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**formulating an oceanic jurisprudence**

**cabot martin**

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Formulating an Oceanic Jurisprudence

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## PREFACE

The Sea Grant Colleges Program was created by Congress in 1966 to stimulate research, instruction and extension of knowledge of marine resources of the United States. In 1969 the Sea Grant Program was established at the University of Miami.

The outstanding success of the Land Grant Colleges Program, which in 100 years has brought the United States to its current superior position in agricultural production, was the basis for the Sea Grant concept. This concept has three objectives: to promote excellence in education and training, research, and information service in the University's disciplines that relate to the sea. The successful accomplishment of these objectives will result in material contributions to marine oriented industries and will, in addition, protect and preserve the environment for the enjoyment of all people.

With these objectives, this series of Sea Grant Technical Bulletins is intended to convey useful research information to marine communities interested in resource development.

While the responsibility for administration of the Sea Grant Program rests with the National Oceanic and Atmospheric Administration in the Department of Commerce, the responsibility for financing the program is shared by federal, industrial and University of Miami contributions. This study, Formulating an Oceanic Jurisprudence, was made possible by Sea Grant support for the Ocean Law Program.

Any attempt at formulating an oceanic jurisprudence<sup>1</sup> is doomed either to creative futility or sterile repetition of past methodology unless two potential pitfalls are borne in mind. The first could arise from a failure to consider the unique nature of the oceanic environment both as to legal and physical aspects; the second from a failure to treat oceanic jurisprudence as a dynamic system of analysis having a functional goal. Although the two are interrelated, we may say that the former suggest certain avenues of analysis - of technique - which are best suited to the study of such a milieu, while the latter concerns the student's view of his role and of the role of law in the most basic sense. It would be presumptuous, of course, to attempt to present a complete scenario of a legal regime for man's oceanic milieu. This short paper will do no more than give our highly personalized view of the proper manner in which to make such an attempt.

The student's view of his role and of the role of law will in many ways determine the range of intellectual avenues

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<sup>1</sup>The term "oceanic jurisprudence" is taken to mean the analysis or science of laws dealing with man's oceanic activities. Although this covers both municipal and international regimes, much of the following will refer specifically to the latter.

open and the sancity of previous methodologies.<sup>2</sup> An eminent American jurist has noted that

The more wedded we become to a particular classification or definition, the more our thinking tends to become frozen and thus to have a rigidity which hampers progress toward the ever needed new solutions of problems whether old or new.<sup>3</sup>

Care, then, must be taken not to create a solidification detrimental to progressive inquiry.

If we see, for instance, the role of the student as one of merely describing an existing legal regime and its historical underpinnings then we militate against the formulation of new doctrines and of the optimum co-incident of the realities of man's oceanic legal regime. The future tense is not, in effect, represented. If, on the other hand, we take the position that the state of the existant oceanic legal regime is deplorable and that the potential for formulation of new doctrines is largely unexploited, then an investigation based thereon has a far better chance of playing a positive role in developing an oceanic legal regime.<sup>4</sup>

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<sup>2</sup> McDougal & Lasswell (1960) The Identification and Appraisal of Diverse Systems of Public Order, in McDougal, M. and Associates Studies in World Public Order 3, 38-41.

<sup>3</sup> Jessup (1956) Transnational Law 7.

<sup>4</sup> See generally Henkin (1960), Changing Law for the Changing

Moreover it is submitted that any such investigation should be comprehensive in terms of the nature of the problems treated. O'Connell notes the success of the piecemeal "minimal solution" of certain international problems generally and specifically of some oceanic problems in the traditional framework, bringing about a restriction in the areas of conflict.<sup>5</sup> A review of the literature will further reinforce the impression that past attempts have been to create minimal solutions to specific problems.

It may be helpful to define the purpose of our proposed jurisprudence as - the conceptual analysis of oceanic legal regimes existent and optimal in relation to man's oceanic milieu.<sup>6</sup>

The use of milieu imports an environmental approach to our problem, a position not without its dangers. However the greatest danger would seem to lie in ignoring the relationship of man's milieu to any optimization of our understanding of the oceanic legal regime. The so-called oceanic milieu is but a

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Seas in Gullion (Ed.) Uses of the Seas 69. Also Chapter 10 (Craftsmanship in International Law) in Jenks (1958) The Common Law of Mankind.

<sup>5</sup>O'Connell (1966) The Role of International Law, 95 Daedalus 627, 628.

<sup>6</sup>On the use of conceptual schemes generally see Sprout, H. and Sprout, N., (1965) The Ecological Perspective on Human Affairs, 160 et seq.

subsystem of man's total milieu just as any oceanic legal regime should be looked upon as a subsystem of the larger, comprehensive process of authoritative decision. However, differences in the oceanic milieu, as distinguished from a "terrestrial" milieu exist to a sufficient extent and have sufficient impact on the nature of any oceanic legal regime that the characterization seems desirable. Our position, then, can be said to be policy-oriented.<sup>7</sup> That is, we will start with a given goal of an optimum legal regime related to man's oceanic milieu and deduce from that inductive premise those changes in the regime and/or milieu which are necessary for the maximization of this goal.<sup>8,9</sup>

Determining the role of law in man's oceanic milieu presents problems of the most fundamental nature. In terms of its validity we are told that the validity of any legal order

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<sup>7</sup> For one position on the perspective and intellectual skills needed for such a position see McDougal and Lasswell (1960) Legal Education and Public Policy, in McDougal and Associates op. cit., 42-154.

<sup>8</sup> See Sprout and Sprout (1965) op. cit., 179 et seq.

<sup>9</sup> Charles deVisscher warns us that "what is lacking in the study of international law is less doctrine than method, less a general theory than a more attentive observation of the realities of every kind which, in a social milieu still often refractory to law obstruct its development, or, on the contrary promote its progress." Theory & Reality in Public International Law, vii (1957).



must correspond to or be derived from "an existing obtainable maximum of social and political reality."<sup>10</sup> McDougal and Burke see the historic function of the law of the sea as that of

...protecting and balancing the common interests, inclusive and exclusive, of all peoples in the use and enjoyment of the oceans, while rejecting all egocentric assertions of special interests in contravention of general community interest.<sup>11</sup>

While this latter perspective is valuable, the dangers inherent in such a position should be noted. In particular, one should be careful not to confuse a process of decision with a legal position, that is, law is not merely a style of argument.<sup>12</sup> While some see a restricted role that law can play in producing the "conditions of world order"<sup>13</sup>, it seems a short step from accepting the principle ubi societas, ibi ius (as many "classical" writers seem to) to realizing that man's conception of his milieu in large part determines the role of legal regimes within it. Any legal regime is part of man's response to the demands of his milieu. How then can

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<sup>10</sup> Lauterpacht, E., (Ed.) (1970) International Law: Being the Collected Papers of Hersch Lauterpacht, Vol. I, 89.

<sup>11</sup> McDougal and Burke (1962) The Public Order of the Oceans 1.

<sup>12</sup> See on this area generally Falk (1970) The Status of Law in International Society especially Part I.

<sup>13</sup> O'Connell (1966) op. cit.

a realistic legal regime be formulated without reflection upon the milieu?

The role of law adopted then is that it is a tool of social engineering, admitting of the possibility of progressive development by a conscious attempt to resolve the various and varying pressures of man's milieu on his social structures. Law, in terms of the oceanic milieu, seeks to resolve man's conflicting interests and uses on the municipal and international levels within the context of physical and social realities.

Given our conceptual goal and the nature of man's oceanic milieu, do certain analytical approaches commend themselves? The oceanic legal regime is unique not only for its purported comprehensive nature in spatial and subject-matter terms but also for the pronounced lack of certainty and effectiveness in many areas. Its uniqueness also derives from the accelerating development of new values, uses and conflicts regarding oceanic resources; changes in man's oceanic milieu which, generally, have a potential international impact presenting the alternatives of a further divergency of legal regime and milieu or the modification of regime. This does not preclude the assessment and regulation of technological development to achieve an optimum. Moreover, these uses, values and conflicts are closely

related to the physical and spatial characteristics of the oceanic environment.<sup>14</sup> McDougal & Burke see as necessary for the study of the public order of the oceans a "comprehensive and realistic orientation in the factual processes of interaction by which the oceans are enjoyed..."<sup>15</sup> At the other end of the scale we have O'Connell by whom we are instructed to disregard as a base for order generally, "factual circumstances so ephemeral and so vague" as the nuclear deterrent.<sup>16</sup>

In the final analysis then, it is not the unique physical or political characteristics of the oceanic milieu themselves which require their inclusion in the analysis of the oceanic legal regime. Rather it is the goal of analysis as seen by the student. We assume that traditional methods of jurisprudence can not provide the tools of analysis or the proper perspective for such a study, which sees the necessity of including the factual political and physical realities of the oceanic milieu.

The problem, then, resolves itself into finding techniques

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McDougal and Burke (1962) op. cit., vii. See also Johnston (1967) Law, Technology and the Sea, 55 Calif. L.R. 449, 458-459. Also Garica-Amador (1959) The Exploitation and Conservation of the Resources of the Sea 10-12.

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Op. cit. x.

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Op. cit. 628.

whereby we may gain the necessary perspective and specific tools of analysis. Although we do not exclude other methodologies, it would seem that certain features of multi- or interdisciplinary research lend themselves to the treatment of our problem.<sup>17</sup> First, we should resolve the ambiguity existing as to the meaning of the terms "interdisciplinary" and "multidisciplinary". Basically, they are taken in the sense of "mutual" and "many" respectively. One author takes the position:

...when a particular investigation incorporates the findings of several disciplines, borrows their tools and techniques, above all when it makes use of conceptual patterns and analysis pertaining to several branches of knowledge in order, once these have been compared and appraised, to make them converge, we are dealing with interdisciplinary activity.<sup>18</sup>

Another author sees an interdisciplinary team as being:

...a group of persons who are trained in the use of different tools and concepts, among whom there is an organized division of labor around a common problem, with continuous intercommunication and re-examination of postulates in terms of the limitations provided by the work of the other members, and often with group responsibility for the final product.<sup>19</sup>

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<sup>17</sup> See generally the special number, Multidisciplinary Problem-focused Research 20 International Social Sciences Journal 193 (1968).

<sup>18</sup> de Bie. (1968), Introduction in Multidisciplinary Problem-focused Research, op. cit., 205.

<sup>19</sup> Luszki, (1958) Interdisciplinary Team Research: Method and Problems, 10.

This is not as restrictive as our first definition. Still another author describes the rationale for interdisciplinary research in the following manner :

The values and the techniques of each discipline are necessary for the perspective of each participant in the shared search for some common themes and values.<sup>20</sup>

We will distinguish the two on the basis of the low level of interaction possible in multidisciplinary research, considering that this latter technique may be one using a multifactorial approach only with no borrowing of concepts or tools of analysis.<sup>21</sup> We are reminded that the interdisciplinary mode is extremely difficult to achieve in problem-focused research<sup>22</sup>, but at least one author sees the attempt to become a multidisciplinary scholar as being a "Leonardesque aspiration" producing "a shallowness, a lowest-common-denominator breadth, an absence of that profound specialization which is essential for scientific productivity." This, he claims, can be avoided by the "narrowness" of the inter-

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<sup>20</sup>Royce, (1965) Introduction, in Crutchfield, (Ed.) The Fisheries: Problems in Resource Management, viii.

<sup>21</sup>For a misconception of the nature of interdisciplinary research see Estep, (1964) International Lawmakers in a Technological World, 33 Geo. Wash. L.R. 162, 164.

<sup>22</sup>de Bie, (1968) op. cit. 207.

disciplinary mode.<sup>23</sup> His analysis of the multidisciplinary approach would seem accurate.

Three basic factors can determine the validity of a particular application of the interdisciplinary method: (a) the student's appreciation of study and research as bases for intelligent action (b) the complexity of the object of research; (c) the desirability of the solution of new problems having no traditional solutions available.<sup>24</sup> Again, the Sherifs see interdisciplinary "coordination" as a validity check of special value in view of the dangers of intellectual isolation. They state that

Deliberate assessment by one discipline of what is needed from other disciplines and who it needs to transact with will provide a center of gravity for its own development that is conducive to probing its problems at any degree of intensive-ness desired.<sup>25</sup>

These points seem well taken in relation to our desired system of analysis.

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<sup>23</sup> Campbell, (1969) Ethnocentrism of Disciplines and the Fish-scale Model of Omniscience, in Sherif, M. and Sherif, C.W. (Eds.) Interdisciplinary Relationships in the Social Sciences, 328, 329-330.

<sup>24</sup> de Bie, (1968) op. cit., 201.

<sup>25</sup> Sherif and Sherif (1969) Interdisciplinary Co-ordination as a Validity Check: Retrospect and Prospectus, in Sherif and Sherif (Eds.) op. cit. 3, 8.

We will now consider some of the basic characteristics of interdisciplinary research as utilized by the social sciences.<sup>26</sup> First, we can distinguish four aspects of problem solving in which the interdisciplinary mode may play a part: (a) formulation; (b) method of investigation; (c) explanation; (d) application. It is felt that, generally, the earlier in the research process the mode is introduced, the better.<sup>27</sup> The actual introduction will be a function of the degree of collaboration suited to the problem or available resources and the kind and degree of theoretical integration desirable.

We can identify at least seven patterns of collaboration possible<sup>28</sup>: (a) fusion - here disciplinary boundaries are lowered and all researchers subscribe to an over-all theoretical system within which an attempt is made to handle all problems undertaken; (b) multivariable approach with common focus- here researchers work together on the same central problem but use their own methods and theoretical framework. Integration is provided by progressively developing common

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<sup>26</sup> The following discussion borrows extensively from Luszki (1958) op. cit.

<sup>27</sup> Miligram, (1969) Interdisciplinary Thinking and the Small World Problem, in Sherif and Sherif (Eds.) op. cit., 103, 104.

<sup>28</sup> See Luszki, (1958) op. cit. 108-135.

concepts; (c) formal integration within which the separateness of disciplines is maintained (d) division of research problem into sub-inquiries, with interdisciplinary collaboration; (e) unstructured collaboration within a general problem area.

There are two other possibilities, collation and the case where an independent researcher is in close physical proximity to other disciplines and casually makes contact. Neither of these are interdisciplinary within our definition.

Basically there are four levels of theoretical or conceptual integration possible<sup>29</sup>: (a) the eclectic - a very common method but one open to abuse by use when there is in fact no integration achieved; (b) the multi-factorial - different from the eclectic in that no unified theory is achieved; (c) uni-disciplinary - here other disciplines are brought in to amplify and discover new facts of theoretical relevance; (d) fusion - this requires an exposition of the basic underlying assumptions of the theoretical propositions of each discipline. In practice, these levels are neither clear-cut nor steady state and modifications are made as the resolution or examination of the problem progresses. If close collaboration and a high level of integration of theoretical constructs are planned it will be necessary to introduce the

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Ibib., 154-159.



interdisciplinary mode at an early stage.

We shall now enumerate some of the weaknesses and positive aspects of this mode of inquiry<sup>30</sup>;

Weaknesses - (a) in the case of large teams there can be a loss of originality on the part of some members;  
 (b) it is expensive and the administrative task is heavy;  
 (c) it may mean a misallocation of resources especially where used unnecessarily;  
 (d) it requires the diversion of time from research in the traditional sense to communication.

Positive Aspects - (1) larger problems can be tackled and a broader outlook obtained than usual;  
 (2) there is intra-team stimulation;  
 (3) researchers gain an insight into their own disciplines;  
 (4) problems lying at the interfaces of disciplines tend to be treated;  
 (5) specific techniques and tools will be gained for application to the individual disciplines.

To prepare for such an endeavor, it is said that four training objectives must be achieved: (a) the researcher's sensitivity to fields other than his own must be sharpened; (b) he must understand the role of the specialists in other fields; (c) he must gain a knowledge of the specific subject matter of other disciplines; (d) he must be capable of conceptualizing at a sufficiently high enough level of abstraction

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<sup>30</sup> Ibid. 300-304.

to treat more than one field.<sup>31</sup> In total, the training necessary to engage in interdisciplinary research is closely akin to that which we see necessary for our problem generally. Without a practical exercise, it is difficult to decide whether the method is suited to our purposes but it would seem, from principle, that it will be extremely valuable for the new perspective and tools of analysis it can provide.

Given the value of interdisciplinary study, what are the disciplines which should be included in our case? The broad answer is, of course, all disciplines which treat aspects of man's oceanic milieu and his activities in it. Inclusion of all of these would be unwieldy for any one study and their identification is beyond the scope of this paper.<sup>32</sup>

However, it has been noted that

...the increase in scientific investigation into the ocean both stimulates the need for developing legal prescriptions applicable to previously unknown types of interactions on the sea and provides technical information indispensable for creating new legal provisions.<sup>33</sup>

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<sup>31</sup> Ibid. 291.

<sup>32</sup> Note as an example, the consideration of the role of various myths and taboos regarding fish and fishing in Johnston, (1965) The International Law of Fisheries 23-28 and 34-38.

<sup>33</sup> Burke, (1966) Ocean Sciences, Technology, and the Future Law of the Sea, 13.

A more deterministic analysis of the influence of technological development on the law of the sea is given by Craven.<sup>34</sup> Frampton has treated the influence of the advance of technology on the lawyer on the municipal level<sup>35</sup> while Jenks has dealt with the impact of science and technology on international law generally in several places.<sup>36</sup> ~~We have already noted the necessity of~~ including in our study the factual realities of the oceanic milieu.<sup>37</sup> Science and technology are not only a means of studying these factual realities but are capable of changing the configuration of the milieu. Thus we identify the study of science and technology as disciplines vital to the conceptual analysis of oceanic legal regimes.

As noted above, any treatment of a second discipline should be undertaken with a great deal of caution.<sup>38</sup> The temptation will be great to obtain merely a popularized view leading to

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<sup>34</sup> Craven, (1967) Technology and the Law of the Sea, in Conference on Law, Organization and Security in the Use of the Ocean, Vol II, I, especially 3 & C-12. Note the comments by Schacter C-8 and Frye C-12.

<sup>35</sup> Frampton, (1965) Scientific Éclat and Technological Change: Some Implications for Legal Education, 63 Mich. L.R. 1423, especially 1442.

<sup>36</sup> For instance, Jenks (1968) The New Science and the Law of the Nations, 17 Inter. & Comp. L.Q. 327.

<sup>37</sup> Supra 7.

<sup>38</sup> Supra 9.

absurd statements.<sup>39</sup> The student, then, must seek a facility with oceanic sciences and technology of a high degree. Facility with and not knowledge of strictly speaking, as we have already seen that it is not the role of the student to become the master of the content of the disciplines with which he is interacting.<sup>40</sup> He must concentrate more on the conceptual. In the case of science and technology where the differences from law seem extreme, it may be helpful, in reaching the proper balance, to study the philosophy and history of science and technology. The student must also be aware of the manner in which both scientific research and the diffusion of scientific knowledge are influenced by social conditions and, in turn, influence social behavior.<sup>41</sup>

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<sup>39</sup>Take for example, a statement in which general differences in the physical properties of the Atlantic and Pacific oceans are taken as indices of the eventual ease of management in Busiuk (1968) *Marine Resources Development, Foreign Policy and the Spectrum of Choice* 12 *Orbis* 39, 68; Also, Jenks (1963) *Law, Freedom and Welfare* 36, where the dangers of "inflammable moon dust" are discussed!

<sup>40</sup>Supra at 9.

<sup>41</sup>See generally the special number on the sociology of science 22 *Inter. Soc. Sc. J.* No. I (1970). Note also Campbell's "preliminary exercise in the sociology of science" (op. cit.) which gives a guide to the potential and need for interdisciplinary study in the social sciences.

What are the conceptual underpinnings of science and technology? That question, too, is outside the scope of this paper but we may begin by examining two conceptual tools used in these fields.<sup>42</sup>

A particular problem which we will meet is that of predicting the nature of future claims, conflicts and uses in order that we may treat our legal regime not only as to its suitability to the existing milieu but also to probable future conditions (or as to its adaptability to future conditions). This is a very difficult question but one which observers of the nature of scientific discovery and, as we shall see later, scientists themselves have treated within the context of a new discipline -- futurology.<sup>43</sup> Futurology attempts "...to extrapolate the present state of the world in the future - that is, see how it will evolve, distinguishing what is now inevitable from what can be controlled."<sup>44</sup>

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<sup>42</sup> For a view of the relationship between the basic philosophy and the techniques used by science and law, see Cowan (1964) Some Problems Common to Jurisprudence and Technology, 33 Geo. Wash. L.R. 3.

<sup>43</sup> A rather grandiose term but one which seems to have the sanction of its practitioners. See the special issue on futurology, 21 Inter. Soc. Sc. J. 515, (1969).

<sup>44</sup> Ibid., 515.

McDougal and Lasswell see it necessary in their general treatment of world public order to project future developments especially in the fields of science and technology by a consideration of "past trends conjointly with the available stock of scientific knowledge."<sup>45</sup> This position is, of course, implicit in their continual reference to "trends in decision". The concept of technology assessment, referred to above, also involves the treatment of future technological developments in terms of present decision making.<sup>46</sup> Many attempts have been made at such projections, but it would seem that the pinpointing of more specific characteristics of future milieux is an area of neglect. Craven sees the proper role of the technologist in this regard as being

...to identify the technological innovations which will be introduced in the next decades, the social conflicts which may arise therefrom and interact [emphasis added] with scholars of jurisprudence to identify the spectrum of legal doctrines which might be apropos in resolution of the technological and sociological problems so raised.<sup>47</sup>

However, scientific and technological discoveries are essentially unpredictable and that all that seems possible is a range of

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<sup>45</sup> McDougal and Lasswell (1960) op. cit., 20.

<sup>46</sup> Supra 6. See Green (1968) Technology Assessment & the Law, 36 Geo Wash L.R. 1033.

<sup>47</sup> Op. cit., at p. 3.

potential developments.<sup>48</sup>

A more specific conceptual tool of the scientist is that of systems analysis. Practitioners of this method of analysis trace the use of the systems approach from Plato's Republic through St. Thomas Aquinas' Summa Theologica to Hobbes' Leviathan and the present day operations research.<sup>49</sup> A system, in simple terms, can be said to be a set of parts co-ordinated to accomplish a set of goals.<sup>50</sup> Nearly any human activity can be subsumed within that definition. For instance, Churchman shows the use of the systems approach in studying the maritime shipping industry in terms of one of its sub-systems, the operation of ports.<sup>51</sup> Cowan has described the relevance of systems analysis to law directly

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<sup>48</sup> See Horowitz (1969) Engineering and Sociological Perspectives on Development: Interdisciplinary Constraints on Social Forecasting, 21 Inter. Soc. Sc. J. 545 and Ricto, R. and Sulc, O. (1969) Ibid. 563.

Furthermore it has been noted with some pessimism that "Scientific and technological knowledge are cumulative and grow so rapidly that social knowledge cannot keep pace with the changes thus generated." Ben-David (1970) Introduction, 22 Inter. Soc. Sc. J. No. I. This is W.F. Ogburn's "cultural lag" hypothesis first set out in his 1922 work Social Change.

<sup>49</sup> Churchman (1968) The Systems Approach, 239 et seq. This volume is a lucid explanation of the general use of systems analysis and its intellectual basis.

<sup>50</sup> Ibid. 29

<sup>51</sup> Ibid. 48-60.

in relation to conceptions of the judicial process, concentrating on the use of computers.<sup>52</sup> At least one author has dared to approach the treatment of international oceanic legal regimes on this basis.<sup>53</sup>

However, it would seem that the direct benefits of systems analysis to jurisprudence lie in focusing on the different modes of thinking of the "scientist" and the "lawyer". This is a minor theme of Cowan<sup>54</sup> but it is more helpful to look at the basic process of systems thinking as developed by Churchman.<sup>55</sup> In thinking about a system, one begins with ascertaining its basic characteristics; (a) the systems's objectives (b) its environment (c) its resources (d) the components of the system (e) the management of the system. The systems approach, then, is one of problem solving in such a way that decision-making takes place in a logical and coherent fashion, often by the creation of models.<sup>56</sup>

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<sup>52</sup> Cowan (1963) *Decision Theory in Law, Science and Technology* 17 Rutgers L.R. 499.

<sup>53</sup> Friedheim, (1969) Understanding the Debate on Ocean Resources Law of the Sea Institute Occasional Paper, No. 1.

<sup>54</sup> Op cit, 499-503

<sup>55</sup> Op cit, 3-15.

<sup>56</sup> The term "environment" as used here is not equivalent to our use of milieu but reflects only part of it. Churchman (op. cit 34) defines environment as that which lies "outside" the system in that the system can do relatively little about its characteristics or its behavior and which determines in part how the system performs.



Apart from any clarification gained in thinking of the oceanic milieu and legal regime, we should bear in mind that other disciplines with which we will be interacting will probably be using the systems approach. In order to appreciate their findings, we should, at least, be aware of the methods by which they were derived; if we are to engage in interdisciplinary work this may be indispensable. One such area, in which the student will necessarily be involved and in which systems analysis is becoming a vital tool, is the management of oceanic living resources.

It has been said in relation to fisheries management that "In few areas of international law is the challenge of our reason and imagination so acute; and seldom do jurists so obviously require the services of the natural sciences."<sup>57</sup> In response to the many-faceted biological and economic aspects of the

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The use of models is only one of several approaches to the use of the systems approach. See Boguslaw (1965) The New Utopians: A Study of System Design and Social Change 9-23.

For the value of models to interdisciplinary research generally see Luszki (1958) op cit, 159-162. There, at p. 162 it is noted that "The test of the success of a model is not whether it is true but whether it has encouraged research."

<sup>57</sup>Johnston (1967) New Uses of International Law in the North Pacific 43 Wash. L.R. 77, 79. Johnston's multidisciplinary and policy-oriented treatment of international fisheries law (op cit) would seem to exhaust the potential of multi-disciplinary research (as opposed to interdisciplinary) to a great extent.

fisheries, especially those characterized as international, models, both biological and bio-economic, have been used to establish a sound basis for decision-making.<sup>58</sup> Much of this model building has revolved around the selection of a management goal, usually maximum sustainable yield as against maximum economic yield. Another approach has been to construct a rudimentary social-decision model based on the concepts of applied welfare economics.<sup>59</sup> The latter treatment deals with the various "components" from ocean to consumer and tests various alternative goals, typical operations in systems analysis. Modeling, especially digital simulation modeling, has been used in an attempt to solve management problems arising out of the exploitation of north Pacific salmon stocks.<sup>60</sup> Here,

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<sup>58</sup>For a general historical account in this area see Chapman (1970) *The Theory and Practice of International Fishery Development-Management* 7 San Diego L.R.469, 409. That writer maintains on page 411 that "In essence the entire theory of fishery conservation [i.e. management] rose or fell on the accuracy and completeness of statistics [gathered for or in the course of model building] as well as knowledge of certain vital parameters of the particular fish stocks involved." It is suggested that this strongly supports our general contention that any study regarding the oceanic legal regime must include reference to the physical characteristics.

<sup>59</sup>Arnold and Bromley (1970) *Social Goals, Problem Perception, and Public Intervention: The Fishery* 7 San Diego L.R. 469, 470.

<sup>60</sup>Paulik and Greenough (1966) *Management Analysis for a Salmon Resource System* in Watt (Ed.) Systems Analysis in Ecology 215.

there is a clear case of the use of systems management to form the basis for optimizing intra- and interseasonal economic and legal decision-making. The growing predilection amongst fisheries biologists to use the systems approach in resource management seems to grow out of a number of basic characteristics of the method-- for instance, its ability to suggest policy and to consider immediate, diverse and complex problems.<sup>61</sup> The student of oceanic legal regimes, quite apart from his role in resource management, requires solutions to similar types of problems. This is not the place, however, to decide on the value of the systems approach to our study, apart from commenting that it would seem to hold promise.

At all times the concept of a prime discipline must be kept foremost. In the wonderland of interdisciplinary study especially, it provides a sure perspective and helps solidify thinking. This brings with it the need to gain a mastery of the classical works and concepts of law, especially those of international law.

#### SUMMARY

Briefly stated, we have found that the present state of both

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Dr. A. Jones, class discussion, January 1971, Rosenstiel School of Marine and Atmospheric Sciences.

the oceanic legal regime and the traditional manners of inquiry leave much to be desired. In an attempt to obtain a better perspective, we have defined as the purpose of our proposed jurisprudence, the conceptual analysis of oceanic legal regimes existant and optimal in relation to man's oceanic milieu. In an attempt to include in our analysis the physical and political realities of that milieu, we examined and found much value in interdisciplinary techniques. By this means, we learnt the value of borrowing concepts and research techniques from other disciplines. We then identified the study of science and technology as particularly important areas and examined two aspects of that study-- the prediction of technological development and the use of systems analysis. We ended by, once again, stressing the need for a firm grasp of the concepts and contents of legal regimes.

Into which of Friedheim's four boxes<sup>62</sup> will the advocate of such a jurisprudence fit? It is possible that the answer is either one. However, without anticipating the solution to one of our most basic problems, can the bias of normative nationalism or functional nationalism withstand an encompassing treatment of man's oceanic milieu?

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<sup>62</sup> Friedheim (1969) op cit, 1-32. The four types of investigator given are normative nationalist, functional nationalist, functional internationalist and normative internationalist.

The manner of inquiry set out above does not seem to correspond to past methods of studying the so-called "international law of the sea" and its poor sister "admiralty law". It may be said that such an inquiry is either impractical or alternatively that it will be extremely difficult. The former comment lies in the realm of speculation and, in view of the prize, the latter is of no consequence.

