COASTAL ZONE '80

Volume III

Proceedings of the Second Symposium on Coastal and Ocean Management

Billy L. Edge, Editor

Sponsors:
American Society of Civil Engineers
(Waterway, Port, Coastal and Ocean Division)
Office of Coastal Zone Management
Edison Electric Institute
Heritage Conservation and Recreation Service
Maritime Administration
National Aeronautics and Space Administration
National Marine Fisheries Service
Office of Sea Grant

National Park Service
State of Florida Department of Environmental Regulation
State of Florida Department of Natural Resources
The Coast Alliance
The Coastal Society
Urban Land Institute
U.S. Department of Energy

Diplomat Resort Hotel
Hollywood, Florida
November 17-20, 1980

Published by the
American Society of Civil Engineers
345 East 47th Street

SCIENCE AND PLANS: CALIFORNIA'S COASTAL WETLANDS

by

Christopher P. Onuf*

INTRODUCTION

The traditional role of scientists in the management of natural resources has been to provide technical information. The traditional explanations (by scientists anyway) of the shortcomings of most attempts at management have been that the necessary technical information was not available, or if available, that it was not applied, or if applied, that it was applied ineptly. The remedy to bad management followed obviously: enlist the participation of high caliber scientists by supporting the necessary research and pay heed to their findings.

This is clearly a caricature of the relationship between science and management. Nevertheless, something of this attitude has motivated the involvement of the University of California Sea Grant College Program in coastal wetlands research. The California Coastal Plan (1975) starkly stated the need for the management of remaining coastal wetlands by enumerating what has already been lost:

> Of the original 197,000 acres of marshes, mudflats bays, lagoons, sloughs, and estuaries in California (excluding San Francisco Bay), the natural productivity and open space values of 102,000 acres (52 percent) have been destroyed by dredging or filling. Of California's remaining estuaries and wetlands, 62 percent have been subjected to severe damage and 19 percent have received moderate damage. In southern California, 75 percent of the coastal estuaries and wetlands have been destroyed or severely altered by man since 1900. Two-thirds of 28 sizable estuaries existing in southern California at the turn of the century have been dredged or filled.

Coupled with the recognition of the need for management was the realization that firsthand scientific knowledge about these systems and understanding of their function was limited. Furthermore, there was no reason to believe that the much greater body of knowledge already assembled for Atlantic and Gulf coastal wetlands would be directly transferable to the rarer, smaller, and more sporadically distributed wetlands along the Pacific coast of the southwestern U.S., because of the vast differences in climate, topography and geology.

*Assistant Research Biologist, Marine Science Institute, University of California, Santa Barbara, California, 93106.

Funded by University of California Sea Grant Program Grants USDC R/NP-1-8E to C. P. Onuf and R/CZ-52 to C. P. Onuf, R. W. Holmes and C. H. Peterson.

The outgrowth of this perception of the problem and how to cope with it was the initiation, in 1976, of a series of on-going research projects on coastal wetlands and an escalating effort by the Sea Grant Program and the staff of the California Coastal Commission to involve scientists in the planning process in a substantive way. I have been a participant in this collaborative effort as a scientist. Here I shall report my observations on what has been achieved; how the plans that are now being formulated are deficient in their protection of natural resources; and what changes in attitudes and perspectives might facilitate the implementation of more effective measures.

My principal conclusion is that the plans are not deficient for lack of relevant scientific information, nor for failure to incorporate such information into the planning process. It is there in the preliminary stages. Unfortunately, in many cases no vestige of that input actually emerges in the final statement of policies of the management plans. I suggest that this regrettable outcome results from the esoteric aura which attaches to scientists and their work (and which, incidentally, we seem disinclined to dispel, for the most part) and the attitude that only scientists are competent to use the information that they produce. In this situation, scientists must actively promote the use of the relevant technical information throughout the planning process if adequate protection for natural resources is to be achieved.

I shall use a few examples from my own experience to illustrate the kind of deficiencies that are occurring in plans and how they developed; what alternatives might more appropriately have resulted; how common sense, not scientific expertise, was necessary to arrive at those more appropriate alternatives, and what procedural changes might expedite the achievement of those acceptable ends (i.e., consistency with the legal mandate, in the proximate sense, and protection of a rare and vulnerable natural resource, in the ultimate sense).

ANALYSIS OF EXISTING PLANS

As set forth in the Coastal Act of 1976, California's coastal zone management program has two phases in time and two levels of organization. The initial phase is the preparation of land use plans and implementation measures by all local governments which include parts of the coastal zone within their jurisdictions and the certification of those plans (Local Coastal Programs) for consistency with the provisions of the Coastal Act by the California Coastal Commission. During the initial phase, six regional commissions are also in operation to administer the Act until certification of the Local Coastal Programs by the state Commission and to assist local agencies in the preparation of their Local Coastal Programs. The second phase commences after the certification of the Local Coastal Programs and the disbanding of the regional commissions (scheduled for January 1981), with local governments assuming full responsibility for most aspects of coastal zone management. The state Commission will retain authority in such matters as siting of energy facilities; serve in an advisory capacity to the local programs; and hear appeals on local actions. Eleven other states have organized their coastal zone management programs along similar lines (Sorensen, 1979).

This system will only be effective if local plans contain adequate policies and implementing measures to manage coastal wetlands. After the certification of a plan, there will be little opportunity for revision to repair mistakes or to tune the planning instruments. Whatever guarantees for the protection of natural resources must therefore be incorporated before certification, if protection is to be provided.

The intent of the Coastal Act with respect to natural resources is explicitly stated in its first sentence (after naming itself).

> Section 30001. The Legislature hereby finds and declares:
> (a) That the California coastal zone is a distinct and valuable natural resource of vital and enduring interest to all the people and exists as a delicately balanced ecosystem.
> (b) That the permanent protection of the state's natural and scenic resources is a paramount concern to present and future residents of the state and nation.
> (c) That to promote the public safety, health, and welfare, and to protect public and private property, wildlife, marine fisheries, and other ocean resources, and the natural environment, it is necessary to protect the ecological balance of the coastal zone and prevent its deterioration and destruction.

Since the California Coastal Commission has consistently regarded coastal wetlands as environmentally sensitive habitats, the primacy of consideration for natural resource protection is even more emphatically stated:

> Section 30240. (a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on such resources shall be allowed within such areas.
> (b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade such areas, and shall be compatible with the continuance of such habitat areas.

Realizing that local governments needed assistance in preparing plans that would meet the special requirements of the "environmentally sensitive habitat" designation, the Commission provided grants, essentially to assemble Environmental Impact Reports that delineated the relevant resources (for instance, presence of endangered species, resting or feeding areas for resident or migratory birds, nursery areas for fishes, etc.); assessed the additional constraints to development imposed by the presence and sensitivity of those resources; and explored the consequences of alternative uses. The assumption was that the final specific plans for wetlands would be based upon these preliminary assessments of the resources. Members of the technical staff of the Commission then asked me to review some of the early plans and preliminary reports on coastal wetlands to evaluate their adequacy for the protection of natural resources.

As is apparent from Table 1 below, some of the planning documents examined were woefully deficient in protecting these resources. (Implicit in this analysis is the assumption that human activities are generally

destructive of natural resource values* of coastal wetlands, notwithstanding that planned manipulations can be used to enhance specific values.)

Table 1. Solutions to planning problems extracted from existing planning documents.

Proposed Use	Mitigation Measure
1. Put high intensity human uses (4-20 residential units per acre and roads) adjacent to a wildlife preserve	Erect artificial barriers to keep uses separate
2. Put 4-20 residential units per acre on the edge of a lagoon where the environmental constraints are moderate to severe while maintaining some other areas away from the lagoon at 0-4 residential units per acre where environmental constraints are minimal	Protect the lagoon by engineering the roads and drainage systems to contain the greater stresses that would otherwise be transmitted to the lagoon
3. Build a park far from the center of city (despite the Plan's claim of its "centralized location,") develop it for intense use either in the existing public utility transmission corridor or on the slopes immediately above the wildlife preserve	Move the transmission towers and lines? (not mentioned in Plan) Convert agricultural land. Or grade the slopes with provision for arresting the concomitant acceleration of erosion. Erect artificial barriers to prohibit uncontrolled incursions into the wildlife area
4. Limit planning for environmental impacts to ~700 acres immediately around the lagoon	Except as provided by catchment basins built as conditions for development within the Plan area, deal with sedimentation of the lagoon by dredging
5. Develop portions of the floodplain to 10-20 units per acre	Require more expensive construction practices to assure safety in a potentially hazardous area

*By natural resources values I mean the utility of an area of land and/or water for the support of wild, especially native or migratory animals and plants. Commonly the natural resource value of an area is regarded higher when the area is essential to sustain exploitable, renewable resources, such as fish and game; supports rare organisms; or is exceptional for its aesthetic appeal in its natural state.

Table 1 (cont'd)

Proposed Use	Mitigation Measure
6. Place a facility for the testing of armed missiles in the middle of a mudflat where shorebirds are more heavily concentrated than elsewhere in the lagoon. Deploy the fill in an elongate, lobed configuration	Compensate for the lost area by replacing a culvert with a bridge to allow regular tidal inundation of an added area predicted to be larger than the area lost
7. Zone for medium density residential development an area that includes 20-30 acres currently used as a breeding colony by endangered least terns.	Set aside 8 acres for the endangered species in a different location from that presently in use, half of which is under the jurisdiction of another agency (an agency that has already expressed official opposition to a preserve.) Protect the preserve with a 100 foot wide buffer strip

1-5. Extracted for the City of Carlsbad's Aqua Hedionda Specific Plan.
6. Extracted from the Final Environmental Impact Statement for Military Construction Project P-875 "Ready Missile Test Facility".
7. Extracted from the City of Chula Vista's Bayfront Plan.

The point is not that the measures cannot accomplish the stated objective of protecting the natural resource values; rather, it is that they consist of artificial structural modifications that will often require strict monitoring and diligent maintenance in order to be effective. Such programs are usually very expensive. In addition, the possibility cannot be ignored that the need for active law enforcement will be increased by placing unoccupied areas of restricted access immediately adjacent to areas of high intensity human use. The system could work, but any lapse in the active and conscientious execution of the program would compromise its effectiveness.

In contrast, the following measures would have the distinct advantage of being less vulnerable to the pitfalls mentioned above and would in addition be cheaper to institute and maintain: surround critical habitat areas with buffer strips; ensure that the highest intensities of human use are arranged to be distant from a preserve; exploit natural barriers to discourage human access to restricted areas; encourage development in areas with the fewest environmental constraints and discourage it in areas with the most severe constraints; design fills and developments to be compact in shape and restrict them to the edge of wetlands to minimize their perimeter of contact with the wetland; and, in general, make efforts to control potential adverse impacts at their sources.

I convened a workshop of a small group of planners, regulatory agency representatives and scientists, all who were deeply involved in coastal wetlands work, to address the evident failure of the local coastal planning process for coastal wetlands. It was a simple matter to achieve

consensus on a set of recommendations that, if followed, would almost certainly result in sounder plans than those now being proposed. They are presented below in outline form and are available from the California Coastal Commission in their entirety under the title "Guidelines for the Protection of the Natural Resources of California's Coastal Wetlands: Proceedings of a Workshop Held at University of California, Santa Barbara, 24-26 May 1979."

RECOMMENDATIONS FOR THE PREPARATION OF MANAGEMENT PLANS FOR COASTAL WETLANDS

I. PREREQUISITES FOR PLANNING THAT WILL ADEQUATELY PROTECT THE NATURAL RESOURCES OF COASTAL WETLANDS

A. Specify the relevant resources. (Maps and transparent overlays to the same scale of ground [and water] cover, habitat utilization by animals, outstanding views, etc.)

B. Set the environmental context. (Maps and transparent overlays to the same scale of topography, slope, soil, floodplain, earthquake hazard, and existing land use; and the full series of available aerial photography.)

C. Identify present and potential adverse impacts on the coastal wetland. (Mainly by comparisons between A & B above.)

II. RECOMMENDED MEASURES AND POLICIES TO PROTECT THE NATURAL RESOURCES OF COASTAL WETLANDS

A. Design the land use plan to minimize adverse impacts. (Based on the assumption that human activities are generally destructive of natural resource values.)

1. Zone low intensity uses close to areas of high natural resource value.

2. Zone the intensity of human use to be least in areas of severest constraints on development (for instance, steep slopes, floodplains).

3. Where development is permitted adjacent to coastal wetlands, require a buffer zone.

4. Where environmental constraints to development exist, zone in large enough units that parcels include some portion that has few constraints. Cluster development in that portion.

B. Exploit natural barriers to separate incompatible uses

1. Set the size of the buffer area necessary for a particular habitat according to the sensitivity of the most readily disturbed species that is known to be present on that site.

a. Intertidal sand and mud flats
b. Vegetated intertidal areas (requires widest buffer)
c. Transition zone (intermediate buffer)
d. Permanent open water bounded by steep shore (narrowest buffer)

C. Regulate construction activities and site planning to minimize adverse impacts on coastal wetlands.

1. Phase construction activity to minimize the expanse of bare soil exposed during the rainy season.

2. Minimize the area of impervious surfaces.

3. Discourage "technological fixes" as alternatives to planning that accommodates to environmental constraints.

4. If development is allowed with a condition for mitigation, require bonding, inspection, and follow-up monitoring to assure that the mitigation is successful.

D. When any filling or extensive disturbance is permitted in a wetland consistent with the Coastal Act, require the acquisition of an area of greater natural resource value in compensation for the area of coastal wetland lost.

1. Plan developments within coastal wetlands to minimize the perimeter of contact between human uses and natural areas by:

a. restricting development to the extremities of the wetland and
b. requiring the developed area to be compact in shape, other factors being equal.

III. IMPLEMENTING THE MANAGEMENT PROGRAM

A. Insure that there is accountability in the administration of the management program by clearly defining and delegating responsibility.

B. Provide for the on-going review of the management program by organizing an advisory committee composed of wetlands scientists, agency representatives conservation groups, and adjacent land users.

It is disconcerting that, regardless of the special qualifications of those who actually proposed the recommendations, virtually anyone with sufficient interest to think about the effects on wild plants and animals of the situations posed in Table 1 would have arrived at similar suggestions. On the one hand, it is reassuring that better plans are attainable by straightforward application of existing information, rather than requiring additional inputs from experts. On the other hand, it is perplexing and discouraging that, given the relative simplicity of arriving at sound plans for natural resource protection, they have not been forthcoming. In order to provide guidance to local governments that are still in the process of preparing their plans for wetlands, it is essential to ascertain at what stage(s) the plans diverge from the stated goals of natural resource protection. In the case of the City of Carlsbad's Agua Hedionda Specific Plan, it is possible to make a comparison with its precursor Environmental Impact Report, to determine whether the shortcomings of the Plan are attributable to an inadequate compilation of relevant technical information or to some other cause.

The comparison revealed that the necessary input was accessible in the Plan's own EIR. The problem evidently lay in failing to actually utilize the EIR in the preparation of important parts of the Plan. This is most obvious in the apparent insensitivity of the Land Use Plan section of the Agua Hedionda Specific Plan in its consideration of impacts related to slopes, hazardous geological conditions, and floodplain hazards, all delineated (described and mapped) in the EIR.

If it is true that the failings of the Plan were not due to inadequate technical input, then clearly, supplying more and better information in the preliminary stages, as would be the scientist's wont, will not be a solution. It would seem that merely contributing the technical foundation for a plan is insufficient. That information must be promoted throughout the planning process.

Given that we now know where in the planning process the technical input got lost and natural resource protection got side-tracked, it is still necessary to explain how it happened, before redress will be possible. Many factors undoubtedly conspire; however, there are a few important factors about which something can be done. First, the Coastal Act attempts to do all things for everyone, or so it seems. In addition to the protection of natural resources the Act includes policies which are intended to preserve or promote public access (including "lower cost visitor and recreational facilities and housing opportunities for persons of low and moderate income"); to maintain coastal dependent industry (including agriculture, forestry, commercial fishing, aquaculture, small boat harbors and major ports); and provide for the siting of essential energy facilities (even when their presence will have adverse effects on most of the other resources, natural and man-made, of the coastal zone).

Second, although planning is supposed to be an integrated process, in fact, it is not. Because the task is so large and so all encompassing, it must be subdivided both by subject matter and in time. Thus, the assembling of background material for a segment of the plan will often be financed by a special grant and the work will often or usually be contracted out. At a later date the related segment of the plan will be formulated, probably by others than those who gathered the relevant background information.

Third, planning that includes an ecological perspective is a relatively recent activity. It is not yet a well defined academic discipline. Older, more experienced planners probably have received no formal training with that perspective. Younger planners will more likely have been introduced to that perspective but cannot have had much experience in applying it.

My interpretation of how these factors interact to the detriment of natural resources in coastal wetlands is as follows. The Coastal Act serves so many masters that is must be very hard indeed to know which master takes precedence in each of the possible situations that could confront a small planning staff in the preparation of its Local Coastal Plan. I with my one axe to grind can deduce (correctly, I think) from the environmentally sensitive status of coastal wetlands that the protection of natural resources in this instance is the highest priority of the management program. It is not surprising that those who have to consider and respond to the whole

welter of conflicting demands (and answer for it to established constituencies) might often or even usually arrive at some other hierarchy of objectives.

Obviously, the purpose of requiring an inventory of the resources of an "environmentally sensitive habitat area" and an assessment of their environmental context is to give those factors the fullest possible consideration in the formulation of the local management plan. Unfortunately, singling out this phase of the process as a special task that must be completed before proceeding to the construction of the plan seems to have the effect of divorcing it from the planning process. It is as if having fulfilled that requirement (cleared that obstacle) it could then be ignored when the real job was tackled. Since the background of most planners is not strong in natural sciences, and since others, perhaps a local consulting company, compiled the information on natural resources, the material is likely to be foreign to the planning staff that formulates the final plan. The commonly held attitude that science is for scientists and that no one else is equipped to handle such material will insure the segregation of the technical input, even though common sense by itself is entirely adequate to reach an acceptable conclusion (i.e., given that the resources of note are concentrated in such locations and are subject to adverse impacts from such source transmitted in such ways - presumably the form of the technical input - the relative merits of various measures and activities ought to be obvious).

The final factor that works toward the diversion of proper attention from the protection of natural resources in the local planning process is that many of the other goals of the Coastal Act have deeply entrenched constituencies, whose vested interests are well understood and whose systems of exerting influence on public policy are well established. Thus, the planning agency will know the interests of land developers and how their interests affect the local community. It is predictable how this will focus the attention and perhaps channel most of the effort of the planning departments into reconciling the mandates of the Coastal Act for public access, low cost housing and public and private visitor-serving and recreational developments with the proposed projects of land developers. Considerations for natural resources are not so represented, at least in the case of the local stewardship of coastal wetlands.

REMEDIES

If this reconstruction of the local coastal planning process as it applies to coastal wetlands is essentially correct, it seems that some actions, entirely within the realm of the possible, could yield substantial improvements. First, it is critical that local agencies be directed, presumably by the California Coastal Commission, that protection of natural resources is the uncontestable highest priority in the management of coastal wetlands and will take precedence over all other considerations except public safety in planning. This by itself could counteract the factors listed above that militate against the use of the input of natural science information. Instead of having to interject this one unfamiliar element into the familiar framework that encompasses all the other competing demands (and in which it would understandably get short shrift because of its unfamiliarity) its relation would be clearly set as preeminent to those other demands. Dominance-subordinance being established, the necessity of coming to grips with the constraints imposed by a specific environment

will also be established. When inescapable, natural sciences become knowable (sufficiently to put together sensible plans, anyway).

It is important for scientists to participate in this phase. The main reason for this is there is as yet no generally recognized and effective constituency at the local level for exerting influence on behalf of natural resource protection in coastal wetlands. Until that vacuum is filled, planners will have to resort to the authority of the so-called expert opinion of scientists to confer legitimacy on their own common sense findings. Such outside consultation and review can only be beneficial to the planning process. On the other hand, the appeal to scientists as the repositories of the special knowledge that will invest a policy with the necessary weight of authority can only perpetuate the aura of othernessness about scientists and their work, which I regard as counterproductive, however unavoidable it may be in this situation. Concluding this line of reasoning, the second action that will help sustain the consideration of natural resource protection throughout the planning process will be to involve scientists as a political instrument. Although in the abstract this is not necessary and is a corruption of the traditional conception of the scientist as an investigator of natural processes and a provider of knowledge about such processes, in practice it appears to be necessary.

Unless this paper is read or heard by a lot more people than I have any reason to expect, there is no chance that either scientists or local planners will realize how their interaction might yield better plans. The initiative must again be taken by the Coastal Commission, in this case most appropriately channeled through the regional commissions. It should take the form of advising all members of the Local Coastal Program staffs as to how the organization of the coastal planning process seems to have obscured the explicit intent of the Coastal Act in regard to coastal wetlands, and why and how scientists should be enlisted to provide the balance of perspective that will most easily achieve consistency with the statutory requirements. Perhaps the same communication would serve to inform interested scientists about the state of the program and how they might be asked to contribute to its furtherance. The regional commissions are the appropriate match-makers, because they will have identified the appropriate scientists from previous consultations in relation to permit hearings and the like.

The third action is already underway: to provide a systematic set of recommendations for dealing with different situations, (i.e., the set of guidelines outlined previously). I am now convinced that they can serve no useful function until the more basic problems of attitude and perspective are addressed by the other two actions.

In this paper I have dealt with the role of scientists in providing technical information in the planning process of wetland resource management. I have belittled the contribution of their on-going research and recommended turning them into political pawns. It would be very misleading to leave them there. A sound plan may be an essential prerequisite of an adequate management program, but it is not sufficient by itself. In the case of California's coastal wetlands, for instance, restoration and mitigation will play very prominent roles. This is because much of our surviving coastal wetland is currently in a degraded condition. Also, some conversion

to other uses will be unavoidable, though law requires compensation by replacement with equal or greater value of wetland (in terms of natural resources) elsewhere. Research has barely begun and is desperately needed on all these issues, if our management of coastal wetlands is going to be ultimately successful.

REFERENCES

1. Sorensen, J. 1979. State-local relations in coastal zone management: implications for change. Coastal Zone Management Journal, 6: 295-302.

2. California Coastal Zone Conservation Commissions, 1975. California Coastal Plan, Sacramento, California.