarding development of commercial applications for materials processing in space. The Tax Status of Space Act was introduced in Congress to give space business the legal status similar to business done on Earth's surface. Private industry is an American tradition and will no doubt prove more efficient than the government system of administration of satellite information. Americans are confident that they will be able to develop domestic regulations that balance the economic needs of the private sector with the legal and political concerns of the international community.

The reality is that these domestic regulations take time to evolve, and in the meantime, it is unlikely that U.S. private industry will succumb to any international duty to disclose remote sensing information; even if that information will save lives.

71. See supra note 5, at 4.
72. See supra note 5, at 125.
73. A. Dula, Private Sector Activities in Outer Space, 19 INT'L. LAW. No. 1, 166 (1978).
b. The Supreme Law of the Land

There is one mechanism in place that may ensure the respect for international law by private industry. Endorsing the U.S. Constitution, the landmark decision of Missouri v. Holland asserted that treaties which have been ratified by two thirds of the Senate are the supreme law of the land. Exceptions include those situations where the treaty is renounced, the subject matter is not that which may be validly addressed by a treaty, or where subsequent federal legislation is passed which conflicts with the earlier treaty. According to the 1967 Space Treaty, Article VI, governments are responsible and liable for the actions of their nationals. Since Congress has shown no intent to disregard the 1967 space treaty, the U.S. may be obliged to draft more restrictive legislation regarding the rights and duties of private enterprises involved in remote sensing. Another feature insuring future disclosure of data is that the Act requires remote sensing operators to be licensed by the Secretary of Commerce.

V. CONCLUSION

The Land Remote Sensing Commercialization Act calls for the retention of the open dissemination approach to the sale of remote sensing data. This issue has not been faced yet by the U.S., either domestically or on the international level. The question is imminent, however, as the subject matter of the most recent COPUOS meetings and space conferences address it. Drafting more restrictive legislation regarding private industry's discretion in its data distribution policies is a necessary first step towards acknowledging any international responsibility towards the countries sensed by U.S. satellites. A duty to do so is evident within an international law context. It remains to be seen, however, whether the United States will conform with international law or even consider any future opinion by the International Court. The United States State Department has expressed the view that the U.S. is not compelled to submit to compulsory jurisdiction of the World Court. Relying on that contention, International Court Decisions are likely to be ignored when the U.S. is in disagreement with them.

Yet, the actions taken by the United States in this area are sure

74. U.S. Const. art. VI, sec. 2; "This Constitution, and the Laws of the United States which shall be made in pursuance thereof; and all Treaties made, or which shall be made, under the Authority of the United States shall be the supreme Law of the Land.
to provide a lead which other nations will follow. Awareness of the issues presented by the dissemination of remote sensing satellite data is a necessary first step for the legal community. The importance of this information and what we do with it is just now being understood. The role of the United States as the leader in technology and space advancement is directly dependent upon the work products of the commercial sector. Because of this relationship, it is imperative that the legal and high technology communities work together in order to exert more influence over United States' and international policies in relation to the dissemination of remote sensing data.