Council on Environmental Quality

Coastal Management Consequences

Evaluation Approach

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This study is the responsibility of the contractor firms listed on the title page. Individuals who had substantial involvement in this study are as follows:

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I. INTRODUCTION

A. Nature of Study and This Report

In May 1976 the Council on Environmental Quality (CEQ) and the Office of Coastal Zone Management of the Department of Commerce (OCZM) initiated a study on evaluating the economic, environmental, and social consequences of implementing coastal zone management programs. Co-contractors for this study were Real Estate Research Corporation (RERC) and Robert S. DeVoy of DeVoy Collaborative. RERC sub-contractors were EDAW, Inc. and Harold F. Wise, Planning Consultant.

The two goals expressed at the outset of the study by CEQ and OCZM were:

- "To develop and illustrate a methodology for identifying and estimating the benefits and costs associated with the implementation of coastal management programs"
- "To identify the various benefits and costs associated with the implementation of particular coastal management programs"

Task I resulted in a report describing the proposed conceptual framework for the methodology. That report was reviewed thoroughly by CEQ and OCZM as well as by the Technical Review Panel (members are listed on Acknowledgement page). Based on that review, the subsequent work program was sharply focused on (1) CZM-specific substantive issues, programs and effects and (2) a generalized approach for evaluating the effects of CZM programs.

In Task II, a draft Interim Report was prepared which had two purposes: (1) to identify the contractors' preliminary conclusions as to the most important benefits and costs of CZM programs and (2) to propose a general approach for evaluating CZM programs in order to determine such effects.

Task III work included: refining the proposed evaluation approach; applying this approach to the selected case studies of Santa Barbara County, California and the state of Massachusetts; and amplifying the preliminary conclusions on coastal management consequences.

This report is one of a set of three:
Coastal Management Consequences -- An Evaluation Approach
Coastal Management Consequences -- Case Studies and Preliminary Conclusions
Coastal Management Consequences -- Summary

B. Description of CZM Program

(to be completed)

II. OVERVIEW OF EVALUATION APPROACH

A. Users and Uses

The proposed evaluation approach is intended to be used by both (1) those responsible for preparing and carrying out coastal zone programs, and (2) those affected by program impacts.

The first group of users includes the coastal zone manager and staff as well as other government officials at state and local levels who are or will be responsible for technical aspects of the program. These users need an evaluation approach which is compatible with their analytical skills and available information resources. They will use the evaluation approach to analyze potential program elements in order to: (1) design effective programs; (2) efficiently implement these programs; and (3) monitor and modify the ongoing programs.

The second group includes affected economic and environmental interests, public officials with policy responsibilities, and individuals with personal or organization concerns. For this group, the evaluation approach needs to be understandable, fairly generalized, and not dependent on considerable data requirements. The approach, therefore, should yield reasonably reliable results, but requires less technical understanding and analytical capability.

The evaluation process can be used by a number of organizations or individuals from varying perspectives or interests in coastal zone management. Since the conceptual framework that is used for analysis is the same in all cases, it provides a consistent format for the various perspectives. By organizing the issues, actions, and effects in this manner, although different groups may weigh components in different ways, all groups are obliged to consider a wide and consistent set of concerns in the same framework. This feature at least insures that some common ground exists for debate and discussion of CZM impacts.

B. Concept and Components

The proposed evaluation approach, termed Decision and Analysis Process (DAP), is intended to be useful in predicting future coastal zone management impacts as well as describing or simulating presently occurring impacts. DAP is designed to be compatible with the capabilities and needs of the most likely users in most states, and can be utilized in either detailed/technical or general modes. The approach is developed with the recognition that coastal zone management is a continuing process of research, planning, programming, action and decision-making, and response.

As displayed in Figure 1, the Decision and Analysis Process traces the causal relationships among coastal zone management issues, policies, public and private actions, and their circumstances (i.e., natural conditions and economic-environmental-social changes) in order to identify potential effects. These effects are in terms of likely outcomes rather than precisely defined consequences. The user of DAP must make decisions regarding the nature and extent of public and private actions which will be caused by coastal zone management issues and policies.

Given these decisions, DAP moves into the analysis of effects which are likely to result from the projected public and private actions. The level of specificity and quantification of the effects depends upon the specificity of the actions, availability of data on trends, conditions, and prospects, and the capabilities and needs of the DAP users.

Likewise, the area of study may vary, from a specific locality or parcel in a coastal zone to an entire state or even region. The types of descriptions that are possible and that would be required for the analysis will vary, of course, with the scale of the area of study. For some characteristics, for example, site specific-information would be necessary for the greatest precision and analytical reliability, while in other cases only generalized descriptions would be possible.

The evaluation process may reflect varying levels of detail of information, but such levels are oriented to the same conceptual framework. This will allow analysis at either policy or detailed technical levels, and accommodates varying levels of information for various components.

The following illustration (Figure 2) depicts the major decisions and analyses entailed in using DAP. Initial steps (1, 2, 3) pertain to identifying relevant issues and describing the pertinent context (conditions and trends) of these issues in the selected study area.

Next (step 4) is the identification and evaluation of key determinants (including legal, political, natural, physical, and economic factors) which substantially affect future prospects in the coastal study area. This part of the analysis takes account of forces other than the CZM and alternative non-CZM actions in determining the future; by so doing, CZM effects can be more precisely estimated.

Concurrent with the determinants analysis is step 5, the identification of public policies (at all levels of Government) which affect the coastal zone and are in any respect relevant to CZM. Some non-CZM policies are likely to be consistent with CZM while others will be contrary. This difference should be determined by comparative analysis.

DECISION AND ANALYSIS PROCESS (DAP)

Figure 1 OVERALL APPROACH

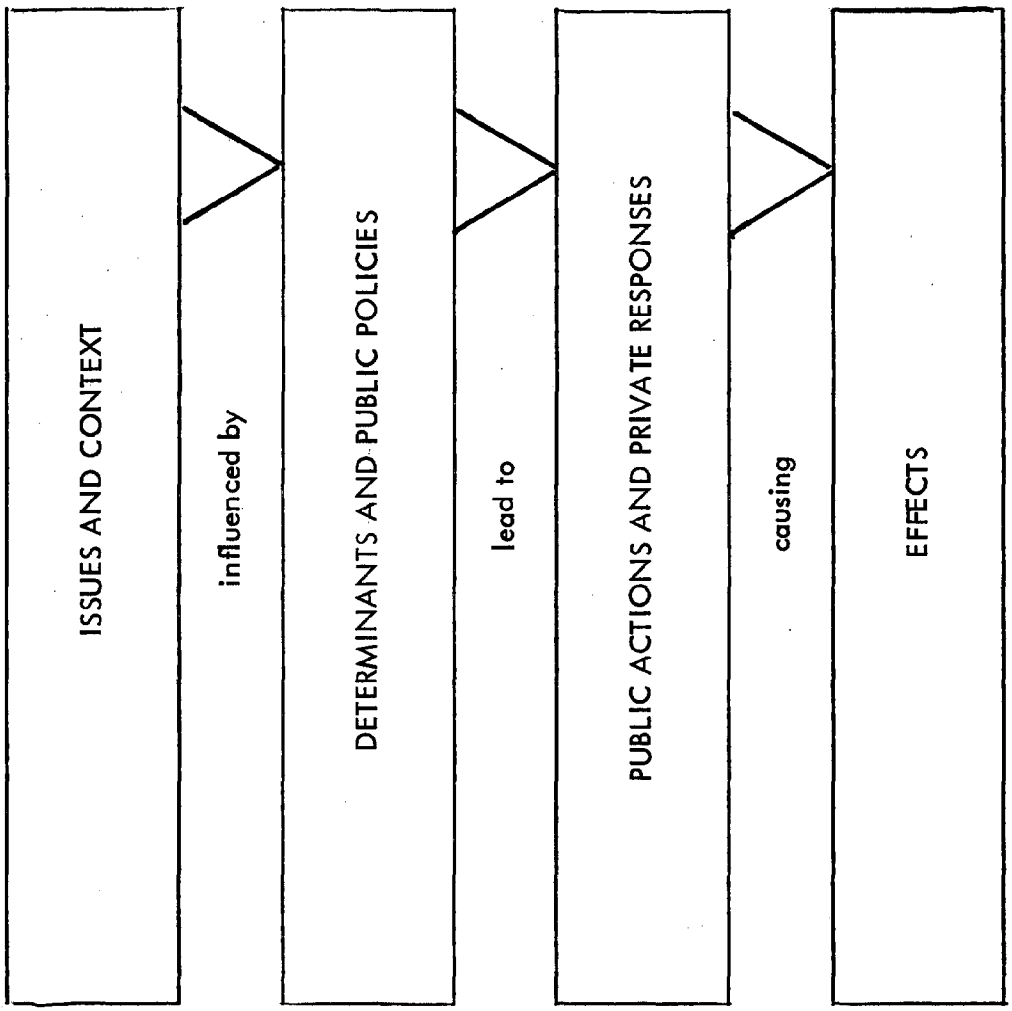


Figure 2

DECISION AND ANALYSIS PROCESS (DAP): GENERALIZED STEPS

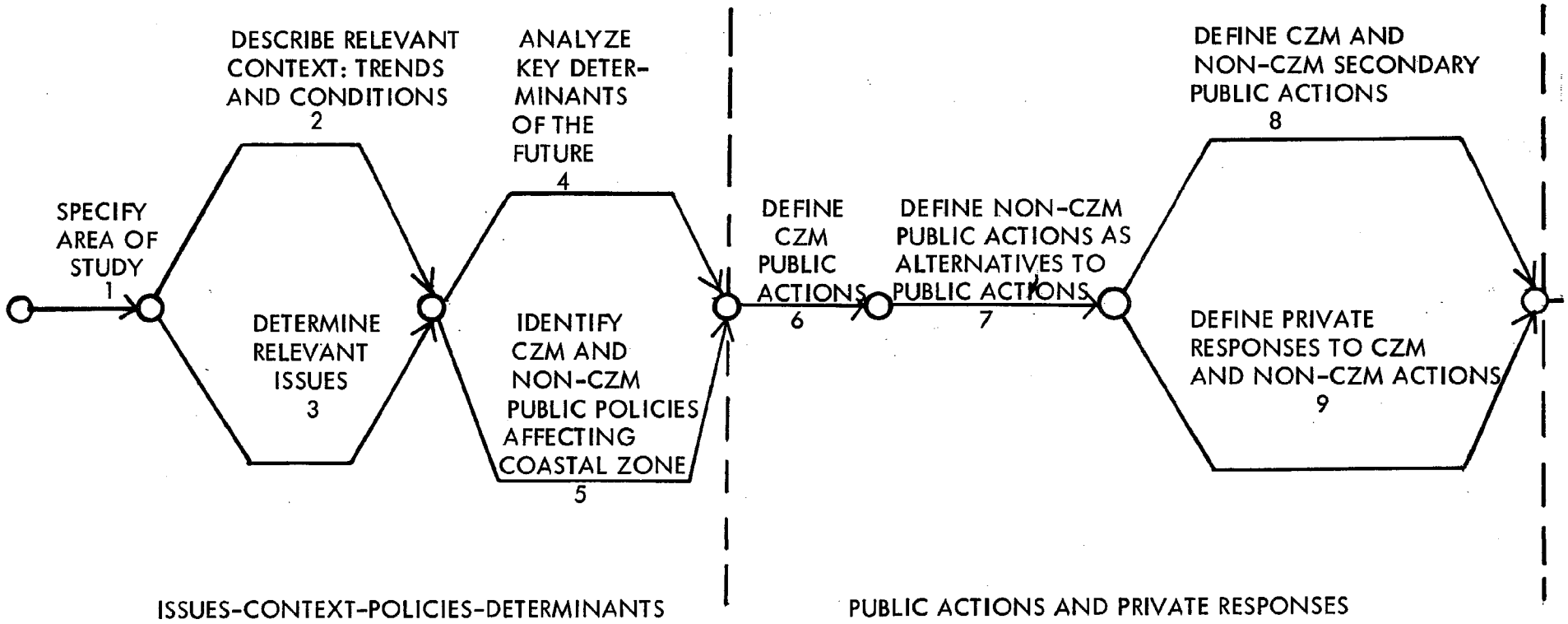
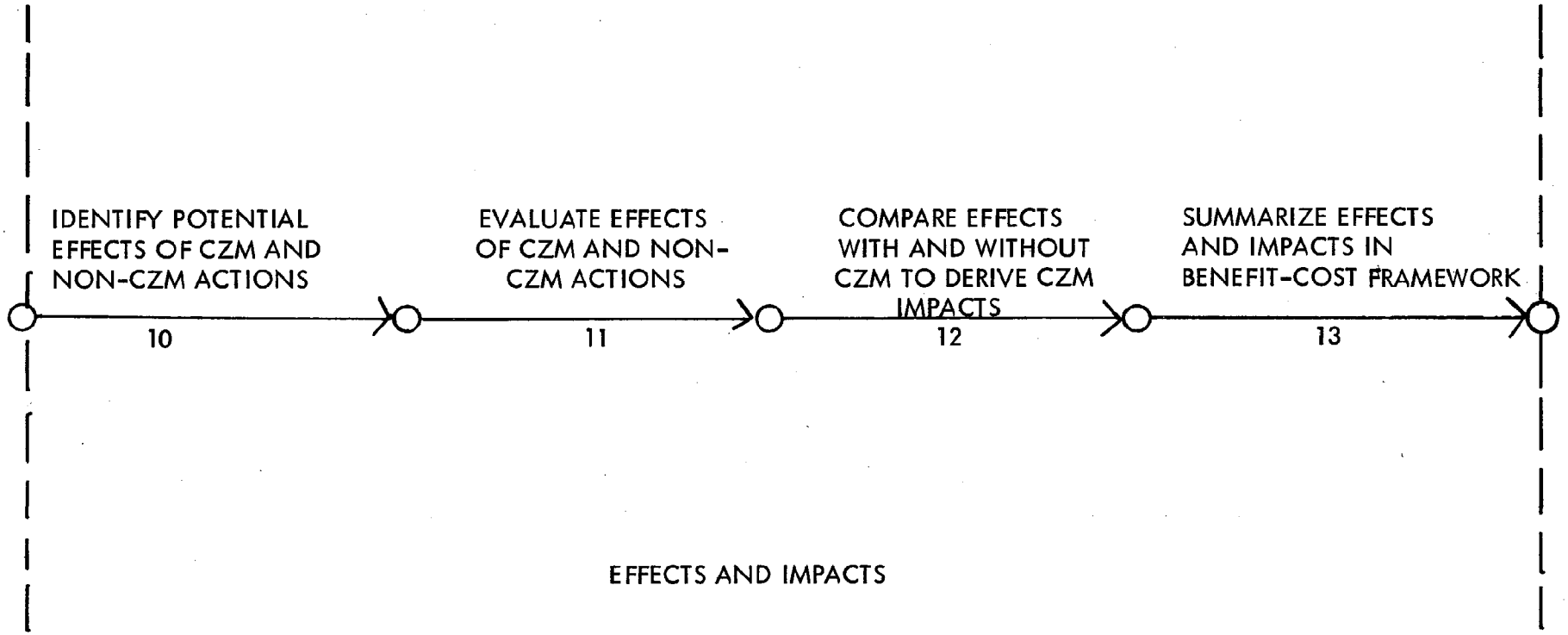


Figure 2 (Continued)



Step 6 entails the translation of the defined policies into CZM public actions -- some actions will be explicitly spelled out, of course, but others will need to be postulated. The non-CZM public actions to be defined in step 7 are to be those which would be taken were it not for the CZM actions. The secondary public actions (step 8) and private responses (step 9) are those which flow from and are because of the primary public actions.

Steps 10 and 11 first identify potential effects of the defined actions and then evaluate those effects in order to test them and refine their definition (including quantification and distribution). The final steps (12 and 13) compare the conclusions of the analyses with and without coastal zone management. They are the differences in these alternatives sets of actions and effects which constitute the impacts of the specific forms of coastal zone management under study.

In actual use, DAP is applied on an iterative and multi-scan basis. The first time through the process should be accomplished without research. The users simply select specific issues and for each issue think through the apparent relationships of policies, actions and effects. The second scan should (1) focus on identifying the issues more precisely and (2) pinpointing areas where research should be concentrated because of significant information gaps, substantial uncertainty or major potential importance in determining effects.

The third scan should follow the DAP approach step-by-step in as much detail as is practicable given the need for precision, complexity of the circumstances, and available resources.

DAP can be applied by either the concurrent consideration of "with" and "without" CZM or by first tracking the CZM policies, actions, effects and then considering what would occur without CZM.

III. COMPONENTS OF THE EVALUATION APPROACH

The previous description of the Decision and Analysis Process (DAP) identified the overall concept and the major steps in the evaluation approach. Following are specific descriptions of each of the major components including: (1) CZM context: trends and conditions; (2) CZM issues; (3) determinants; (4) policy options; (5) public and private actions; and (6) effects.

A. CZM Context

This initial research activity is simply to prepare a composite description of the most pertinent characteristics of the study area. The most pertinent characteristics are those which are likely to determine or be determined by the CZM issues, policies and actions. Through the multi-scan application of DAP, these judgments can be made. The subsequent lists of issues, determinants, actions, variables, effects, and measures are useful guides.

Information to be compiled and assessed on past trends, current conditions and future prospects would include at least the following in most cases:

- Physical characteristics: land and water uses; natural features such as terrain, soils, geological forms, flora and fauna; and climate

- Economic characteristics: employment distribution by industrial categories and occupations; business composition; major imports and exports; household income distribution; unemployment trends; population trends; land values; construction costs; financing availability and costs

- Institutional characteristics: government jurisdictions; development regulations; growth management policies and plans; fiscal capabilities

In preparing the description of land and water uses, it may be helpful to classify uses by the following categories:

Table 1. CATEGORIES OF LAND AND WATER USE

A.	Recreation Areas		Land Water
B.	Natural Areas (undeveloped)		Land Water
C.	Developed Areas		
	1.	Renewable Resources	Agriculture Forestry Aquaculture
	2.	Nonrenewable Resources	Mining Quarrying Energy Resource Extraction
	3.	Urban or Other Development	Ports and Harbors Industrial Energy Facility Sites Transportation Residential and Residential-Related

In most instances, the information required for the preparation of this context description will be available in current reports of government agencies. Additional research should be minimal. This activity should focus on providing a factual basis for subsequent parts of the evaluation process. It need not and should not absorb significant time or analysis resources.

B. CZM Issues

Concurrent with the preparation of the factual base on study area context (i.e., trends, conditions and prospects), CZM issues are identified and assessed. These issues are the fundamental reasons for coastal zone management programs. Those which are selected for analysis will provide the focus and general framework for the remainder of the evaluation process.

As shown in Table 2, the major coastal zone management issues pertain to recreation, natural areas, and development. A further identification of issues also is shown in the table.

Table 2. MAJOR COASTAL ZONE MANAGEMENT ISSUES

Recreation	**Recreation** • Marinas/Boating • Private Recreational Development/Second Homes • Tourism • Access to the Shore
Natural Areas	**Water Use** **Natural Forces** • Coastal Erosion • Storm Damage **Natural Area Preservation**
Development	**Coastal Dependent Energy Facilities** • Offshore Development • Energy Facility Siting **Urban Waterfronts** • Ports and Harbors **Growth** • Economic Development • Urban Growth

An issue in the context of coastal zone management implies some type of conflict over particular types of changes that may occur in the coastal zone. The types of conflict that could be stated as issues include the following:

- Conflict in use: As indicated in Table 1, there are five categories of geographical or functional uses of coastal areas; conflicts arise over shifts from one type of use to another, or from shifts within the major categories. Conflicts may also arise due to the present pattern of uses, where one or more uses may be incompatible. A particularly important type of conflict is the incompatibility of some natural and human activities; likewise, a conflict between renewable and nonrenewable resource use is another important type.

- Conflict in intensity of use: Another aspect of the conflict is in how much of a particular use will occur. If too intense use is anticipated, then environmental systems or personal preferences may be violated, for example.

- Conflict in timing of use: Perhaps the most difficult type of conflict that occurs in coastal areas is whether there is harmony between present and future uses. Because of the basic irreversibility of most coastal uses, consideration of both short and long-term uses is necessary.

- Conflict in who wins and who loses: A particularly important conflict arises over how benefits and costs are distributed. The dimensions to how this type of conflict may be stated are presented in the discussion of the evaluation approach, but it suffices to state that substantial disagreements may arise over who will reap benefits and who will bear burdens.

- Conflicts in who decides: Because of the overlap of governmental jurisdictions in coastal areas, there is often a problem of whether Federal, state or local authority exists. Similarly, there is a conflict between decisions by public or private sectors since different objectives often are present.

An issue, then, is a conflict which arises in the context of changes in the coastal area, where some disagreement exists over the timing, nature, quality, and authority for determining future events.

All of the issues listed in Table 2 infer some conflict of the general types listed. Further issues certainly could be identified. However, this list of issues is representative of the range of types of issues likely to be encountered in most analyses of the consequences of coastal zone management.

C. Key Determinants

The basic concept of DAP is that coastal issues lead to a selection of policies, which are implemented by public actions, which cause secondary public actions and responsive private actions, and these actions result in certain effects. This cause-effect chain has a missing link: external determinants.

That is, the issues, policies, actions, and effects all are influenced by more factors than those directly related to coastal zone management. It would be much easier to apply DAP without the considerable complication of taking account of the key external determinants, but the results could be very misleading. Therefore, it is best to add this component to the process.

These external determinants are the natural, economic, social, legal, political, and institutional circumstances and forces which interact to influence events and largely affect future changes. Included are such diverse and pervasive factors as shown below in Table 3:

Table 3. KEY EXTERNAL DETERMINANTS

Natural Hazards (e.g., storms, earthquakes)

Physical Geography and Geology

Existing Land Uses, Values and Ownerships

Infrastructure Investments (e.g., transportation, sewers, utilities)

Economic Feasibility (i.e., marketability, profitability)

Fiscal Feasibility (government cost-revenue balance)

Development Regulations (e.g., zoning, environmental regulations)

Legal Constraints (e.g., taking issue, state/local jurisdictional problems)

Table 3. (cont'd)

Political Constraints (e.g., intergovernmental relations, growth concerns)

Size of Population/Economy and Growth Rate

Consumer Preferences

Taking account of the key external determinants can be done subjectively with limited analysis or explicitly using various analytical techniques. Either way, decisions must be made as to the relative importance of each of numerous determinants in influencing a particular issue, policy, action, or effect. For example, the issue might be natural area preservation with a policy to preclude further filling in of coastal wetlands. An action could be to rezone certain lands from industrial to agriculture designations. The nature and magnitude of resulting economic effects would be determined substantially by such determinants as the demand for industrial land, the available supply and the comparative attractiveness of the coastal lands rezoned.

D. Policy Options

A policy expresses a position, attitude, preference, or response of a government regarding a particular topic (usually an issue). Fostering public access to the shore is an example of a coastal zone management policy. In most cases where DAP would be applied, the coastal zone management policies will be formally expressed. The task will be to determine what the alternative policies were before or would be without CZM.

Careful identification of alternative policy sets is important because the policies establish the direction, scope, nature, and perhaps even scale of potential implementation actions.

E. Public and Private Actions

The public actions which are pertinent to coastal zone management are those which were not taken, were modified or were taken because of the coastal zone program. Actions which were not taken are those which would have occurred without CZM. Similarly, the actions before modification by CZM are what would have happened without CZM. Taken together, these comprise the sets of primary public actions with and without CZM.

Secondary public actions are those which occur because of the primary actions. These secondary actions usually are needed to support, compensate for or extend primary actions. For example, the acquisition of a site for a beachfront park could require a new road to provide access. These secondary actions are best determined by the public officials with specialized responsibilities once the primary actions have been defined.

Examples of the major types of primary public actions are shown on Table 4.

Table 4. PRIMARY PUBLIC ACTIONS

Planning, Administration, Implementation Monitoring (including CZM)

Regulation (health code; environment; zoning; subdivision; building)

Taxation/Fee (for revenue; penalty; incentive)

Provision of Subsidy (lower income; preservation of unique areas/buildings)

Provision of Services (environmental protection; parks; recreation; other)

Construction (roads; utilities; dikes, bridges, breakwaters, seawalls; other)

Acquisition (open lands, rights-of-way; fee or partial)

It is assumed for purposes of DAP that only those private activities that may be seen as responses to or a consequence of public actions (or policies) are to be considered in determining CZM effects. Examples of potential private actions are shown below.

Table 5. PRIMARY PRIVATE ACTIONS

Removal of existing activities from the coast

Location of new activities

Intensification of activity/land use

Expansion of activity/land use

Table 5. (cont'd)

Disinvestment in business/property

Transfer of ownership

Change of use

Change in procedures, operations

Protection of people, property, environment, public rights

Grants of easements

Resistance to CZM by political and legal actions

F. Effects

Effects are the changes in conditions and trends which occur because of the specific policies and actions under consideration. For example, the decision to avoid construction on wetlands would have several effects, including but not limited to reducing construction employment in the locality while preserving the ecosystem, thereby enhancing commercial fishing business. Even the public and private actions discussed above actually are effects of specific policy decisions.

The number of possible effects of coastal zone management is virtually limitless viewed in the broadest perspective and greatest detail. Nevertheless, there are relatively few effects which appear to be more important than the others. These are listed in Table 6.

Table 6. IMPORTANT CZM EFFECTS

A. Economic

- Employment
- Profits
- Land Values
- Public Expenditures/Revenues

B. Environmental

- Water Quality
- Ecosystem Stability and Diversity
- Water Supply

Table 6. (cont'd)

C. Energy

- Site Availability
- Resource Availability

D. Social

- Recreation Opportunity
- Community Stability/Viability
- Sense of Well-Being
- Access to the Shore

In actually using DAP, it is expected that the users would select those effects which most concern them; also it is likely that the selected effects would be defined more specifically than they are here. However, for many analyses this array of effects should suffice. Since one of the intentions of DAP is to facilitate comprehensive and balanced evaluations, it is best to not limit the number of effects to much fewer than those listed here. It is possible to evaluate the more important effects in greater detail while maintaining a comprehensive and balanced perspective.

In order to describe the changes in these categories of effects which are caused by specific policies and actions, it is useful to establish specific measures of change. For example, one measure of flood severity is feet above flood level. Using this measure, the impact of a flood is the difference in water level during the flood period compared to other times. This is only a simple, direct measure of the flood. There are numerous other measures, such as: acres of land inundated; property damage in dollars; loss of life; and restoration costs in dollars.

Potential measures for each category of effect are shown in Table 7. While these are by no means the only measures of these effects, they are the most commonly used. For selected detailed analyses, the researchers probably would use additional measures to describe the effects.

Typically, the analysis of coastal zone management will be intended to reach conclusions on the direction, magnitude, timing, and distribution of the effects. The choice of measures must permit such multi-dimensional determinations. For the most part, however, establishing these various facets of effects will depend on the analytical techniques employed.

Table 7. SELECTED MEASURES OF IMPORTANT CZM EFFECTS

Types of Effects	Measures
Economic	
Employment	Jobs Total Wages and Salaries Unemployment Rate
Profits	Aggregate Annual Business Income Aggregate Net Income After Taxes
Land Values	Market Value of Land Total Assessed Values for Tax Purposes
Public Expenditures/Revenues	Total Amount of Capital Improvement Program Annual Debt Service Total Operating Budget Total Property Taxes Fees and Service Charges Intergovernmental Transfers
Environmental	
Water Quality	Biological Oxygen Demand Bacteria Population Counts Siltation (parts per million)
Ecosystem Stability and Diversity	Number of Species Species Population
Water Supply	Acre Feet
Air Quality	Particulate Matter (tons per year) Oxides (tons per year)
Energy	
Site Availability	Number of Available Suitable Sites Compared to Need for Sites
Resource Availability	Magnitude of Supply Legal Extractive Capability Economic Extractive Feasibility

Table 7. (cont'd)

Social

Recreation Opportunity	Ratio of Demand to Capacity of Sites and Facilities Time-Distance of Travel from Urban Areas to Sites
Community Stability/Viability	Population Growth Rate Housing Turnover Rate Unemployment Rate Total Property Value Per Capita
Sense of Well-Being	Qualitative Assessment
Access to the Shore	Laws Regarding Public Use Road Access and Parking Acres of Coastal Public Parks

The analytical techniques to be used in the application of DAP will depend upon the interest of the users, the quality of the desired results, the analysts' technical capability, resources available, information available, and the complexity of the situation. Nevertheless, whatever techniques are used -- from simple observation and deduction to multiple-regression analysis or econometric modeling -- there are some basic intermediate variables which must be analyzed in order to measure the effects. These variables are listed in Table 8.

The nature and magnitude of these intermediate variables will be influenced by specific policies and actions. In turn, changes in the variables will largely determine the measures of the effects. For example, a decision to restrict horizontal urban expansion (a policy) could lead to enactment of a new zoning ordinance (an action) which could alter land uses (a variable) thereby affecting employment (an effect). (Just as it is reasonable to think of CZM actions as a type of effect themselves, the variables which contribute to the measuring of the selected effects also are effects themselves.)

In evaluating the potential effects of a particular policy-action set, the previous determinants analysis is used to estimate the specific

nature and magnitude of the identified effect. For example, the demand for housing (a determinant) would substantially determine the implications on employment of limiting urban expansion. Given a strong demand for single-family housing, the effect of a strict urban boundary could be major, while in a weak market situation it would be much less.

Table 8. INTERMEDIATE VARIABLES CONTRIBUTING TO THE MEASUREMENT OF EFFECTS

Category of Effect	Type of Variable
Economic	
Employment	Levels of Economic Activity Land Use Labor Productivity
Land Values	Land Supply-Demand Relationships Construction Costs Property Taxes Transportation Improvements Community Facility Changes Regulations (Land, Building, Business) Socioeconomic Factors Growth Potentials (Speculative Value)
Profits	Business Volume-Prices Fixed Overhead Costs Variable Operating Costs Regulatory Compliance
Public Expenditures/Revenues	Growth Rates Development Pattern and Standards Public-Private Cost Responsibilities Debt Capability Cost Trends Tax Base Intergovernmental Transfers

Table 8. (cont'd)

Category of Effect	Type of Variable
Environmental	
Water Quality	Runoff (Siltation, Chemicals) Spillage, Dumping (Fuel, Oil, Trash) Flooding
Ecosystem Stability and Diversity	Wildlife Habitat Food Sources Species
Water Supply	Capacity of Supply Consumption Treatment (Contamination) Distribution
Air Quality	Noise Causes and Perceptions Pollution Sources
Energy	
Site Availability	Physical Potentials Regulations Demand
Resource Availability	Physical Potentials Regulations Demand

Table 8. (cont'd)

Category of Effect	Type of Variable
Social	
Recreation Opportunity	Sport-Boats Registered per Capita Public and Private Marina Slips per Capita Total Acreage in Public Beaches per Capita Average Travel Time to Nearest Public Beach Relationship of Average Travel Time to Income Bracket Categories Average Cost per Person for a Beach-Oriented Recreational Day Quality of Sports Fishing
Community Stability/Viability	Community Economic Base Employment Levels Proportions of Community Income Originating from Various Industry Types Housing Turnover Rate Socioeconomic Characterstics of the Population Vacancy Levels in Housing/Commercial Facilities Property Values
Sense of Well-Being	Citizen Participation in Local Issues Voting Participation in Elections and Referendums Level of Improvement and Investment in Existing Properties Rate of Approval of Proposed Bond Issues Rate of Housing Turnover Subjective Evaluations of the Community by Residents Composition of the Population
Access to the Shore	Proportion of Shoreline that is Public Ownership Number of Public Rights-of-Way to the Shore Number of Private Developments Providing Access Easements Ratios of Boat, Slips, Moorings, and Ramps to Registered Boats Availability of Public Parking Spaces Along the Shore Availability of Public Transportation to the Shore Socioeconomic Composition of Beach Users

IV. GUIDELINES FOR USING DAP

As described above, it is proposed that this Decision and Analysis Process be applied: first, as a thought process without research; second, by focusing on areas of key concern to better define research needs; and, third by systematic step-by-step application of the entire process and related guidelines.

Figure 2 indicates that DAP has three major stages:

- Issues, Context, Policies, Determinants
- Public Actions and Private Responses
- Effects and Impacts

Upon completion of each of these three stages it is important to review and validate the decisions and analyses made to that point to ensure that the results are as realistic as possible, given the needs of the study and available resources.

The following guidelines are not intended as complete instructions for using DAP but rather as a further explanation of each major step with guidelines intended to make DAP of value to the intended users.

1. Specify Area of Study

Most of the time the study area will be defined from the prospective of the user of DAP. For example, state officials will tend to be interested in the entire coastal area and the effects on the whole state and major regions. Local officials mostly will focus on their own jurisdiction and property owners on their own property. Interest groups will focus on types of areas (e.g., wetlands). These orientations are understandable and DAP is usable in each case.

However, other considerations also will influence the definition of the study area, including:

- Availability of pertinent information -- larger areas than otherwise desired may be necessary in order to use available information.
- Potential importance of effects -- for example, it probably would be desirable to view the lower-cost housing effects of CZM from not only local but an area-wide perspective and energy plant siting from local, regional, state, and even national perspectives.

- Nature of CZM policy and actions -- in order to better understand the views of others involved in the issues under consideration, it is usual to analyze the issues from their perspectives; this may entail defining the study area differently than if only one perspective was of concern.

2. Describe Relevant Context: Trends and Conditions

The basic purpose of this step is to present enough information about the local context to enable the evaluation process to proceed. The characteristics may be divided into various groups -- physical, economic, and institutional. Physical characteristics relate to land uses, water uses, physical forms, flora and fauna, to geographical features and other factors. Economic factors refer to the prevailing types of activities that are found in the area of study, such as employment mix, transportation characteristics and use, industry mix, land values, and financial constraints. Institutional factors would relate to public policies and regulations that affect the area, existing plans, codes, and zoning constraints, as well as patterns of private policies and decisions.

The area of study may vary, from a specific locality or parcel in a coastal zone to an entire state or even region. The types of descriptions that are possible and that would be required for the analysis will vary, of course, with the scale of the area of study. For some characteristics, for example, site specific-information would be necessary for the greatest precision and analytical reliability, while in other cases only generalized descriptions would be possible.

Other factors to consider in the context analysis are:

- Degree of accuracy that is required: The information does not have to be more accurate or reliable than the amount of variation in the conclusions that are derived. If an imprecise but reasonable solution will provide enough information to perform an analysis or to make a decision, more elaborate or detailed information is not necessary.

- Applicability of existing data sources: If readily available sources of data (such as census data or municipal land use and transportation plans) are useful, then use of such data would be recommended.

- Requirements of the particular issue: The data requirements for various issues will vary; for example environmentally-oriented issues will require more careful specification of the physical characteristics of the study area than will more economically-oriented issues.

The types of information required for this part of the study can be defined quite specifically by referring to the previous lists of determinants, public actions, private actions, types of effects, measures of effects, and intermediate variables. It is expected that the context analysis and issue identification will proceed concurrently and be closely related so that the research can focus on the issue topics, and the issue statements can be refined based on research findings.

3. Determine Relevant Issues

As stated above, issues entail conflict. While it is expected that the users will define their own issues, there is a discussion of issues in Chapter III-B., with a general list in Table 2. Another guideline as to potential issues is the companion report entitled Coastal Management Consequences -- Case Studies and Preliminary Conclusions. Many CZM issues are defined and their effects generally described in that report.

4. Analyze Key Determinants of the Future

The context description ought to provide the information to be evaluated in order to estimate the influences which key determinants are likely to have regarding future events and conditions. Examples of some of the more important determinants are listed in Chapter III-C. These are the factors which will largely shape the future in terms of size, physical pattern, economic activity, pace of change, etc. The purpose of this determinants analysis is to enable CZM policies, actions and effects to be viewed in a dynamic deterministic context rather than just on the basis of trends and present conditions. This analysis step should enable a more realistic assessment of CZM than would be possible without it.

The analysis of determinants comes at this time because the results ought to be considered in defining both CZM and non-CZM public actions and private responses (steps 6-9). However, the greatest use of the determinants results will be in evaluating effects (step 11). Accordingly, while the general description DAP implies that the determinants analysis is completed before the definition of action commences, in fact the analysis continues through to the evaluation of effects.

5. Identify CZM and Non-CZM Public Policies Affecting Coastal Zone

CZM policies are likely to be explicitly stated in recent plan reports and other records. If not, at least drafts of potential CZM policies are almost certainly to be available. Other relevant public policies can

be extracted from comprehensive planning documents in most places. Some interpretation, updating and gap-filling may be necessary.

A comparison should be made of the CZM policy statements and the other policy statements to ascertain similarities and differences. Policies should be classified as follows:

- Unique to CZM (i.e., no similar or contradictory policy is present in other statements).
- Common to CZM and other established policy.
- Significant contradiction between CZM policy and other policy.
- Other policy substantially affecting coastal zone with no relevant CZM policy (other policy should be one where a related CZM policy would seem reasonable).

This classification provides the basis for considering the likely public actions which will be taken to implement these policies. The distinction between CZM and non-CZM policies is evident once this classification is complete -- except where the CZM policy has a similar counterpart in other policy statements. In environmentally progressive places, this often could be the case. Alternative ways of handling this are to: (1) treat all such policies as CZM policies; (2) find out when each was first adopted and assign it on the basis of the earliest adoption date; (3) eliminate these policies from further consideration (this will frequently not be practicable because they continue as significant issues); (4) although the policies are stated similarly, differentiate them in the subsequent analyses of actions and effects to see if their inclusion in the CZM program makes a significant difference.

6. Define CZM Public Actions

Where the CZM plan describes intended actions to implement the plan, much of the analysis of this step is made easier. Even in such cases, the description of actions will need to be analyzed to determine if all actions are listed and if they are adequately described. Probably it will be necessary to add actions, define the actions further and, very importantly, determine the magnitude, timing and physical distribution of the actions.

In most places, it will be necessary to refer back to the policies in order to determine what public actions would be undertaken. It is best to obtain the cooperation of the officials who prepared the plan and those who will be principally responsible for its implementation to define these

actions. Even with their assistance, determining magnitudes, timing and distributions of the actions will require informed speculation.

Table 4, in the previous section, lists the general types of primary public actions which are most likely to be germane to CZM. This list could be useful as a checklist.

7. Define Non-CZM Public Actions as Alternatives to CZM Public Actions

What is sought here are the public actions which would occur were it not for the CZM program. Included would be actions which were terminated, intended but never started, or substantially changed because of CZM. Also included would be those future actions which would be taken were the CZM program not in effect.

The identification of the ongoing or planned actions (e.g., an airport expansion into a wetlands area) ought to be relatively easy to ascertain from public documents and some interviews. Some interpretation probably would be required to describe how these actions would be changed by CZM.

More difficult and speculative will be the definition of future actions were it not for CZM. Here it seems best to reason through what the probable alternative action would be to each of the CZM public actions. By having several persons do this and seeking consensus the results should be reasonable. Again, cooperation from the most knowledgeable public officials is highly desired.

8. Define CZM and Non-CZM Secondary Public Actions

The secondary public actions which are sought are those which are needed to support, compensate for or extend the specific primary public actions defined in steps 6 and 7. These actions are needed to better comprehend the overall actions entailed in implementing the CZM program. While it might be desirable to go to third level actions or even beyond in some cases, the analysis would become very complex. Also, most of the overall impact of CZM should be captured by consideration of the primary and secondary actions.

Perhaps the best way to identify these secondary actions is to think through the public facilities and services entailed in supporting the first action (e.g., widening a road to a new park). Also, consider what actions would be taken to compensate for a primary action (e.g., raising taxes to finance land acquisition).

9. Define Private Responses to CZM and Non-CZM Actions

Table 5 lists the kinds of private actions which are likely responses to the public actions identified in steps 6, 7, 8. In order to keep this activity manageable and the results most useful, the private actions defined should be confined to those which are both directly responsive to the above-defined public actions and likely to be of substantial influence in determining effects.

This activity can be completed by: (1) deciding who in the private sector is likely to be most affected by each of the public actions; (2) identifying how they are likely to be influenced; (3) determining what their responses are likely to be; and (4) estimating the potential magnitude and importance of these responses.

10. Identify Potential Effects of CZM and Non-CZM Actions

Note that this step in DAP is just to identify potential effects -- in the next step these effects will be evaluated which will result in more specific descriptions of their characteristics including, where possible, quantification and distribution.

Table 6 provides a useful checklist of some of the more important CZM effects.

The proposed way of identifying the types of effects caused by the actions specified above is to do the following:

- For each action, consider if it would have significant influence on each of the variables related to each of the types of effects listed on Table 8 (e.g., will the elimination of vehicles from the beach cause changes in land use? No.).
- Subjectively sum the above judgments by effect to draw conclusions as to what effects are likely to be caused by each action.
- Consider if the nature and magnitude of each action-effect is likely to be important enough to justify evaluation in the next step.
- Prepare a list of action-effect relationships to be evaluated later.
- Prepare a preliminary definition of those effects (i.e., a brief paragraph) along with a statement explaining why the actions are perceived to have the described effects.

11. Evaluate Effects of CZM and Non-CZM Actions

This step entails a testing and further definition of the preliminary effects resulting from step 10. Here is where the key products of most of the previous steps become integrated.

The following sub-steps are proposed:

(a) Conduct investigations and other analyses to verify the preliminary action-effect statements from step 10. Note that whatever analytical techniques are used, the variables listed on Table 8 should be considered.

(b) Prepare refined statements of effects based on (a).

(c) Conduct analyses required to estimate potential magnitudes of these effects. The measures shown on Table 7 for each effect should be used at a minimum. Additional measures may be desired depending on needs and resources. In these analyses it is very important that the key external determinants listed on Table 3 be taken into account in order to properly evaluate the effects of the specified actions in a dynamic context of complex forces -- only some of which are embodied in the actions being considered.

(d) Determine how each of the effects would be distributed from place to place, among people and over time. Some indications of the incidences of effects will surface from the previous analyses in this step -- now is the point to address this important aspect of the effects explicitly and comprehensively. Some of the ways that effects will be distributed include the following:

- Level of jurisdiction: whether at community, county, state or national level.
- Geographical scale: whether effects occur for a particular site, at the sub or community level, within the region, or across some larger area.
- Owner-interests versus public-interests: whether individual property rights may be subordinated or enhanced by public rights.
- Public versus private: whether costs are borne by the public sector or are transferred to the private sector.

- Residents versus visitors or transients: whether effects favor those residing in the immediate area or visitors to the area.

- Future versus existing residents: whether costs or effects are distributed upon newcomers, previous residents, or both.

- Future versus existing businesses: this parallels the issue of new versus previous residents as a distribution of effect.

- Urban versus rural considerations: whether the effect has varying impact on urban or rural activities.

- Income levels: whether various income levels, particularly lower income levels are adversely or inequitably affected.

- Timing of effects: whether the distribution of effects may vary over time, so that present adverse effects may be superseded by positive long-term effects; related to this issue is whether the effects occur one-time only or recur over time.

12. Compare Effects With and Without CZM to Derive CZM Impacts

Fundamental to the "with and without CZM" characteristic of DAP is the distinction made in the meanings of "effects" and "impacts" -- words that commonly are used interchangeably. By the completion of step 11, CZM effects have been determined. In addition, considerable effort has gone into deriving non-CZM policies, actions and effects. That effort is essential to derive CZM impacts since these impacts are the differences between CZM and non-CZM effects.

Each of the CZM actions with its specified effects should be compared with its corresponding non-CZM action and its effects. If the DAP procedures and lists of effects and their measures are used consistently in the CZM and non-CZM analyses, this comparison should be straightforward. If not, some adjustments will be entailed.

13. Summarize Effects and Impacts in Benefit-Cost Framework

Step 12 completes the analysis of CZM effects and impacts using DAP, but there is need to summarize the results in a clear, concise and useful format.

The following illustration (Figure 3) is proposed as a suitable format. Accompanying text would explain how the analyses were undertaken, provide rationale for the conclusions, and include supporting data. The Santa Barbara, California and Massachusetts case studies (included in the companion report to this one) are representative of the application of DAP on a limited-study basis.

Figure 3 ILLUSTRATIVE FORMAT FOR SUMMARIZING CZM EFFECTS

Important Effects

Benefits:

Costs:

Distribution:

Timing:

Magnitude:

Other

Related Issues:

Significant Effects:

V. ASSESSMENT OF EVALUATION APPROACH

There are a number of problems or limitations in developing and using the evaluation process that has been described. Some of those problems lie in the conceptual framework that has been suggested for analytical use, as indicated by the following:

- The translation of issues into policies and actions is not a precise art, since it requires the ability and willingness of the analyst to speculate rather freely on events in the future that are not clear.

- Furthermore, policies and actions related to CZM are part of very complex context, where many other policies, actions, and other conditions determine future and present events. There is, therefore, the highly difficult problem of specifying in absolute terms the effects with and without coastal zone management; this is also not a precise art.

- A third conceptual problem lies in how to verify the accuracy of the decisions and estimates that are used in the process. Since the process relies on a series of assumptions and judgments, it is not possible to validate the conclusions reached by individual analysts; it may not even be possible to replicate the subjective quantities used to derive conclusions.

- A further difficulty is that determination of CZM actions and effects aims toward a moving target. CZM impacts will be determined not just by the types of policies and actions specified in the plan and program, but more importantly, by the actual extent, timing, and quality of implementation as well as the public and private responses to this implementation. The analyst can only guess as to how actual events will correspond to plan and program intentions.

- A final conceptual difficulty arises from the fact that policies, actions, and effects will shift over time, so that both the nature and distribution of impacts will shift. The precise dimensions of those shifts and at what points they occur are unknown.

A second problem lies in the analytical applications of the evaluation process. The types of problems would include:

- The evaluation process must apply to widely varying circumstances, allowing for variations in user capabilities, data availability (discussed below), governmental authority and level of jurisdiction, environmental and economic settings, and efforts at coastal zone management. In other words, the specification of the local or state context is a critical element of the analysis--since that allows placing all decisions with relation to a particular issue in a concrete and non-abstract setting for analysis.

- There will also be a wide variety of analytical techniques that could potentially be linked with the conceptual framework and evaluation process. That is, many states or localities may have very sophisticated analytical devices or tools that can be used to supplement or reinforce the basic process of capturing individual judgments as to issues, actions, and effects. The evaluation process therefore has been designed, but not fully integrated, so that existing analytical techniques may be used if available; it has also been designed, however, so that it is not dependent upon such techniques or tools, and that manual operation with limited information may also be possible.

A third set of problems that arises with the use of the evaluation process is in terms of data requirements and availability, as indicated by the following:

- One set of data problems is in terms of consistency, so that the same depth or availability of data will not prevail in all circumstances. There will be considerable variation in the sources and types of information that can be used to form judgments and conclusions with regard to CZM programs.

- A second set of data problems lies in the tradeoffs among accuracy, cost, and ability to understand by a variety of users. The dilemma is that the more accurate and detailed information that is developed, the less useful or comprehensible that data and its implications may be to decision-makers, and the more costly the data will be to obtain.

In summary, a number of limitations or problems exist with the application of the evaluation process in a wide and diverse number of locations, specific contexts, and for a variety of issues and policies. As is apparent, further investigation seems to be necessary. On the other hand, the evaluation process must be affirmed for its intention--as presented in this report, it will prove useful for the following purposes:

- It provides a common framework for organizing information and capturing perspectives from a variety of users, and therefore provides a common basis for discussion.

- With the information that is compiled in the framework, the discussion that occurs will presumably be on rational and objective grounds, and where realization of the complexities of coastal zone management must be acknowledged.

- The evaluation process will not--and is not intended -- replace the decision-making capabilities of public officials, private interest groups or other participants in activities in coastal areas. Those decisions may be based on better or more consistent information, but the final weightings and value judgments will depend on how the evaluation process is used.

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