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Management Problems in Common Property Resources X

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ABSTRACT

Marine fisheries are a common property resource which, because of the special biological characteristics of the resource, must be managed in multiple and often antagonistic jurisdictions. To clarify the management options peculiar to fisheries resources, a typology of common property resources is developed. The typology is then applied to Chesapeake Bay fisheries as a demonstration of the typology's usefulness in examining institutional arrangements in fisheries management.

Institutional and Jurisdictional Constraints
in Fisheries Management

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One of the most persistent problems in discussing common property resources is that of definition. The term itself is understood to have varied meanings, depending upon both the type of resource under discussion and the orientation of the discussant. Thus an economist views the common property aspect of fisheries quite differently than the political scientist; they will each have yet another view of the common property aspects of range management. *Biologists' views?*

In this paper, I propose to accomplish three objectives: first, to elaborate upon a definition of common property resources; second, to develop a typology of common property resources with an emphasis on fisheries; and, third, to apply that typology to the Chesapeake Bay fisheries as a demonstration of the typology's heuristic usefulness in examining institutional arrangements in fisheries management.

COMMON PROPERTY RESOURCE: DEFINITION

The definition of common property resource relies upon either economic grounds or legal (i.e., political) grounds which rest upon notions of property. Typically, the economic definition evokes a resource subject to unlimited access by all users. Each independent user then produces externalities which have a negative effect upon other users; these "externalities are technological relationships and not matters of law or institutional management" (Dorfman, 1974:6). This open-access resource

is "used, if not necessarily owned, in common by all the members of the community. Neither exclusion nor discrimination is permitted with respect to its access" (Fisher and Krutilla, 1974:38). While property rights have significance, they do not define a common property resource; the "distinguishing feature of a common property resource is that it transmits influences directly from one economic agent to another" (Dorfman, 1974:7). Thus the concept of externality--that use by one diminishes the resource for another--is the economic basis for a definition of a common property resource.

Other economic definitions of common property resource rely more heavily on an understanding of accessibility. The term "relates specifically to the conditions governing access to the resource, not to the nature of the owners or of those who exercise control over the resource" (Christy, 1975:697). Thus public property may be common property (e.g., recreation lands that are free) or not (e.g., grazing land managed by the Bureau of Land Management in the United States); even private property may be common property, as when a public right-of-way or footpath exists across privately owned land. Christy (1975:696) lists four characteristics of common property resources:

- A. It is a natural resource whose flow of services has economic value.
- B. The flow of services is treated as indivisible.
- C. The flow of services can be used by any individual economic unit within a group of economic units.
- D. There is no agent that controls access within the group of economic

units to the flow of services from
the resource.

In addition, common property usually "exists where the costs (social, political, or economic) of acquiring and enforcing rights of property are greater than the benefits that can be obtained" (Christy, 1975:698).

Despite the hopes of economists, the concept of common property can not be defined without a consideration of property rights and their allocation. The preceding quotation assumes that property rights exist but the cost of asserting them is too high. There are viewpoints that insist that some forms of property are immune from acquisition.

The earliest modern writer on property is Hugo Grotius (1608) who wrote The Freedom of the Seas. In this essay to justify the Dutch trade in the East Indies, he distinguishes three kinds of property: res nullius, which is no one's property but can be acquired; res communes, which is anyone's property and cannot be acquired as personal property; and res publica, which is public property (Grotius, 1608:22). A fish captured on the high seas is an example of res nullius, because no one owned it but by capture it becomes the captor's property. The air is res communes because it cannot be captured or occupied. Grotius writes that the sea is also res communes because "it is so limitless that it cannot become the possession of anyone and because it is adapted [by nature] for the use of all" (Grotius, 1608:28); this distinction of being limitless is important in defining modern fisheries rights because our present concept of "freedom of the seas" is based explicitly on Grotius. Res

publica is then the "private property of a whole nation" (Grotius, 1608:30), such as the national sea shore.

What we label as "common property" is therefore not one but several kinds of property. The fish caught on the high seas becomes its captor's property by virtue of his labor; no nation or individual could lay claim to it prior to the capture. This lack of ownership, however, resides not in the fish but rather in its location. The same fish caught in a Scottish lord's salmon stream is private property before the first line is cast, which is why fishing rights in salmon and trout streams may be leased. Had the fish traveled instead into American waters to spawn, it would have belonged to the state in which it was found and its capture bound by numerous state-imposed restrictions such as seasons, licenses, and gear. However, our peripatetic and biologically unlikely fish may have swum into waters whose fishing is assigned to a tribe of Native Americans, in which case it would become the property of the entire tribe rather than of one individual. Thus we cannot casually label a fish as a common property resource: it may be res nullius, res communes, res publica, or simply private property, depending upon where it is found, how it is caught, and by whom.

A new concept of "common heritage" takes the issue of property further. This idea, first espoused by Arvid Pardo, Maltese Ambassador to the United Nations, defines some property as the common heritage of mankind. It is therefore everyone's property (and since it is already owned, cannot legally be appropriated by any one individual or state) and should be

subject to joint management ^{not in citations} (Kent, 1977:242-243). Pardo was calling for the common heritage to apply to the sea resources that are outside national jurisdiction such as the mineral deposits and fisheries. "The common heritage idea should be understood as a wholly new concept of property rights, a modern alternative to the traditional ideas of exclusive ownership or of free and unlimited access" (Kent, 1977:244). Proponents feel this new idea is necessary because changes in environmental pressures and resource availability makes old ideas of property obsolete.

How then, are we to define common property resource? The term "seems to be a catch-all concept for a variety of essentially different circumstances that require different definitions and formulations" (Dorfman, 1974:9). However, there is general agreement that such a resource is both limited and has a pool of users whose access has not been restricted. The problem of commons management arises when this pool of users is larger than the resource can permanently bear. To go beyond this general understanding, a typology of common property resources should be of more utility as a heuristic device to direct management initiatives.

TYPOLOGY

There are three factors which have a major impact in classifying common property resources: the scale of the endeavor (i.e., the size of the user pool); the property right involved (transferable or non-transferable, exclusive or non-exclusive [Regier and Grima; 1985:853]); and the nature of the resource.

TABLE 1: A TYPOLOGY OF COMMON PROPERTY RESOURCES

Scale of User Pool	Property Right	Nature of Resource
Traditional (internal control, little external control)	Non-transferable - Exclusive	Stationary - Renewable
<u>or</u>	<u>or</u>	<u>or</u>
Localized (external political control)	Non-transferable - Non-Exclusive	Stationary - Non-renewable
<u>or</u>	<u>or</u>	<u>or</u>
Regional (external political control)	Transferable - Exclusive	Fugitive - Renewable
<u>or</u>	<u>or</u>	<u>or</u>
National (internal political control)	Transferable - Non-Exclusive	Fugitive - Non-renewable
<u>or</u>		
Multinational (little internal or external control)		

itself (stationary or fugitive, renewable or non-renewable) (See Table 1: A Typology of Common Property Resources.)

Scale of User Pool

While the scale of the endeavor is not strictly synonymous with political jurisdiction, the two are intertwined. At one end of the scale are small, self-contained communities such as were once found in medieval Europe and are now virtually restricted to developing countries. In these communities the traditional commons system (Cox, 1985c; Gonner, 1966; Hoskins and Stamp, 1965) has the most chance of success (Berkes, 1981; Berkes and Pocock, 1983; Berkes and Pocock, 1981, Ruddle and Akimichi, 1984; Ruddle and Johannes, 1985). At the opposite end of this scale are the virtually unrestricted user pools comprised of users from many nations and ethnic groups. These user groups have little formalized political control, largely because the resources they use are outside political jurisdiction. High seas fisheries are, for example, accessible to any user with sufficient capital; restrictions which may be imposed by non-democratic governments on their citizens' participation in the fishery are not limitations on access per se but rather are limitations which would be imposed on a particular individual regardless of his activity. In this category, restraints and management restrictions of any kind are difficult to apply because of a lack of agreement among participants, a lack of political jurisdiction, and the extreme difficulty of consistent enforcement.

Between these two extremes lie a wide variety of user pools. Others include localized user pools that are part of a

wider political community which impinges upon use of the resource. Fishing towns such as Gloucester, Massachusetts, in the nineteenth century are an example of this level of user pool. Access here is rarely restricted because the user pool from any one community is small compared to the resource; the resource becomes endangered by the combination of many such user pools. Here restraints are often self-imposed (Berkes and Pocock, 1981; Pringle, 1985).

A fourth possible category is the regional user pool which is, once again, controlled by an external political community. Examples of this category include river basins, large coastal areas such as the New England region of the American eastern seaboard (Dewar, 1983), or interstate regions such as the Chesapeake Bay area. Political jurisdictions overlap in this category; for example, resources within the Chesapeake Bay area are controlled by three states, the District of Columbia and the federal government. These overlapping jurisdictions generate complex management problems which require innovative institutional arrangements (Cox, 1985a).

A fifth category is the national user pool; this community of users has an internal political control in that the users are drawn from throughout the political jurisdiction exercising control. Visitors to national parks come from the entire nation and the regulations they face have been devised by a national process, unlike consumers of municipal water who are constrained by state and federal regulations as well as their own municipal ordinances.

These discussions of the scale of the endeavor are not exhaustive; a variety of other categories exist. The possibilities lie on a continuum rather than presenting a finite number of discrete points. The complexity of the management problem is directly influenced by the scale of endeavor and its relationship to the type of resource and the type of property rights involved.

Property Right

Academic discussions of the legal niceties of property law do little to illuminate the practical concerns of common property resource management (Johnston, 1965:303). Regardless of how the property rights have been generated--and even if they do not exist in law but rather only in custom--what matters in management is the practical application of those rights. Regier and Grima (1985), following Dales (1975), have devised a four-part schema of property rights together with its management implications (See Table 2: Property Rights).

Rights are either transferable or not. Transferable or individual rights are saleable for goods or money, or are subject to bestowal and removal for services rendered. Non-transferable rights have been removed from individual control and rest with the government or with the community of users. These rights may be assigned to individuals but the individual may not transfer the right to another. For example, in a medieval village, the right of access to a common was attached to the property within the village. A householder could not sell his right to use common pasture and still retain his house and property. The house could be transferred, thus inevitably transferring the

TABLE 2: PROPERTY RIGHTS

Transferrable	Rights to use administered by government with a centralized bureaucracy, regulatory boards, courts	Rights to use privatized in part and administered by a community of users	Rights to free access to community resources in tradition of individual stewardship	Rights to free access to common property, in tradition of untrammelled exploitative use
Transferrable	Rights to legitimate use exchanged for money in a free market institution	Rights to legitimate use exchanged by informal bartering openly in public	Rights to use conferred through a patronage establishment, publicly condoned	Rights to uses purportedly exchanged, but fraudulently, by criminal swindlers

Exclusive right

Nonexclusive right

Source: Regier and Grima, 1985:853.

right to common, but the right to common was not severable (Gonner, 1966:3-4).

Similarly, property rights may be exclusive or non-exclusive. Exclusive rights imply a limited access to the resource; grazing permits for public land are exclusive in that only a limited number are issued, and access to public grazing is restricted to those holding permits. A non-exclusive right gives access to the resource to a defined pool of users rather than to individuals; any city resident may use the municipal parks. Access to high seas fishery is virtually unrestricted; therefore, the right to exploit these fisheries is at present non-exclusive.

The management implications of property rights are considerable. A non-exclusive, non-transferable right is not, by definition, susceptible to political management. For some resources, such as open-seas fishing, there are no legal property rights at all attached to the resource. Therefore, to initiate any management program, we must first create a property right in the resource. To accomplish this, political jurisdiction of some sort must be imposed upon the resource. In the case of high-seas fisheries, this entails extending political jurisdiction of some nations out into the open seas. The "common heritage of mankind" proponents would have us give this jurisdiction to all nations; others argue for extending the jurisdiction of only the coastal states. However we decide, the simple recognition of the type of property right involved begins to direct our managerial options.

Nature of the Resource

Resources may be categorized as stationary, such as forests, mineral deposits, and oyster beds, or fugitive as in wild game and most fish stocks. They may also be considered renewable, such as fisheries or forests, or non-renewable, as are minerals. Each category generates a set of management issues.

Stationary resources are readily identifiable and rarely is their ownership open to question. Oyster beds, since they rest on state-owned bottoms, belong to the state. National forests are managed by federal agencies; private forest lands are harvested by the corporations which own them. Government may regulate private resources for the good of the political community but the ownership and control are clear.

In contrast, fugitive resources may span several political jurisdictions and are difficult to capture. Ownership of the resource varies with its location. For example, in the United States, the "state ownership" doctrine applied to fisheries until the 1940's. Under this doctrine, the right to navigable waters, submerged land, fish, and wildlife was a public trust dating from colonial times. The public character of the rights was passed on to the various sovereign states which therefore owned the fish. However, in 1948, the Supreme Court struck down the state ownership doctrine and declared that federal law was pre-emptive. This has led to awkward situations in which the American government regulates fisheries inside state waters. Other problems also arise when the fish travel out of one jurisdiction and into another; for example, fisherman in the second territory may feel that the resource is unfairly exploited before they have

access.

This fugitive character of fisheries may be categorized according to either the political jurisdiction or the type of fish, although clearly these distinctions are closely related. Christy (1977:237) combines a classification of migratory pattern with political jurisdictions:

1. Unshared stock exists in a single national jurisdiction.
2. Shared stock exists in the jurisdiction of two or more adjacent or opposite coastal nations.
3. Highly migratory stock is within the jurisdiction of two or more nations and exists outside any national jurisdiction.
4. Anadromous stock lives in the fresh or estuarine waters of a single national and outside the nation's jurisdiction on the high seas.
5. High seas stock exists only outside national jurisdictions (e.g., some whales).

Thus the nature of the resource is closely related to the scale of the user pool because access is frequently determined by political jurisdiction. However, the two are distinct in that the user pool of one jurisdiction may harvest several stocks, or, conversely, one stock may be susceptible to more than one user pool.

Given this typology, resources fit into one of four categories. Forests and public grazing lands are stationary-renewable. Mineral deposits such as coal or copper are stationary-non-renewable. Fisheries, wild game, and some water-borne plants

*well, three, actually
(see next p.)*

are fugitive-renewable. "Fugitive-non-renewable" remains a null set.

Where do fisheries fit into this typology? All fisheries are renewable resources, which excludes the non-renewable categories. Beyond that, however, fisheries may be found to fit virtually any combination.

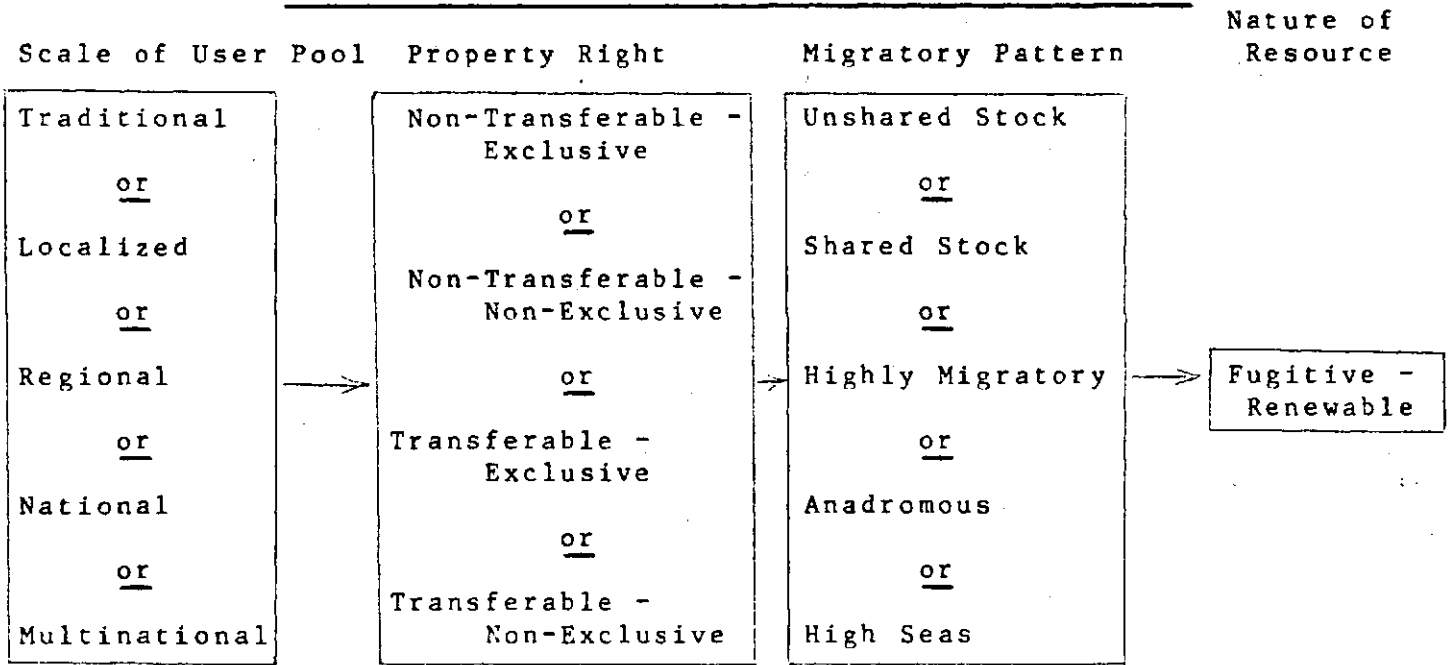
Most fisheries (excluding the truly sedentary fisheries such as oysters) are fugitive. The fugitive characteristic means they will probably cross several political jurisdictions; thus the typology in this category will be expanded to include the five migratory patterns discussed above. (See Table 3: Typology of Fugitive Fishery Resources.) This biological characteristic hampers collection of scientific data on fishery stocks, future yields, and any other information usually deemed essential to resource management. Thus social, political, and economic factors will have a proportionately greater influence in a fugitive resource than they might in another resource.

Property rights in fisheries may fall into any category. Some fishery property rights, such as enjoyed by certain Pacific Northwest Indian tribes, are non-transferable. Others, such as the right to certain salmon runs or trout streams, may be leased and are transferable. Conventional fishing licenses convey an exclusive right of access to the fishery, while Asian villages have non-exclusive rights to the local stocks (Hooper, 1985).

Finally, any one of the almost infinite user pools may describe a group with access to the fishery.

A variety of techniques are available to the fishery

TABLE 3: TYPOLOGY OF FUGITIVE FISHERY RESOURCES



manager; the usefulness of each technique depends almost entirely on the type of resource being managed. A small pool of users with exclusive and transferable rights to a fishery will respond to approaches that are inappropriate for a large pool of users drawn from several political jurisdictions. One use of the typology just developed is for managers to organize their perceptions of their own resource. Determining the differences and similarities between resources helps determine the transferability of management techniques. An application of the typology to Chesapeake Bay fisheries follows to serve as a demonstration of the problem-structuring possibilities of the typology.

CHESAPEAKE BAY FISHERIES

Problems in Fisheries Management

The complex and interconnected ecosystem of the Chesapeake Bay is in serious difficulties. Late in 1983, the Environmental Protection Agency completed a six-year \$27,000,000 study of the Bay. The study

clearly indicated that the Chesapeake is an ecosystem in decline. It found that submerged aquatic vegetation (SAV), which plays a crucial role in the Bay's food chains and physical processes, has declined 84% since 1971. The study showed that areas exhibiting low (or no) dissolved oxygen have increased 15-fold in the last thirty years. Furthermore, the study established a direct link between the rising influx of sediments, nutrients, organic compounds, and heavy metals to the dramatic decline of living resources. Over 100 million pounds of oyster meat was shucked annually in the early 1900's and today that figure is less than 30 million pounds. Landings of freshwater spawning fish such as striped bass, shad, and yellow perch, have decreased nearly 4-fold since the early 1900's. (Summary, n.d.:1).

Solutions to the environmental problems of the Chesapeake

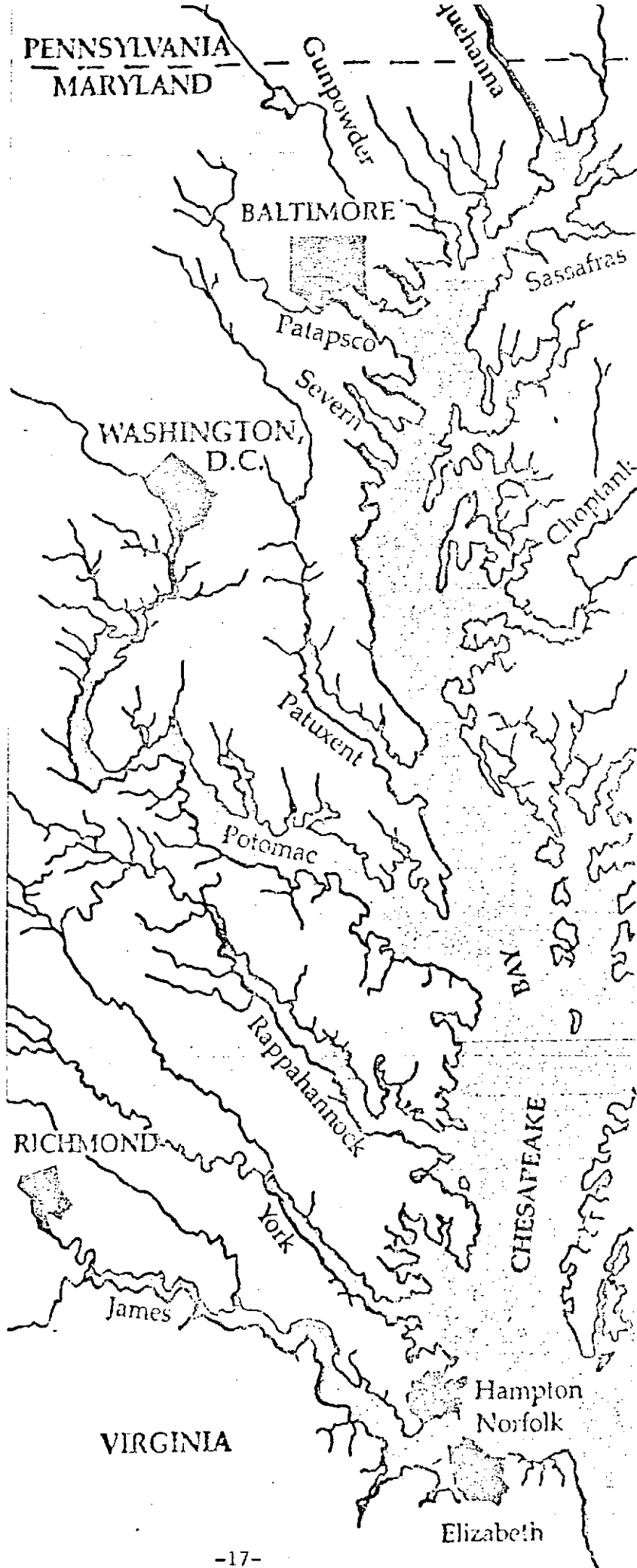


FIGURE 1:
The Chesapeake Bay

Source: Choices for The Chesapeake: An Action Agenda (Baltimore: Citizens Program for the Chesapeake Bay, 1983), p. 3.

are complicated by the multiple government jurisdictions that control Bay Fisheries. (See Figure 1) Virginia and Maryland are the two states most directly involved in managing the Bay's fishery resources. However, the impact of both the District of Columbia and Pennsylvania and the overlapping federal jurisdiction, which includes all navigable water and the oceans out to the territorial limit, further exacerbate management problems.

One deceptively simple problem caused by the multiple state jurisdictions is the variation in fishing gear permitted in Virginia and in Maryland. In Virginia, for example, a crab pot is defined as a "structure made of wire or thread net;" hard crab pots may not have mesh smaller than 1 1/2" but peeler pots have no restrictions at all (Summary and Comparison, 1983:5). In Maryland, a crab pot is legally defined as a "cube shaped device with openings toward inside [with] sides not more than 24" long [and] constructed of wire." Hard crab pots in Maryland may not have mesh smaller than one inch, and peeler pots have identical restrictions (Goldsborough, 1984:1). The variation is sufficiently extreme that, prior to 1985, possession of regulation Maryland gear in Virginia water could lead to an arrest. Any substantial change in gear regulations -- short of a total lack of restrictions -- will be an economic hardship on an already stressed industry.

one AR
is crabs

(hard =
in between
molts;

peeler =
just shed
one carapace
and new one
hasn't yet
hardened;
can be eaten
whole, as
"soft crab")

Oysters,
finfish are
other ARs

A second state-level concern is socio-cultural. Virginia and Maryland have been historic rivals for control of the Bay: boundary disputes date back to 1632 (Horton, 1981:B6). Virginia has a traditional abhorrence of regulation, while Maryland is

TABLE 4: GOVERNMENT ORGANIZATIONS ENGAGED IN FISHERIES MANAGEMENT

Federal:

National Marine Fisheries Service

Multi-State:

Atlantic States Marine Fisheries Commission
Mid-Atlantic Marine Fisheries Commission

Tri-State:

Chesapeake Bay Commission

Bi-State:

Potomac River Fisheries Commission

State:

Virginia Marine Resources Commission
Maryland Department of Natural Resources

happier to regulate (Fisher, 1984). Although the traditional cultures of fishermen in the two states are very similar to the outside observer, the fishermen themselves view their cultures as dissimilar and cherish those differences in the same spirit as two high schools perpetuate a sports rivalry.

A third factor that inhibits any organized coordination of the Bay is the overlapping jurisdictions of various local, state and federal agencies and laws. (See Table 4: Government Organizations Engaged in Fisheries Management.)

Until 1971, Maryland allowed county residency requirements for crabbing licenses. The U.S. Army Corp of Engineers has jurisdiction over dredging in all navigable waters and in ocean waters, and thus the Corps is involved in keeping Bay channels and Hampton Roads clear for shipping. The Fishery Conservation and Management Act of 1976 (Magnuson Act) establishes eight fisheries management councils; the Mid-Atlantic Regional Fishery Management Council coordinates fisheries for New York, New Jersey, Delaware, Pennsylvania, Maryland, and Virginia. Although the Bay is not technically in the Fishery Conservation Zone (3-200 miles off shore), the Council does preempt some coordination efforts of the two major Bay states. While this list does not exhaust the multiple jurisdictions in the Bay, it does indicate the complexity of regulations for the Chesapeake.

Application of Typology

Excluding the sedentary fisheries, Chesapeake Bay fisheries are:

- (1) fugitive-renewable resources, comprised of

- (2) shared stock and highly migratory stock.
- (3) Property rights are non-transferable and
- (4) exclusive.
- (5) The pool of users consists almost entirely of localized, externally controlled users (e.g., Gloucester, Virginia, and Smith Island, Maryland).*

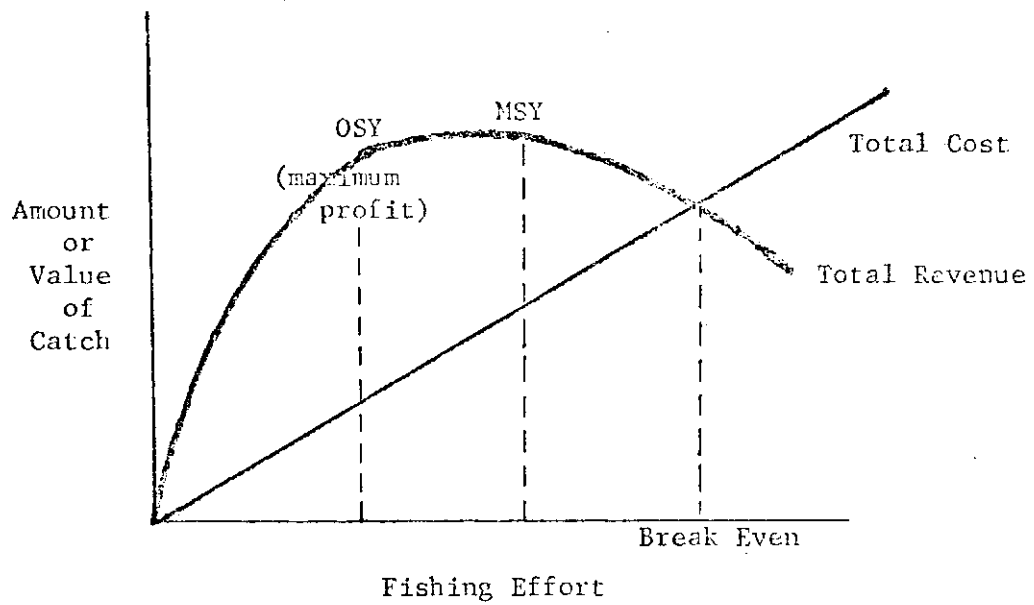
Setting political considerations aside momentarily, this description indicates several options for management.

1. fugitive-renewable resources. As discussed earlier, managers are not able to rely upon extensive scientific data being available.

As a renewable resource, the various fisheries can be managed for either maximum sustainable yield (MSY)--the level at which the seasonal catch equals the replenishment of the stock--or the optimal sustainable yield (OSY)--the level of catch which maximizes profit by generating the largest possible return per unit of effort (See Figure 2: Amount or Value of Catch vs. Fishing Effort). Since the OSY is usually at a level of catch below MSY, and since the data which generates the MSY is suspect, the fishery should be managed for something less than the estimated MSY (Eckert, 1979:123; Gulland, 1974:110). This may be easier than it first appears because "among the public at large there is enough growing awareness of the simpler aspects of fishery problems for the idea of exceeding the MSY to have achieved the moral stigma of a specialized form of pollution" (Gulland,

*While in theory regional and multinational pools exist, in practice the users primarily come from Maryland and Virginia. A few Delaware or North Carolina fisherman will venture into the Bay but they have no significant impact.

Figure 2: Amount or Value of Catch vs. Fishing Effort



1974:109).

2. shared stock and highly migratory stock. Although the stock is both shared and highly migratory, the user pool does not move outside the shared stock political jurisdictions. Therefore, the manager can discount the need to regulate the user pool in the federal government's territorial waters. What the manager must do, however, is insure that the users' behavior within the shared stock range is consistent with the demands of the migratory stock management.

← ? is this what transferability is all about?!

3. non-transferable property rights. The property rights in the fishery exist and do not need to be created. Unlike property rights in high-sea fisheries, which to date do not exist in any recognizable or enforceable form, the rights to Bay fisheries have been established by positive law and ratified by custom.

4. exclusive property rights. These rights are exclusive in the sense that no one may fish in the Bay without a license. However, as a practical matter neither Maryland nor Virginia imposes a limit on the number of licenses issued. The states would need to justify a license limit on conservation grounds. At present, Bay regulators seem happier to manage through catch limits and season and gear restrictions. We therefore have the interesting situation of exclusive rights but unlimited access.

5. localized user pool. Finally, the pool of users is comprised of localized, externally controlled users. The regulatory impact upon the fisheries comes from the two states, but the actual bureaucratic structure in place is overwhelming.

Recognition of the size and character of the user-pool suggests that the management focus should be at the regional level, and in fact, this is so. Fisheries management in Virginia and Maryland is coordinated through frequent but informal communication between the two states. Both states report to the Chesapeake Bay Commission their progress on fisheries initiatives on a quarterly basis. In addition, the National Oceanic and Atmospheric Administration (NOAA) has established a Chesapeake Bay Stock Assessment Committee, formed of federal, state and academic participants to make long-range term plans for stock assessments and to implement the plan. (Goldsborough, 1986, n.p.)

CONCLUSION

Through the development of a common property resource typology and its application to a specific fishery, we have demonstrated two ideas. First, fishery resources fit a wide spectrum of common property resource types. Second, the major characteristics (user pool, property rights, resource characteristics) provide a valuable heuristic device for structuring our views of fisheries resources. By utilizing a formalized approach to problem-structuring, we can improve the soundness of decisions in fisheries management.

APPENDIX I

Limited Access

Management of the commons, once its limits become known, is possible by one of three approaches (Friedheim, 1979:32-34). One is the use of voluntary agreements within a community; this will work only with a very small pool of users who have traditional ties to each other and the resource. The second is to increase the stock; however, this is not technologically feasible for a commercial fishery resource. The final approach is enclosure and the establishment of property rights. This approach is not only inevitable for larger fisheries, but also in limited testing it has proved a viable alternative (Keen, 1973).

It is important to note that the open access to fisheries in the United States is an unusual situation in a developed nation:

Moreover, it has been a tradition in [the United States] that marine fish resources are available to all.... The inevitable result has been overexploitation and over-capitalization.... Other natural resources have not had this handicap in the United States, nor is this practice common in many of the other principal fishing nations. It will be necessary sooner or later to alter the system.... (Fisheries Management Under Extended Jurisdiction, 1975:vii)

American fishing communities often do not realize their unique position as the last unlimited access resource:

[Fishermen] are seeing probably the last large common property resource gradually being transformed with some set of limits being put on the access to that resource. Water rights have gone that way, oil has gone that way, timber [and]...grazing lands have gone that way, and the transition has come last to the sea because it has been so expansive in what it could produce. We are in a stage of transition. (Adasiak, 1978:96).

Limited entry is closely related to the idea of enclosure. Limited entry restricts the size of the user pool; enclosure creates political jurisdiction over territory which previously had no political oversight. This in turn paves the way for limited entry.

There are two types of ocean enclosure: centralized, in which ownership is defined functionally and control is given to the world system ("common heritage with mankind"); and decentralized enclosure which compartmentalizes ownership (Friedheim, 1979:35).

The common heritage ideal has lost momentum as the Law of the Sea treaty was finalized. However, the concept of

increasing community power is a derivative of the common heritage idea and is gaining visibility (at least in academic circles). Arguments for community control are based on experience and sound bureaucratic principles. Government regulation of smaller fisheries may well be in a growth stage, but the "management of relatively stable (or steady-state) fisheries in the post-industrial society, however, may instead require a historical perspective [Cox, 1985b] and a community based approach" (Berkes, 1985: 207). Large governmental regulation may not work in these smaller fisheries because of a clash of philosophy: government regulation creates individual property rights in a community system which operates on communal property rights (Berkes, 1985:207). Indeed, these systems may be impossible to bring under the large government regulatory umbrella:

Rights are enunciated to safeguard freedoms, but the tendency to formalize and allocate rights can be carried too far....[The 'tragedy of the commons'] does not follow inevitably when rights to use are not rigorously formalized, at least not within a local community of husbandmen....

The de facto systems of legitimate and imagined rights in thousands of locales are entirely too complicated to bring under formal law and/or into the market-place. (Regier and Grima, 1985:857-858).

Although the preceding quotation describes Canadian fisheries, it is applicable to fisheries throughout the world.

The trend toward decentralized enclosure is "unmistakable and perhaps irreversible" (Friedheim, 1979:36). The 200-mile limit which was once so controversial is now accepted worldwide: all coastal nations treat the 200-mile economic zone as territory in which national law will prevail, and fishery access is limited. The exclusionary zone is now even used as a testing ground for national sovereignty, as a recent Argentine fishing dispute near the Falklands indicates (Coone, 1986:12).

Enclosure and limited access strike at the very heart of fishing traditions. However, some observers have noted social and economic changes in fishing communities across the nation. Fishermen have perceived the need for effective use of political resources to solve economic hardships (Dewar, 1983). In addition, changes in technology and marketing are forcing the fishing communities into less individualist ways of thinking; "relationships among the harvesting, processing, and management sectors are becoming standardized, routinized, and structured according to formal rules" (Miller and Van Maanen, 1983:372). A generation ago, such structure would have been anathema to the fishermen; now it is viewed as a necessary adjunct to economically successful fishing. Fisherman are becoming businessmen:

Simply put, fisherman seem to have realized that their survival as fishermen is predicated mainly on their survival as businessmen....

Importantly, fishermen interpret competition in the harvesting sector in terms of zero-sum games. Predictably, this encourages a harvesting sector divided against itself, and alliances among fishermen are coming to be extremely problematic, situationally specific, and temporally limited. As a consequence, the traditional dimensions of conflict and alliance within a fishery (e.g. ethnicity, target species, gear type, region fished) are becoming relatively weak predictors of fishermen's economic and political behavior. (Miller and Van Maaren, 1983:376).

What seems inescapable is that the traditional independent fisherman in industrialized nations must go the way of the small farmer. However, in developing countries the community controlled resource--non-exclusive, non-transferable rights in a small community of users--may yet survive. Neither process is necessarily to be preferred over the other: commentators must realize that many criticisms of limited entry apply to a particular scheme and not to the general theory of limited access (Popper, 1978:10).

APPENDIX II

GOVERNMENT ORGANIZATIONS ENGAGED IN CHESAPEAKE BAY FISHERIES MANAGEMENT

Chesapeake Bay Commission. The organization that is most specific to Bay concerns is the Chesapeake Bay Commission, a tri-state commission created in 1980 by the General Assemblies of the State of Maryland and the Commonwealth of Virginia. As of 1986, Pennsylvania is a full member of the Commission. The Commission's duties include recommending legislative and administrative action for coordinated and cooperative use of the Bay, monitoring resources, representing tri-state concerns to the federal government, and arbitrating tri-state conflicts. In 1984, a fisheries advisory group was formed with representatives from the scientific and political communities of both states.

Potomac River Fisheries Commission. A bi-state Potomac River Fisheries Commission created by the Potomac River Compact. It is limited to oyster bar maintenance and regulation and licensing of taking crabs, finfish, and shellfish; the regulations are subject to amendment, modification, or revocation by joint enactment of the two states. The commission has no enforcement powers.

Atlantic States Marine Fisheries Commission. The Atlantic States Marine Fisheries Commission was created by compact in 1942. All the Atlantic coast states are members as is Pennsylvania. The Commission's concern is with tidal fisheries; the National Marine Fisheries Service is the Commission's primary research agency. It serves in a strictly advisory capacity; compliance with interstate plans formulated by the Commission is left at the discretion of the individual states.

Mid-Atlantic Marine Fisheries Commission. In contrast to the Atlantic States Marine Fisheries Commission, the Mid-Atlantic Regional Fishery Management Council has an enforcement mechanism. Plans drafted by the Council are put into effect by federal regulations promulgated under the authority of the National Marine Fisheries Service (U.S. Department of Commerce). The U.S. Coast Guard and the National Marine Fisheries Service enforce the regulations.

National Marine Fisheries Service. The National Marine Fisheries Service (NMFS) is the primary federal agency for funding and implementing marine resource research. Housed in the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce, NMFS has programs supporting data collection and administering cooperative fisheries programs. This service chairs the Chesapeake Bay Stock Assessment Committee established by NOAA.

Virginia Marine Resources Commission and Maryland Department of Natural Resources. The two state-level agencies responsible for fisheries management are the Virginia Marine Resources Commission (VMRC) and the Maryland Department of Natural Resources. VMRC, which is in Virginia's office of Commerce and Resources, protects Virginia's seafood industry and conserves marine resources. Its regulatory powers are less than those of Maryland. The Maryland

Department of Natural Resources has given primary responsibility for tidal fisheries management to the Tidal Fisheries Division of the Tidewater Administration. The Department has substantial rule-making authority.

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