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The Legal and Political Implications of the International Undertaking on Plant Genetic Resources

by

Harold J. Bordwin

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INTRODUCTION

In November 1983, the biennial conference of the Food and Agriculture Organization of the United Nations (FAO) addressed the problem of international conservation and exchange of plant genetic resources. These resources include the vast assortment of seeds used by plant breeders to create the improved plant varieties that are the foundation of modern agriculture. Many nations are concerned about the increased destruction of and the increasing politicization of control over critical genetic resources. Out of the 1983 FAO conference emerged a controversial document: the International Undertaking[1] on Plant Genetic Resources. While less developed countries (LDCs) supported the Undertaking, a number of developed countries opposed it. These developed countries opposed the Undertaking because they believed it called for decreasing their control over plant genetic resource activities and increasing the free international availability of special genetic stocks.

Analyzing the potential legal implications of the Undertaking requires an appreciation of the environmental and political problems threatening the conservation of plant genetic resources. In Section I, this Comment discusses the international seed industry and the problems of genetic erosion and genetic uniformity as sources of agricultural vulnerability to environmental forces. This section also discusses the political conflict surrounding plant breeding by multinational agribusinesses. In Section II, the international efforts to preserve plant genetic resources are analyzed. After discussing the circumstances of the adoption of the Undertaking by the FAO conference, this section reviews the provisions of the Undertaking and their legal implications. This Comment concludes that, because the developed countries oppose the Undertaking, the less

* Associate, McKenna, Conner & Cuneo, Los Angeles, California; J.D. 1985, Georgetown University Law Center, Washington, D.C.; B.A. 1982, Wesleyan University. The author wishes to thank Julie Broude Bordwin for her extensive comments and assistance.

1. The term "undertaking" has no established meaning in international law and apparently was chosen in this case to avoid any legal connotations. Telephone interviews with Jay Levy, FAO Information Department, Washington, D.C. (Mar. 2, 3, 1984).

developed countries' efforts to increase their participation in international plant genetic resource decisions and to increase their access to special genetic stocks will not succeed.

I
THE INTERNATIONAL SEED INDUSTRY

Plant breeders crossbreed plants in the hope of uniting the best features of the parents in a new variety. To achieve this goal, breeders search for plants with desirable characteristics. "Primitive" varieties, varieties from other geographic areas, and wild relatives represent the only sources of additional desirable genes.[2] Because glaciation during the ice ages destroyed many plant varieties in higher latitudes,[3] the tropics are the site of the greatest genetic diversity.[4] Plant breeders send explorers to countries in the tropics, most of which are LDCs, to collect seed samples from plants with desirable traits. These plants may be weeds or primitively cultivated varieties called primitive cultivars. Through these practices, genetic resources flow from the LDCs to the developed nations.

Once the seeds are collected, the long process of incorporating their exotic genetic material, known as germplasm,[5] into a commercially viable line begins.[6] The first step in incorporating exotic germplasm is to

2. PIONEER HI-BRED INT'L, INC., REPORT OF THE 1983 PLANT BREEDING RESEARCH FORUM AUG. 9-11, 1983: CONSERVATION AND UTILIZATION OF EXOTIC GERMPLASM TO IMPROVE VARIETIES 29 (1984) [hereinafter cited as PIONEER REPORT].

3. Mooney, *The Law of the Seed: Another Development and Plant Genetic Resources*, 1983 DEV. DIALOGUE 3, 8.

4. Report of the Director-General on Plant Genetic Resources, Conference of the Food and Agriculture Organization of the United Nations para. 18, F.A.O. Doc. C/25 (1983) [hereinafter cited as Report of the Director-General].

5. Exotic germplasm is "[a]ny germplasm that is not currently being used in a particular country. This is in contrast to 'elite,' adapted germplasm that has undergone a great deal of selective breeding and natural selection in the area of use." PIONEER REPORT, *supra* note 2, at 9. Exotic germplasm includes "all germplasm that does not have immediate usefulness with selection for adaptation to a given area." *Plant Breeders Need for Exotic Germplasm*, DIVERSITY, Nov.-Dec. 1983, at 8 (quoting A. HALLAUER & J. MIRANDA, QUANTITATIVE GENETICS AND MAIZE BREEDING (1981)).

6. Although a full discussion of biotechnology is beyond the scope of this Comment, developments in this field may increase scientists' ability to manipulate genes. At present, however, genetic engineering techniques are limited to breeding simple microorganisms. N. MYERS, A WEALTH OF WILD SPECIES: STOREHOUSE FOR HUMAN WELFARE 202-08 (1980); telephone interview with Christopher Chapman, Genetics Resources Officer, International Board for Plant Genetic Resources (IBPGR), Washington, D.C. (Jan. 9, 1985). Genetic engineering encounters three difficulties when applied to plants. First, plants have tough cell walls that act as a physical barrier to any attempt to manipulate genes. Second, it is difficult to regenerate a whole plant or animal from an individual cell (although scientists have successfully regenerated tobacco and potato plants from individual cells). Third, regenerated plants have difficulty surviving in nature. Interview with Chapman, *supra*.

As the possibility of using genetic engineering to create new plant varieties increases, continued access to exotic germplasm, the essential raw material of biotechnology, becomes

grow the seed and evaluate the characteristics of the plant. Next, the plant must be interbred into a form that can be successfully crossed with a current commercial variety.[7] Scientists then transfer characteristics from this form into an existing crop line by further interbreeding. Finally, the resulting variety is tested for stability and uniformity.[8] The entire process takes from ten to fifteen years.[9] Because the process is technologically and financially demanding,[10] most modern plant breeding is conducted by large corporations in developed countries where technical support is more readily available. The commercial seed industry includes such major American corporations as ITT, Atlantic-Richfield, Occidental Petroleum, Upjohn, Cargill, Celanese, FMC, and Purex.[11]

World agriculture depends upon this breeding process to assure the improvement and stability of its crops. Advances in tomato breeding provide an excellent example of the use of exotic germplasm to improve a crop. Until the 1940's, domestic commercial tomato varieties exhibited minimal genetic variability. "[P]rogress in tomato improvement lagged and . . . few major innovations were achieved."[12] In 1940, a major disease-resistant gene was detected in an exotic germplasm source. Since then, breeders have incorporated fifteen disease-resistant genes from wild species into commercial tomato varieties.[13]

Estimating the value of such germplasm discoveries and breeding developments is difficult. "Funds invested in crop variety improvement have typically shown a return to the public of thirty-five to fifty percent annually."[14] The United States has much at stake in the genetic breeding market. One author estimates that breeding increases the farm-gate value of American agricultural products by approximately one percent,

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increasingly crucial. Mooney, *supra* note 3, at 18-19. Genetic engineering is based upon the ability to manipulate genetic material rather than to create it. N. MYERS, *supra*, at 196-97. Thus, "[g]enetic diversity is essential if we are to harvest the benefits of recent advances in biological technology." Brown-Weiss, *The Planetary Trust: Conservation and Intergenerational Equity*, 11 ECOLOGY L.Q. 495, 526 (1984).

7. PIONEER REPORT, *supra* note 2, at 43-44.

8. Telephone interview with Gordon McCleary, Director of Corporate Information, Pioneer Hi-Bred International, Inc. (Feb. 29, 1984).

9. Interview with Christopher Chapman and W. Ellis Davies, Genetics Resources Officers, IBPGR, in Washington, D.C. (Mar. 2, 1984).

10. *See* S. Smith, The Plant Breeder's Perspective on Genetic Diversity—A Reply to "The Law of the Seed" by Mr. Pat Mooney 5-6 (undated draft) (on file with author); PIONEER REPORT, *supra* note 2, at 47. Private plant breeders in the United States spent $114,950,000 on research in 1982. Kalton & Richardson, *Private Sector Plant Breeding Programs*, DIVERSITY, Nov.-Dec. 1983, at 17. Pioneer Hi-Bred alone spends approximately $15 million per year on corn research. Interview with McCleary, *supra* note 8.

11. Fowler, *Why Corporations Should Not Patent Plants*, 42 BUS. & SOC'Y REV. 26, 29 (1982).

12. PIONEER REPORT, *supra* note 2, at 121.

13. *Id.* at 122.

14. *Id.* at 21. Return to the public is in the form of moderated food prices.

or one billion dollars, annually.[15] Additionally, the commercial seed industry, which relies on plant breeding to produce its finished products, has annual sales of approximately thirteen billion dollars.[16]

A. The Biological Problems of Genetic Erosion and Genetic Uniformity

Genetic erosion and genetic uniformity are two related problems that threaten both world agriculture and the commercial seed industry.[17] Genetic erosion refers to the overall loss of plant genetic diversity resulting from the extinction of different plant varieties. Examples of genetic erosion abound. The United Nations estimates that three-fourths of all vegetable varieties now grown in Europe will be extinct in ten years.[18] The reduction of genetic diversity threatens the adaptability and hence the survival of remaining plant varieties because the remaining varieties can no longer be interbred with the extinct variety to acquire its valuable characteristics. An example of genetic erosion of existing crop varieties exists in Great Britain, where "a variety of cauliflower is suffering from a blight that probably could be checked—if only breeders could find the old variety that grew there 50 years ago."[19]

The related problem of genetic uniformity arises when many individual plants in a single crop have common parents and, as a result, very similar genetic composition.[20] Widespread cultivation of improved crossbred varieties is the primary cause of genetic uniformity. Genetic

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15. N. MYERS, *supra* note 6, at 41; *see also Plant Breeding Research Forum Warns Government Inaction May Cause Future Food Shortages*, DIVERSITY, Aug.-Sept. 1983, at 4. "One-half of the U.S. farmers' increased productivity over the past 50 years [is attributable to] U.S. plant breeding programs." *Id.*

16. *See* Mooney, *supra* note 3, at 96-97.

17. The threat to genetic resources posed by modern development pressures is extremely serious:

> Industrialization and population pressures are now destroying much of the Earth's biological diversity. The recent Conference on Biological Diversity . . . warned that the accelerating disappearance of [plant and animal] species and the resulting shrinkage in biological richness and diversity may be the crucial environmental issue for the rest of the century. It is estimated that at least 20,000 species are becoming extinct each year.

Brown-Weiss, *supra* note 6, at 526.

18. Fowler, *supra* note 11, at 27. It is not clear whether the U.N. estimates refer to primitive cultivars or products of advanced breeding. *Id.* For other examples, see Mooney, *supra* note 3, at 13-17 (discussing many examples of genetic erosion), and *Fruit and Nut Collection in Pakistan of "Utmost Urgency,"* DIVERSITY, Nov.-Dec. 1983, at 15 (reporting on the devastation of fruit and nut species in Pakistan).

19. Paul, *Third World Battles for Fruit of Its Seed Stocks*, Wall St. J., June 15, 1984, § 2, at 1, col. 6.

20. For example, 71% of the United States corn crop is derived from six varieties of corn, 65% of the rice crop is derived from four varieties of rice, 50% of the wheat crop is derived from nine varieties of wheat, and 72% of the potato crop is derived from four varieties of potatoes. Shapiro, *Seeds of Disaster*, MOTHER JONES, Dec. 12, 1982, at 11, 12; King, *Preservation of Genetic Diversity*, in SUSTAINING TOMORROW: A STRATEGY FOR WORLD CONSERVATION AND DEVELOPMENT 41, 44 (F. Thibodeau & H. Field eds. 1984).

uniformity increases the vulnerability of agriculture to environmental forces such as drought, disease, and pests because varieties with many common genes tend to react similarly to such forces. An entire crop can be devastated by one pest if all varieties have many common genes.[21] Lack of genetic diversity caused the Irish potato blight of the Nineteenth Century[22] and the 1970 Southern corn leaf blight in the United States.[23]

Ironically, the success of past plant breeding efforts is one of the major causes of both genetic erosion and genetic uniformity. As farmers in LDCs substitute the improved, high-yielding varieties created by these efforts for the primitive cultivars they previously raised, those primitive cultivars are abandoned, their germplasm is lost (genetic erosion), and crops with similar genetic composition become dominant (genetic uniformity). The overall result is greater crop vulnerability to changes in environmental conditions.[24]

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21. Brown, Remarks by Dr. William L. Brown, in 1983 Plant Breeding Research Forum Information Packet (1984) [hereinafter cited as Plant Forum] (on file with author).

22. In 1845, the Irish potato blight reduced Ireland's population by almost one-third. *National Plant Germplasm System: Hearing Before the Subcomm. on Department Operations, Research and Foreign Agriculture of the House Comm. on Agriculture*, 97th Cong., 1st Sess. 8 (1981) [hereinafter cited as *Germplasm Hearings*]. Approximately one million people died and one and one-half million emigrated during the blight. Shapiro, *supra* note 20, at 11.

23. The 1970 corn leaf fungus blight destroyed 15-20% of the United States corn crop, causing the nation's farmers to lose between $500 million and two billion dollars. *Germplasm Hearings*, *supra* note 22, at 4, 8; *see also* N. MYERS, *supra* note 6, at 17; Shapiro, *supra* note 20, at 12.

24. N. MYERS, *supra* note 6, at 24. Other factors contribute to genetic erosion and genetic uniformity. First, changing land use patterns and urban policies in LDCs result in the destruction of plant habitats. Int'l Board for Plant Genetic Resources, A Global Network of Genebanks 1 (undated pamphlet) [hereinafter cited as IBPGR Global Network]. Second, improper treatment of germplasm at regional storage facilities has damaged or destroyed extensive holdings of germplasm. *See* N. MYERS, *supra* note 6, at 21-23. As much as 40% of the germplasm collected in CIMMYT, the world's largest maize germplasm collection center, may be damaged or unavailable due to limited supplies. Goodman, Remarks by Dr. Major Goodman, in Plant Forum, *supra* note 21. Third, plant breeders often discard breeding materials that they no longer require. *See* IBPGR Global Network, *supra*, at 1. Old varieties may be discarded for economic, market, or trade secret reasons. Mooney, *supra* note 3, at 41. If a commercial breeder discards only unsuitable commercial varieties, and not basic germplasm and breeding material, genetic erosion is unlikely. Mooney suggests, however, that commercial breeders often dispose of their basic breeding material as well as their unsuitable commercial varieties thus accelerating genetic erosion. *Id.* Fourth, plant breeders' rights legislation, which grants plant breeders patent-type rights to certain types of new varieties, provides an incentive for increased genetic uniformity and has accelerated genetic erosion. The protection offered by such plant patenting laws applies only to varieties that are genetically uniform, encouraging substitution of commercial, genetically uniform cultivars for local varieties, ultimately increasing genetic erosion and uniformity. Fowler, *supra* note 11, at 27-28; *cf.* IBPGR, Plant Varieties Rights and Genetic Resources at 7-8, IBPGR Doc. AGPG: IBPGR/83/36 (1983) (concluding that plant breeders' rights legislation accelerates genetic erosion but is not the direct cause of such erosion). For a discussion of plant breeders' rights and a critique of American and European legislation, see Barton, *The International Breeder's Rights System and Crop Plant Innovation*, 216 SCI. 1071 (1982). For a vehement criticism of plant breeders' rights, see Mooney, *supra* note 3, at 14-66.

Some have argued that biotechnology causes genetic erosion because it requires taking

B. The LDCs' Objections to the Structure of the International Seed Industry

In addition to contributing to the scientific problems of genetic erosion and genetic uniformity, the economic and political structure of the international seed industry is a source of political conflict between the LDCs and the developed countries. The LDCs contend that germplasm, as the raw material of the seed industry, is a commodity with value. One indication of the value of germplasm is the economic effect of the introduction of exotic germplasm into an existing variety. For example, one strain of wheat introduced into the United States from a sample collected in Turkey in 1948 has saved American farmers an estimated three million dollars per year by preventing stripe rust losses.[25] LDCs attribute such gains not to the developed nations' advanced breeding technology but to years of selective breeding by farmers in LDCs. Some argue that nature, through evolution, is responsible for 90% of plant breeding, 9.9% is attributable to the work of subsistence farmers, and only 0.1% is the result of modern plant breeding.[26] LDCs are disturbed that large multinational corporations dominate the seed industry and reap large profits.[27] Developing countries believe it is unfair for them to pay royalties to foreign corporations on varieties developed with germplasm which originated within their borders.[28]

The seed industry and the United States disagree with the LDCs' charges of exploitation. They believe that royalties collected from the sale of improved seed varieties fairly compensate them for the risk and expense of plant breeding incurred by the seed industry.[29] In addition,

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germplasm from its natural environment in the LDCs to laboratories in the developed countries. Clarence Dias (President, International Center for Law in Development, New York, New York) & Upendra Baxi (Vice-Chancellor, South Gujarat University, Surat, India), An Open Letter to Non-Governmental Organizations and Non-Governmental Individuals on the Problem of Plant Genetic Resources 7 (Dec. 1983) [hereinafter cited as Dias Letter]. The fault with this argument is that a sample of germplasm, often merely a handful of seeds from a local crop, is too small to cause genetic erosion. Additionally, the IBPGR requires all missions which it supports to deposit a duplicate sample with the government of the situs. *See* PIONEER REPORT, *supra* note 2, at 47.

25. Mooney, *supra* note 3, at 52-53.

26. Fowler, *supra* note 11, at 27; *see also* Mooney, *supra* note 3, at 56-57.

27. *See* Mooney, *supra* note 3, at 4, 25-26, 95-104. The Dias Letter, *supra* note 24, at 3, states: "Today [the] seed business is big business . . . . [The] corporate seed industry seeks profit and power, not peace and development."

Pioneer Hi-Bred, allegedly the most profitable American seed company, earned the following five-year average returns: 12.2% (as a percentage of net sales) and 23.6% (as a percentage of net equity). Telephone interview with Gordon McCleary, Director of Corporate Information, Pioneer Hi-Bred International, Inc. (Sept. 25, 1984).

28. *See* Fowler, *supra* note 11, at 27.

29. *See* U.S. Dep't of Agric. (USDA), Position Paper of the United States Department of Agriculture on the International Plant Germplasm System 3-4 (1984) [hereinafter cited as USDA Position Paper]; telephone interview with Dr. Quentin Jones, National Coordinator for the National Plant Germplasm System, USDA Agricultural Research Service, Beltsville, Md.

farmers in LDCs are not compelled to buy seeds from developed countries but can choose local varieties or advanced varieties developed by international organizations.[30]

II

INTERNATIONAL EFFORTS TO CONSERVE PLANT GENETIC RESOURCES

A. The International Board for Plant Genetic Resources

1. The Structure of the Board

Until recently, the International Board for Plant Genetic Resources (IBPGR) provided the only international response to the problems of genetic erosion and genetic uniformity. The Consultative Group on International Agricultural Research (the Consultative Group) established the IBPGR in 1974.[31] The Consultative Group is an international entity co-sponsored by the FAO, the World Bank, and the United Nations Development Programme, and it is comprised of forty-seven governments, international organizations, and foundations.[32] The Consultative Group established the IBPGR "to promote the collection, conservation, evaluation, utilization and exchange of plant genetic resources."[33] The IBPGR has seventeen members, thirteen of whom are elected by the Consultative Group upon the recommendation of the IBPGR. The FAO and the United Nations Environment Programme each designate one member, and the IBPGR elects an outsider to chair the Board. Finally, the Executive Secretary of the IBPGR is an *ex officio* member.[34] The elected members serve in an individual capacity and not as government representatives.[35] At least four of these elected members must be from LDCs; currently there are six such members.[36]

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and IBPGR board member (Mar. 9, 1984); telephone interview with Dr. Charles Murphy, National Program Leader for Grain Crops, National Program Staff, USDA Agricultural Research Service, Beltsville, Md. (Feb. 17, 1984).

30. PIONEER REPORT, *supra* note 2, at 47.

31. IBPGR, Facts About the IBPGR 1 (undated pamphlet) [hereinafter cited as IBPGR Facts].

32. *Id.*

33. *Id.*

34. *Id.* at 1-2.

35. *Id.*

36. In 1985, the IBPGR is composed of the following members: Prof. E.L.J. Kahre (Chair), Sweden; Dr. C.J. Bishop, Canada; Dr. O. Brauer, Director of FAO Plant Production and Protection Division (*ex officio* member, representing the FAO); Prof. J.P. Cooper, United Kingdom; Dr. D.C. Giacometti, Brazil; Dr. A.B. Joshi, India; Prof. F. Kikuchi, Japan; Dr. Q. Jones, United States; Prof. R.J. Olembo (*ex officio* member, representing UNEP); Dr. W.J. Peacock, Australia; Dr. S.A. Qureshi, Pakistan; Prof. G.T. Scarascia-Mugnozza, Italy; Dr. D. Sène, Senegal (Vice Chair); Dr. J.T. Williams (*ex officio* member, Executive Secretary of the IBPGR); Dr. Xu Yun-tian, China; Dr. R.V. Valmayor, Philippines; and Prof. G. Fischbeck, Federal Republic of Germany. IBPGR, Chairman and Members of IBPGR in 1985 (1985) (available from IBPGR).

2. *Assessments of the IBPGR's Performance*

Since 1974, the IBPGR has completed a number of important projects on an annual budget of only $3.8 million.[37] The programs include sponsoring 250 germplasm collecting missions in more than seventy countries. A mission entails gathering samples of exotic germplasm, either in the form of seeds or seedlings, for the purpose of placing them in a storage facility. Missions usually focus on collecting varieties that are near extinction and have potential economic value. The IBPGR has also designated thirty-eight centers in twenty-nine countries for the long-term storage of thirty crops, sponsored advisory committees on major crop preservation subjects, and sponsored training courses and publications on conservation and use of plant genetic resources.[38] The developed countries overwhelmingly support the IBPGR because of the effectiveness of these programs in combatting genetic erosion.[39] The LDCs are less enthusiastic about the IBPGR, although their criticism is more political than scientific.[40] Their discontent, arising from the perception that the IBPGR addresses the needs only of the developed countries, manifested itself at the November 1981 biennial conference of the FAO.[41]

The FAO conference directed the FAO Director-General to prepare a report and a draft of an International Convention on Plant Genetic Resources.[42] The Director-General presented his report and a draft con-

37. IBPGR Facts, *supra* note 31, at 3.

38. *Id.* at 5-7.

39. At the Fall 1983 meeting of the Consultative Group, the following countries supported and praised the IBPGR: the Federal Republic of Germany, the United Kingdom, Japan, the Netherlands, Belgium, the United States, France, Switzerland, Sweden, Australia, and Canada. Consultative Group for Int'l Agric. Research, Summary of Comments Made at Centres Week on the IBPGR Programme (Oct.-Nov. 1983) [hereinafter cited as CGIAR Summary] (on file with author).

40. *See* Report of the Director-General, *supra* note 4, paras. 142, 143; *Deadline—Late Breaker*, DIVERSITY, Nov.-Dec. 1983, at 21; Walsh, *Seeds of Dissension Sprout at FAO*, 223 SCI. 147, 147-48 (1984).

41. There is a general consensus among LDCs that the international plant genetic resources system is politically unresponsive. The Fowler Report is a first hand summary of the debates at the FAO Conference in November 1983. C. Fowler, Report by the Rural Advancement Fund on the 22nd Session of the Conference of the Food and Agriculture Organization of the United Nations, Nov. 5-23, 1983, Rome, Italy, at 3 (Rural Advancement Fund, Pittsboro, N.C., 1983) [hereinafter cited as Fowler Report]. Mexico and other Latin American States initiated the challenge to the IBPGR. *Deadline—Late Breaker*, *supra* note 40, at 21; Mooney, *supra* note 3, at 25, 45 (quoting Mexico's Representative to the FAO: "Mr. Chairman, we—countries from the South—know that the wealth of these resources, in their natural state, come from our territories. . . . That's why we're fighting . . . .").

42. The operative provisions of the resolution requested the Director-General "to examine and prepare the elements of a draft international convention, . . . to prepare a study on the establishment of an international bank of plant genetic resources, . . . [and] to present proposals based on the studies mentioned to the Committee on Agriculture." Report of the Director-General, *supra* note 4, para. 1.

vention to the FAO's Committee on Agriculture in March 1983.[43] In that report, he charged that the Consultative Group and the IBPGR are amorphous bodies[44] that fail, at least at the global level, as mechanisms through which states can either monitor plant genetic resource activities, or express their views and concerns.[45] He also charged that both organizations lack international legal personality, the ability to enter into binding contracts, and any institutional permanence.[46] In his view, these problems prevent either organization from functioning efficiently and obstruct the LDCs' role in international plant genetic resource decision-making.[47] In calling for changing the status quo, the Director-General also referred to the LDCs' criticism that the IBPGR is oriented toward developing cultivars valuable to the agriculture and industry of industrialized countries, to the detriment of resources important to developing countries, such as breeders' lines.[48]

Critics have made a number of other charges against the IBPGR. First, scientists in developed countries receive most of the IBPGR grants. Second, the IBPGR has failed to include any significant proportion of the world's collected germplasm under its agreements to guarantee free and unrestricted exchange. Third, even for those germplasm collections covered, "free and unrestricted exchange" agreements are of questiona-

43. The proposal established the basis for an international gene bank and an international convention on plant genetic resources. U.N. Committee on Agriculture (COAG), Proposal for the Establishment of an International Genebank and the Preparation of a Draft International Convention for Plant Genetic Resources, Conf. Res. 6/81 (Provisional Agenda Item 10(a)) at para. 8, U.N. Doc. COAG/83/10 (1983) [hereinafter cited as Committee on Agriculture]. According to one source, positions on the proposal were divided along a "North/South battle line." Mooney, *supra* note 3, at 35. While representatives of LDCs strongly supported the FAO Director-General's proposals, representatives from the developed countries did not. *Id.* at 34-35. At the close of the COAG session, the "[r]epresentatives were completely unable to agree on the final wording of the Committee report and . . . finally agreed to allow the draft committee report to pass without detailed debate. Country after country rose to state their opposition to the final document." *Id.* at 35. To appease opponents, the COAG directed the formation of an advisory group to assist the Director-General in preparing a report for the FAO Council meeting in June 1983, and the FAO Conference session in November 1983. *Id.* at 44. The Report of the Director-General, *supra* note 4, is the result of the work of the advisory group. The International Undertaking on Plant Genetic Resources was taken directly from the Report.

44. Report of the Director-General, *supra* note 4, para. 143. This charge was echoed at the FAO conference by the representative from Benin, who stated that the IBPGR is "accountable to no one." Fowler Report, *supra* note 41, at 3.

45. Report of the Director-General, *supra* note 4, para. 137. One observer describes the international plant genetic resource system as "a patchwork of organizations." McClintock, *Politics and Economics of Genetic Diversity*, DIVERSITY, Nov.-Dec. 1982, at 17.

46. Report of the Director-General, *supra* note 4, paras. 117, 119, 132, 141. *But Cf.* Consultative Group for Int'l Agric. Research, Statement of the Chairman of the IBPGR at the Conclusion of the IBPGR's Presentation at International Centers' Week (Oct.-Nov. 1983) [hereinafter cited as CGIAR Statement] (stating that IBPGR's agreements are probably enforceable).

47. Report of the Director-General, *supra* note 4, paras. 137-43.

48. *Id.* para. 142.

ble value because the IBPGR lacks the legal capacity to create enforceable obligations. Fourth, the IBPGR has been unresponsive to the LDCs' concerns. For example, according to its critics, the IBPGR withheld information on the poor quality of germplasm storage facilities in the developed countries, thus leading the LDCs to rely to their detriment on developed countries' conservation techniques. Critics also charge that the IBPGR failed to warn LDCs that germplasm released to the United States would allegedly become the property of the United States government and subject to its political control.[49]

The Consultative Group rejects the charges that the Board is ineffective and unrepresentative and that it denies the LDCs an active role in international plant genetic resource activities. It believes that the Board has legal personality and the ability to execute binding agreements.[50] In addition, the Consultative Group believes that the Board's independent, informal structure enables it to allocate its funds free from political pressures.[51] One Board member asserts that the FAO's prior coordination of international plant genetic resource activities epitomized inefficiency, ineffectiveness, and politicization,[52] and the IBPGR represents a significant improvement.

B. The International Undertaking on Plant Genetic Resources

1. Policy Objectives and Rationale Guided by the Common Heritage Principle

Despite this conflict, in November 1983, the biennial FAO Conference adopted by resolution the International Undertaking on Plant Genetic Resources. The resolution was intended as a "strong formal commitment" by the FAO Conference to the principles of the Undertaking.[53] The objective of the Undertaking, according to Article One, is "to ensure that plant genetic resources of economic and/or social interest, particularly for agriculture, will be explored, preserved, evaluated and made available for plant breeding and for scientific purposes."[54]

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49. Mooney, *supra* note 3, at 29-31, 70-79.

50. CGIAR Statement, *supra* note 46. The IBPGR may have legal personality for the following reasons: (1) it was properly created by the Consultative Group as a legal entity; (2) it has exercised all the rights and obligations of a legal entity; (3) its legal capacity has been implicitly established by its ongoing relationships with international organizations, member governments of the Consultative Group, and contracting parties; and (4) it satisfies the requirements of a *de facto* corporation under United States common law.

51. *See* CGIAR Statement, *supra* note 46; CGIAR Summary, *supra* note 39; Report of the Director-General, *supra* note 4, para. 140.

52. Interview with Jones, *supra* note 29; *see also* Walsh, *supra* note 40, at 148. The FAO allegedly operated with 80% overhead costs. Interview with Murphy, *supra* note 29.

53. Report of the Director-General, *supra* note 4, para. 83.

54. Report of the Conference of FAO, 22nd Sess. FAO (Agenda Item 6) para. 285 (art. 1), U.N. Doc. C/83/REP (1983) [hereinafter cited as Conference Report].

The Undertaking is grounded on the "universally accepted principle that plant genetic resources are a heritage of mankind and consequently should be available without restriction."[55] Neither the Undertaking nor the FAO Director General's Report to the Conference explains, however, precisely what is meant by "heritage of mankind."[56] It is likely that this concept was adopted from the "common heritage principle" developed by the Law of the Sea Conference. Although developed for application to deep seabed resources,[57] this principle is also relevant in the context of plant genetic resources.

The common heritage principle is comprised of four elements:

1) No one should exploit the resource in question until rules have been agreed upon to ensure that exploitation will be in the common interest;
(2) No state should acquire more than its equitable share of the resource;
(3) The world community should determine what constitutes equitable sharing, taking into account the interests of those who did not have a chance to participate in exploiting the resource in the past;
(4) An international body should have exclusive and comprehensive authority to administer the resource.[58]

Only some of these elements can guide the application of the common heritage principle to plant genetic resources.

The first element makes little sense in the context of plant genetic resources because, unlike the deep seabed which is as yet undeveloped, germplasm is already being exploited. Plants and their genetic material are already subject to the sovereignty of the state in which they are located. Plant genetic resources are being exploited, and their continued exploitation is economically and agriculturally necessary; therefore, exploitation should not be suspended pending the conclusion of rules to protect the common interest.

The second and third elements of the common heritage principle call for equitably shared resources in a manner determined by the world community, recognizing the interests of those countries that have not previously participated in exploiting the resources.[59] Applying these elements to plant genetic resources first requires an examination of the Undertaking's definition of the plant genetic resources within its scope. Article Two of the Undertaking defines plant genetic resources as the

55. *Id.* Article Five also states that plant genetic resources should be available "free of charge, on the basis of mutual exchange or on mutually agreed terms"; application of this policy is limited, though, to "adhering [g]overnments and institutions." *Id.* para. 285 (art. 5).

56. The FAO's Committee on Agriculture (COAG) proposed, in March 1983, the adoption of an international convention on plant genetic resources. The COAG proposal defined plant genetic resources as "a heritage of mankind" which should be "fully and freely available." The COAG intended to assure the availability of these resources whether under state or private control. Committee on Agriculture, *supra* note 43, paras. 3, 33, 39, 48.

57. *See* Brown-Weiss, *supra* note 6, at 553.

58. *Id.* at 554.

59. *Id.*

"reproductive or vegetative propagating material of [five] categories of plants."[60] The first four categories—cultivated varieties in current use and newly developed varieties, obsolete cultivars, primitive cultivars, and wild and weed species—are characterized either by their availability on the market or by their lack of significant economic value. The application of the common heritage principle to such germplasm already follows the customary practices of states and plant breeders. Equitably sharing germplasm does not mean its unlimited distribution. Access to germplasm is sometimes limited by governments through quarantine regulations, and through limits on the number of samples that are available only to "genuine users" from nations who practice reciprocity. Furthermore, certain countries do not release germplasm from some cash crops.[61] Nonetheless, "[s]uch restrictions [do] not appear significantly to affect the availability of resources, particularly those of food crops."[62]

The application of the common heritage principle to the fifth category of germplasm, "special genetic stocks,"[63] is controversial because it adversely affects developed countries and the seed industry.[64] Special genetic stocks, are those varieties or lines that the breeder uses to produce the variety sold on the market. In the case of hybrids, for example, the seed produced by the crop grown by farmers is not suitable for planting. Thus, farmers must return yearly to buy seed rather than plant seed saved from their own harvest. If farmers or seed companies had access to the parents of the hybrids, known as in-bred lines, then they would be able to produce the plantable hybrid seed on their own.[65] Special genetic stocks typically represent large capital investments and are maintained by private breeders as trade secrets.[66] Freely sharing such resources would radically undermine the property rights private breeders have traditionally possessed in special genetic stocks. Recognizing this threat, the American Seed Trade Association challenged the Undertaking for

60. Conference Report, *supra* note 54, para. 285 (art. 2).

61. Committee on Agriculture, *supra* note 43, para. 21. In addition, lack of money and expertise necessary to prepare samples and incomplete data on existing germplasm collections may also hinder access to supposedly unrestricted material. *Id.* para. 22-32.

62. Report of the Director-General, *supra* note 4, para. 28. In any case, states may impose express conditions on access and still conform to the Undertaking because the Conference Report anticipates that governments may adhere to the Undertaking without giving full effect to all its obligations. Conference Report, *supra* note 54, para. 285 (art. 11).

63. Conference Report, *supra* note 54, para. 285 (art. 21(a)).

64. Telephone interview with Dr. Donald Plucknett, Scientific Advisor to the Consultative Group, Washington, D.C. (Mar. 5, 1984); telephone interviews with Jack Kollpenberg, Research Associate, Cornell University Department of Rural Sociology (Feb. 17 and Mar. 2, 1984); interview with Chapman, *supra* note 9; telephone interview with Dr. Donald Duvik, Director, Plant Breeding Division, Pioneer Hi-Bred International, Inc. (Mar. 5, 1984).

65. *See* Report of the Director-General, *supra* note 4, para. 30; Committee on Agriculture, *supra* note 43, para. 25.

66. Telephone interview with Sidney Williams, Attorney, Asgrow Seeds, Inc. (Mar. 2, 1984); *see also supra* note 10.

"strik[ing] at the very heart of free enterprise and intellectual property rights."[67] The United States and New Zealand also opposed the Undertaking because they believed its inclusion of special genetic stocks threatened the property rights of plant breeders.[68] Industry contends that the effect of the Undertaking's definition of plant genetics resources "would be to subject all private breeding materials to be made available to anyone."[69]

Yet, the fear of a mandate for freely shared special genetic stocks may be unfounded because the Undertaking's scope is limited in Article Five to "adhering governments and [international or national] institutions."[70] Many governments and institutions already share special genetic stocks. For example, stocks controlled by the United States government and public research institutions are freely exchanged through the National Plant Germplasm System (NPGS).[71] Some international organizations, such as the thirteen International Agricultural

67. The American Seed Trade Assoc., Position Paper on FAO International Undertaking on Plant Genetic Resources 2 (1984) [hereinafter cited as Position Paper].

68. USDA Position Paper, *supra* note 29, at 1, 3; Conference of the FAO, 22nd Sess. (18th mtg) at 15, U.N. Doc. C/83/II/PV/18 (1983); Conference Report, *supra* note 54, para. 285, n.1. *See supra* note 24 (discussion of plant breeders' rights).

American agribusiness believes that the underlying intent of the Undertaking is to decrease their control of special genetic stocks. Telephone interview with Dr. Donald Duvik, Director, Plant Breeding Division, Pioneer Hi-Bred International, Inc. (Jan. 13, 1985).

69. Position Paper, *supra* note 67, at 2. Even though some activists in LDCs advocate binding plant breeders in the private sector to international legal obligations, Mooney, *supra* note 3, at 44, it is doubtful that the Undertaking goes as far as the United States and its agricultural businesses fear because Article Five is expressly limited in its application to "adhering governments and institutions." *See* Conference Report, *supra* note 54, para. 285 (arts. 2.1(d), 5).

70. Conference Report, *supra* note 54, para. 285 (arts. 2.1(d), 5). *See also supra* note 55.

71. Telephone interview with Robert Falasca, American Seed Trade Association, Washington D.C. (Mar. 5, 1984); telephone interview with Jones, *supra* note 29; interview with Chapman, *supra* note 9. The NPGS is a network of plant introduction facilities, germplasm collections, an information system, and advisory groups under the USDA. *See* DIVERSITY, LABORATORY FOR INFORMATION SCIENCE IN AGRICULTURE, SPECIAL REPORT: THE NPGS—AN OVERVIEW (1982) [hereinafter cited as SPECIAL REPORT]. At the center of the system is a long-term storage facility at Fort Collins, Colorado, designated as the National Seed Storage Laboratory. This facility contains 100,000 samples of more than 1300 species and has a capacity for an additional 400,000 samples. *See* N. MYERS, *supra* note 6, at 21. The NPGS budget for the current fiscal year is $13 million, and it will increase by a total of $400,000 over the next five years. Jones, Remarks by Dr. Quentin Jones, in Plant Forum, *supra* note 21. For additional information regarding the NPGS, see the SPECIAL REPORT, *supra*, and the *Germplasm Hearings*, *supra* note 22. Germplasm collected in the NPGS "is available without charge to any *bona fide* plant scientists in the United States. In addition, material in the NPGS is exchanged with countries around the world for *germplasm needed by the U.S. scientists.*" SPECIAL REPORT, *supra*, at 1 (emphasis added).

Along with a reciprocity requirement, transnational germplasm exchanges may also be conditioned on overriding political considerations. Mooney, *supra* note 3, at 29-31, 69-70. American sources strongly refute claims that political considerations play any role in restricting the free exchange of germplasm for scientific purposes. Telephone interview with Murphy, *supra* note 29. "The United States is firmly committed to the principle of free and unrestricted exchange of germplasm with all nations." USDA Position Paper, *supra* note 29, at 4.

Research Centers (IARCs) that operate under the auspices of the Consultative Group, make all breeding material freely available to public plant breeders, giving priority to those in LDCs.[72] The special genetic stocks controlled by private companies, however, are arguably beyond the reach of the Undertaking.

The final element of the common heritage principle calls for an international body having "exclusive and comprehensive authority" to administer the resource in question.[73] Articles Seven and Nine of the Undertaking address this principle by setting up the FAO as the central coordinator of plant genetics activities. Specifically, Article Nine proposed, and the Conference by a separate resolution required, that the FAO establish an intergovernmental commission on plant genetic resources.[74] Article Seven calls for present national and international plant genetic resource activities to be "further developed and, where necessary, complemented in order to develop a global system" to protect plant genetic resources.[75] Article Seven describes this system as including a network of international centers that will develop and maintain seed collections, a system for exchanging information on these collections, and the Board, pursuing and developing "its present activities, within its terms of reference, in liaison with FAO."[76]

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72. Telephone interview with Dr. Donald Plucknett, *supra* note 64. Among other things, the IARCs act as germplasm storage banks and plant breeders. Report of the Director-General, *supra* note 4, para. 118. They "are [politically] autonomous, working . . . under the overall direction and supervision of a Board of Trustees, whose members act in a personal capacity. In the case of many of the institutions, some of the members of the Boards are designated by the [Consultative Group]." *Id.*

73. Brown-Weiss, *supra* note 6, at 554.

74. Conference Report, *supra* note 54, para. 285 (art. 7). The Commission on Plant Genetic Resources held its first meeting March 11-15, 1985. The Commission reviewed the responses of countries and international institutions to the Undertaking, evaluated the status of plant genetic resource base collections and the status of *in situ* conservation, assessed the international plant genetic resources information system, reviewed the training needs of developing countries, and set future tasks for the Commission. FAO, Notification and Invitation to Attend the First Session of the Commission on Plant Genetic Resources (Feb. 1, 1985) (Ref.: G/X/AGP-725(a)) (CPGR/85/1 Jan. 1985) (CPGR/85/2 Feb. 1985).

75. Conference Report, *supra* note 54, para. 285 (art. 7).

76. *Id.* The mandate of the International Board for Plant Genetic Resources, called the "Terms of Reference," is as follows:

> The Board will have responsibility, under the authority of the [Consultative Group], for recommending policies and developing programmes in close collaboration with and with the help and advice of FAO to meet the following objectives:
> (i) To plan, initiate and coordinate wherever possible a worldwide programme through the promotion of genetic resources concepts at government and scientific level [sic];
> (ii) To identify general and specific needs for exploration, collection, conservation and evaluation of plant genetic resources with particular reference to species of major economic importance and their wild and cultivated relatives, to determine priorities among them, and to ensure to the fullest possible extent that the materials conserved are made available for plant breeding and other scientific activities as required;
> (iii) To see that the collection of genetic resources is carried out according to the established priority needs;

The mandate of the intergovernmental commission to "monitor" the activities listed in Article Seven, and to "take or recommend measures" to ensure the comprehensiveness of the global system, marks a potential shift in international authority over plant genetic resource activities from the Consultative Group and the IBPGR to the FAO. Both the United States and Canada objected to the Undertaking as a threat to the role of the Board.[77] The United States position is that responsibility for coordinating the international plant germplasm system lies with the IBPGR:[78] "Our government is concerned . . . that the important work of the IBPGR . . . may be impeded by political factors or cumbersome procedures . . . . The *autonomous* technical nature of the IBPGR must be maintained and protected from political interference."[79]

Opposition to the Undertaking on the ground that through it the FAO usurps the role of the IBPGR is unsupportable. Article Seven calls on the IBPGR to pursue and develop its activities within its terms of reference and in liaison with the FAO. The terms of reference of the Board call on it to develop policies and programs "in close collaboration with and with the help and advice of FAO."[80] Finally, the FAO is already a member of both the Consultative Group and the Board. As with the issue of free availability of special genetic stocks, opposition to the Undertaking because of its effect on the Board is based not on what it actually says but on the fear of what may come to pass if the intergovernmental commission called for in the Undertaking subsequently expands its powers.[81]

(iv) To arrange for the replicated maintenance of both seed and vegetative collections and the duplication of materials between collections;
(v) To implement appropriate data storage and retrieval systems;
(vi) To arrange for the characterization of collections, and to incorporate relevant data in data storage and retrieval systems; to promote fuller evaluation by breeders; and to see that relevant data are exchanged along with materials;
(vii) To promote training at all levels;
(viii) To promote technical meetings to further the foregoing objectives and to issue technical publications relating to standards, methods and procedures and other matters;
(ix) To support research activities into problems the solving of which are essential to the operation of the Board's activities.

International Board for Plant Genetic Resources, Terms of Reference, *reprinted in* Report of the Director-General, *supra* note 4, at 39 app. C [hereinafter cited as Terms of Reference].

77. Conference of the FAO, 22d Sess. (18th mtg.) at 14, C/83/II/PV/18 (1983).

78. USDA Position Paper, *supra* note 29, at 5.

79. *Id.* at 5-6 (emphasis added). Japan, the Netherlands, the United States, Sweden, Australia, and Canada have all opposed efforts to change the Board's structure. CGIAR Summary, *supra* note 39.

80. Terms of Reference, *supra* note 76.

81. The United States has given as one reason for rejecting the Undertaking the "[d]isparities in basic definitions . . . . The Undertaking specifically includes 'elite and current breeders' lines and mutants' in the definition of plant genetic resources. Conversely, terms such as 'auspices' and 'jurisdiction' are not defined." USDA Position Paper, *supra* note 29, at 1.

The opposition of the United Kingdom, the Federal Republic of Germany, France, and

The remaining portions of the Undertaking are proposals that are fundamental to any plant genetic resource system and are not controversial. Articles Three through Five address the responsibilities of governments to explore, preserve, evaluate, document, and exchange plant genetic resources. Article Six calls for greater international cooperation in this area, and Article Eight calls for increased financial support for such activities. Article Ten is designed to prevent the spread of contaminated seeds. Article Eleven, the final provision, pertains to information reporting by those adhering to the Undertaking.[82]

2. *The Legal Effect of the Undertaking*

The Undertaking is not legally binding, even on states that choose to adhere to it.[83] The Conference only urges states to "give effect" voluntarily to the Undertaking.[84] States adhere to the Undertaking by advising the Director-General of their intent to adhere and of their ability to effectuate the principles of the Undertaking.[85] As of autumn 1984, the Director-General had received "replies" from approximately sixty countries.[86] The contents of the replies, though, are unknown.[87]

The Conference intentionally chose to adopt an undertaking rather than either a legally binding convention or a less formal code of conduct.[88] The Conference and the Director-General rejected a legally binding international convention for two reasons. First, a convention would take too long to implement. Second, the binding nature of the convention could inhibit it from achieving the broadest possible support, because "[s]tates may have difficulties in joining in a consensus on the text of a legally binding instrument and in committing themselves to implementing each one of its provisions."[89] The FAO Conference and the Director-General also rejected incorporating their plant genetic resource agenda into an informal code of conduct with less force than an undertaking. A code of conduct "would reflect an international consensus on . . . principles"; in contrast, the Undertaking was intended to "establish specific commitments."[90] Despite this intent, eight industrialized nations

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the Netherlands was apparently not as strong as that of the United States. They primarily objected to a last minute amendment that changed the status of the intergovernmental body within the FAO from a subcommittee of the Committee on Agriculture (COAG) to a separate commission under COAG. Conference of the FAO, 22d Sess. (21st plen. mtg.) at 12-13, C/83/PV/21 (1983).

82. Conference Report, *supra* note 54, para. 285 (art. 11).
83. Report of the Director-General, *supra* note 4, para. 83.
84. Conference Report, *supra* note 54, para. 285 (Res. 8/83).
85. *Id.* para. 285 (art. 11).
86. Interview with Chapman, *supra* note 6.
87. *Id.*
88. Report of the Director-General, *supra* note 4, paras. 79-80.
89. *Id.* para. 78.
90. *See supra* note 1; Report of the Director-General, *supra* note 4, paras. 78, 82.

at the Conference reserved their position on the Undertaking. These countries were Canada, France, the Federal Republic of Germany, Japan, New Zealand, Switzerland, the United Kingdom, and the United States.[91]

As a non-binding resolution, the Undertaking expresses the FAO Conference's support for a revised plant genetic resource system rather than any individual state's intent to commit itself to this system. Despite its lack of direct legal force, however, the Undertaking may have or may acquire international legal significance as "evidence of customary law."[92] Customary law "reflects a [consistent] general practice accepted as law."[93] The formulation of principles in a prescriptive resolution "may elucidate and develop the customary law" if those principles then become the general practice.[94] In this way, nonbinding "[r]esolutions on new legal problems provide a means of corralling and defining the quickly growing practice of states . . . ."[95] The gap between the content of the Undertaking and present international practice, together with the opposition of developed countries and the seed industry to the Undertaking, makes it doubtful, however, that international practice will change to conform to the Undertaking.

CONCLUSION

Genetic erosion and genetic uniformity are serious environmental threats to global agriculture. The existing international plant genetic resource system, directed by the International Board for Plant Genetic Resources, is effectively combatting genetic erosion and genetic uniformity. The LDCs, however, want a larger role in the international plant genetic resource system and increased access to those resources. The Undertaking is an attempt by the LDCs to achieve both these ends, but it is likely to fail because developed countries refuse to support an agreement which threatens to divest private companies of the fruits of their investments in research.

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91. Conference Report, *supra* note 54, para. 285 (nn. 1, 2). A country reserves its position if it neither blocks consensus nor joins it. The United States position is that it is "impossible to provide either a positive or negative response to all or any part of the Undertaking." The United States cites definitional disagreements with the Undertaking as well as the lack of documentation of the scientific and technical aspects of implementation. USDA Position Paper, *supra* note 29, at 1.

92. I. BROWNLIE, PRINCIPLES OF PUBLIC INTERNATIONAL LAW 695 (3d ed. 1979).

93. Statute of the International Court of Justice, art. 38(1)(b), 59 Stat. 1055, T.S. No. 933 (1945). For international law purposes, custom has four elements: duration, consistency, generality of the practice, and a sense among states that they are adhering to the practice because of a legal obligation. I. BROWNLIE, *supra* note 92, at 4-12.

94. I. BROWNLIE, *supra* note 92, at 696.

95. *Id.*