APPENDICES

commission on the ORGANIZATION of the government FOR the conduct of FOREIGN POLICY

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Environmental and Resource Interdependencies: Reorganizing for the Evolution of International Regimes

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1. HOW WE ORGANIZE FOR PARTICIPATION IN INTERNATIONAL SCIENTIFIC PROGRAMS: THE SHORTCOMINGS OF FUNCTIONAL ECLECTICISM

No nation goes out of its way to propose the creation of international arrangements for jointly managing a resource: unilateral or bilateral methods are always preferred. Multilateral arrangements are considered only when it is recognized that a valued objective cannot be attained without them. The evolution of multilateral regimes for dealing with a scarce resource—whether this be money, clean air or water, fish, radio frequencies, or radiation safety—is thus a function of a general recognition that these goods cannot be obtained through institutionally "cheaper" arrangements. This means that no arrangement is concluded until such a recognition has occurred.

Functional Eclecticism

The United States today participates in a number of international regimes for the allocation of scarce scientific and technological resources: it is participating in a series of complex negotiations and programs designed to lead to the creation of additional ones. All illustrate the truism just stated. Tele-communications standards and radio frequencies, under ITU auspices, are gradually subjected to increasing multilateral regulation as new equipment suggests new needs. Monitoring of air and water characteristics becomes an internationally-coordinated activity under UNEP when a general concern over the deterioration of the environment becomes manifest. Coordination of R & D, under Organization for Economic Cooperation and Development (OECD), is recognized as being necessary in the field of energy resources only after oil shortages become painful. The cautious work of Food and Agricultural Organization (FAO) and World Health Organization (WHO) on the Codex Alimentarius suggests that the need for international pure food regulation is not yet fully recognized. Are we ready to trade national control over off-shore and seabed mining for unregulated rights of passage through straits? The international consideration of these separate issues suggests that the need for a comprehensive ocean regime is at least on the international agenda, though that "need" was not apparent until after diverse nations made competing claims for the same resource.

After the recognition of mutual need does emerge the regimes set up to satisfy them tend to become encapsulated in their specific tasks. They tend toward preoccupation with the technological, commercial and bureaucratic clients, interests, and characteristics which relate most immediately to the task. In short, the game is programmed *against* the possibility that new needs and possibilities implicit in the technologies being managed be permitted to emerge and be used for the greater benefit of all.

For better or for worse, the notion of "disjointed incrementalism" sums up all too accurately the process of organizing United States participation in international scientific and technological programs and management. Disjointed incrementalism has

its good sides: it facilitates our understanding of how things now happen and it therefore enables officials to advocate and plan the survival of established programs and offices while occasionally permitting innovation and expansion. But these advantages also imply a number of shortcomings which, in our opinion, are sufficiently grave to justify the elaboration of a different approach to the organization of American efforts in the realm of the international management of science and technology.

Why Functional Eclecticism Is Not Good Enough

The criterion of the goodness of any mode of making decisions must be its ability to achieve a given political purpose. Lacking a purpose, decision-making machinery is bound to reflect the logic of incrementalism, i.e., of many fragmented purposes. If we take the purpose of U.S. policy to be the fashioning of global and national institutions capable of realizing collective interests of a long-term character, a very different strategy becomes necessary. These collective interests are unprecedented: they involve nothing short of fashioning institutions and rules capable of helping us to transcend "the global crisis" in which we find ourselves. Unlike past crises, the current need cannot be simply diagnosed and treated by building alliances, waging war, engaging in economic aid programs, furthering arms control, seeking to remove commercial and financial discrimination and building institutions for conflict management. Unlike past crises our current predicament is total. Everything determines and feeds on everything else, especially pursuits and objectives which are predominantly peaceful and have been associated in the past with the forward-looking and welfare-enhancing actions of states. The predicament is total because we can no longer simply liberalize trade rules, provide for global monetary reserves, seek to diversify energy sources, contribute to agricultural self-sufficiency in Asia, protect fish stocks threatened with extinction, survey the moon, sell nuclear reactors, mine the ocean bottom, provide for standardized automobile emission equipment, etc. . . . *without doing these things jointly and in full appreciation of their complex interactions and interdependencies.* Joint action implies that the substantive links among these separate issues be formally recognized in policy-making; and this suggests a form of bureaucratic organization different from the prevailing one. It calls for a different method of identifying the unit which is to be regulated or managed and for a capacity of conceiving and planning the management of the links. Moreover, such an approach calls for consultative and planning mechanisms which select and associate actors in a manner different from the issue-specific and interest-specific pattern which now prevails.

The incremental decision-making associated with functional eclecticism recognizes interdependencies without doing anything about them. As one short-term approach seemed to come to a natural end, because the issue area in question began to collide with another which suddenly revealed its dependence on the first, the incremental mode dictated an expansion of the concern and its merger with another. But we remained locked into a cognitive pattern in which we avoided a longer-term perspective which would have raised the question of what additional issue areas the now expanded one might meet, and how to prepare for the collision. This art of foresight involved presupposes that we have a wider notion of what the collective welfare demands, what ultimate notions of welfare are to be furthered. This calls for new criteria which would allow us to specify which combinations of two or more concerns seem appropriate.

The current debate over the law of the sea illustrates this inherent failing of functional eclecticism though almost any other area of science/technology could be used to make the point. It shows that our cognitive attempts to deal with this bundle of issues have been marked by successive uncoordinated short steps, even though the ensemble to be dealt with implies that solutions adopted in one sector depend on solutions adopted in another in order to be effective. We sought successively to manage threatened fish stocks in in-shore waters and eventually elsewhere, only to collide with the nutritional objectives of developing countries. We attempted to safeguard the resources of our continental shelf only to find the tables turned on us in such a way that much of the world is in danger of becoming territorial sea. We needed larger tankers to carry more oil only to realize that the living resources of the sea can be endangered by these behemoths. We favor strong pollution controls but this objective can only be realized at the expense of the equally cherished principle of the freedom of the seas. Could not much of this have been anticipated and planned *jointly* if a less incremental mode of decision-making had been accepted, less dependent on issue-specific techniques and interests? We do not think that "ocean space" is an altogether acceptable unit for the construction of a regulatory regime and a focus for national and international organization. But we do think that if "ocean space" had been used earlier as an orienting concept the complex multifactor pattern of action and reaction, cause and effect, and feedback would have been realized before it was too late to head off the passionate

but issue-interest-specific negotiating positions we witnessed at Caracas, Venezuela.

Incrementalism favors interests which are able to articulate clear and immediate claims and groups who can demonstrate the link between these claims and the alleged national interest. In the ocean debate, fishermen, oceanographers, mining firms, the Navy, and those concerned with the balance of payments (in government and in the private sector) were recognized as interested parties. Environmentalists, nutritionists, and economic planners had to fight for recognition. Generally, only those involved with the *immediate* consequences of choices to be made are recognized as legitimate claimants. Those more concerned with the second and third-order consequences of the choices have to fight for recognition—and often fail. The result is that better informed and more comprehensive choices which could have been taken in anticipation of later (and usually unwanted) consequences have to wait for the next round of incrementally-informed functional expansion—when the damage is already done.

The piecemeal construction of more elaborate international regimes and programs inevitably results in the growth of undesirable redundancies. Some redundancies in administration are desirable: the simultaneous effort by different agencies to deal with the same problem has some of the characteristics of a fail-safe system. While we admit this we do not then come to the conclusion that *all* redundancies are helpful. Functional specialization is of course desirable for many purposes of efficient operation. It is also desirable when a given set of issues can be met best without politicizing it in the full sense of national and international controversy (as is now the case with the law of the sea). But it can be carried too far when it results in operations and activities which duplicate unnecessarily and which may even be incompatible. For instance, both FAO and WHO (and their cognates in governments) are concerned with the food-population-nutrition interface. Both sponsor research and both monitor local conditions relating to the nutritional aspects of health. More important still, both are concerned with the elaboration of agreed international standards of conduct and they do "coordinate" their activities in the form of joint committees and working parties. However, the fact remains that each approaches the interface within the set of its own goals. WHO is interested in limiting population while also working for higher life expectancies, i.e., contributing to population growth. FAO is interested in increasing the food supply and in encouraging the orderly distribution of food through regulating international commodity markets. These objectives are not wholly consistent within and between FAO and WHO. The research and monitoring done by each is subordinated to the special organizational purposes, not the common purpose of more adequately feeding a world population which is to be kept small. Would not a single system of research and/or monitoring remove some of the redundancy?[1]

II. SOME PRINCIPLES OF REORGANIZATION

When collective welfare is conceptualized in these comprehensive terms, functional eclecticism is soon shown to be its own worst enemy because it tends to over-functionalize. For the reasons given above, the bureaucratic unit created to deal with the perceived interdependency will attempt to keep under its purview all programs and activities which it considers to be linked to its mandate, whether or not such specialization advances the collective welfare. The problem, then, is how the *unit* to be monitored, studied, ruled or managed is to be defined.

We are under no illusion that institutions and policies that are appropriate to new settings of interdependence will emerge full-grown, like Athena from the head of Zeus. We know that the attainment of collective welfare objectives is likely to come about—if it comes about at all—on the basis of discrete steps, taken one at a time. What we plan to offer below is a *style of viewing* international technological and welfare interdependencies that is superior to the current approach, and which can serve as a road map on the basis of which more appropriate institutions and policies can be arrived at.

Which Unit is to be Regulated?

A few illustrations will make the point. Units to be managed more comprehensively are now defined either in spatial/physical terms or by virtue of their substantive/technological properties. Neither suffices for all purposes. Spatial definitions of the unit-to-be-regulated have been arrived at in the case of Outer Space, Antarctica, and possibly the oceans. Separate scientific-technological-commercial interests have been merged in single regimes which take physical space as their organizing frame. The same trend is now underway with respect to the weather and climate. Substantive-technological definitions have been adopted in the regimes for food, telecommunications, nuclear safety, and environmental protection. The putative energy regime being discussed now is similarly conceived, and the

[1]For extensive case material and theoretical comment on the foregoing argument see J. G. Ruggie and E. B. Haas (eds.), *International Responses to Technology*, International Organization (Summer 1975)

same may be true of efforts to deal with the world population problem. We argue that this may be adequate for certain, but not for all, purposes.

Table 1 seeks to illustrate how various ways of looking at the regulation of ocean space may all be equally valid—depending on one's purpose for regulation. It makes the point that there are no "natural units" which "self-evidently" provide a focus for integrated and comprehensive regulation or management. Yet the manner and purpose of defining the unit tends to imply the kind of regime which will be adopted. Different functions, rules and governing bodies will be set up depending on whether we focus on the technologies associated with the "unit", on the immediate results associated with the application of the technologies, on the externalities likely to be produced by the technologies, on longer-range impacts associated with the activities, or on desirable organizational and decision-making forms we may wish to superimpose on the ensemble from the beginning. Each column seeks to illustrate the kinds of consequences and concerns likely to go along with each of the technologies of current interest. If "ocean space" is not a self-evidently natural unit for the construction of a regime, what is? We may want to build world government by pieces: in that case the oceans are a likely unit because of the opportunities illustrated in the last column. But if we wish to alleviate famine or stabilize the price of hard minerals, the items listed under "extra-national impacts" suggest that an ocean regime may not be the appropriate form of world organization. How can we transcend functional eclecticism?

Why Regulate?

As long as the purpose of policy is simply to acquire more information prior to action, a func-

TABLE 1.—ALTERNATIVE WAYS OF CONCEPTUALIZING OCEAN SPACE LINKAGES

Technology	*Immediate Results of Main Activity*	*Externalities* + *positive* − *negative*	*Extra-National Impact*	*Organizational Change/ Decision-Making*
Underwater Mining (oil, manganese, etc.)	increase production	increase pollution − disturb world price system − congestion of waterways − decrease ldc income − *increase supply + *increase self-sufficiency of industrial states +	claims for exclusive national jurisdiction; change world trade system	multinationals become more national; vertical integration with ldc's declines; more complex price negotiations
Shipbuilding, Merchant Shipping (containers, LASH, OBO, etc.)	construction of large ports increase traffic	increase pollution − danger of collisions − crowding − decrease shipping costs + improve	confusion of flag and ownership issue; taxation, wages, rates: who decides?	automated scheduling and integrated land/sea service; more concentrated multi-national consortia and operations service +
Integrated fishing operations with electronic gear	increase catch diversify catch	deplete fish stocks− interfere with food chain − decrease ldc income/ employment − increase supply + diversify protein sources +	claims for exclusive national jurisdiction; special zones, quotas, gear rules	international stock management schemes; discriminatory regional rules; bilateral understandings
Marine Habitats, Parks, etc.	migration and travel construction	increase pollution − *slow urban growth +	whose nationality? territorial jurisdiction claims; tax controversies	intergovernmental negotiations for resolving conflicts and new rules
Oceanographic and Meteorological Research Equipment	increase information	better decisions on use of resources, weather, ecosystems + unequal access to data −	restriction on right to access; disputes over access to data obtained	multinational coordinated research; research by ICSU organs and/or international organizations
Nuclear Submarines with MIRVs	increase in cruising and delivery capability	*stabilize bipolar deterrence + militarize most of oceans − speed nuclear proliferation −	innocent passage, access to straits, character of straits	efforts to restrict access and create nuclear-free zones; command/control devices not needing foreign facilities of access

*These externalities might well be rated negatively for LDC's

tionally-specific, physically defined and reasonably self-contained arrangement is appropriate. It makes sense that U.N. Environmental Programme (UNEP) should be responsible for monitoring the environment and that the International Atomic Energy Agency (IAEA) should sponsor research on reactor safety. Likewise, at the national level, it makes sense to permit the various specialized bodies already in existence to engage in similar activities. Information gathering is a highly professionalized process depending almost entirely on scientific expertise. The dominance of physical or technical criteria and characteristics is therefore appropriate, including the definition of what is to be studied and/or monitored. It is true that the act of acquiring information tends to foreclose options with respect to choice later in the process. So it must be. There is no alternative once we admit that the problems caused by science and technology (as practiced in the past) can only be solved with the help of science and technology (as practiced in the future). We consider this concession to "technique" preferable to the alternative of permitting ill-informed and short-run political, commercial and military objectives to limit the scope of research and monitoring.

Functional specialization and disaggregated task performance in national and international bodies are no longer acceptable, however, once management or regulatory action involving the collective allocation of resources is to be legislated. Once research has resulted in the identification of a complexly-linked nexus of issues and relationships, units defined in spatial and substantive terms are no longer helpful or viable in determining how and where to organize activities. Separate legislation for food, the oceans, population, pollution, and energy will lead to disjointed management which ignores the feedback loops and trade-offs between the activities and interdependencies subsumed by each unit. The collective allocation of resources calls for political choices, for the ordering of priorities, for the creation of a future-oriented consensus. Hence, it makes more sense, once this need arises, for the Department of State (and the U.N.) to create a "Bureau of Resource Allocation" than separate agencies to deal with food, the oceans, population, pollution, and energy. Specialized scientific and technical inputs are necessary for such choices to be effective, but they cannot dictate what those choices will or should be.

In sum, once we admit that physical/spatial or substantive/technological definitions of issues are not equally acceptable for all purposes, it becomes necessary to develop a different set of criteria on the basis of which to conceive of problem areas and organize activities. This set of criteria should facilitate three things: (1) It should tell us when and how to *couple* what substantive issues so as to make collective legislation for an entire bundle of substantive concerns possible; (2) It should tell us when and how to *decouple* what functions performed in the service of such collective objectives; and (3) It should do so by specifying a proper mix between political choice and expert judgment so that, in (1) not everything is determined on the basis of short-term quid pro quo calculations and, in (2) the fragmentation and encapsulation of functional task performance is not repeated. As a set of general principles, then, the coupling of decision-making should be informed by scientific and technical knowledge, while the decoupling of task performance should be ordered by a hierarchy of purposes derived from that aggregation of decision-making. Furthermore, since we cannot know what future developments in knowledge will be, and since there now exists no clear political consensus concerning future needs, the institutional arrangements now constructed should make it possible for policy and regimes to "grow into" new tasks *as* new collective interests and interdependencies come to be recognized and acted upon.

Our ability to do any of this rests upon, as already stated, our developing a definition of the "issues" or "units" of concern to collective management, in terms other than their physical/spatial or substantive/technological characteristics. As a first step we propose to have a look at the activities international regimes perform, in response to environmental and resource interdependencies.

Reconceptualizing Present Forms

Before going further we must establish a convention on the use of the key terms which will dominate our discussion from this point on: task, function, purpose. The word "task" will be made to refer to the kinds of activity performed by an international regime, such as the following. All regimes coordinate activities, constrain unilateral volition, specify a set of norms for the behavior of members, make plans, provide a service, have mechanisms for the resolution of differences—these tasks inhere in the very notion of "collectivity" or "regime." None of these terms differentiates adequately among the unique "functions" that different international regimes have. "Functions," to be described presently, provide the superordinate reasons as to *why* regimes perform these tasks. "Purposes" describe more ultimate objectives of states in having functions performed, such as various ways of defining and realizing collective welfare. The main "functions" of regimes are:

1. Problem Search and Definition. We are here think-

ing of such activities as the environmental studies or science policy meetings of the OECD, and the basic research performed by or through any number of global agencies—Global Atmospheric Research Program (GARP) on weather, MAB on the relationship between man and the biosphere, LEPOR on oceanography, UNEP on derived working limits and pollutant pathways, WHO-IAEA on the health hazards of irradiated products, etc. Whether in the social or natural sciences, the purpose of these regimes is to conduct studies for the acquisition of basic knowledge about the characteristics of systems, and to search for and define emerging problems (and possibilities) within them.

2. Harmonization/Standardization of National Responses. In areas in which problems and/or possibilities have already been defined we would expect, in the first instance, national attempts at regulation/exploitation. Yet, in attempting to carry out such activities, countries may discover that they are "bumping into" one another. It may be decided that rules of the road are necessary or that a division of labor makes sense. Contemporary illustrations of this phenomenon include weather observation through the World Weather Watch (WWW), environmental monitoring through UNEP, oceanographic monitoring through IGOSS, as well as equipment standardization and performance harmonization in civil aviation (ICAO), shipbuilding (IMCO) and the use of uniform telecommunications equipment (ITU). In each case the activities themselves remain national. The purpose of the regimes is to so arrange the confluence of national responses (to problems or possibilities) that, in their collective manifestations, they make it possible for all interested actors to attain their common objectives.

3. Defining Property Rights. As developments in science and technology have made the international commons exploitable, the question of defining national/international and private/public property rights has become a pressing concern. This is now the case with the frequency spectrum, the seabed and ocean space, and will soon be so with respect to the climate and perhaps outer space. The purpose of such regimes as may be established is to delimit rights of access and exploitation.

4. Collective Elaboration of Welfare Choices. All regimes are predicated upon the definition of a purpose, but in virtually all cases the purpose of the collectivity is subordinated to the disparate purposes of national policy. As environmental and resource interdependencies become more severe, however, one might expect the emergence of regimes in which the disparate purposes of national policies are redefined in terms of the larger collectivity. Some modest instances of this may be found in, for example, the attempt to control the use of nuclear technologies and materials by means of international safeguarding, and in such limited environmental standards as have been agreed to. At the Bucharest Population Conference reproductive habits in the Third World were added for consideration, and at the Rome Food Conference the feeding of livestock in the advanced countries joined the list too—without consequence thus far in either case. If the notions of the "finiteness" or the "outer limits" of the carrying capacity of the planet have any validity, however, one would expect to see more such efforts at collective choice to emerge. The function of the regimes subsequently created would be to calculate the trade-offs among different national activities when not all can be pursued, and the collective allocation of resources among societies in accordance with such trade-offs. This function involves "management" in the sense of ongoing allocational choices.

As already suggested, the existing pattern of organization and decision-making, both domestic and international, results in the virtual isolation from one another of these four basic types of regimes. Each has associated with it its own type of client and each is governed by its own type of actor. Furthermore, within each of the four, further isolation is guaranteed by the spatial/physical and substantive/technological differentiation of regimes. The attempt to forge a systematic relationship among regimes performing similar tasks in different substantive areas is difficult, and among regimes performing altogether different tasks almost impossible—witness the problems domestic and international environmental agencies are having.

Nevertheless, having reconceptualized the tasks regimes presently perform makes it possible to indicate how those tasks might be coupled. But this depends on the acceptance of "purposes" for action beyond the performance of functions. These become more sweeping and interdependent as we move from Type 1 to Type 4.

The Context of Regimes

If we examine the circumstances under which regimes of each of the four functional types have, in the past, emerged, an obvious principle of organization stands out: they are a response to the type and degree of enmeshment or interdependence of policy among the countries concerned.

In the case of regime-type 1, it is usually not necessary to pursue problem search and definition internationally, although there may be good (financial, symbolic, ulterior) reasons for wanting to do so in particular circumstances. Furthermore, the impact of the product of the regime on the domestic

realm of members is not automatic. Before there will be such an impact a domestic actor has to seek to make use of the product (if, for example, it is scientific knowledge) or otherwise introduce it into the domestic policy domain (if, for example, it is a set of findings about the comparative advantages of different R & D strategies).

With respect to regime-type 2, the opportunity costs of not harmonizing or standardizing equipment or performance internationally may be very high, either in a monetary sense or because interference, inefficiency of operation or even disaster may result. Furthermore, the link between the regime and the domestic realm is more direct, for a set of rules for harmonization/standardization may mean profit or loss for a domestic industry or political ascent or decline for a domestic agency.

As for regime-type 3, the attempt to unilaterally define international property rights will lead to retaliatory acts by others, the consequences of which cannot be predicted by anyone. The chances are that it would lead to short-term gains for the most powerful but long-term losses for all. Hence, the international regime is a response to such constraints and contingencies. Furthermore, the link between the output of the regime and the domestic domain is direct, for what becomes international property can no longer be national property, and the number of domestic actors affected is likely to be high.

Lastly, with the case of regime-type 4, the realm of domestic behavior or domestic life-styles of others is reached. What a society can or should do domestically is the issue at stake—whether it concerns the domestic use of a technology, modes of industrial or agricultural production, waste disposal or land use, reproduction, or consumption habits. The interdependence of many kinds of policies becomes complete.

As suggested above, we are likely to reach this fourth level as "the outer limits" of systems are approached. If and as we do, and if and as intersectoral and inter-societal trade-offs become necessary, then a legitimate hierarchy of purposes clearly emerges, which allows us to conceptually and institutionally subordinate the four types of regimes, one to the other. The fourth would, of course, be in the dominant position, and the remainder successively subordinated to it. But even if the fourth level is not reached, there are clear instances in which superordinate-subordinate relations *now* exist among regime purposes and/or in which we can expect such relations to *emerge* over the course of the next few years. How can we know that? By looking at these regime types as being ordered on an ascending scale of politically recognized interdependencies. The basis for conceptual and institutional aggregation, then, is existing and anticipated policy interdependencies.

III. ORGANIZING FOR THE EVOLUTION OF REGIMES

We have described in ascending order of complexity the various functions and tasks which collective arrangements in the fields of science and technology carry out. The guiding principle of the order is the extent to which the activities of nations become enmeshed in one another as each nation seeks to maximize the physical and social welfare of its own citizens. And the criterion of complexity is the extent to which inter-sectoral and inter-societal trade-offs become necessary and the creation of hierarchies of purposes for collective arrangements is called for as a result. We do not wish to deny that ultimately everything is probably dependent on everything else, cognitively and practically. Macro-systemic attempts to understand linkages, to model and to simulate them, are praiseworthy heuristic exercises. The efforts of the Club of Rome in pushing us toward international planning at a very comprehensive level focuses concern upon the overarching purpose of making and keeping the planet habitable. However, such efforts do not provide a viable basis for the design of international regimes. Our understanding of the linkages remains fragmentary. Differences over the sharing of benefits and dangers will always exist. Tasks and functions cannot be performed or rearranged unless there is some semblance of consensus on the horizon regarding the meshing of purposes, even in the absence of definitive agreement. Lastly, the generation of global responses to global problems need not necessarily take the form of global institutions at all. We, therefore, take as our point of departure some likely areas within which the meshing of purposes is beginning to take place, and propose the rearrangement of tasks and functions on the basis of emerging policy interdependencies.

A depiction of *existing* regimes will suggest how to put these general principles of organization to work in the design of *future* regimes.

Existing Regimes

The major instances of existing international regimes in the fields of science and technology are summarized in Table 2. As the demonstration there makes clear, a regime need not be lodged in a single international organization, or indeed in *any* international organization. Typically, the existing regimes involve several international organizations, some at the regional and others at the global level. At the same time, there exists a considerable number of bilateral and multilateral regimes in which transgovernmental mechanisms, such as joint consultation, take the place of formal organi-

zations. Three other patterns also appear which must be noted.

First, the tendency toward "functional eclecticism," which we have already described and criticized in general, reappears here in concrete form, and the problems attending this mode of management, too, can be demonstrated more concretely. Physical/spatial and substantive/technological definitions of the "area" of international interdependence now delimit regimes: environment, oceans, food, energy, mineral resources, and so forth. Note, however, the *actual* relationships among the regimes so defined: (1) Moving horizontally, from left to right, from one regime-type to another which incorporates more elaborate joint purposes, the original conception of the "area" of interdependence has progressively less to do with what really makes regimes hang together. For instance, the extent to which actual fisheries *management* is beginning to emerge is due to recognized interdependencies in employment, trade, and nutrition policy—not in "the oceans." (2) Attempting to move, horizontally, from right to left, in the coherent execution of tasks, is problematical since the relationship among regimes and organizations is often either random or does not exist at all. Functional autonomy seems to prevail. (3) Lastly, there is now no coordination worth mentioning among regimes within the same regime-type (columns): the proliferation of problem recognition and observational activities, as an illustration, speaks for itself.

Second, there exist two distinct clusters of regimes, those adopted by market economy advanced industrial countries and those which attempt to link them to LDC's. Two partial sets of exceptions might be mentioned. The Soviet bloc maintains its own regional arrangements for regionally recognized interdependencies and participates only marginally in the global ones. And there is a tendency emerging among LDC's to attempt their own approaches and arrangements, although it is not yet clear how lasting these efforts will be or what form they will take.[2]

Third, and to the surprise of no one, the making of collective welfare choices internationally is rudimentary at this time. It is barely beginning to take shape in the case of food allocation and fisheries management, while in the case of environmental standards, a notable difference of commitment exists between the global and regional (North Atlantic) levels (with the exception of IMCO conventions on marine pollution). To a limited degree, such choices are being made in the public health field. To the extent that collective welfare choices are beginning to be made, however, *they result from one or another of two superordinate purposes: the global redistribution of income, goods, and services (from North to South); and the improvement of the quality of life by controlling those characteristics of science and technology which undermine it.* Obviously there exists no agreement on either of these. Yet, by more fully elaborating these two superordinate concerns and by incorporating the lessons learned from the study of existing regimes, it is possible to sketch out some policy areas within which negotiations are beginning to take place and to offer some frameworks for the design of relevant future regimes within which hierarchies of purposes can emerge.

[2]Worth citing, in this connection, is the recent "Cocoyoc Declaration," adopted by participants in the UNEP/UNCTAD *Symposium on 'Patterns of Resource Use, Environment and Development Strategies,'* Cocoyoc, Mexico, October 8–12, 1974.

Future Regimes: What to Couple with What

The two superordinate concerns which now are beginning to cut across virtually all existing regimes both involve many sectors of science and technology. Both are inextricably involved with the world economic system. Both involve all four regime-types at this time. What, then, should be linked with what? Our proposals are based upon two general rules. First, those functions and activities should be linked which are now seen, or soon will be seen, as being related *in the pursuit of a common purpose.* Second, "to link" does *not* necessarily imply immediate institutional restructuring. Where common purposes are slow to emerge, it makes sense to design international institutions in such a way as to facilitate more rapid problem recognition and cognitive linking among different policy bundles. These cognitive frames can become designs for the organization of programs and activities as common purposes come to be discovered and defined.

Thus, by examining the patterns of policy interdependencies which are beginning to be recognized, it is possible to specify four distinct clusters of future functions and tasks:

IMPROVING THE QUALITY OF LIFE (REGIME A)

We propose that those nations now recognizing, or on the threshold of recognizing, that the improvement of the quality of life involves potentially sharp changes in the pattern of industrial/economic growth, consumption of energy, use of raw materials, urbanization, transport, innovation and decision-making—but in a setting in which population growth is no longer a problem—set their own pace with respect to the tasks of coordination, constraining unilateral action,

TABLE 2.—EXISTING REGIMES

	Regime Types *Functions carried out by:*				
Internationally recognized interdependence "area"	*Problem Recognition and Research (1)*	*Standardization, Measurement, Observation (2)*	*Property Delimitation (3)*	*Collective Welfare Choices (4)*	*Other Regimes Being Discussed*
Environment	UNEP, OECD, EC, IMCO, IOC, SCOPE, SCOR, UNESCO (MAB), ICAO	UNEP, IMCO	OECD, EC, IUCM, IMCO, ICAO	Marine pollution standards (global); european regional standards (for a few pollutants)	LDC's splitting from UNEP into HABITAT
Food (incl. fish)	FAO, WHO, NGO's foundations fisheries comm.	FAO, WHO fisheries comm.	Commodity agreements: fisheries comm.	Fish (by species and regions); surplus disposal rules; marketing some commodities	Decentralized world food reserve and allocation tied to productivity program
Energy	OECD, EC, NGO's foundations	EC	OPEC	Oil production	Importers' arrangements tied to monetary policy
Mineral resources (non-energy) and Water	UNESCO (IHD) foundations	ICSU	none	no	Exporters' discussing cartels
Population	UN, WHO, NGO's foundations	UN, WHO	none	no	—
Nuclear Energy	IAEA, EC	IAEA, EC	none	Nuclear materials safeguarding	Trend toward merger of two regimes
Public Health	WHO, IAEA, FAO	WHO, IAEA	WHO/FAO	Radiation safety standards; Codex Alimentarius; International Pharmacopeia; epidemic control	no
Telecommunications	ITU, INTELSAT, UN, COSPAR	COSPAR	ITU, INTELSAT, UN	Uses of outer space	Resource satellites
Oceans	UN, IMCO, UNCTAD, UNEP, FAO, ITU, ICSU, IOC	UNEP, IMCO, ITU	IMCO	None since a breakdown of Geneva regime	LOS discussions now
Weather, climate	WMO, ICSU	WMO	none	no	Rules for permissible experiments
Application of S/T to economic and social development	UN, UNESCO, UNIDO, IAEA, OAS, OAU, IBRD	none	none	no	LDC discussion in terms of protecting *national* rights to access and exclusion
Pure research	CERN, UNESCO, ICSU	none	none	no	
Social-economic planning	UN, ILO, OECD, IBRD	UN, ILO, OECD	none	no	Using UN research centers for evaluation of DD2
Global trade and economic development	UNCTAD, IBRD, FAO, GATT, OECD	UNCTAD	UNCTAD, GATT	no	Using UNCTAD to link to commodity trade
Global trade and money	IMF, UNCTAD, EC, OECD	IMF	IMF, EC	Special drawing rights	Link to commodity and fuel trade

specifying norms of behavior, and providing common services. In short, we propose that the OECD countries focus their attention on OECD as the forum for jointly making collective welfare

choices, for managing the set of interdependencies captured by the environment/energy/-growth/trade/money nexus. In so doing, they will keep their effort separate from similar interests in the Soviet bloc, but the U.N. Economic Commission for Europe might renew its tarnished lease on life if it can serve as the link between the Western and the Eastern blocs of the North. The effort of the OECD countries will thus be regional in nature. It may set the eventual pace of the LDC's, but it should not wait for them.

Speaking in functional terms, this regime would be of Type 4; it would make management and allocational choices. It would properly subsume and include the problem-recognition function already carried out by OECD. It should acquire those functions of harmonization and standardization which contribute centrally to the success of management but which are now dispersed among various agencies. However, such coupling need not be carried to the point of actually merging other regional agencies with OECD. The work of the European Space Organization, for instance, is properly self-contained, as is the European Center for Nuclear Research's (CERN). As long as these tasks are performed within the context of a regional management concept, the execution of the specialized functions can be left separate.

GLOBAL ENVIRONMENT (REGIME B)

Global environmental concerns are not now susceptible to collective allocational choices because of the sharp division of opinion of whether the costs of management will penalize the economic development of the LDC's. However, the opportunity is at hand for the more systematic scientific and political discussion and investigation of the issue, provided the redistributional aspect and its trade/money manifestations are explicitly linked to the effort. Hence we propose a U.N. regime for the environment which includes these social and economic dimensions. The function would not be of the management type *now*, though the regime should be so built as not to foreclose its evolution. It is also too early to speak of defining an international commons. However, it is not too soon to so construct the research, standardization, and harmonization functions as to facilitate progress toward the redefinition of property rights. Some of the institutional consequences of this suggestion would be the merging of certain activities of FAO, WHO, UNDP and IBRD with those of UNEP.

FOOD AND POPULATION (REGIME C)

Global redistribution and/or development is clearly related to population growth, and to the adequacy of local agricultural production and the existence of an equitable agricultural commodity trading system. It is also dependent on the ability of LDC's to earn from trade the foreign exchange needed to finance commodity, energy and fertilizer imports. Agricultural productivity seems closely intertwined with overall economic and social changes, including industrialization and urbanization. Thus, systematic efforts to spur the application of new and old technologies to economic development closely interact (directly and indirectly) with food and population policy. Hence we propose that these links be overtly recognized in international programs to (a) deal with food shortages, (b) stabilize commodity prices and supplies, (c) apply science and technology to development and (d) deal with population growth. This means that *separate* international programs for diffusing technology (UNESCO, ACAST, IAEA, UNIDO), controlling population (WHO), increasing agricultural productivity (IBRD, UNDP, FAO), dealing with stocks and surpluses (fisheries commissions, FAO, WFP) are worse than useless: they are mutually self-defeating.

It is probably not possible to speak of redefining property rights in this area in the absence of prior agreement on a management concept, with the possible exception of the weather and climate. It is probably also too soon to elaborate such a concept now. Hence the work of the regime should lead to the faciliation of efforts which would result in the formulation of such a concept in the not too distant future. Problem recognition and harmonization of policies, carried out now under the auspices of many agencies and programs, can then be combined or left separate, depending on the direct dependence of the allocational choices on such services. Again, not *everything* relating to food, population, commodity trade, and SDR's requires centralization.

ENERGY AND MINERALS (REGIME D)

A third U.N. regime would address the redistributional issue evoked by world energy supplies and prices, the search for alternative energy sources and its potentially disruptive impact on the growth of LDC's, the trade-offs to be worked out between trade concessions the North offers the South in exchange for the stabilization of non-agricultural commodity markets. This also involves the use of technology for development and resource planning, and an equitable compromise between the rapid introduction of new technologies (e.g., earth resource satellites and sea-

bed mining equipment) and the protection of established markets for raw materials exporters. This regime would also include the matter of when, how and under what safeguards nuclear reactors should be installed in the search for new energy sources.

This exercise in regrouping international regimes has deliberately omitted those functions and activities which need not be regrouped in order to achieve superordinate purposes.[3] Many of the activities relating to pure research, to telecommunications, and to public health have little inherent rapport with these purposes. Hence there is no reason to disturb their functional specialization and character. We are thus left with a residual category of existing regimes, of all four functional types, which ought to be serviced in much the same fashion as in the past. This is true notably of the epidemic control activities of WHO, the meteorological intelligence of WMO, the aircraft safety standardization of ICAO and the telecommunications policies of ITU. However, this is not to say that the implications and findings of these self-contained functions should not be *utilized* in the more holistic approaches of the major regimes proposed.

Moreover, there are some functions and activities which are now in the process of being coupled which should probably be *decoupled.* Most important are the efforts which are now tending toward the creation of new "international commons," legal arrangements which would eliminate or restrict national (and private) property rights in favor of international (and public) authorities. The oceans debate illustrates our point. The point of the negotiations is to create a new commons while preserving an old one, by limiting the transformation of large parts of the seas from a public into a set of private goods. As such, however, it couples a set of aims, pursuits and technologies which ought *not* to be coupled. The significance of fisheries management, as already noted, is due to its links with employment, trade, and nutrition—not the water. The importance of manganese and oil relates to industrial activity, trade and monetary policy—not the water. The same is true for shipping, marine pollution, and underwater cables. Subjecting the oceans to a multi-purpose regime aggregates according to a faulty principle and may result in an irrelevant commons.

If there *were* agreement today on the overarching links between ocean resources, development and trade, the proper management principle would be the incorporation of ocean-related economic activities in a global development program, not in a comprehensive International Seabed Authority. In the absence of such an agreement it makes much more sense to keep these concerns decoupled, under the aegis of several authorities and regimes and to create a Seabed Authority with restricted powers, in the hope that disaggregation now would permit reaggregation at some future time. Premature aggregation is likely to call into being bureaucratic and commercial interests organized around the "wrong" focus, but becoming so strong as to prohibit reorganization later. Much the same case can be made for the weather and climate in the context of discussions leading toward the creation of an international commons for the atmosphere.

This poses the more general issue of where, on principle, decoupling can and should take place.

Future Regimes: Where to Decouple

Some functions must go along with superordinate purposes but many need not. If they can be made to serve many purposes and if they do not uniquely serve the programs and organizations in which they are now found, there is no need to keep them there. Why should MAB be in UNESCO? Or UNISIST? Must LEPOP be in the U.N. system at all instead of being coordinated by ICSU? Why must FAO do its own work on plant genetics? Thus, for those instances in which a superordinate purpose does *not* exist, and for which we have *not* proposed an overarching regime, we suggest the following organization:

PROBLEM RECOGNITION AND RESEARCH

We do not think that the reasons for centralizing problem recognition and research functions in the United Nations are very persuasive. Problem-recognition is primordially the task of experts who are already organized into a complex international network of nongovernmental organizations, working groups, and invisible colleges. We believe that problem-recognition in the context of environmental and resource interdependencies can be best handled by the following mechanisms:

(1) A network of international systems analysis institutes staffed by specialists from the natural and the social sciences, whose work could be made available regularly to the operating regimes and institutions of the global and regional systems. These institutions would of course respond to requests for certain kinds of investigations which may be made by the political and coordinating organs of the regimes. Such a network could take the place of similar operations in the OECD and in such U.N.-affiliated bodies as UNRLSD, the U.N. Institute for Training and Research (UNITAR), and the Center

[3] In this discussion we have drawn upon suggestions contained in a confidential memorandum of the Dag Hammarskjöld Foundation (Taljöviken discussion paper no. 5, November, 1974).

for Programming. The International Institute for Applied Systems Analysis in Vienna is one possible model.

(2) Problem-recognition activities which are specific to the concerns of the major regimes (food, commodity trade, mineral depletion, and energy consumption) should be linked more tightly to the decision-making bodies and fora associated with the regimes, but need not therefore be centralized bureaucratically within them. In fact, such activities as are now carried out within FAO and WHO, for instance, might well be removed from them because of their tendency toward over-specificity. The research connected with them could be delegated to national institutions supervised by appropriate working parties or committees of ICSU, or of international professional associations. This mode of organization is illustrated by GESAMP. Large-scale internationally coordinated research projects, such as MAB and LEPOR, need not be associated with a specific international organization. Both serve as problem-defining and problem-mapping operations necessary *before* consideration can be given to the creation of new international commons arrangements for the protection of the biosphere, so that their results should be reported to the Global Environment Regime. Their work can be coordinated by ICSU and the IUCN, however.

(3) International information systems (e.g., UNISIST and IRS) should be organized by ICSU and put at the disposal of national and international operating agencies.

HARMONIZING AND STANDARDIZING

Many activities related to harmonizing national practices (in monitoring, aviation, shipping) are specific to one or more of our regimes. Many more are properly specific to the minor regimes which have a low enmeshment potential with respect to collective welfare purposes. For example, ITU, WHO and WMO activities in this realm, already largely decentralized to their national and professional components, should be left as they are. In other instances, such as satellite exploration and development, what is needed are "right-of-way" rules which enable each interested party to conduct experiments without infringing on the rights of others. For the proper functioning of our energy/food/mineral regimes, what matters is the *information* about weather, soil erosion, and mineral deposits that these satellites produce; the *activity* itself can be carried out autonomously.

This, however, is not true for all such activities. Environmental monitoring which involves specific measurements at designated spots, or observations concerning energy usage or food production may call for closer integration into one or the other of the major regimes. This would entail the standardization of practices and the harmonization of equipment and procedures specific to an agreed international task. While the actual operations could still be decentralized nationally and/or regionally, the instructions governing the operations should be centralized. The WWW is one model we have in mind. A similar model may be appropriate for the coordination of national food reserves policies under Regime C.

PROPERTY RIGHTS

What, then, about the function of considering and creating new property rights? This shades closely into the comprehensive allocational choices and is often part and parcel of such choices, as in the Law of the Sea negotiations. We are impressed by the harm which can be done by premature definitions of international commons, premature because the trade-offs between rival purposes and aims have not been properly calculated and negotiated. We therefore urge that this function *not* be attempted comprehensively in the absence of explicit debate about superordinate purposes. Such debates could be enhanced by the provision, in the proposed international systems institutes, of special "look out" staffs whose job it will be to do the necessary intellectual reconnaisance of the costs and benefits of alternative definitions of property rights. No special regime is required for this.

Centralized Confrontation and Decentralized Action

In offering these suggestions for the organization of international regimes, we explicitly acknowledge and accept two sources of tension which are inherent to the enterprise. The first is the ever-present contradiction between the need of states to respond collectively to problems and opportunities that developments in science and technology pose, and their desire to maintain national autonomy and flexibility in so doing. The second is the pull between scientific choices, which are heavily informed by consensual knowledge of cause/effect relations, and political choices, which are heavily informed by normative purposes and negotiated priorities. Rather than avoiding these two sources of tension, we have deliberately incorporated them into our proposals.

It is obvious that any attempt to couple international activities which have grown up separately as a result of functional eclecticism will trigger controversy as to priorities. It forces a confrontation of national purposes which are now at loggerheads. It leads to collective political choices. Political choices

(and non-choices) are by definition holistic: they call for or result in the decision to take away resources from some sectors or some actors in order to bestow them upon others; they are also holistic because in shifting resources decision-makers perforce work out priorities as to which aspect of the collective welfare they wish to stress or slight, which purpose to further or to constrain. We thus accept that fundamental allocative choices are political choices. We further accept that in a growing number of instances they need to be made collectively.

At the same time, we have sought to focus this collective politicization by two means. We have, first of all, distinguished between the need to make collective decisions in certain areas from the institutions through which collective actions are carried out. Our motto here has been "centralized confrontation and decentralized action," referring to permanent discussions and negotiations as to which regime is to get what resources, together with flexible strategies of implementation. And we have further focussed the confrontational aspect on the redistributional and environmental domains since they attract more shared interest than any others which might be suggested. Our aim has been to make sure that separate sectors are discussed jointly, and that in the process of bargaining priorities for action emerge. Once done, however, the actual implementation of programs need not be centralized bureaucratically. Thus, centralization of decision-making increases politicization because it forces the confrontation of dissimilar objectives; decentralization of action, involving scientific knowledge and technological constraints, permits a subsequent lessening of controversy.

Second, we have sought to so construct the problem-recognition and standardization functions as to highlight the need for scientific knowledge in making more holistic political choices. Scientific knowledge will never be a final or conclusive basis for political choices. But, at the same time, scientific knowledge can elucidate political purposes and facilitate those choices, and thereby ultimately remove issues from *uninformed* confrontation. Thus, we have deliberately suggested the mingling of knowledge and purposes, of scientists and their networks with the more political interests which now dominate decision-making.

Will such a cognitive reordering not simply raise to the level of intensive international political controversy some matters still modestly flowering within the shelter of technocratic and transgovernmental decision-making processes? The cognitive reordering is already well launched. The intensive international political controversy over the already linked issues of resources, environmental protection, re-allocation and the management of technology is a patent fact of life. There is no way of interpreting the epochal international conferences since the 1974 Special Session of the General Assembly except as the opening rounds in a long bout over the reallocation of everything valued. In this long bout, the United States has become the leader of the opposition, as Daniel P. Moynihan so aptly put it.[4] Disregarding some of the maxims of innovative regime construction that we suggested has been one of the reasons why so little progress was made at the Law of the Sea Conference. Certainly, by adopting the perspective we have urged, political controversy is not going to decline in the foreseeable future. On the contrary, as more issues are discussed jointly, the stakes will rise for the "tyrannical majority" and the not-so-loyal "opposition." Their mutual interdependencies, however, will not wither away. And so a new set of rules of the international resource and welfare game will painfully evolve. We, like Moynihan, hope that new perspectives including that suggested above will make it possible for the United States to influence those rules in such a way as to enhance everyone's welfare.

[4]Daniel P. Moynihan, "The United States in Opposition", *Commentary* (March 1975).