The institutional framework of regulatory agencies involved with management of marina development is multi-layered and, at the local level, variable. The variety of agency purviews are not seen to be well coordinated so as to ensure consistent thorough reviews of all development plans. An absence of comprehensive information for impact assessment further complicates the process. Since the information deficit is not amenable to solution, better interagency coordination and establishment of long range management objectives are proposed as ameliorative steps toward resolution of the existing management dilemma.

INSTITUTIONAL FRAMEWORK

Regulation of marina development involves a diverse group of agencies arrayed over three levels of government (i.e., local, state and federal). These agencies operate from unique perspectives with overlapping, although not necessarily coordinated, purviews. The regulatory agencies are in turn, supported to varying degrees by a variety of advisory agencies. The multiplicity of involved parties occasionally results in very thorough reviews of proposals and occasionally results in disjoint, discordant reviews. The dichotomy seems to result from the lack of a protocol for coordination of all agency reviews.

At the local level, a proposal for marina development will be reviewed by the Wetlands Board, the building inspector, the local health department and the local zoning board, if one exists. The purview of the building inspector and local health department are relatively well defined and limited. The design of structures and upland site development are regulated by the building inspector. The health department regulates potable water supply and sewage disposal. The Wetlands Boards purview is less well defined. In its most narrow construction, it covers any activities in the intertidal zone, which is specifically defined based on the presence/absence of vegetation. Broader construction of the purview hasn allowed boards to consider and/or regulate development in either waterways or on land, which may impact the intertidal resources. The local zoning board possesses the most extensive purview in terms of area and activities. One difference between zoning boards and other local agencies is the clear charge to the zoning board to consider the appropriateness of individual projects based on surrounding land uses, either existing or planned. Typically, there is no coordination among local regulatory agencies as far as management objectives are concerned. Particularly in rural areas coordination which does occur is frequently serendipitous, in the form of individuals who serve in multiple roles.

At the state level, proposals for marina development can initiate review by the Virginia Marine Resources Commission (VMRC), the Health Department and its Bureau of Shellfish Sanitation, and the State Water Control Board (SWCB). The common aspect of the review conducted by each of these agencies is a concern for water quality and its impacts on marine/estuarine resources and/or human health. Coordination among these agencies at the level of individual projects exists in the form of timing of permit issuance but does not typically involve in depth consultations or concerted efforts to share information or expertise. The state agencies effectively operate independently, regulating development in an effort to achieve agency-specific objectives.

Chesapeake Bay Research Conference
Williamsburg, Virginia, March 20-21, 1986

MARINA SITINGS FROM THE SCIENTIFIC ADVISOR'S VIEWPOINT

by Carl Herschner
Virginia Institute of Marine Science
School of Marine Science
The College of William and Mary
Gloucester Point, Virginia 23062

INTRODUCTION

Shoreline development projects frequently raise a wide variety of concerns which run the gamut from environmental to economic. In the Commonwealth of Virginia, review, assessment and regulation of proposed projects can involve a diverse and variable group of special interest groups, advisory groups and regulatory agencies. One type of project which routinely involves almost all the concerns and groups is marina development. As such, these projects provide interesting case studies of the current efforts in Virginia to manage shoreline development and the estuarine resources of the Commonwealth.

Management of marina development places a premium on establishment of long range management objectives and short term impact assessments. This is a result of the large number of regulatory agencies involved and the conflict marina development presents between development and preservation goals. It is the purpose of this paper to: 1) briefly review the institutional framework and impact assessment related to management of marina development, and 2) assess the respective effects on the management process. The review of these topics is based on the author's personal experiences with the process. The intent is to highlight some of the problem areas and suggest some possible modifications.

 Contribution No. 1298 from the Virginia Institute of Marine Science,
 School of Marine Science, The College of William and Mary, Gloucester
 Point, Virginia 23062

THE COLLEGE OF WILLIAM AND MARY SCHOOL OF MARINE SCIENCE VIRGINIA INSTITUTE OF MARINE SCIENCE

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At the federal level review and regulation of marina development is operationally vested in the United States Army Corps of Engineers (Corps). The Corps is supported in its review by advice from the Environmental Protection Agency, National Marine Fisheries Service and the U.S. Fish and Wildlife Service. The Corps review focuses on environmental effects and navigation considerations. Within these areas of concern its purview effectively overlaps that of both the local and state agencies, especially well in the VMC. In Virginia the "w" is a formal procedure for coordination of project reviews by the federal agencies and the state agencies involved. The process is long, tedious, and costly, to case-by-case sharing of information and does not extend to coordination of federal and state management objectives. Local agencies do not typically participate in the federal/state review or coordination.

**Impact Assessment**

The potential impacts associated with marina development can be broadly categorized as economic, social or ecological. This classification is arbitrary and only for purposes of this paper. The importance attached to these different types of potential impacts is variable, depending on both the setting and local interests. Not all potential impacts are reviewed for each proposed project. Again, local interests generally influence the scope of the assessment.

Each type of potential impact encompasses a number of specific items. Assessments of the extent of impact are generally based on a number of interested parties and can be either quantitative or qualitative in nature. Table 1 summarizes the types of potential impacts, the sources of assessments usually relied upon and the type of assessment. The general types and their relative importance are reviewed below.

**Economic Impacts**

Economic impacts are generally amenable to quantification, although in cases of cash flow the assessments are usually educated estimates. Typically economic impacts assume their greatest importance at the local level, and the government is interested in promoting economic development or adjacent property owners are concerned about diminished property values. In the absence of these interests, economic impacts may not typically receive overt considerations.

**Social Impacts**

Adjacent property owners and local interest groups usually ensure social impacts are at least aired in the resource management forum. With few exceptions, assessment of social impacts is not amenable to quantification. Regulatory agencies will receive at least some information on social impacts but none of them possesses a formal protocol for evaluating these impacts and weighing them against other "hard" metrics. The authority given to each proposed project in its social impacts of greatest importance at the local and state levels. Both the local wetlands board and the VMC conduct public hearings at which evaluation of social impacts (generally offered by those affected) constitute a significant part of the testimony received for consideration. The role these evaluations play in the final decision may be highly variable, but due to the absence of formal protocols for weighing not amenable to quantification. (See Davos, 1977 and Dee et al., 1973 for treatment of weighing in management decision processes.)

**Ecological Impacts**

In general, ecological impacts are the focus of most of the deliberation and decision rationale in regulation of marina development. Indeed, the marina's personal observation has been that parties concerned essentially economic or social concerns for a proposed project will frequently attempt to portray those concerns in an ecological context in order to have their project approved. In some circumstances, this places a premium on the development of accurate assessments of potential environmental impacts. Unfortunately, in most cases, such assessments remain beyond the abilities of scientific advisors. The body of quantitative information currently available for assessment of marina impacts simply does not permit either site specific or general evaluation of potential impacts. (See Brandma et al., 1973 and Nixon et al., 1973 as examples of the detailed studies necessary for impact assessment.)

For purposes of discussion, ecological impacts can be divided between physical impacts and ecological impacts. Direct impacts are those resulting from the physical construction of the project. Secondary impacts are those resulting from the operation or use of the facility. From the perspective of a scientific advisor, appreciation of the distinction between these two types of impacts is essential. When given an "a priori" evaluation of ecological impacts it is much easier to speak with certainty about direct impacts than it is to impel certainty about secondary impacts.

Data which might support predictions of secondary impacts associated with marina development simply do not exist (see Raytheon Co., 1978 for review). These data searches addressing the question, the current consensus seems to be that: 1) evaluations must be site specific, and 2) the necessary correlations between the physical parameters of a site and potential ecological impacts (particulars water quality) simply do not exist.

Indeed, such correlations may never be sufficiently refined to support site specific management decisions regarding secondary impacts due to the inherent uncertainty associated with human behavior. It will be "difficult to understand the relationships between local characteristics, current patterns and pollutant transport mechanisms for protected areas of pollution impact, without also having to assess the probability an individual boat owner will choose to bypass his marine sanitation device or spill a can of gasoline.

**Special Edition**

**Westmoreland County**

Westmoreland County is blessed with miles of beautiful shoreline and relatively unpolluted waterways, as well as an abundance of fish, shellfish, crabs and waterfowl. This abundance is due in no small part to a still largely undisturbed but irreplaceable resource, its tidal marshes. These marshes reduce pollutants, serve as natural habitats for wildlife and fish and support, through their interactions with the tidal waters, much of which makes Westmoreland waterways clean and productive. Rapid and unplanned growth as well as short sighted development and property developers and developers a constant threat to the continued vitality of this resource. Only through careful planning and strict controls can needless destruction of these marshlands be avoided.

There are approximately 2,600 acres of tidal marshes found in Westmoreland County. Of these, the majority (1,845 acres) occur along the Potomac side of the County. The remaining 750 acres are found along the Rappahannock. Generally, brackish and saltwater marshes characterize the Potomac shoreline where the salinity is much higher than compared to the upper reaches of the Rappahannock River which harbors only tidal freshwater marshes.

**Letters to the Editor**

How much plant material does a marsh produce?

Salt marshes produce an average of four tons of organic material per acre in a year and as much as 10 tons per acre per year. By comparison an average yield of wheat is about two tons per acre per year. None of the marsh material is used for commercial purposes, except by visibly wise and sugar cane producers, come close to producing as much potential animal food as do the salt marshes.

Although much of the organic material produced on the marsh stays there, 25 to 40% may be exported through tidal action, growth by consumers or other mechanisms of translocation. The marshes are thus the primary producer for the driftless food web of the estuary.

What are some of the values of nonvegetated wetlands?

Nonvegetated wetlands are very important areas for wading birds, shorebirds and other migratory waterfowl. They are heavily utilized by commercial and sport fishes for feeding and are important habitat for blue crabs.

Organisms such as razor clams, quahogs, clam worms, soft-shelled clams, lugworms, burrowing shrimp, sea squirts, barnacles, polychaetes, snails and many more inhabit these nonvegetated sand and mud flats and are a food source for predators. In a meter square of sand/mud flat one can expect a find between 5,000 to 8,000 organisms.

Probable the most important overall value of the tidal flats is that mediating the breakdown of the plant material produced on the marshes and catalyzing the recycling and exchange of nutrients within the estuary. This function has both water-quality maintenance and habitat value implications.

**This Issues Quote**

Man, despite his scientific achievements, his artistic pretensions, and his great expectations, owes his existence to a six inch layer of top soil and the fact that it rains.

-Anonymous

(cont. p.3)
The effective management of marine/estuarine resources would seem to require a comprehensive overview of all facets of the managed system, encompassing economic, social and ecological considerations. Because the purview of the regulatory agencies are not uniformly comprehensive, effective coordination is essential for meaningful attainment of goals. This coordination is not evident at present. While some of the agencies interact regularly, there is not obvious unification of efforts. Achievement of such coordination should not be impossible, since, ostensibly, all the regulatory agencies share similar or related goals.

A step in the process of developing a consistent and thorough management effort would be documentation of decision rationales by each agency. This can form the basis for analysis of similarities and dissimilarities among agency objectives. In some cases it may also help better define those objectives. In turn, the availability of specific information on the decision process of each agency may provide an opportunity for reduction in duplication of reviews and a chance to ensure consistently thorough review of all proposals.

The efficacy of management of marina development on a case-by-case basis can be measurable in view of the shortcomings of impact assessment. The current process of management provides at least the potential for piecemeal despoliation of the resource. Promulgation and implementation of a regional management plan may provide the opportunity for preservation of some benefits of degraded systems and simultaneously aid developers in effective planning.

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<td>increase in wake induced erosion</td>
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</table>

* L-local government  S-state agency  D-developer  I-interest group  A-scientific advisor

**REFERENCES**

Anne Arundel County, "Anne Arundel County Boating and Marina Study," a report by the County Office of Planning and Zoning, 1980.


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