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The Interaction of Law and Technology: The Continental Shelf Problem

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THE INTERACTION OF LAW AND TECHNOLOGY: THE CONTINENTAL SHELF PROBLEM

A coastal State, under the 1958 Convention on the Continental Shelf, may exercise exclusive control over the adjacent seabed and subsoil to the extent that the depth of the superjacent water permits exploitation.[1] Recent developments raise doubts about the effectiveness of this limit; advances in marine technology now permit commercial exploitation of almost the entire seafloor. To keep pace with these advances, plans have been proposed to place ocean space under international control, requiring the placement of new limits on the area under the coastal State's exclusive control.

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1. Convention on the Continental Shelf, adopted April 29, 1958, 15 U.S.T. 471, T.I.A.S. 5578, 499 U.N.T.S. 311 (effective June 10, 1964).

   Article 1-
   For the purpose of these articles, the term "continental shelf" is used as referring (a) to the seabed and subsoil of the submarine areas adjacent to the coast but outside the area of territorial sea, to the depth of 200 meters or, beyond that limit, to where the depth of the superjacent water admits of the exploitation of the natural resources of said areas; (b) to the seabed and subsoil of similat submarine areas adjacent to the coasts of islands.

   Article 2-
   1. The coastal State exercises over the continental shelf sovereign rights for the purpose of exploring its natural resources.
   2. The rights referred to in paragraph 1 of this article are exclusive in the sense that if the coastal State does not explore the continental shelf or exploit its resources, no one may undertake these activities, or make a claim to the continental shelf, without the express consent of the coastal State.
   3. The rights of the coastal State over the continental shelf do not depend on occupation, effective or notional, or on any express proclamation.
   4. The natural resources referred to in these articles consist of the mineral and other non-living resources of the sea-bed and subsoil together with living organisms belonging to sedentary species, that is to say, organisms which, at the harvestable stage, either are immobile on or under the sea-bed or are unable to move except in constant physical contact with the seabed or the subsoil.

While it was not commercially feasible in 1958 to recover mineral deposits under water deeper than two hundred meters,[2] the past ten years of research and development have opened ninety-eight percent of the seafloor to exploitation.[3] Commercial exploratory wells recently have been drilled from stationary platforms in waters exceeding two hundred meters in depth.[4] Floating platforms, developed through Project Mohole, have made possible drilling in much deeper water;[5] several companies have conducted initial experiments with these devices in water up to two thousand meters deep.[6]

The necessity of surface support systems maintained exploitation costs at high levels in the past. Surface vessels are expensive because they must withstand the buffeting of the wind and waves. Structurally, submersibles operating independently of the surface will be less complex and thereby less expensive since they must withstand only a constant pressure.[7] Ceramic and glass are now being developed as a low cost hull material[8] and free flooding machinery, able to operate on the sea floor without a protective covering, will soon be commercially available to further decrease the cost of exploitation.[9]

These technological developments have been a source of international concern. Malta's delegate to the United Nations last year urged the internationalization of the seafloor, pointing out that

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2. Scientific Considerations Relating to the Continental Shelf, U.N. Doc. A./Conf. 13/2 and Add 1, at 39 (hereinafter cited as Scientific Considerations).

3. Aerospace Firms Prominent at OECON, 20 TECH. WK. 32 (February 20, 1967).

4. Grunawalt, The Acquisition of the Resources from the Bottom of the Sea - A New Frontier of International Law, 34 MIL. L. R. 101, 122 (1966).

5. Niblock, Oil Companies to Use Mohole Technology, 20 TECH. WK. 24-5 (April 17, 1967).

6. Aerospace Firms Prominent at OECON, supra note 3.

7. Craven, The Challenge of Ocean Technology to the Law of the Sea, 22 JAG J. 31 (1967).

8. Id. at 33.

9. Id.

small nations were afraid that large, scientifically advanced, countries would seize the area which should be the "common heritage of all mankind."[10] The United Nations Political Committee has appointed a special thirty-five nation committee to study the question.[11]

The United States Congress has also expressed concern. A House Foreign Affairs subcommittee has held hearings on a plan to give the United Nations control of the ocean floor.[12] Senator Claiborne Pell of Rhode Island submitted a comprehensive treaty regulating the exploration and exploitation of ocean space, also proposing to place control of the seabed in the United Nations.[13] An authority would then be established to license individual countries and corporations to develop the marine mineral deposits.[14]

In re-examining this question of the seaward limit of the juridical continental shelf, this comment will first evaluate the usefulness of a strictly geological definition. After a brief history of the development of the continental shelf doctrine, the definition formulated by the participants of the 1958 Geneva Conference on the Law of the Sea will be considered in detail. The final section will examine other proposals for defining the shelf and the problems raised by these alternate suggestions.

The Geological Definition of the Continental Shelf

The earth's surface under the sea may be divided into two general areas, the continental margin and the abyssal plain.[15] The continental margin is merely the submerged portion of the continent, which in turn may be divided into the continental shelf, and its outer perimeter, the continental slope.[16] .Presently, the shelf is

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10. N.Y. Times, December 9, 1967 at 17, col. 1 (late city ed.).

11. G.A. Res. 2340, U.N. Doc. A/RES/2340 (XXII) (1967), reprinted in 7 INT'L. L. MAT. 174 (1968).

12. N.Y. Times, September 18, 1967 at 51, col. 2 (late city ed.).

13. S. 263, 90th Cong., 2d Sess. (1968).

14. TREATY ON PRINCIPLES GOVERNING THE ACTIVITIES OF STATES IN THE EXPLORATION AND EXPLOITATION OF OCEAN SPACE, Articles 1 et seq., 114 Cong. Rec. S. 2199, (daily ed., March 5, 1968). (Hereinafter cited as OCEAN SPACE TREATY.)

15. D. ERICSON & G. WOLLIN, THE EVER-CHANGING SEA 154 (1967).

16. Id.

the most economically important portion of the seabed and subsoil.

Geologists, oceanographers and geographers unanimously agree that the continental shelf has a physical reality and a conceptual usefulness.[17] There is difficulty, however, in determining the exact outer edge because of its complex structure and the different ways in which it was formed. For a general definition, most geologists and oceanographers accept the formulation adopted by the International Committee on Nomenclature of the Sea Floor:

> Continental Shelf, shelf edge and borderland. The zone around the continent extending from the low-water line to the depth at which there is a marked increase of slope to greater depth. Where this increase occurs the term shelf edge is appropriate. Conventionally, the edge is taken at 100 fathoms (or 200 meters) but instances are known where the increase of slope occurs at more than 200 or less than 65 fathoms. When the zone below the low-water line is highly irregular and includes depths well in excess of those typical of continental shelves, the term continental borderland is appropriate.[18]

To supplement this general definition, oceanographers have compiled average statistics for the continental shelf, e.g., an average width of forty nautical miles, an average depth of seventy-two fathoms, and an average slope of 0°07' (although somewhat steeper in the inner portion than the outer portion of the shelf).[19] These statistics are misleading, however, because of the wide variations in the characteristics and topography of the shelf.[20] The use of the average slope to define the geological extent of the shelf is not entirely feasible. The shelf's surface is often irregular; numerous scattered submarine mountains, trenches and canyons disrupt the otherwise gently sloping seabed.[21] In places, the seabed's surface is so irregular that the concept of the shelf is no longer useful, and the area is termed a continental borderland.[22] An example of a contin-

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17. Scientific Considerations, supra note 2, at 40, para. 8.

18. Emery, K. O., Geological Aspects of Sea-Floor Sovereignty, in THE LAW OF THE SEA 145 (Alexander, ed. 1967).

19. F. P. SHEPARD, SUBMARINE GEOLOGY 257 (2d ed. 1963).

20. Id. at 256.

21. Id.

22. See supra note 2 and accompanying text.

ental borderland is the seafloor off the coast of Southern California, between Long Beach and the Northeast Bank, with Catalina Island resulting from one of these diastrophic irregularities.[23] Other irregularities have resulted from the action of glaciers and rivers before the continental shelf was submerged.[24]

The width of the shelf is also of little value in formulating a general geological definition of the area because of the wide variations. At points, such as off the coast of Chile, Corsica and Southeastern France, the shelf is non-existent; the sea-floor descends almost immediately to the abyssal depths.[25] In other areas, the continental shelf extends for hundreds of miles.[26] For example, in the Bering Straits, the shelf is eight hundred miles wide at points,[27] while off the Mid-Atlantic States north of Cape Hatteras, the shelf is approximately one hundred miles wide.[28] A general definition based on an average depth also would not be useful because of wide variations.

The continental slope begins at the shelf edge. It is the part of the continental margin which drops steeply to the abyssal plain, the latter lying generally two thousand fathoms below the surface of the water.[29] The average declivity of the continental slope is $4^{o}17'$ for the first thousand fathoms of depth,[30] although this declivity may be as great as 45^{o} in places.[31] The rock forming the abyssal plain is denser than the rocks in the continental margin, but this boundary is hidden under a layer of sediment swept down from the continent, and the boundary is not readily discernible.

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23. F. P. SHEPARD, supra note 19, at 280, 287.

24. D. ERICSON & G. WOLLIN, supra note 15, at 154.

25. Scientific Considerations, supra note 2, at 40, para. 10.

26. Id.

27. Browning, Exploitation of Submarine Resources Beyond the Continental Shelf, 4 TEX. INT'L. L. FORUM 1, 5 (1968).

28. F. P. SHEPARD, supra note 19, at 213.

29. Id. at 200.

30. Id. at 298.

31. Browning, supra note 27, at 4.

The History of the Continental Shelf Doctrine

The Continental shelf doctrine is of relatively recent origin. It began with the 1945 Truman Proclamation in which the United States claimed exclusive control over the seabed and subsoil of the adjacent continental shelf, [32] and the doctrine has developed rapidly in the next twenty-three years.

Immediately following the Truman Proclamation, a number of other countries made similar claims to their adjacent continental shelf.[33] Concurrently, in 1949, the International Law Commission (ILC) began studies for the codification of the law of the sea, including the formulation of a regime for the continental shelf.[34] Throughout the first half of the fifties, the ILC considered the question during several sessions culminating in the 1956 Report of the Commission. This report contained a draft convention on the Regime of the High Seas, including a number of articles dealing with the continental shelf.[35]

After receipt of the draft convention, the General Assembly called for a conference on the Law of the Sea.[36] This conference, convened in Geneva on February 24, 1958, was to use the ILC draft convention as the starting point of its deliberations. Of the five large committees, the Fourth Committee was assigned the topic of the continental shelf.[37] The final Convention on the Continental Shelf resulted from the work of the Fourth Committee.

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32. Proclamation on the Continental Shelf of September 28, 1945, Proc. No. 2667, 59 Stat. 884 (1945).

33. LAWS AND REGULATIONS ON THE REGIME OF THE HIGH SEAS, U.N. Doc. ST/LEG/SER. B/1; ST/LEG/SER. B/2 (1951, 1952).

34. Summary Records of the 1st Session of the International Law Comm'n., 1949 1 Y.B. Int'l. L. Comm'n. 43, U.N. Doc. A/CN.4/SR. 5 at para. 64.

35. International Law Comm'n., Report, 11 U.N. GAOR Supp. 9, U.N. Doc. A/3159 (1956).

36. G.A. Res. 1105, 11 U.N. GOAR Supp. 17, at 54, U.N. Doc. A/3572 (1957).

37. Whiteman, Conference on the Law of the Sea: Convention on the Continental Shelf, 52 AM. J. INT'L. L. 629, 631 (1958).

The 1958 Geneva Convention Definition of the Continental Shelf

Article 1 of the Convention on the Continental Shelf closely followed the final draft of Article 67 of the Regime on the High Seas submitted by the International Law Commission.[38] The only substantive difference was an amendment clarifying the status of submarine areas adjacent to islands.[39] The Conference adopted two tests to determine the areas over which the coastal State could exercise the rights defined in Articles 2-7. These tests are the "two hundred meter" test and the "exploitability" test.

The two hundred meter test permits the littoral State to exercise its exclusive rights to a point on the shelf where the superjacent water reaches a depth of two hundred meters. The State's rights cease to be exclusive beyond this point. In establishing this boundary, the Commission attempted to follow as nearly as possible the geological and geographical boundary, although it recognized that both boundaries would not completely coincide.[40] The Commission provided that for areas of the shelf cut laterally by narrow deep trenches, the seaward areas would still be under the control of the adjacent State.[41]

This definition's main advantage was its certainty; it created a clear demarcation line for the determination of rights.[42] This boundary, furthermore, included most of the submarine areas which could be described as part of the continental shelf since the shelf extended to depths greater than two hundred meters only in rare instances.[43] The final reason for its adoption was that exploitation

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38. Summary Records of the Fourth Committee, U.N. Doc. A/ Conf. 13/C.4/SR.19 at para. 14 (hereinafter cited as Fourth Committee)

39. Id.

40. International Law Comm'n., Report, 11 U.N. GAOR Supp. 9, U.N. Doc. A/3159 (1956) at 296-297, comments 2, 5, 6, 7, 9 to Art. 67 (hereinafter cited as 1956 Report).

41. Id., at 297, comment 8 to Art, 67; Mr. Francois' comment during the 358th meeting of the International Law Commission, 1956 1 Y.B. Int'l. L. Comm'n. 137 at para. 19, U.N. Doc. A/CN. 4/ SR. 358 (hereinafter cited as 1956 Yrbk.).

42. 1956 Report, supra note 41, at 296, comment 3 to Art. 67.

43. Scientific Considerations, supra note 2, at 40-41.

was not anticipated to occur in deeper waters.

The exploitability test is embodied in the phrase " . . . or, beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources of the said areas."[44] If technology advanced to a point where it became economically feasible to drill or mine at greater depths, the exclusive rights of the coastal State would automatically extend to that depth. For the Commission, this definition solved two problems. First, the test would allow the law to keep pace with technological and scientific advances.[45] Second, it would enable States with otherwise narrow shelves to exclusively exploit greater portions of the seabed.[46] The very nature of this test, however, immediately raises two important problems.

The first problem is that under a possible interpretation of the exploitability test, only those States with the actual technical capability of exploitation in deeper waters could extend their control to this larger area of the seafloor.[47] Little discussion of

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44. Article 1, Convention on the Continental Shelf, supra note 1.

45. 1956 Report, supra note 40, at 296, comment 2 to Art. 67.

46. Id.; Mr. Amado's comments during the 357th meeting of the International Law Commission, 1956 Yrbk., supra note 41 at 135, para. 86.

    Two other related advantages to the exploitability test were mentioned during the meeting of the Fourth Committee of the 1958 Conference. Urugquay's delegate said the test would prevent States with narrow shelves from having foreign vessels exploit minerals outside the two hundred meter limit, while still relatively close to the coastal State's shore, Fourth Committee, supra note 38, at 34, para. 23. Colombia's delegate said the test would also prevent a technically advanced State from working the resources beyond the two hundred meter limit, while the less developed State would be unable to develop minerals closer to the shore, Fourth Committee, supra note 38, at 41, para. 4.

47. This problem was raised several times during the meetings of the Fourth Committee. Mr. Obiols-Gomez of Guatamala and Mr. Patey of France mentioned this possible interpretation during the thirteenth meeting, Fourth Committee, supra note 38, at 34, para. 23. The issue was raised again during the seventeenth meeting by the delegate, Mr. Bocobo, and Mr. Obiols-Gomez,

this point occurred during either the meetings of the Fourth Committee or the International Law Commission. Strong evidence, however, points to the rejection of this interpretation. Rear-Admiral Mouton, the Dutch delegate to the Conference, apparently disapproved of this argument; for him, if any State could exploit minerals to a certain depth, then all States should be entitled to claim exclusive rights to submarine areas lying at an equal depth, although this would create evidentiary problems.[48]

Two other considerations militate against the adoption of this interpretation. As a guide to interpretation, it should be noted that one of the Commission's principles, especially with regard to the compromise embodied in Article 1, was equal treatment of all States.[49] The proposed interpretation would lead to inequality since it would give more territory to scientifically developed maritime nations, while the underdeveloped countries would be limited by the two hundred meter isobath. This inequity was pointed out by Mr. Carty, the Canadian delegate to the Conference.[50] If the Fourth Committee had carefully considered the problem, they probably would have rejected this line of reasoning.

The interpretation also raises problems of conceptual equality. The coastal States obtain their rights ipso jure.[51] By gaining

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Fourth Committee, supra note 38, at 41, para. 12, and at 43, para. 29. The committee apparently never definitively answered the question, however, and the answer remains in doubt.

48. Fourth Committee, supra note 38, at 44, para. 51. Mr. Mouton expresses his opinion on this matter more clearly in his book, MOUTON, THE CONTINENTAL SHELF 42 (1952). The major evidentiary problem is in determining what constitutes effective exploitation, e.g., how permanent must the installation be; must the development and exploitation of the minerals in the area be profitable; is an exploratory or experimental well sufficient to extend the control of the coastal State; what happens if the only installation at that depth is abandoned as unprofitable?

49. Reference Guide Prepared by the Secretariat to the ILC's Final Report on the Regime of the High Seas, 11 U.N. GOAR, Annexes, Agenda Item No. 53, U.N. Doc. A/C.6/L. 378 (1956), commentary to Articles 67-68.

50. Fourth Committee, supra note 38, at 37, para. 34.

51. Article 2(2), (3), Convention on the Continental Shelf, see supra note 1. The continental shelf could have been treated in

rights in this manner, occupation of the continental shelf adjacent to their territorial seafloor is not required. If only those States actually drilling in deeper water could obtain rights to these new areas, they would, in effect, be gaining territory ipso facto, or by actual occupation. Excluding States without this capability would therefore be inconsistent with the concept of control ipso jure, and the criteria of Article 2.[52]

The second problem deals with the absolute seaward limit of the coastal State's control. At the meetings of the ILC and the Fourth Committee, fears were expressed that the exploitability test would lead to the division of the entire ocean floor.[53] The problem is not wholly academic. The United States Department of the Interior has already granted exploration permits for areas under fifteen hundred meters of water.[54] Oil and gas leases have been awarded for areas of even greater depths.[55] Several arguments, however, have been made against such a contention.[56]

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four ways: a) It could have been regarded as res communis, and no State could claim exclusive rights to it. The high seas are regarded as res communis. b) It could have been treated as res nullius, whereby any State could claim any portion of it, upon a showing of occupation. This is the treatment given to newly discovered islands. c) Only the adjacent coastal State could have been permitted to claim exclusive rights, ipso facto, by actual or notional occupation. d) If rights to the shelf were granted ipso jure, only the adjacent coastal State could claim the rights. Title would vest by operation of law; the controlling State would have to do nothing.

52. Mr. Lima, El Salvador's delegate, hinted at this argument during the fourteenth meeting of the Fourth Committee, Fourth Committee, supra note 38, at 33, para. 14.

53. Mr. Pal and Mr. Scelle both mentioned this possibility during the ILC's 357th meeting, 1956 Yrbk., supra note 41, at 133, para. 73. Mr. Fattal, Lebanon's delegate, expressed similar fears during the 1958 Conference, Fourth Committee, supra note 38, at 38, para. 1.

54. Brock, Mineral Resources and the Future Development of the International Law of the Sea, 22 JAG J. 39, 42 (1967); Griffen, The Emerging Law of Ocean Space, 1 Int'l. Lawyer 548, 574-575 (1967).

55. Id.

56. Brock, supra not 54, at 42.

The general consensus in the International Law Commission was that the Convention would apply solely to the continental margins.[57] At the 1958 Conference, it was pointed out that while under the exploitability criterion the area might extend to the continental slope, it certainly would not extend to the abyssal plain.[58] The retention of "continental shelf" in Article 1 reinforces this interpretation. During the ILC's eighth session, Mr. Garcia-Amador, delegate from Cuba, suggested the substitution of the term "submarine areas" for "continental shelf."[59] The other members, however, rejected this proposal because the term "continental shelf," while inexact and somewhat vague, had wide usage and had gained a clear connotation for the public and for jurists.[60]

Arguably, the phrase "adjacent to the coast" in Article 1 places a horizontal limit upon territory claimable under the exploitability test.[61] This argument parallels the treatment of shallow areas on the seaward side of submarine trenches. If the trench or canyon were wide and deep enough, under the two hundred meter test, the seaward

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57. 1956 Yrbk., supra note 41, at 132-133, paras. 57, 62, 73.

58. The Panamanian delegation proposed a revision of Article 1 which would have explicitly limited the control of the coastal State to the continental margin, U.N. Doc. A/Conf. 13/C.4/L.4 at 127. This proposal read as follows:

    For the purpose of these articles, the common expression "continental shelf" is used as referring to the seabed, soil, and subsoil of the submarine areas adjacent to the coast but outside the area of the territorial sea, including both the constituent parts of the continental terrace, the continental shelf proper and the continental slope with its gorges, valleys, depressions and ravines, as far as the further points at which the depth of the superjacent waters addmits of the exploitation of the natural resources of said areas of the continental slope, but excluding the great depths of oceanic basins. (Emphasis added.)

    During the sixteenth meeting of the Fourth Committee, the American delegate said that this limitation was implicit in the ILC's proposal because of the practical problems of mineral exploitation at greater depths, Fourth Committee, supra note 38, at 40.

59. 1956 Yrbk., supra note 41, at 130-135, paras. 44 et seq.

60. Id.

61. M. MCDOUGAL & W. BURKE, THE PUBLIC ORDER OF THE OCEANS, 685-688 (1962).

areas would not be part of the coastal State's continental shelf.[62] To permit the State then to claim these areas, which are clearly exploitable, under the exploitability test would be inconsistent. If these areas can not be claimed ipso jure by the littoral State, then a fortiori, other areas more distant from the coast must be excluded. Current State practice, however, causes some doubt about the validity of this argument.

The United States, a leader in legislation dealing with the continental shelf,[63] possibly has already claimed jurisdiction over a non-adjacent shallow portion of the sea-floor. In 1966, a group of California businessmen created a navigation hazard while attempting to establish an artificial island for a canning factory on Cortes Bank, fifty miles off San Clemente Island. The intervening water is a maximum of fourteen hundred meters deep. The United States Attorney in San Diego reportedly has threatened to prosecute pursuant to the Outer Continental Shelf Lands Act.[64]

The Convention's ambiguous definition of the shelf had little practical importance in 1958.[65] With present technology this is no longer true. Interference with scientific expeditions already have occurred.[66] Greater obstruction of future commercial enterprises can be expected. These developments by themselves would require a re-examination of the Convention. If further consideration is to be given to the plans to place ocean space under international control, a revision of the definition will become mandatory.

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62. 1956 Report, supra note 40, at comment 8 to Art. 67.

63. The first unilateral assertion of rights over the mineral and biological resources of the continental shelf was President Truman's Proclamation of September 28, 1945 on the Continental Shelf, Proc. No. 2667, 59 Stat. 884. Many States modeled their claims after this proclamation.

64. 67 Stat. 462 (1953), with codification revisions now, 43 U.S.C. secs. 1331 et seq. (1964). For a full report of this dispute, see Griffen, supra note 54, at 572.

65. Fourth Committee, supra note 38, at 40, para. 22.

66. Burke, Ely, Young, Jacob, Harlow & Wright, A Symposium on Limits and Conflicting Uses of the Continental Shelf, in THE LAW OF THE SEA 172 (Alexander, ed. 1967).

Other Proposed Definitions of the Continental Shelf

A third method of delimiting the continental shelf was proposed during the meeting of the ILC and the Fourth Committee. The Colombian jurist, Mr. Yepes, suggested during the 117th meeting of the Commission that in cases where no shelf existed, the adjacent riparian country should control the seabed and subsoil out to twenty miles from the coast.[67] The Yugoslavian delegation made a similar proposal in 1958. The coastal State would control the seabed and subsoil for a minimum of fifty miles from the shore and a maximum of one hundred miles.[68] The United Arab Republic said all States should control a belt of a predetermined width, without setting the exact limit.[69]

Mr. Yepes made his proposal to benefit countries, like Chile and Peru, with narrow geological shelves.[70] Mr. Hudson of the United States rejected this boundary because the littoral countries would not be able to exploit the area they gained.[71] This reasoning is no longer valid.

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67. 1951 1 Y.B. Int'l. L. Comm'n. 296, para. 25, U.N. Doc.A/CN.4/Ser. A/1951 (hereinafter cited 1951 Yrbk.).

68. Fourth Committee, supra note 38, at 32, para. 7; below is the full text of the proposal.

> 1. For the purposes of these articles the term "continental shelf" is used as referring to the seabed and subsoil of the submarine areas adjacent to the coast but outside the area of the territorial sea, to a depth of 200 metres, but only up to a boundary line not extending beyond 100 miles from the outer limit of the territorial sea. Local occurrences of submarine gorges, valleys, depressions and ravines shall not be taken into account in this area of 100 miles, provided they are within the outer limit of the continental shelf as described in the preceding sentence.
> 2. Where such a depth is greater, the continental shelf stretches only up to a boundary line not extending beyond 50 miles in the direction of the high seas from the outer limit of the territorial sea, U.N. Doc. A/Conf. 13/C.4/L.12, at 129.

69. Fourth Committee, supra note 38, at 27, para. 8.

70. 1951 Yrbk., supra note 67, at 296, para. 31.

71. Id. at 297-298, para. 32.

The UAR delegate, Mr. Gohar, listed four advantages to be gained from his delimitation. First, the demarcation line would be simple to locate. It would also place a definite limit on the littoral State's control. Third, this limit would benefit countries without extensive shelves off their shores. Finally, the test would spur the development of deep water technology.[72] No reason for the ultimate rejection of this and the Yogoslavian proposal appears in the records of the Fourth Committee.

Senator Pell's treaty contains the latest proposal for defining the juridical continental shelf. Under this treaty, the boundary would be placed at the six hundred meter isobath, well down the continental slope.[73] This line, however, leaves two major problems unsolved. It would not substantially aid the countries with narrow shelves. Off these coasts, the seafloor drops so steeply that only a few horizontal miles would be gained. Disputes, furthermore, could still easily arise with regard to the continental borderlands, where the seabed is highly irregular.

If the seafloor were internationalized, three factors should be considered in determining the position of the edge of the juridical shelf. All States, as much as possible, should receive equal treatment. The area placed under the riparian State's exclusive control should be wide enough to provide the State adequate protection. Finally, the limit should be stable and easily discoverable. A boundary placed seventy-five miles from the shore would fulfill all three requirements.

All the coastal States would be treated more or less equally. The area under each country's control would be proportional to the length of its coastline. Greater equality than this is not, as a practical matter, feasible. Landlocked States, furthermore, would be able to benefit from the exploitation of submarine resources. If they desired, these countries could exploit shallow areas beyond the seventy-five mile limit under a license from the United Nations. Under both the exploitability test and the depth test, this would not be practical. Under the exploitability test, they would be excluded. If a version of the depth test were in force, the smaller countries would have to develop the deeper parts of the seabed and subsoil.

A seventy-five mile belt should provide all littoral States adequate protection. Permanent installations outside this belt could

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72. Fourth Committee, supra note 38, at 27, para. 9.

73. Art. 29, OCEAN SPACE TREATY, supra note 14, at 2001-2002.

do little damage even if they were engaged in illicit activities, e.g., illegal broadcasting. If ocean space were internationalized, further protection could be given to the coastal States. When granting licenses, the United Nations authority could be directed to take into accounts the interests of the coastal State. Periodic inspections of the installation was one of the measures included in the treaty proposed by Senator Pell.[74] Other control devices could be developed as circumstances required.

The proposed seventy-five mile boundary would furnish the requisite certainty and stability. This boundary depends neither upon the topography of the seabed nor advances in technology. The only uncertainty would be in fixing the baseline at the shore of the coastal State. This uncertainty also remains with the determination of the extent of the territorial waters. The errors which this uncertainty could create would be minor, and could be taken into account by the licensing authority.

Several objections might be raised against the proposed limit. Several of these arise because the limit has no relation to the geological continental shelf. Most commentators agree, however, the juridical shelf need not coincide with the geological definition.[75] The use of the geological definition was understandable when there was some question about the coastal State's ability to control these areas. For example, in President Truman's proclamation, one of the justifications for asserting control over the shelf was that it could be considered an extension of the mainland.[76] Under the regime of the 1958 Convention, however, this rationale is not required. The boundary should be established considering the interests of the coastal States and the other members of the international community. The analysis would be similar to that used for delimiting territorial waters or the contiguous zones. Geographical factors are not prominent in these determinations, only legal and political factors.

Another objection is that the oil pools and mineral beds might extend beyond the seventy-five mile limit into the area controlled by the United Nations. Disputes in these areas could result, considering the migratory nature of oil and gas, because of intensive development by one party to the detriment of the other developer.

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74. Art. 19, OCEAN SPACE TREATY, supra note 14, at 2001.

75. MOUTON, supra note 48, at 16; GARCIA-AMADOR, THE EXPLOITATION AND CONSERVATION OF THE RESOURCES OF THE SEA 93 (2d ed., 1959).

76. Proclamation No. 2667, 59 Stat. 884 (1945).

No major question should arise, however, since similar problems have arisen in other areas, and have been solved.

Perhaps the most analogous situation developed with the passage of the Submerged Lands Act[77] and the Outer Continental Shelf Act[78] in 1953. Pools of oil and gas overlapped the areas controlled by the State and Federal governments. Agreements regarding these areas were reached by the parties.[79] Overlapping pools might also be found in the North Sea, where a number of nations have claims to the submarine resources.[80] The treaty between the United Kingdom and Norway, establishing the boundary between their respective areas, left the treatment of the overlapping pools to later agreement.[81]

Property lines often cut across oil and gas fields on the mainland. Several types of arrangements have been created to develop these pools equitably and with a minimum of waste. In the United States, two plans used are the "unit operation," and the "unitization of the field."[82] The unit plan consists of an agreement by the parties to develop the field cooperatively in order to minimize waste and to develop according to the geological structure rather than according to the arbitrary property lines. In this plan, the participants retain their respective property, but equitably divide the production among themselves.[83] This type of plan could be modified for use on the continental shelf.

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77. 43 U.S.C. secs. 1301 et seq. (1964).

78. 43 U.S.C. secs. 1331 et seq. (1964).

79. Henderson, Participation by United States Geological Survey in the Administration of Federal Law and Regulations Governing Mineral Leasing, Drilling and Producing Operations on Outer Continental Shelf Lands in Gulf of Mexico, in OIL AND GAS OPERATIONS: LEGAL CONSIDERATIONS IN THE TIDELANDS AND ON LAND, (Slovenko, ed., 1963).

80. Young, Offshore Claims and Problems in the North Sea, 59 AM. J. INT'L. 505, 517 (1965).

81. AGREEMENT RELATING TO THE DELIMITATION OF THE CONTINENTAL SHELF BETWEEN THE UNITED KINGDOM AND NORWAY, Art. 4, March 10, 1965, 551 U.N.T.S. 213.

82. R. SULLIVAN, HANDBOOK OF OIL AND GAS LAW 358 (1955).

83. Id.

The unitization of a field is similar to a unit operation in that there is cooperative exploitation of the field. This cooperation, however, is achieved by a cross assignment of interests so that each owner and lessee will have an undivided interest in the whole pool.[84] This might be the best plan for use on the continental shelf, since each party would have an interest in the total production, which could easily be monitored.

Another possible solution would be to license the coastal State to develop the remainder of the pool. This would not benefit the smaller, non-maritime countries directly. The revenues derived from such a license could indirectly benefit these underdeveloped nations through loan and aid programs of the United Nations. A program of this nature was suggested earlier this year by Dr. Rich and Dr. Engelhardt, two prominent physicists.[85]

Conclusion

Advances in marine technology have opened ninety-eight percent of the ocean floor to commercial exploitation. Because of the ambiguity of the exploitability tests, the present definition of the shelf could lead to disputes among the maritime countries. Furthermore, the recent proposals to internationalize ocean space require a stable limitation on the coastal State's control, unrelated to scientific advances. If these proposals are adopted, the boundary which provides the requisite certainty, stability, protections and equality of treatment is a line seventy-five miles from baseline of the shore or inland waters of the coastal State.

ANTHONY LIMITONE, JR.

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84. Id.

85. Newsweek, March 11, 1968 at 69.