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Problems in Chesapeake Bay of mutual interest to the state of Maryland and the Commonwealth of Virginia

J. Claiborne Jones

John B. Pleasants
Virginia Institute of Marine Science

PROBLEMS IN CHESAPEAKE BAY OF MUTUAL INTEREST TO THE STATE OF MARYLAND AND THE COMMONWEALTH OF VIRGINIA

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by

J. Claiborne Jones
and
John B. Pleasants

Virginia Institute of Marine Science
Gloucester Point, Virginia

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INTRODUCTION

The Chesapeake Bay, one of the largest and most productive estuaries in the world, represents a vast natural, economic, and social resource for the citizens of the surrounding land area. The Bay is many things to many people. Much of the economic development of the entire region has been based upon the natural transportation network and the fisheries industry provided by the Bay and its tributaries. The Bay system also offers a wide variety of water-oriented recreational opportunities, a source of water for both residential and industrial users, and a site for the final disposal of many waste products. The natural resources and processes of the Bay and the activities of man in relation to those processes and resources form a dynamic, complex and interrelated ecosystem. It is unfortunate, but inevitable, that problems arise when man's use or intended use of one resource conflicts either with his use of another resource or with the natural processes of the environment. The need to provide a plan for the resolution of such conflicts and to ensure the coordinated management and efficient use of the Bay's resources was one of the factors which prompted the formation of the Chesapeake Bay Legislative Advisory Commission.

With a surface area of approximately 4400 square miles, a length of nearly 200 miles and more than 7000 miles of shoreline meandering through the states of Maryland and Virginia, the Chesapeake Bay is the largest estuary in the United States. Formed about 10,000 years ago as the great glaciers melted at the end of the last Ice Age, the Bay

is the drowned valley system of the Susquehanna River and is typical of many coastal plain estuaries with its broad, shallow expanse of water. It varies in width from 4 to 30 miles but has an average depth of less than 28 feet, with two-thirds of the Bay being 18 feet deep or less. The source of fresh water for the Bay is runoff from a drainage basin covering approximately 64,200 square miles, including the areas drained by the Susquehanna, Potomac, Rappahannock, York and James rivers. Salinities range from 33 parts per thousand at the mouth of the Bay near the ocean to almost zero at the northern end and at the heads of the smaller estuaries tributary to the Bay. This great variation in salinity levels is one of the factors which enables the Bay region to support such a wide variety of aquatic and terrestrial life forms. The waters, marshes and woodlands of the area provide a productive natural habitat for more than 2700 species.

The sheer number of indigenous species is but one indication of the extreme complexity of the biological communities within the Bay region. These communities are continually impacted by a number of naturally-fluctuating physical and chemical variables such as temperature, salinity, pH, dissolved oxygen and nutrient concentrations. With the wide naturally-occurring fluctuations in the system, it is sometimes difficult to determine when natural variations have been overridden by potentially serious and undesirable artificial trends. Further complicating the situation is the fact that the activities of man interact and interfere with these natural processes and it is not always possible to distinguish between man-induced and

natural variations. None of these factors or variables can be addressed separately; all are an important part of the dynamic interplay which characterizes the Chesapeake Bay ecosystem.

The population of the Bay region, approximately 7.9 million in 1970, is expected to more than double by 2020 to 16.3 million. More than 50 percent of this growth is expected to occur in the metropolitan Washington, D.C. area. Employment in the region is expected to grow at approximately the same rate as population; per capita income is projected to nearly quadruple; manufacturing output is expected to increase by almost 600 percent. All of these factors will place additional demands on the Bay's water and related land resources. Increasing population and urbanization will be accompanied by a general increase in the uses and users of the Bay system. A natural consequence will be increased competition and conflicts among the various uses of the resources, as well as among users of individual resources. While it is true that the Bay can be many things to many people, it cannot be all things to all people. Effective management strategies for the resources of the Chesapeake Bay and the uses of those resources must be devised if the quality of the Bay is to be preserved or enhanced.

Since the Chesapeake Bay is a shared resource, many aspects of its use and management are also a shared responsibility. Because of the 46 principal rivers and streams which flow into the Chesapeake Bay, the regional implications of the Bay's problems extend as far north as New York and as far west as West Virginia. In terms of management, however, the Bay is essentially a bi-state resource of the State of Maryland and the Commonwealth of Virginia. While the

important contributions of the Susquehanna River drainage basin cannot be ignored, the mainstem of the Bay itself lies almost wholly within the states of Maryland and Virginia. It is therefore with these states that the principal management responsibility rests. Because of the dynamic character of the estuary and the mechanics of hydrologic transport, the waters of Maryland and Virginia seriously impact one another. Virtually all of the salt water in the Maryland portion of the Bay has travelled through Virginia, and a majority of the fresh water in the Virginia part of the Bay has come through Maryland. It is therefore misleading in some respects to refer exclusively to "Virginia waters" or "Maryland waters". Clearly, the water and related land resources of the Chesapeake Bay are of mutual and vital interest to both states. The actions of either state in relation to the use of those resources can have significant repercussions for the other.

This paper identifies specific problems in the Bay region which are of mutual concern to the states of Maryland and Virginia. The present and projected future magnitude of the problems is discussed and the potential for improved coordination between the states in solving those problems is assessed. It is obvious that any serious problem in the Bay is of mutual interest to both states. Mere commonality of a problem, however, is not necessarily an indication that improved coordination is the key to its solution. Many problems which are common to Maryland and Virginia are also common to coastal states in general. Their solutions, however, often lie more

appropriately in the hands of individual state and local governments. The fact that shoreline erosion is a problem in Maryland as well as in Virginia, for instance, is not ipso facto evidence that improved coordination between the states would be an optimal or even reasonable means of lessening the problem. Existing Federal, state, regional and local management strategies and enforcement capabilities must also be considered. Improved application of existing regulatory mechanisms is often preferable to and more effective than insisting upon a new "coordinated" approach to problem solving which too often does little more than add an additional layer to the decision-making process.

The following areas of possible bi-state coordination are discussed in this paper: water quality, recreation, transportation and navigation, shoreline erosion, fisheries, information and research, economics, planning and major facility siting, and air quality.

WATER QUALITY

Water quality within the Bay region varies widely and is influenced by many factors including proximity to urban areas, the type and extent of industrial and agricultural activity in adjacent land areas, stream flow characteristics and the amount and type of upstream land and water usage. Although the importance of clean water may vary for each intended use, it is obvious that the quality of Bay waters should be preserved or enhanced since degraded water has little to offer any of the inter-related uses of the Bay. Problems in water quality may occasionally be the result of natural processes of the environment, but they arise most frequently when man's waste loads exceed the water's natural capacity to assimilate them. The quality of water in the Bay itself is generally good, with most of the major problems occurring in the tributaries, especially near areas of high population concentrations.

The major point sources of pollution within the Bay region are municipal sewage outfalls, industrial waste outfalls and combined sewage-stormwater drains. With the expected continuation of population growth and the concentration of industry in areas already plagued by water quality problems, existing point sources of pollution will not be corrected without an enormous commitment of resources. Industrial discharges are expected to decrease moderately in the future due to increased water recycling, but growing populations will require increased capacities and treatment efficiencies of the existing municipal sewage treatment systems. While these problems are

common to the states of Maryland and Virginia, they are basically site-specific. Since the passage of the Federal Water Pollution Control Act Amendment of 1972, the elimination of these point sources has been within the purview of the Federal government. While the provisions of the Act are implemented at the state and local levels, it is doubtful that coordination between the states would be beneficial. Enforcement of existing regulations by the individual states would appear to be the most effective, albeit expensive, solution to the problems of point source pollution.

Major non-point sources of pollution in the Bay area include agricultural and urban runoff, and marine transportation spills. Although the percentage of land in agricultural use is projected to decrease in the future, intensive farming practices utilized in an attempt to grow the same or greater amounts of crops on smaller land areas may contribute even greater loadings of nutrients from fertilizers as well as pesticides and herbicides. Among the problems associated with agricultural runoff are increased sedimentation, nutrient enrichment and the release of toxic herbicides and pesticides. Urban runoff is expected to increase markedly as population growth and urban expansion continue. The methods for controlling these non-point sources of pollution are less well defined than those for point sources. Improved land use management, which is essentially a prerogative of local governments, appears to be a basic element in any solution to problems of this type.

As the total amount of petroleum products shipped on the Bay increases, the probability of accidental spills will also increase. Other hazardous substances in transport will also be subject to the increased probability of spills as Bay traffic increases. Such spills can never be completely eliminated because human error, the principal causative agent, cannot be erased. Preventive measures can and should be taken, however, and regional responses to emergency spills can certainly be improved. The states should coordinate their efforts and resources to develop a prompt and efficient response to spills which impact large areas of the Bay. While such plans exist at the state and federal level, they do not adequately provide for the coordination of all available resources and actual response measures are often on an ad-hoc basis.

Additional toxic substances in Bay waters pose a difficult and continuing problem for the regions. Some of these substances are natural products of erosion such as trace metals like zinc, copper and cadmium. Others such as herbicides, pesticides and polychlorinated biphenyls (PCBs) are manufactured and released by man. Little is known about the long-term impacts of many of these substances and it is often not possible to recognize the toxicity of a substance until long after it has been released to the environment. Further complicating the issue is the fact that some substances which are beneficial or even necessary at low levels may be toxic when misapplied or used excessively. Chlorine, for instance, has been used widely and routinely by sewage treatment plants in the Bay region, but

it has also been implicated in massive fish kills. Further, because some toxic substances such as the pesticide kepone are insoluble in water, they become permanently lodged in the sediments and may be continually recycled through dredging activities or storms. Toxic substances, then, represent a definite problem but we currently lack the necessary information, technology and management techniques to deal with the problem in any but the broadest sense. Again, a regional response mechanism to deal with the release of known toxic substances would be beneficial and coordinated research efforts should be directed toward the impacts of potentially toxic materials.

Water quality problems in the Bay region involve many complex issues and conflicts. The principal goal of any management strategy must be to accommodate the myriad of legitimate uses of Bay resources in a manner which will not further deteriorate their quality.

RECREATION

The rising disposable income of Americans has generated an increased demand for outdoor recreation nationwide, and the Chesapeake Bay region is no exception. With more than 7000 miles of shoreline and a temperate climate, the Bay area is extremely attractive to those seeking the enjoyment of such water-related recreational activities as sailing, boating, swimming, picnicking, camping, hunting and fishing. The rapidly expanding population will generate increasing demands for such activities while present demands already exceed existing facilities. Total demands for recreation are expected to increase by more than four-fold from 59 million to 258 million activity-days by 2020. The urban areas such as Norfolk, Richmond, Washington, D.C. and Baltimore, with their high population densities, show the greatest overall need for additional facilities. Problems are both caused and compounded by a lack of access to the waters of the Bay. Because a large majority of its shoreline is in private ownership, the Chesapeake Bay is among the most inaccessible bodies of water in the nation. Residential development in all areas of the Bay region is steadily increasing and has already pre-empted long stretches of waterfront, thereby denying public access from adjacent inland areas. Further complicating public access to the Bay is the fact that much of the shoreline is physiographically unsuitable for recreational development because of the large amount of wetlands present. Lack of public access to the waters of the Chesapeake Bay is the most severe limiting factor in terms of developing or improving water-related

recreational opportunities. Illustrative of the problem is the fact that 28,000 trailer boats registered in Maryland in 1971 accessed the Bay through only 125 public boat ramps. There are only 18.6 miles of public beaches in the entire state of Virginia and only 35 miles in Maryland. While the need for increased access is obvious, the means for obtaining it are much less clear. The problem is clouded by the very real and emotional issue of private property rights. A coordination of state efforts would not appear to offer much hope for resolution of this issue.

Even if access to the Bay were improved, new conflicts might arise or existing ones be exacerbated. Recreational activities can have significant adverse impacts on water quality. The sanitary and petroleum wastes from recreational craft are serious problems in some areas of the Bay's tributaries. While both states have laws governing pleasure boat sewage handling facilities, differences in those laws might affect the choice of State for boat registration or anchorage by some citizens. A uniformity of laws and regulations between the states in this regard might be desirable. Similarly, a uniform Bay-wide recreational traffic management plan might be beneficial in alleviating some wake-induced shoreline erosion problems.

Pollution of the Bay's waterways from all sources seriously impacts water-based recreation. Water quality has deteriorated in some sections of the tributaries to the point where recreation involving body contact with the water is precluded. This problem is

particularly prevalent in the urban areas of the Bay where demands for water-oriented recreation are often the greatest. The presence of stinging sea nettles (Chrysaora sp.) throughout the Bay also seriously limits water contact recreational opportunities during the warm months but these do not seem to be problems which can be addressed effectively through improved coordination except possibly in the area of research.

TRANSPORTATION AND NAVIGATION

Water-based transportation has been an essential factor in the economic development of the Chesapeake Bay region since the Colonial period. The movement of bulk commodities such as petroleum, coal, grain and iron ore is expected to continue to dominate waterborne commerce in the region. Approximately 160 million short tons of cargo were shipped on Chesapeake Bay during 1974, with more than eighty percent of this freight passing through the major ports of Baltimore and Hampton Roads. This figure is expected to climb to approximately 300 million tons by 2020. The increasing size of bulk carriers and the general increase in bulk traffic will intensify the need for deeper channels in the major harbors and the main stem of the Bay. The deepening of these channels poses major problems not only in terms of actual dredging activities but also in the area of dredged spoil disposal. Maintenance dredging of existing and proposed channels as well as the proposed deepening of the approach channels to Baltimore will generate approximately 800,000,000 cubic yards of material for disposal over the next thirty years. There are currently no containment facilities in the Bay area capable of handling such tremendous volumes of materials, much of which may be contaminated. The deepening of the Baltimore Harbor approach channels will involve extensive dredging in both Maryland and Virginia. Since neither state, acting alone, can adequately deal with the problem, a coordinated approach to the question of environmentally acceptable spoil disposal is indicated.

As water borne traffic increases, conflicts between recreational and commerical craft will escalate. These conflicts occur both in channels and in ports of all sizes, but are most pronounced in the major harbors. Problems in ports appear amenable to local solutions. Development and approval of a coordinated Bay-wide vessel traffic management plan would do much to reduce or eliminate problems in the main vessel channels of the Bay and its tributaries.

The problems of wake-induced erosion and inadequate sanitary facilities, mentioned in relation to recreational boating, are also applicable to commercial traffic. Accidental spills of hazardous substances are another important consequence of increased commercial traffic. While it is not a problem for the Bay itself, it should be mentioned that any future development of offshore port facilities might provide additional relief in the area of vessel traffic on the Bay and would require coordination between the states.

SHORELINE EROSION

Shoreline erosion is a significant and continuing problem throughout the Bay region. Approximately 45,000 acres of fastland in Maryland and Virginia have been lost to the forces of erosion over the past 100 years. While the causes of erosion are complex and not entirely understood, the effects are all too clear to waterfront property owners in the area. Using the intensity of development and existing erosion rates as criteria, the U.S. Army Corps of Engineers has identified 259.5 miles of Chesapeake Bay shoreline in Maryland and 142.9 miles in Virginia as having "critical" erosion problems. It is estimated that an additional 44.4 miles have the potential to become critical.

The dominant erosion agent within the Chesapeake Bay and its tributaries is the waves generated by local wind actions. Waves associated with hurricanes and other large storms can be particularly damaging. Other natural processes responsible for erosion are the action of tidal currents, the seepage of groundwater through the fastland and into the exposed shore zone, the long-term gradual rise in sea level and rainfall runoff. The most important man-induced cause of shoreline erosion in the area is the wake from passing recreational and commercial vessels.

The most obvious impact of erosion is the loss of valuable property, both public and private, including structures which have been inadequately designed or unwisely positioned. In many areas, the

natural forces of erosion have been accelerated and compounded by the activities of man. Intensive development along the shoreline and the removal of natural protective devices such as vegetative cover on fastlands or the destruction of wetlands have increased the magnitude of the problem.

A more subtle but equally severe impact of the erosion process is caused by the product of that process--sediment. Sedimentation is one of the most important non-point source pollutants in the Bay region. It has significant impacts on both the natural environment and man's use of the resource. Sediment from shoreline erosion is often deposited in natural or man-made navigation channels, leading to increased maintenance dredging and the problems associated with dredged material disposal. Sediment can also cover productive shellfish beds and valuable aquatic plants. It also increases turbidity, thereby inhibiting light penetration and reducing primary plant productivity. Sediment can also act as an important mechanism in the transport of toxic chemicals which may be adsorbed onto the surface of sedimentary particles.

Both structural and non-structural means have been employed in attempts to prevent or control shoreline erosion. Structural solutions include bulkheads, revetments, jetties and groins. All are useful tools, but each must be used correctly to ensure effectiveness and reduce any attendant problems. Jetties and groins, for instance, may interfere with natural transport mechanisms and lead to severe

repercussions for downstream areas. Marsh creation and vegetation along the shoreline and adjacent fastland are the most effective non-structural means of arresting erosion.

In dealing with the question of shoreline erosion, it is important to recognize that the Bay is a dynamic and unstable environment and erosion is largely a natural process of that environment. State sediment control laws and numerous local ordinances have been enacted in efforts to stem the flow of sediment into the Bay and its tributaries. Erosion is a problem of Bay-wide significance, but its solutions are primarily local in nature. Coordination of state efforts does not appear to offer any particular advantage.

FISHERIES

The fisheries resources of the Chesapeake Bay region are of enormous importance to the states of Maryland and Virginia as well as to the nation as a whole. The average annual commercial harvest of finfish and shellfish from the Chesapeake Bay and its tributaries from 1966 to 1970 was 409 million pounds with a dockside value of $31.2 million. Shellfish harvests alone averaged 88 million pounds worth $23 million during the period. The economic importance of the shellfish resource is shown by the fact that it comprised only 24% of the commercial harvest by weight but accounted for 78% of the total harvest value. Total landings in the Bay from 1970 to 1977 averaged more than 600 million pounds per year. In addition to the commercial fishing industry, there is an important recreational fishery in the Bay region.

The fisheries resource, however, is far from inexhaustible. The historic decline in oyster production in the Bay region over the past 100 years has been well-documented and much-discussed. Most of the commercially and recreationally important species in the Bay, based on current fishing efforts, are projected to experience pressures in excess of their maximum sustainable yields (MSYs) prior to the year 2020. MSY for half of the species is expected to be exceeded by 2000. For many species, recreational catches will be the principal reason for exceeding MSY. The problem of declining stocks is extremely complex, involving major biological, economic and social factors. With the wide naturally occurring fluctuations in population, it is

difficult to distinguish between normal variations and those changes which have been caused and can thus be controlled by the actions of man. There appear to be several areas in which coordination between the states might be beneficial in the development of fisheries management strategies.

The Chesapeake Bay is a single ecological unit and the species which reside therein are integral parts of that unit. The important migratory species which roam the Bay recognize no political boundaries, yet their management is subject to multiple jurisdictional authorities imposed by the Federal government, the State of Maryland, the Potomac River Fisheries Commission and the Commonwealth of Virginia. Conflicting rules and regulations promulgated by the states compound the problem. Virginia, for instance, permits the dredging of blue crabs during the winter months while Maryland does not. Since these crabs spawn in the lower Bay and migrate northward, Virginia's dredge fishery can impact the migration of crabs into Maryland waters. Purse seines, the principal gear employed in Virginia's menhaden fishery, are illegal in Maryland. The two states also have different regulations governing the taking of undersized and oversized striped bass. Such inconsistencies in harvesting regulations often have no biological or ecological basis and could be eliminated through improved coordination.

Some type of regional or coordinated management of migratory waterfowl might also be appropriate. Basic regulations regarding bag

limits and length of hunting season are set forth by the Federal government but actual dates for the opening and closing of a season are determined by the States. Hunters from a state with an earlier opening date may thus be given a distinct advantage.

Major research efforts aimed at assessing and arresting the declining oyster population should be undertaken in a coordinated manner. The major seed areas in Virginia waters are of vital importance to the oyster industries of both states. As commercial hatcheries and aquaculture facilities assume an increasingly important role, there will be an even greater need for cooperation and coordination among the states and the federal government.

Other important problems include the incorporation of the recreational fishing effort into any overall fishery management scheme. For some species, such as bluefish, the recreational fishery is far more important than the commercial effort. For other species, such as the blue crab, the impact of the recreational fishery has not been assessed. The size of the recreational harvest is not known in either case. While the wholesale destruction of fish habitats such as wetlands appears to have been stemmed, the growing population, increased development and declining water quality will continue to severely impact the Chesapeake Bay fishery. Recent court decisions which question the legality of reserving fisheries to state residents will necessitate improved coordination between Maryland and Virginia in the protection and preservation of these vital resources of the

Chesapeake Bay region.

INFORMATION AND RESEARCH

For many years the Chesapeake Bay has been a principal center of estuarine research. Studies have been conducted by academic institutions, private foundations, government-sponsored commissions, citizen groups and numerous research agencies at all levels of government. As a result of these efforts, various agencies and institutions throughout the Bay region possess a great deal of historic and current data pertaining to the Bay and its resources. Unfortunately, there has been a lack of coordination among the concerned agencies in the collection and dissemination of this information. It is often difficult for interested individuals to determine what, if any, information has been collected on a given subject and from whom that information can be obtained. The result is that different institutions sometimes collect identical data for very similar purposes. With so many separate entities operating in the Bay, it is difficult for state officials to keep abreast of the research being conducted by agencies of adjacent states or even by other agencies within their own state. A Bay-wide information system which monitored ongoing research projects in the region and provided access to data gained through those efforts would help avoid this duplication of effort.

The issue of improved information gathering and sharing is only a part of the larger problem of identifying research needs and coordinating research efforts within the Bay region. For problems of significance to the entire Bay, jointly designed and executed studies

are important in determining common information and research needs. The long-range impact of toxic substances has already been identified as a problem of mutual concern which requires additional research. A single Bay-wide repository for the long-term storage of sediment and water samples might prove valuable in establishing a background level from which future trends in the presence of toxic materials can be measured. Such an effort would require coordination and uniformity in the collection and storage of samples as well as jointly-supported sophisticated analytical laboratories.

A coordination of research efforts does not imply that all efforts should be concentrated upon a particular problem in the Bay at the expense of all others. Nor does it mean that single entity should be given the authority or responsibility to coordinate or direct all research projects in the Bay area. Research efforts are far too numerous and complex for such an arrangement to be effective. States and individual agencies must be given the latitude to determine their own information needs and research priorities based upon their own problems. Rather, this call for coordination simply recognizes that different agencies and institutions around the Bay have varying interests and capabilities. In addressing problems of Bay-wide significance, these resources should be properly channeled and coordinated in a manner which will produce the most comprehensive and effective research efforts possible.

It is also important to develop an orderly and routine mechanism

for the funneling of new research findings into the regulatory and decision-making process so that management policy will reflect the best available scientific knowledge. This will involve the translation of research results into non-technical language to improve understanding and coordination between scientists and managers at all levels.

ECONOMICS, PLANNING AND MAJOR FACILITY SITING

Approximately 43% of the land area in the Chesapeake Bay region is considered to be developed. Of the 43% which is developed,83% is in agricultural use and 17% is considered urban. Forest lands occupy 54% of the total land area in the region and wetlands, which are of crucial importance to the Bay ecosystem, account for the remaining 3%. Land required for residential use in urban areas is expected to increase roughly in proportion to population growth. The demand for residential lands will therefore increase by approximately 107% by the year 2020. Manufacturing output is projected to increase by 560% by 2020, requiring an increase in land for industrial purposes of 50%. Land in crops and miscellaneous farm uses, as well as forest lands, are expected to show a steady decline through the foreseeable future. The fragile wetlands areas appear to be adequately protected by state and Federal statutes from future development or degradation. Although there is a sufficient quantity of land in the Bay area available for residential and industrial development, conflicts between competing types of land use in preferred areas are unavoidable. The best means of providing for the orderly development and wise use of the Bay area's land resources is through the development of comprehensive land use planning and management techniques.

The laws and traditions of both Maryland and Virginia place primary responsibility for land use controls at the level of local governments. Local zoning ordinances can be used to effectively designate residential and commercial land uses, to preserve and

protect conservation areas and parks and to limit or control development in flood-prone areas. These ordinances have, for the most part, been poorly coordinated among localities and have lacked a comprehensive approach to the problems of total resource management. State land use controls in both Maryland and Virginia have been directed at specific resources such as wetlands and rivers and waterways which have been legislatively designated as "scenic". Attempts have been made at the federal level since 1970 to establish a nationwide land use planning and policy process but these efforts have not proved successful. Public opposition to land use controls instituted by the state or federal government has traditionally been strong in the states of the Bay region and this opposition can be expected to continue. The Coastal Zone Management Act of 1972 provides a convenient mechanism for the coordination of state efforts in the realm of coastal resources planning and management. Virginia, however, is no longer a participant in that program. If any type of comprehensive land use planning were to be enacted in the future, an essential element of that policy would be an assessment of the impacts of land use practices upon the water resources of the Bay region. The effective implementation of such a policy could be enhanced through coordination of state and/or federal planning and management efforts.

The need for an improved and coordinated planning process is especially acute in the area of siting major facilities which have impacts of greater than local significance. Such facilities include, among others, power plants, refineries, and major port and docking

facilities. Many of these facilities have impacts of national, as well as regional, consequence. In the past, determinations concerning the location of these facilities have often been made by industry based largely on economic factors and the states have been forced to assume a reactive posture. Maryland is attempting to address this problem through its Coastal Facilities Review Act and coastal zone management program while Virginia relies primarily upon the expertise of various state permitting agencies.

The total demand for electricity in the Bay region is projected to increase by 13.5 times by 2020. More and larger power plants will be required to meet this demand. Nuclear power is expected to account for 72% of the Bay area's power pool requirements by 2020. Water withdrawal by power plants is expected to decrease due to increased recycling and improved efficiency but water consumption will increase dramatically. Power generating facilities impact the resources of the Bay in many ways. Issues of concern include aesthetics, air and water quality, impingement and entrainment of biota, possible radiological effects and the disposal of nuclear wastes.

The impacts of such facilities as power plants and oil refineries are frequently of a regional nature. These impacts can best be addressed through a coordinated planning process which might include allocations of areas throughout each state for particular defined uses. Such a process must involve an assessment of the total costs and benefits of a project to the region and even the nation as a

whole. An unbalanced cost/benefit ratio is obtained, for example, when the tax benefits of a major facility accrue to one state or region while part or all of the negative environmental impacts are absorbed by another. If the national interest dictates that an oil refinery be built in the Chesapeake Bay region, the total resources of the states in the region should be utilized in determining optimal locations for the facility. Discoveries of oil or natural gas in the Mid-Atlantic area would increase the need for interstate coordination in addressing such problems as pipeline corridors or landfalls in the Bay region.

AIR QUALITY

Air pollution does not appear to be a significant problem in the Bay region at this time. The level of pollutants is naturally higher in the densely populated, highly industrialized urban areas and shows a general increase due to climate factors during the summer months. Federal air quality standards have been established by the Clean Air Act Amendments of 1970 and 1977; attainment of these standards is the responsibility of the individual states. Air quality programs in Maryland and Virginia are administered by the Bureau of Air Quality and Noise Control and the State Air Pollution Control Board, respectively.

Future economic and industrial development in the region will have serious implications in terms of maintaining or improving existing air quality conditions. Of particular significance will be the requirements for additional power plants. The production, conversion, and direct and indirect consumption of energy are major contributors to air pollution. Energy and environmental policies are inextricably joined, though this fact is not always recognized, either legislatively or institutionally. National energy policy, for instance, calls for the conversion of many industrial facilities to coal which adversely affects air quality.

Meteorological conditions tend to link the air quality of states in the Bay region. Prevailing winds generally transport air masses in a southerly direction during the winter months and northerly during

summer months. There is, therefore, the potential for the transport of pollution from one state to another. A coordinated monitoring program might be useful in the identification of air quality problems of potential impact to the adjacent state.

Federal and state air quality regulations allow tradeoffs between stationary sources of air pollution within an area as long as regional standards are not violated. Such an arrangement might create conflicts requiring coordinated bi-state resolution. A new emitting facility in northern Virginia or southern Maryland might very well entail tradeoffs from facilities in the other state. Air quality problems are basically the responsibility of the individual state and the federal government, but some coordination in the design and location of major facilities in the border areas may prove desirable.

SUMMARY

In conclusion, it is clear that there are a number of significant problems which are of mutual concern to the State of Maryland and the Commonwealth of Virginia. Unfortunately, the solutions to these problems are not as easy as their identification. They are as complex and interrelated as the environment of the Bay itself and the solutions involve biological, chemical, political, economic and social considerations. Fisheries problems, for instance, are integrally related to the problems of water quality which, in turn, are severely impacted by land use practices. Conflicts among various users and uses of the Bay abound. None of these problems can be assessed or addressed in isolation. The Bay is a single coherent ecological unit and many of its problems should be addressed as such. The growing population in the Bay region will continue to place increasing stress on the limited resources of the Bay. The ultimate goal of those agencies in both states which are concerned with the health of the Chesapeake Bay should be the development of a well coordinated land and water management scheme which will enable the utilization of the Bay's resources in a manner which will provide the fewest conflicts and the maximum benefits to the greatest number of people.

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