

CHAPTER 3.

COASTAL AREA MANAGEMENT PLANNING

Introduction:

Effective management of the coastal zone of tropical islands requires that natural resource areas critical to development be identified, legally protected, and managed for sustainable use. These "critical areas" include economically or socially valuable area, or unique or representative natural environments as well as areas of historical or archaeological importance. "Protection" implies that the identified resource use for the area is given legal status which permits its management. In some cases, protection may mean isolating an area from human use to safeguard endangered wildlife or scenic features, but this is only one interpretation. Areas can be protected for fisheries purposes, so it becomes an offence for any activity to take place which detracts from fishermen's use of that area. Protection of an area can be also for tourism or recreation, which are important economic activities in many Caribbean and Pacific islands, or to ensure that multiple use of a coastal area can take place because it is possible to regulate where, when and how resources are utilized. Establishing a series of **Protected Areas** can be an effective method of managing the coastal zone, where resource ownership is less clearly defined than it is in the hinterland. An alternative terminology is in use in some Caribbean and other tropical islands of **Natural Area** management (see Putney, 1978). This has value in stressing that in any island it is possible to recognise certain areas which fall into distinct units geographically or ecologically, in which it is desirable to integrate all development activities. For example, river valleys with their catchments, floodplains and estuaries form "natural areas", as do wetland basins, peninsulas, and some lagoons or bays with their surrounding coastal zones. Natural Area Management Planning would attempt to regulate all activities within the demarcated area in relation to the specific characteristics of that area. It would seek to maximise social and economic development, but be constrained by the need to safeguard the ecosystem structure and viability on which that development was based. Because the area is an integrated natural system, all development activities must be integrated also.

There is another sense in which a "natural area" requires its own type of management. In a wetland or bay, for example, the economic uses are likely to be based on "nature", or a particular grouping of natural resources;

i.e. the economy of the area may depend on fish populations, mangrove productivity or the spectacular nature of reef dive sites. Natural Area Management Planning will be concerned, thus, with management of distinct areas of the island in which the natural resources are of paramount importance.

With this **System Plan** in place, studies of the management alternatives for each of the areas included in the system plan can be undertaken. Such studies aim to produce the information required to recommend the most appropriate management option. Following this a decree for the legal establishment and protection of the area and the approved resource uses can be drafted. This requires clear recommendations on boundaries, management category, and general management concept.

Once the individual area has been legally declared, a **management plan** is drafted to specify clearly (1) the present situation, (2) the desired situation, and (3) actions needed to achieve the desired situation. The management plan may be supplemented with **site plans** for specific development sites and/or construction drawings for particular facilities.

The exercises presented here are designed as an introduction to the skills and experiences necessary to plan the management of natural resource areas in the coastal zone. Students should be familiar with the overall planning sequence, by following through the process, as a team, from beginning to end. For small island nations, where the pool of human resources is likely to be limited, coastal managers will need to develop a comprehensive view of natural resource area management.

The training course/workshop or field course format is well adapted to the concept of learning by doing. Depending on the intensity, each training course (one for system plans, one for studies of management alternatives, and one for management plans) could be completed in about two weeks. The same material could be broken down into segments and presented as a course at an educational institution. This approach would work best if an easily accessible natural resource area and suitable background materials and management plans for existing protected areas were available for use during practical exercises.

Because the situation of each user of this Workbook will be different, all steps of the planning process from system plan to site and construction plans are outlined in Table 3.1. The user can concentrate on those steps of the process that best fit the training context at hand, without losing sight of the overall planning picture. However, less detail is given for the exercises suggested

Table 3.1 Steps in Planning the Management of Natural Areas

System Plan (as a plan by itself, or as part of a National Development Plan or Coastal Management Plan).

1. Define desired system characteristics and management categories.
2. Define selection criteria for individual areas.
3. Collect and map basic data on human and natural systems, at the national or regional level, based on the selection criteria. (see also Exercise 1.3)
4. Identify potential areas.
5. Rate each potential area in terms of selection criteria.
6. Select areas that will best match the desired system characteristics.
7. Draft plan, review widely, revise, and submit for approval at appropriate government level.

Study of Management Alternatives (for all areas recommended in system plan).

1. Define study area based on information provided in system plan. (see also Exercise 3.1)
2. Collect and map data on human and natural systems. (see also Exercises 1.3. & 3.1)
3. Analyse potentials, limitations, and constraints for management.
4. Define alternative management strategies and review with relevant government departments and resource users.
5. Verify appropriateness of management category temporarily assigned in system plan.
6. Synthesise preferred management concept and boundary recommendations.
7. Write up concise report, including a draft protected area declaration, and submit to relevant authorities.

Management Plan (Site Plans for legally protected areas)

1. Supplement data on natural and human systems contained in study of management alternatives.
2. Define specific objectives for management of area.
3. Divide area into management zones.
4. Design environmental, public use, and operations programmes.
5. Prepare integrated development programme including institutional measures, staff development, and physical development plans.
6. Estimate cost and define funding strategy.
7. Synthesise plan into concise document, review with

Table 3.1 continued..

- relevant government departments and resource users, revise, and submit for official approval.
8. Evaluate and revise plan at regular intervals. (see also Chapter 6)

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under the Management Plans and Site Plan sections, because many of the operating principles are similar to those treated thoroughly under System Planning.

A. SYSTEM PLANNING

The goal of system planning is to propose the nature and content of a Natural Resource Area System for an entire island, a whole coastal zone, or a particular region of it. The nature of the system is defined by the management categories selected and the content by the physical areas included.

The plan which results from the exercises may either stand on its own or be incorporated into a national or regional development plan, or a coastal management plan. Ideally such a plan should include the elements indicated in the model table of contents presented in Table 3.2.

Table 3.2 Model Table of Contents, for a Protected Areas System Plan

1. Executive Summary
2. Introduction
3. Present Situation
 - a. legislation
 - b. government policy
 - c. designated areas
 - d. management infrastructure
 - e. management activities

Table 3.2 continued..

4. Development of the System

- a. justification
- b. goals and objectives
- c. management categories
- d. site selection process and criteria
- e. areas recommended for inclusion in the proposed system

5. Management Requirements

- a. overview of the implementation process
- b. legislative requirements
- c. management infrastructure
- d. revenues and budget
- e. law enforcement
- f. cooperative agreements and concessions
- g. liability
- h. contributions from government ministries
- i. inclusion of private lands
- j. community participation

6. Management Programme

- a. research and planning
- b. information, awareness, and education
- c. institutional development

7. Conclusion

8. References

9. Appendices

- a. background on human and natural systems of the island
- b. summary of environmental legislation
- c. summary descriptions and maps of areas to be included in system
- d. budget requirements and revenue projections

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System planning requires familiarity with the following concepts and skills:

- the overall planning process
- conservation objectives
- management by objectives

- management categories
- selection criteria
- the use and analysis of maps, hydrographic charts, and aerial photographs
- field reconnaissance and interviewing techniques

The exercises which follow are concerned with each of these aspects. Ideally students should work through all the individual exercises in order to produce a complete System Plan. This will be most effective if done with the cooperation, support and participation of officials from relevant government agencies. A complete System Plan can be drafted in about 14 working days if well prepared in advance. To facilitate this the training site should be centrally located on the island, or within the target region, and there should be good access to information and transportation networks.

Exercise 3.1 PREPARING A DATA ATLAS

Background:

Effective development of a Natural Resource Areas System Plan requires considerable environmental and socio-economic data. This information is most usable when mapped at a common scale to facilitate analysis and synthesis through overlays, and published as a Data Atlas.

This exercise is designed to give students experience in collecting the required data and converting it into a common format. To carry out this task, students will need to know the kind of data that will be required, and the potential secondary sources for acquiring it.

Aim:

To familiarize students with the methods and techniques for developing a Data Atlas, a summary of relevant information on natural resources for a target island or region of an island.

Duration:

This exercise may need to be carried out over a period of several days. The exact time will depend on how much background information is supplied by the instructor, and the size and complexity of the island or region under study.

Suitable Location:

The training site should be near the major town or university of the island or region, where information networks are usually concentrated.

Materials Required:

1. Listing of information required for the Data Atlas (Table 3.3)
2. Model map format (Figure 3.1).
3. Listing of potential sources of information.
4. Simple drafting materials and equipment.
5. Overhead projector, artograph, enlarging and reducing photocopier, camera and slide projector, or other equipment capable of converting maps to a common scale by optical means.
6. Topographic maps, hydrographic charts, and aerial photographs of island or region under study.

Instructions:

1. Review list of information required (Table 3.3), note potential sources, and model map format (Figure 3.1).

Table 3.3 Information to be Included in a Data Atlas

- topographic map and bathymetric chart of coastal waters
- predominant currents
- rainfall
- relatively natural areas
- terrestrial life zones
- important marine habitats (mangroves, coral reefs, seagrass beds)
- endangered and locally important species (endangered species, game species, nesting seabirds, migratory species, nesting turtles, marine mammals etc.)
- natural, cultural and historic attractions (bathing beaches, waterfalls, unique or scenic features, reefs for snorkelling and diving, historical or archaeological sites, sites of religious importance, etc.)
- physical infrastructure (roads, airports, ports, towns and villages, industrial sites, waste disposal sites, sewerage outfalls, etc.)
- coastal resource use (fishing areas and landing sites; tourism and recreational facilities; good anchorages; watersheds supplying potable water, hydroelectric or irrigation systems; etc.)
- established and recommended parks and protected areas
- publicly owned land

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2. Review all topographic maps, hydrographic charts, aerial photographs, and reference materials which are available.
3. Assign each member of the group a subject category or map area that will be his/her responsibility. Group members then carry out independent research to obtain data for their assigned map(s).
4. Use the optical equipment to convert maps to a common scale. This should be done as follows:

(a) Selecting the base map scale:

Since the final product of the exercise is a Data

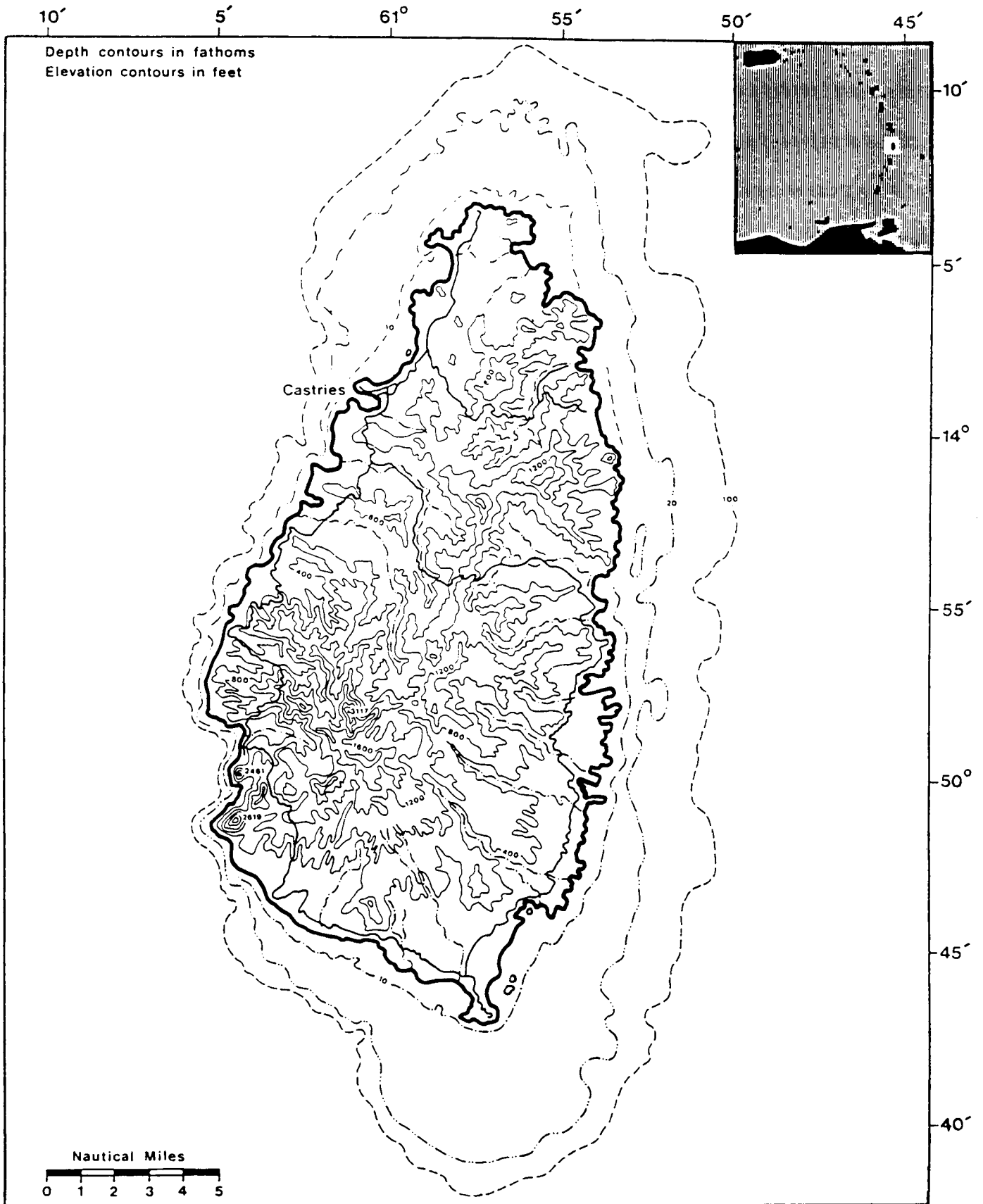


FIGURE 3.1 MODEL MAP FORMAT

Atlas that can be reproduced easily, the size of the maps will depend on the reproduction equipment that is available. For example, if a simple copy machine is to be used, the base map should fit the standard format (8.5 x 11 inches for machines produced for the U.S.A. market). If a model with more options is available, then its larger formats can be used (for example, 8.5 x 14 inches or 11 x 17 inches for models produced for the U.S.A. market).

(b) Producing the base map:

Once the size of the base map has been selected, a good topographic map of the island or region under study can be reduced by optical means to fit the available space. Sufficient space should be left so that the bathymetry of the island's marine shelf can later be filled in by reducing marine charts. Figure 3.1 is an example of a base map with both topography and bathymetry.

(c) Map reduction by optical means:

This is most easily accomplished by an opaque projector, which will project the image of a map. The projector can be moved, thereby adjusting the focal length so that the map is projected at the desired size. The map outlines are then traced onto drawing paper of the required format. This process is simplified by fashioning a rear screen projector, as follows - at night mount translucent drawing paper, with the appropriate map margins already drawn in heavy ink lines, on the outside of an easily accessible window. Project the appropriate size image onto the inside of the window where the paper is mounted, and trace the image on the paper on the outside. In most cases, the amount of detail will have to be decreased from the original map in order to fit the reduced size. For example, instead of showing 10 metre contours, it may be necessary to use only intervals of 100 metres.

If an opaque projector is not available, then the same results can be obtained by projecting photographic slides of the original map. Again, the slide projector can be moved to produce the image size required. A further alternative, usually requiring more patience and considerable trial and error, is the use of a reducing copy machine to reduce the image to the required size. If the map original is large, then it will be necessary to reduce it in sections, fit and tape these together, and

further reduce them. With any means of optical reduction, it is critical to have a graphic scale showing on the map. so that the scale can be determined at the reduced size.

5. After conversion of all map data to a common scale, students should submit their contribution to the Data Atlas.
6. Maps should be checked and the results discussed by the group. A simple comparison of data will often show inconsistencies and errors. Correct any errors and eliminate inconsistencies; for example, endangered species will be found rarely in urban or agricultural areas; recreational beaches hopefully would not be found where sewage outfalls are located.
7. Assemble the separate contributions into a Data Atlas.

Product or Results Expected:

A Data Atlas containing a series of maps at uniform scale with environmental, resource use, and legal information relevant to the design of a Protected Areas System.

Interpretation and Application to the Problem Area:

The Data Atlas provides much of the background information needed for general decisions on resource management, and the design of a Protected Areas System in particular. The location and extent of key resources, and their uses, are displayed together with land ownership. Natural areas and resources critical to the development process can be pinpointed, potential protected areas identified, and conflicting uses noted.

Examples of completed Data Atlases for the 25 islands or island groups of the Lesser Antilles can be obtained from the Eastern Caribbean Natural Areas Management Programme (ECNAMP address in Appendix 8).

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Alternative Exercises:

The above exercise can be shortened considerably if all the information to be used in the Data Atlas is available to students at the start. The disadvantage of this

approach is the loss of practical research experience by the students.

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Further Reading:

Geoghegan, T. 1983. Guidelines for Integrated Marine Resource Management in the Eastern Caribbean; Report on the Workshop, "Planning for Marine Resources Development". Eastern Caribbean Natural Area Management Programme, St. Croix; 52 pages.

IUCN (undated) Data Atlas: Planning a Marine Conservation Strategy for the Caribbean Region. International Union for the Conservation of Nature, Morges, Switzerland; 6 pages & 22 maps.

Putney, A.D. 1982. Final Report, Survey of Conservation Priorities in the Lesser Antilles. Eastern Caribbean Natural Area Management Programme, St. Croix; 30 pages.

Salm, R.V. & Clark, J.R. 1984. Marine and Coastal Protected Areas: a Guide for Planners and Managers. International Union for the Conservation of Nature, Morges, Switzerland; 302 pages.

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Exercise 3.2 DEFINING THE STRUCTURE OF A PROTECTED AREA SYSTEM

Background:

Management of a system of protected areas begins with basic policy decisions. What should the system include ? How many management categories are necessary to ensure that the major objectives of resource management and national development are attained and that conflicting uses are segregated ? What portion of the island's resources can or should be managed by a central authority? Which government agency, or non-governmental organisation, should administer each management category ?

To answer these questions, the resource manager must understand clearly the **objectives of resource management**, the different **groupings of objectives** for each management category and the **resource situation** of the island or target region.

Aim:

To establish the structure of the Protected Areas System through the definition of objectives for management, and their application to management categories.

Duration:

One day (8 hours)

Suitable Location:

Laboratory/drawing office

Materials Required:

1. Matrix of conservation objectives and management categories recommended by IUCN (Table 3.4).
2. Narrative description of protected area categories, e.g. for the British Virgin Islands (Appendix 5).

Table 3.4 Categories of Protected Areas and Corresponding Conservation Objectives

Categories used:

I	Strict Reserve	VI	Resource Reserve
II	National Park	VII	Anthropological reserve
III	Monument/Landmark	VIII	Multiple Use Area
IV	Managed reserve	IX	Biosphere Reserve
V	Protected Landscape/Seascape	X	World Heritage Site

Type of Objective:

- 1 = Primary objective for management of area and resources
- 2 = not necessarily primary, but always important objective
- 3 = included as an objective where applicable and whenever resources and other management objectives permit

Primary Conservation Objectives	Category									
	I	II	III	IV	V	VI	VII	VIII	IX	X
Maintain sample ecosystems in natural state	1	1	1	1	2	3	1	2	1	1
Maintain ecological diversity and environmental regulation	3	1	1	2	2	2	1	2	1	1
Conserve genetic resources	1	1	1	1	2	3	1	3	1	1
Provide education, research, and environmental monitoring	1	2	1	1	2	3	2	2	1	1
Conserve watershed condition	3	3	3	3	2	3	3	3	3	3
Control erosion, sediment; protect downstream investments	3	3	3	3	3	3	3	3	3	3

Table 3.4 continued..

Primary Conservation Objectives	Category									
	I	II	III	IV	V	VI	VII	VIII	IX	X
Produce protein and animal products from wildlife; permit sport hunting and fishing			2		3	3	3	1	3	
Provide recreation and tourism services		1	2	3	1		3	1	3	1
Produce timber, forage, or marine products on sustained yield basis				3	2		3	1	3	
Protect sites and object of cultural, historical and archaeological heritage		1	3		1	3	1	3	2	1
Protect scenic beauty and open space	3	1	2	2	1			3	2	1
Maintain open options; manage flexibly; permit multiple use					3			3	2	1
Simulate rational, sustainable use of marginal areas and rural development	2	1	2	2	1	3	2	1	2	2

Source: Salm, R.V. & Clark, J.R. 1984. Marine and Coastal Protected Areas: a Guide for Planners and Manager. International Union for the Conservation of Nature & Natural Resources, Morges, Switzerland; 302 pages.

Instructions:

1. Review all materials provided (1 hour).
2. Set out the characteristics that the Protected Areas System should have (1 hour). These usually include as a minimum those areas considered to be:
 - areas with unique features
 - "national symbols"
 - areas critical to the survival of endangered or economically important species
 - areas of value for natural resource exploitation
 - areas of great value for recreation or tourism
 - areas representative of the island's or region's coastal and marine life zones
 - critical watershed areas
 - major historical or archaeological sites
3. As a group, discuss and design the protected area categories most appropriate to the study area; using Tables 3.4, Appendix 5 and the Data Atlas (see previous exercise), as reference (1.5 hours).
4. As a check on the group's decisions, go through the Data Atlas to see if samples of the most important resources of the island or region would be included in the protected area categories you have designed (0.5 hours).
5. Based on your decisions, draft a matrix of objectives and management categories, and describe each category in narrative form (1 hour).
6. Present the recommendations of the group to a review panel made up of local experts in the subject area (2 hours).
7. Incorporate the recommendations coming out of the review panel session into a final document on management objectives and categories for the Protected Areas System (1 hour).

Product or Results Expected:

1. Matrix showing the objectives and management categories for a Protected Areas System for the island or region.
2. A narrative description of each of the management categories selected.

Interpretation and Application to the Problem Area:

The results obtained by this exercise provide the conceptual underpinnings for the Protected Areas System. The matrix and narrative descriptions define the limits within which the central authorities should manage the most important natural areas of the island or region.

Table 3.5 and Appendix 5 provide actual examples from the British Virgin Islands.

Table 3.5 Criteria for Selecting Areas for Inclusion in a Protected Areas System : Sample List from the British Virgin Islands.

1. Biological Value: Important to commercial species
Important to endangered species/
wildlife
Important to seabird nesting
Diversity of habitats
Uniqueness to the Islands
Representativeness
Naturalness (not subject to human
interference)
2. Economic Value: Fishery site
Snorkel/dive site
Charterboat anchorage
Hurricane shelter
Tourism attraction
Watershed management
3. Social Value: Cultural significance
Recreation
Aesthetics
Education value
Research value
4. Urgency: Vulnerability
Threat

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Further Reading:

ECNAMP 1986. A Parks and Protected Areas System for the British Virgin Islands. British Virgin Islands National Parks Trust and Eastern Caribbean Natural Areas Management Programme; 90 pages. (Unpublished report, available from ECNAMP).

IUCN 1978. Categories, Objectives and Criteria for Protected Areas. Commission on National Parks and Protected Areas, International Union for the Conservation of Nature and Natural Resources, Switzerland; 26 pages.

- IUCN 1980. World Conservation Strategy. International Union for the Conservation of Nature and Natural Resources, United Nations Environment Programme & World Wildlife Fund; 24 pages, source books and maps.
- Jacobs, P. & Munro, D.A. (Eds) 1986. Conservation with Equity: Strategies for Sustainable Development. International Union for the Conservation of Nature, Morges, Switzerland; 463 pages.
- MacKinnon, J., Graham Child, K. & Thorsell, J. 1986. Managing Protected Areas in the Tropics. IUCN Conservation Monitoring Centre, Cambridge, UK; 295 pages.
- Miller, K. 1980. Planning National Parks for Ecodevelopment: Methods and cases from Latin America; 500 pages. (Available in textbook form in Spanish or in xeroxed manuscript in English from the Author, International Union for the Conservation of Nature, Switzerland).
- Putney, A.D., Honychurch, L., James, A. and White, D. 1984. Cabrits 2000: Development Concepts for the Proposed Cabrits National Park, Dominica. Eastern Caribbean Natural Area Management Programme and Government of Dominica; 24 pages.
- Salm, R.V. & Clark, J.R. 1984. Marine and Coastal Protected Areas: a Guide for Planners and Managers. International Union for the Conservation of Nature, Switzerland; 302 pages.
- Thelen, K.D. & Faizool, S. 1980. Policy for the Establishment and Management of a National Park System in Trinidad and Tobago. Forest Division, Government of Trinidad and Tobago; 26 pages.

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Exercise 3.3 IDENTIFYING AND VERIFYING POTENTIAL AREAS FOR INCLUSION IN A PROTECTED AREAS SYSTEM

Background:

In establishing a Protected Areas System, there are two basic questions that need to be answered. Which areas should be included in the system, and how will these be managed? These questions are the subject of this exercise.

A Data Atlas provides an information overview that facilitates the identification of important natural resource areas to be included in the System. On the other hand, the management categories to be included in the Protected Areas System establish a policy framework, i.e. they define how areas of the System will be managed. However, before hard and fast decisions can be made, more detailed information is required to confirm the suitability of the selected areas and to identify potential conflicts that may arise from current resource use in these areas. This information can be obtained from published sources, unpublished documents, field reconnaissance, and interviews.

Aims:

To define the criteria that will be used to identify potential areas to be incorporated in the Protected Areas System, and to select areas to meet the established criteria.

To verify the suitability of areas preliminarily selected for inclusion in the Protected Areas System through documentation research, rapid field reconnaissance, and interviews.

Duration:

10 - 12 hours, depending on the complexity of the target island or region of the island, will be required for defining the criteria.

Verification will require approximately two weeks; depending on the size of the study area, availability of transport and availability of relevant documentation.

Suitable Location:

Laboratory/Drawing office, and field work using a base facility central to transportation and information networks.

Materials Required:

1. List of criteria for rating potential protected areas, e.g. as simplified from the System Plan for the British Virgin Islands (Table 3.5).
2. Data Atlas, as developed in Exercise 3.1, or similar information.
3. Matrix of management objectives and categories (as from Exercise 3.2 or Table 3.4).
4. Narrative description of the management categories (as from Exercise 3.2 or Appendix 5).
5. Equipment for optical reduction and copying of maps.

Instructions:

Identification of Potential Areas

1. Using Table 3.5 as a reference, define the criteria that should be used to rate potential areas for inclusion in the Protected Areas System of the target island or region (1 hour).
2. Analyse the environmental, socioeconomic, and legal data provided on the natural resources of the study area, to identify potential areas to be included in the System. This can be expedited by the development of a series of transparent map overlays to identify key areas that can achieve the largest number of management objectives. For example, the most obviously important natural areas can be identified by overlaying the following information from a Data Atlas:
 - the larger "relatively natural" areas
 - concentrations of "important marine habitats", "endangered and locally important species", and "natural, cultural, and historical attractions"
 - key watersheds from the "coastal resource use" map
 - large blocks of "publically owned lands"

Note the boundaries where these various resource values overlap. Areas with the greatest concentration of resource values are assumed to be the ones with greatest value for resource protection. Once these areas have been identified, they should be rated using the criteria that were specified earlier. The areas should be listed in order of priority (2-3 hours).

3. Other areas, which may not have multiple resource values but which have one or two very important

values, should be identified also for inclusion in the System. Examples of such areas include the habitat of endangered species with high symbolic value, or areas of particular aesthetic appeal. The Data Atlas will be of little help at this stage, because the identification of these areas depends on value judgements. In these instances, the opinions of those knowledgeable about local resources may be more important, and can be gained from interviews (4 hours).

4. Present the preliminary list of areas identified to a review panel made up of relevant government officers, scientists, and representatives of non-governmental interest groups such as local conservation organisations, fishermen, the tourism industry, wood-using industries, or other major resource users (1-2 hours).
5. Taking into account the results of the review panel meeting, draft a final map of the areas identified (1 hour).

Product or Results Expected:

Map delineating areas that should be investigated for inclusion in the Protected Areas System.

Interpretation and Application to the Problem Area:

The map of the potential protected areas is used as the basis for narrowing the search for elements to be included in the Protected Areas System. It is one of a series of steps in the planning process from very broad, general information, such as that presented in a Data Atlas, to more detailed levels of information on areas of particular interest. Increasing detail is needed as more precise decisions are made.

An example of a map of potential areas for inclusion in a System Plan from the British Virgin Islands is presented in Figure 3.2.

Verification of Potential Areas

6. Assign an area, outlined on the map of protected areas for potential inclusion in the Protected areas System, to each student or group of students. Discuss data needs as a group, starting with the items indicated in Table 3.3, and come to agreement on a definitive list that is practicable in terms of the criteria being used (Table 3.5, or similar list) and the time available (1 hour).

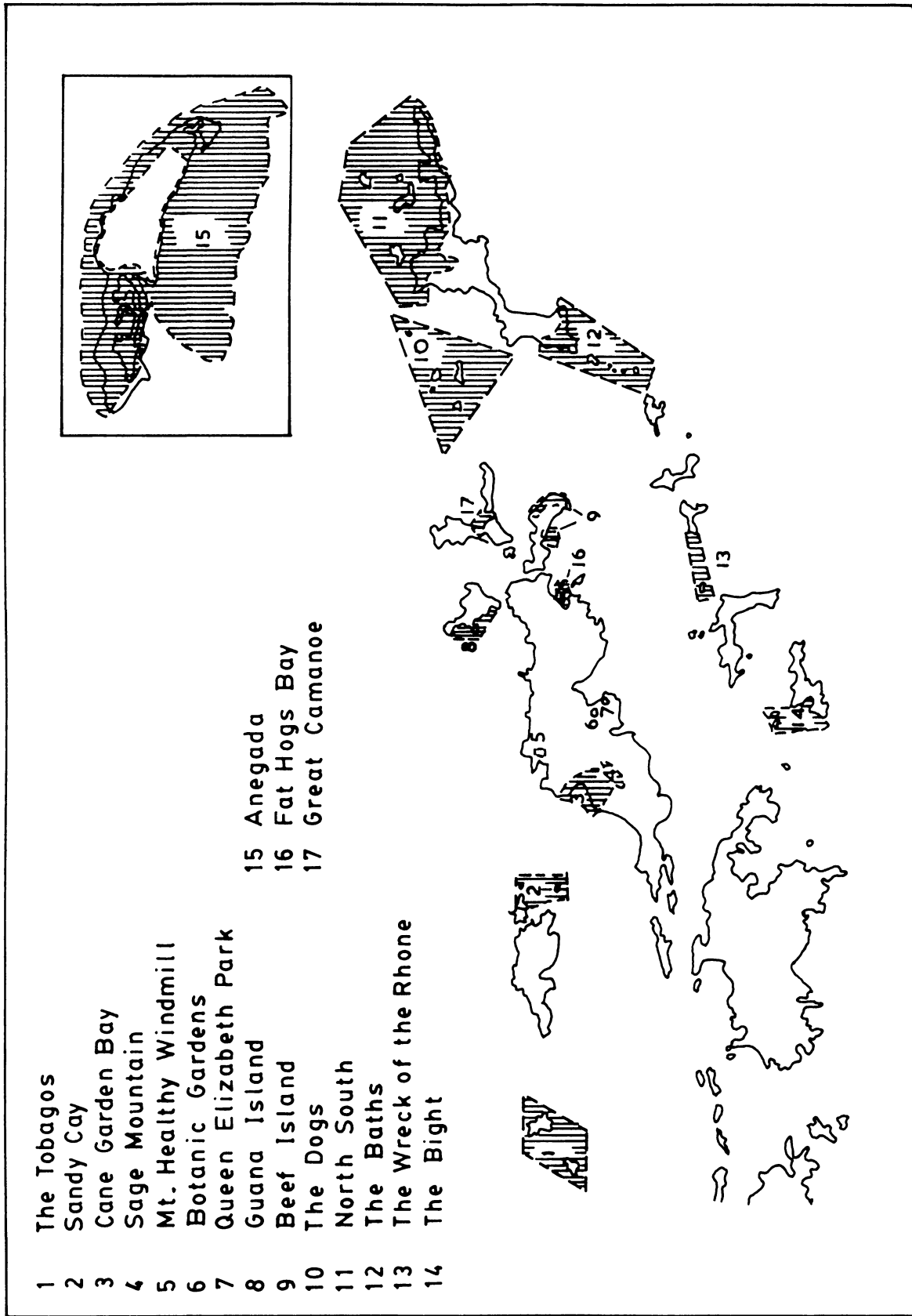


FIGURE 3.2 PROPOSED PROTECTED AREAS SYSTEM - BRITISH VIRGIN ISLANDS

7. Each student or group of students should develop a base map for their assigned area (see Exercise 3.1). Thematic information provided by a Data Atlas or by the instructor should be transferred onto copies of the base map. This information will be checked and supplemented during the exercise (2 hours).
8. Each student or group should carry out documentation research on their area, as follows:
 - sources of information cited in the Data Atlas, or those provided by the instructor, should be noted, and the original documents consulted to get more detailed information on the target area (2 hours).
 - libraries should be consulted for detailed information on the target area (minimum 4 hours).
 - further unpublished documentation should be sought from local management agencies and interest groups, e.g. forestry and fisheries departments; the central planning, tourism and water authorities; local wildlife and conservation societies (minimum 2 days).
 - new information should be added to the thematic maps, and corrections made where necessary. Corrections should be listed for future reference (1 hour).
9. Interviews should be conducted with key resource persons located near the training facility. This should be carried out in conjunction with documentation research. New information and corrections should be noted and added to the thematic maps.
10. Each student or group of students should plan a rapid field reconnaissance (2 hours), as follows:
 - relevant maps should be assembled and appropriately sized base maps prepared (see Exercise 3.1).
 - routes to be followed on land, by water, or even by air, should be planned and sketched on a copy of the base map.
 - particular sites or features to be visited and photographed should be noted and located on the base maps.
 - persons to be interviewed (e.g. resource users, land owners, senior residents), if already known, should be noted and the locations where they can be contacted indicated on the base maps.
 - documents, maps, historic photographs, or other pieces of graphic information to be sought should be listed.
 - data to be collected should be listed. This may

include the presence and range of key species; past and present resource use; histories of important local residents; noteworthy natural, historical, or archaeological features; access routes; dangerous elements; seasonal events, such as weather, wind or current changes, animal migrations or resource uses; pollution sources and dispersion routes; key resource persons; present human population numbers and distribution; etc..

- since time for the reconnaissance will be limited, data needs should be listed in order of priority; and data that can be obtained by other methods (aerial photographs, maps, available documentation) should be deleted from the list.
- data needs should be checked against the list developed during step 2. What data is essential for decision-making at the System Plan level? Are these needs given sufficient priority in the reconnaissance plan? If difficulty is experienced in defining realistic data requirements, guidance should be sought from the tutor.

11. The rapid field reconnaissance should be carried out by each student or group (approximately 1 week, depending on size of the study area, and availability of transportation). Students should be impressed with the time constraints involved, and not given opportunity for additional field study. In this way they will be encouraged to identify priorities and plan realistically.

12. Interviews are an important part of any rapid field reconnaissance. Students should be sensitive to the differences between urban and rural people, and the ways these differences influence interview procedure. The following general guidelines are suggested:

- before asking any questions interviewers should identify themselves and state clearly the purpose of the visit. This should be stated in terms that can be understood easily in the local context. For example, stating that the interview concerns "establishment of a protected area system" may not communicate effectively.
- People are naturally suspicious of strangers asking questions. Considerable sensitivity and tact are required on the part of the interviewer. A certain level of confidence must be reached before important questions can be discussed. The information gathering process will be helped enormously if already known individuals or relatives can be contacted first.
- While rural people are usually very knowledgeable about the resources that sustain their livelihood,

they may use a vocabulary quite different from a student's. Care must be taken not to talk down to an informant or show any contempt for the vocabulary or expressions used.

- Many people are put off by formal interviews, especially when answers are recorded or written down. Questions are better woven into an apparently informal conversation and answers recorded after concluding the discussion.
- The best informants are often those who receive, or perceive, some benefit from the presence of an interviewer; for example, employees where food or lodgings are taken, guides, or those providing transport services.

13. Information gathered during the field reconnaissance should be noted and added to the thematic maps. Corrections should be made where necessary.

14. Each student or group should make a presentation to a review panel made up of the wider group, or, preferably, local experts from relevant government ministries, interest and user groups. Relevant new data should be presented, and corrections noted. An updating of the resource values assigned, using the criteria presented in Table 3.5, should be made for comparison with other areas (2 hours, depending on the number of groups making presentations).

15. At the end of the presentations, the review panel and students should discuss the individual recommendations, and develop a consensus on the areas recommended for final inclusion in the Protected Areas System (2 hours).

Product or Results Expected:

A map of the target island or region indicating the areas recommended for final inclusion in the Protected Areas System.

Interpretation and Application to the Problem Area

After verifying the suitability of the areas recommended for inclusion in the Protected Areas System, sufficient information will be available for writing a Protected Areas System Plan. Such a plan can be submitted, knowing that enough research has been done to indicate with relative confidence the value of the resources of the recommended areas, their current uses, and what potential opposition can be expected if these areas are included in the System.

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Alternative Exercises:

An alternative to this exercise, which targets a particular island or region, would be to carry out the same steps for an hypothetical case.

This could be accomplished by starting with the Data Atlases already available from ECNAMP for the British Virgin Islands. The results of the exercise could then be compared with the System Plan cited above.

The advantage of this approach would be the reduced time required for preparation of the exercise, and the comparison which could be drawn between the work of the student group and the professionals who carried out this exercise in the British Virgin Islands. On the negative side, this approach would be artificial. Informed value judgements, which play a large part in decision-making for any protected area system, would be impossible since neither the students nor local resource experts would have sufficient knowledge of the resources of the target areas.

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Further Reading:

See reports listed under the preceding exercise.

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Exercise 3.4 DRAFTING A SYSTEM PLAN

Background:

A System Plan is a document that guides the development of a Protected Area System. It documents the system's **current status**, sets appropriate **goals and objectives** for further development, and indicates the **policies, legislation, programmes, personnel and budgets** required to achieve the stated goals.

Aim:

To draft a plan for the development of a System of Protected Areas for a given island or region of an island.

Duration:

Approximately 6 days

Suitable Location:

Working from a Drawing Office, the training site should be located near the major town or university of the island.

Materials Required:

1. Model table of contents for a System Plan (as in Table 3.2).
2. Matrix showing the management categories and corresponding objectives for the study area (as from Exercise 3.2 or Table 3.4).
3. A narrative description of the management categories for the study area (as from Exercise 3.2 or Appendix 5).
4. A list of criteria for selection of potential areas for the Protected Areas System (as from Exercise 3.3 or Table 3.5).
5. Map showing areas identified for inclusion in the Protected Areas System (as from Exercise 3.3 or similar).
6. Base maps and basic data for each of the areas identified for inclusion in the system (as from Exercise 3.3 or similar information).
7. Drafting, copying, and word processing equipment.
8. Current legislation and policy statements regarding parks and protected areas.
9. Information on current budget and personnel levels for management of the Protected Areas System (including government votes, donations from non-governmental organisations, and grants from technical assistance organisations).

Instructions:

1. Review all available information (unless this has been done in relation to previous exercises) (1 hour).
2. Invite relevant government officers to a discussion of the requirements for implementing the Plan (3-4 hours), with specific attention being given to:
 - legislative changes
 - institutional changes, cooperative agreements and concessions
 - management programmes, in areas of research and planning, information, education and awareness, resource management, and institutional development
 - budgetary and personnel implications
 - liability
 - fund raising and land acquisition
3. Provide a standard report format and assign each student or group of students a section of the Plan to be written (8 hours).
4. Produce a first draft of the Plan, using an editorial committee made up of the instructor, a student group leader, and if possible a government representative. The remaining students should prepare the graphics (8 hours).
5. The draft Plan should be copied and reviewed by relevant government officials (e.g. parks officer, district officer, planning officer), representatives of resource users (e.g. Chamber of Commerce, Hotel Association, Fishermens' Cooperative), and a representative of a local environmental organization. The participation of these persons at this critical stage must be arranged well in advance of the training session (1 day).
6. Proposed revisions of the Plan should be discussed by the group as a whole and decisions taken on necessary amendments (2 hours).
7. The Final Plan is drafted and submitted to government by the editing committee (8 hours, assuming word processing equipment or typing facilities are available).
8. The students should present the Plan at a seminar to which key government officials, resource users, and members of environmental organisations have been invited. An overhead projector could be used to project graphics (8 hours, including preparation time, organisation, and delivery).

Product or Results Expected:

1. A formal document outlining a plan for development of a Protected Areas System for the target island or region.
2. An oral presentation on the contents of the System Plan to concerned parties.

Interpretation and Application to the Problem Area:

Once the System Plan is developed, attention can be turned to the further study and legal establishment of each area contemplated in the plan, and to the development of the required institutional base.

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Alternative Exercises:

1. In those cases where a System Plan for the target island or region exists already, that plan can be reviewed and updated as necessary following the steps outlined in the exercise above.
2. The preparation of a System Plan can form the basis of a training exercise without the participation of such a wide range of external participants. The instructor must then brief the students more fully or provide further background information. This will detract from the value of the exercise as given, but reduce the required time considerably.

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Further Reading:

The same sources as for Exercise 3.2.

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B. STUDIES OF MANAGEMENT ALTERNATIVES

Introduction:

The study of management alternatives is a tool for making sound recommendations for legal declaration of a specific protected area. It is often difficult to decide how much information is required for this step in the planning process, but, as a minimum, the study should provide sufficient information to make recommendations on the appropriate management category, boundaries, and management concept for the area. A draft decree for establishment and legal protection should be included in the study. It should be borne in mind, however, that it may be unwise to invest human and financial resources in a detailed study until the area has been declared part of the island's Protected Areas System.

Before a protected area can be brought into the system, it must be justified and the various alternatives for management considered (Diamond, 1975). This justification must then be approved by the competent authority and enabling legislation or decree emitted.

The following exercises are designed to provide students with the concepts and experiences needed to carry out a study of management alternatives for a proposed protected area of a tropical island. The exercises can be carried out in their totality only if a relatively small area is selected for this study.

To carry out all the exercises, the students will need to be familiar with the following concepts or skills:

- the place of the study of management alternatives in the overall planning process
- management by objectives
- management categories and their differences
- information gathering and analysis through documents, maps, charts, and aerial photographs, interviews, and field reconnaissance
- requirements for the legal declaration of parks and protected areas

The complete study of management alternatives can be carried out in about a week (more or less 5 working days) if properly prepared in advance and conducted as a team project and if a relatively small area is selected. The students will need to be accommodated near to the study site and have access to transportation.

Materials Required:

1. Matrix showing categories of protected areas and conservation objectives (Table 3.4)
2. Summary of current legislation applicable to parks and protected areas in the island under study.
3. Reference library of relevant documents, maps, charts, and aerial photographs.
4. Island or regional System Plan for Protected Areas (if available; or if prepared under Chapter 3A).
5. Simple drafting and mapping materials and equipment.
6. Typing or word processing services, or equipment.

If it is not possible to complete the entire set of exercises as outlined, portions of it can be undertaken separately. The instructor can fill in the information that the students would have generated from the omitted activities. While leaving out the field reconnaissance portion of the exercises will condense them considerably, this portion is perhaps the most important. It exposes the student to real situations and provides experience in dealing with natural resource issues within the context of rural societies.

Exercise 3.5 SELECTING A PREFERRED MANAGEMENT ALTERNATIVE FOR A PROPOSED PROTECTED AREA

Background:

The study of Management Alternatives for a specific Protected Area is conducted at an intermediate level of detail; more detailed than the System Plan, but less detailed than the Management Plan. The detail is found not so much in the quantity of background information provided, as in the quality of analysis. Thus, the analysis of the potentials, limitations, and constraints for management of a natural area is the central feature of the study of management alternatives.

The overall aim is to provide information needed for drafting legislation for legal protection of an area identified in the Protected Areas System Plan. This requires analysis of the resources and their use within the particular Protected Area, evaluation of **alternative strategies** for management, recommendations for a **preferred management alternative**, definition of **boundaries** of the management unit/s, and elaboration of a general **management concept**.

Stage 1

Aim:

To conduct an analysis of the main potentials, limitations and constraints for management of a proposed Protected Area.

To produce a well documented analysis of the characteristics of a proposed Protected Area and their implications for management.

Duration:

Two days, if the required information is available.

Suitable Location:

The exercise can be conducted at a base facility central to information and transportation networks.

Materials Required:

1. Model outline of a study of management alternatives (Table 3.6).
2. Information summaries developed as part of Exercise 3.3, or similar information.

Table 3.6 Outline of Management Alternatives, Cabrits Development Area, Dominica (Source Putney, 1983)

SUBJECT	OBJECTIVE	ALTERNATIVES	PROS	CONS
1. Development Control, Area Adjacent to Peninsula	Maintain environmental quality especially with respect to sediments, sewage, maintenance of present coastal current patterns, and aesthetic considerations in all of control area including slopes adjacent to the peninsula and Douglas Bay.	a. Utilize presently existing mechanisms of development control exercised by the Physical Planning Department.	a. Requires no new legislation.	a. Department does not have sufficient personnel and infrastructure to enforce standards at present.
		b. Seek new legislation giving broad oversight powers to a new statutory body such as a Cabrits Development Authority which would coordinate development activity of the whole area.	b. Would enhance integration of development control function with management of the National Park, and increase on-site enforcement.	b. Would require new legislation; higher cost.
2. Establishment of a National Park or other protected area	Manage the complex of marine, historical, recreational, and biological resources as a unit under government administration for social and economic development while maintaining the quality of the resource base.	a. Include in a National Park the historical area, the marine areas adjacent to the peninsula and Douglas Bay, and the public lands of the swamps.	a. Would integrate management of all critical historical, natural, and recreational resources of the area and strengthen development control of approved projects in the swamp.	a. Would limit new developments of the swamp area to projects compatible with a park environment.
		b. Include in a National Park the historical area, the marine areas adjacent to the peninsula and Douglas Bay.	b. Would integrate management of the historical & recreational resources of the area.	b. Would lessen control of development in the swamp area.
		c. Include in a Historical Monument the historic area of the peninsula.	c. Would provide management for the historical resources.	c. Would leave areas adjacent to historical area open to inappropriate development possible damage to

MANAGEMENT ALTERNATIVES, CABRITS TABLE 3.6 (Continued)

SUBJECT	OBJECTIVE	ALTERNATIVES	PROS	CONS
3. Development concept	Provide a coherent overall vision of the kinds of development that would be sought.	a. Encourage appropriate cultural and educational activities within the National Park or Historical Monument, but limit all visitor accommodations to areas adjacent to the Park.	a. Gives priority use of historical and recreational resources to educational and cultural development of Dominicans.	recreational and fisheries resources. a. May lessen incentives to commercial enterprises and sacrifice revenues that could be used for development of the educational infrastructure
		b. Balance appropriate cultural and educational activities within the National Park or Historical Monument together with visitor accommodations and other commercial ventures which properly fit into the historical and natural environment.	b. Provides for balanced use of the historical, and recreational, and natural resources and management of the natural and recreational resources.	b. Can tend to domination of the area by expatriots and foreign visitors, with many benefits accruing to non-Dominicans.
		c. Encourage appropriate commercial activities within the National Park or Historical Monument together with visitor accommodations and other commercial ventures which properly fit into the historical and natural environment.	c. Stimulates a rush of commercial activity that will create jobs over the short run.	c.-Probably would lead to expatriot domination. -Would probably lead to a degradation of the historical, recreational and natural resources and a reduction in employment over the long run. -Educational and cultural uses by Dominicans would be sacrificed. -Would require investments in major infrastructure development.
4. Institutional Responsibility	Provide a practical framework for the	a. Managing the area within existing legal framework:	a.-Would not require new	a.-May unnecessarily constrain

MANAGEMENT ALTERNATIVES, CABRITS TABLE 3.6 (Continued)

SUBJECT	OBJECTIVE	ALTERNATIVES	PROS	CONS
ilities	development, administration, and conservation of the area.	Physical Planning for development control of the wider development area and National Parks to manage the National Park area, and an inter-institutional Advisory and Coordinating Committee.	legislation. -Could utilize presently employed personnel but also technical and financial assistance from international organizations.	commercial activities and local participation. -May not create dynamic for private investment or attract private grants.
		b. Manage area under existing legislation, but create private foundation and delegate considerable authority for commercial, educational, and cultural activities.	b.-Would only necessitate creation of new foundation or use of existing foundation. -Foundation would be able to maintain independence necessary to facilitate rapid development of commercial, educational, and cultural activities. -Would maintain Government control over general policy, but facilitate development activities.	b. Would require technical and financial assistance for rapid development of foundation.
		c. Establish a semi-autonomous Cabrits Development Authority with overall responsibility for development and conservation of the area.	c.-Authority could potentially generate its own funds after initial development period -Would concen-	c.-Would require new legislation and a period of technical and financial assistance. -Would sidestep and weaken existing government

MANAGEMENT ALTERNATIVES, CABRITS TABLE 3.6 (Continued)

SUBJECT	OBJECTIVE	ALTERNATIVES	PROS	CONS
			trate authority and thereby encourage a rapid and coherent development of the area.	departments. -May cause Government to eventually lose control over policy to commercial interests.

3. System Plan developed in Exercise 3.4, or similar information.
4. Simple drafting and mapping materials and equipment.
5. Typing or word processing services, or word processing equipment.

Instructions:

1. Review the information summary maps on one of the target areas developed during Exercise 3.3, or similar information (1 hour). If available, students who studied the target area during Exercise 3.3. should present the information to the class.
2. A field trip to the target area should be organised, so that all class members get a feel for its resources, their uses, and current and potential conflicts (1 day, or more depending on the area involved). As above, the students who studied the area as part of the earlier exercise should take a lead role in organising this trip.
3. Each student, or group of students, should be assigned a section of the "background information" from the Data Atlas or other materials produced during the study. Each student or group should analyse the information and determine the implications for management (2 hours). Students should list the facts and assumptions which are thought to represent potentials, limitations or constraints for management of the area. Students should go through the list and ask: "What is the significance of this fact or that assumption for management?", "How does it influence our decisions or alter our perceptions?". The answers to these questions give the planner what is needed for making decisions.
4. Each student should then write up his/her subsection of a "background" chapter (1 hour). Information pertinent to decision-making should be highlighted. For each topic discussed, the implications for planning and management should be noted. If no implication is obvious, then the information should be left out; for example, an indication that three sand types are found in the study area is of no value unless we know how the specific characteristics of these sands have implications for management. Which sands form the best beaches, or which are probably breeding habitat for biting sandflies, and what does this imply for their potential uses? These are the types of questions that need to be covered in this part of the exercise. Experience indicates that analysis is the most difficult aspect of planning for students. It

requires a rather broad spectrum of knowledge, and logical reasoning. Students may require considerable assistance during this phase of the study, and should be encouraged to consult with resource persons.

5. Each student, or group, should present his/her subsection to the class for critique (3 hours). Is the paper concise? Has extraneous or unimportant information been presented without its associated management implications? Have the most important facts and assumptions been selected over the trivial or less important?

Product or Results Expected:

A document analysing the characteristics of the proposed Protected Area and their implications for management should be produced which will provide the information needed to determine the alternatives available for management.

Stage 2

Aim:

To identify and define the various alternative management strategies for a potential Protected Area.

Duration:

4 - 6 hours of classwork.

Suitable Location and Materials Required:

As in Stage 1.

Instructions:

1. Review the general management categories, and their characteristics, presented in the System Plan (Exercise 3.4) and the preceding analysis of potentials, limitations and constraints for management of the area.
2. Review the sample outline of management alternatives for the Cabrits area of the island of Dominica (Table 3.6) and the alternative management structures for the Baths area of the British Virgin Islands (Table 3.7). Note how the most urgent issues and options are systematically defined.
3. Groups of students should independently define the

issues and options for the target area being studied. These will vary considerably from one part of the area to another, but generally will fall under the headings of objectives, management authority, development control in buffer areas, boundaries, zoning, access, facilities, activities, management programmes, and revenues.

4. The instructor should then group the issues and options identified by the students and present them in outline form to the class. Through discussion the class should arrive at a consensus on the most relevant issues and options, and put them into a single outline similar to the examples shown in Tables 3.6 & 3.7.
5. Each student should be assigned the task of reviewing the outline of issues and options with a relevant resource person (e.g. government officer, representative of major user group, land owner, local politician).
6. Later in the day, or at a later class session, students should report on the reaction of the individuals interviewed. They should decide if the outline needs to be changed in the light of the resource persons' inputs and, if so, draft a new outline document.

Product or Results Expected:

An outline of the major issues and options for management of the proposed Protected Area.

Interpretation and Application to the Problem Area:

The outline statement provides a stimulus for defining the various alternatives for management of the target area. It is only a stimulus, however, because the definition of alternatives requires a clear understanding of the possibilities. In the context of small developing island nations, these are not usually clear, and there is often no base of experience to guide planners. The question for discussion is how far one should go in making assumptions about the capabilities of institutions, the ability to bring on trained staff, the feasibility of acquiring key pieces of land, or of taking control over areas of coastal waters.

Table 3.7 Alternative Management Structures for the Baths Protected Area, BVI (Source ECNAMP, 1986)

ISSUE	DESCRIPTION	OPTIONS	PROS	CONS
Management Authority	Who is responsible for management of the area? Related issues: -law enforcement -development control -land management	1. Have management regulated by planning controls and existing laws.	No new legisla- required. No new manage- ment structure required.	Existing enforcement capability inade- quate. Interest groups (NPT, land owners, commercial users) have no input. No coherent manage- ment of overall area. Use conflicts.
		2. Have management regulated by NPT.	Simplifies management of whole area under one set of criteria.	Existing NPT resour- ces, including law enforcement capabi- lity and budget, inadequate. Requires new legis- lation. May create conflict with local interest groups and landowners.
		3. Establish joint management authority for area compri- sed of representatives of NPT, Planning, private landowners, commercial users and local residents.	The needs of all interest groups can be discussed and solutions arrived at by consensus. Cooperative service faci- lities, such as as garbage collection, allow more effective ope- ration.	Decision-making can be unwieldy and time consuming. May be impossible to enforce decisions of management authority. Requires new legis- lation.
Development control	How will land use by regulated? By whom?	1. Have land use regulated by planning controls and existing laws.	No new manage- ment structure required.	Requires improved coordination between government bodies, increased law enforcement capabi- lity and greater political will.

Table 3.7 continued...

ISSUE	DESCRIPTION	OPTIONS	PROS	CONS
		2. Landowners to develop covenants for land use.	Would control development with minimum government involvement.	Would not provide coordination for overall management of area and limits involvement of NPT and Planning. Would not regulate location, kind, or quality of developments.
		3. Develop a common set of controls for low density development and use for entire area.	Would provide one set of criteria for development. Standards for environmental quality would be set and regulated for the entire area.	Would limit option of landowners for development of their property. Requires increased political will to withstand pressures from landowners.
Boundaries of Protected Areas	Assuming a park or protected area will be created, what areas should be included in it?	1. Maintain existing boundaries of national parks within study area and create additional parks at the Baths and the Copper Mine.	Would require minimal new legislation.	Would make overall management of area difficult. Would not allow control of marine activities.
		2. Create a Baths National Park that includes present park areas, that Baths proper, Copper Mine Point, a coastal strip from Fort Point to Devils Bay, and a marine area including all cays south to Round Rock.	Would permit integrated management of critical coastal areas.	Would require purchase of easement along coastal strip on private lands or other commitment from landowners. Would not allow for adequate control of development in watersheds behind coastal strip.
		3. Create a Baths National Park that includes all land area from Fort Point south to Devils Bay and east to Copper Mine Point, as well	Would control development in the most environmentally sensitive	Would require purchase of privately owned lands or other commitment from landowners.

Table 3.7 continued...

ISSUE	DESCRIPTION	OPTIONS	PROS	CONS
		as an offshore marine area that includes all cays south to Round Rock.	marine, coastal and terrestrial areas.	
Trail Access	Along the coast, to attractions.	<ol style="list-style-type: none"> <li data-bbox="606 404 951 460">1. Improve present arrangement of trails leading off road. <li data-bbox="606 533 951 747">2. Build loop trail to connect the Crawl, Spring Bay, and the Baths; improve trail to Devils Bay; and build a trail connecting the Baths road to the Copper Mine. <li data-bbox="606 787 951 842">3. Create a coastal trail for public use. 	<p data-bbox="971 404 1145 460">Least additional cost.</p> <p data-bbox="971 533 1145 654">Would cost less while improving access to major attractions.</p> <p data-bbox="971 787 1145 1002">Would improve access to areas now difficult to reach, such as Fort Point, and from beach to beach.</p> <p data-bbox="971 1046 1145 1134">Would improve aesthetic experience of users.</p> <p data-bbox="971 1178 1145 1296">Would spread usage of beaches more evenly.</p>	<p data-bbox="1168 404 1407 493">Limited access and continued concentration of use.</p> <p data-bbox="1168 533 1407 588">Access would only be partly improved.</p> <p data-bbox="1168 632 1407 687">May require purchase of easement.</p> <p data-bbox="1168 787 1407 942">Would reduce privacy and increase litter problem by spreading it over a wider area.</p> <p data-bbox="1168 986 1407 1141">Would necessitate expense of building and maintaining trail over very difficult terrain.</p> <p data-bbox="1168 1178 1407 1229">May require purchase of easement.</p>
Facilities	Includes restrooms, garbage collection, concessions.	<ol style="list-style-type: none"> <li data-bbox="606 1333 951 1422">1. Simple, basic facilities provided on public lands by NPT. <li data-bbox="606 1661 951 1809">2. Issue a controlled number of private concessions at specific points, and control kind, location, and quality. 	<p data-bbox="971 1333 1145 1455">Would provide visitors with basic facilities.</p> <p data-bbox="971 1499 1145 1621">Would not require collaboration with landowners.</p> <p data-bbox="971 1665 1145 1842">Would increase facilities available to visitors while solving sanitation problems.</p> <p data-bbox="971 1886 1145 1906">Would make pos-</p>	<p data-bbox="1168 1333 1407 1422">Would require initial expense and constant maintenance.</p> <p data-bbox="1168 1466 1407 1621">Would not provide easy access to facilities for the majority of visitors to the area.</p>

Table 3.7 continued...

ISSUE	DESCRIPTION	OPTIONS	PROS	CONS
			sible overall management of area.	
			Would not require outlay of scarce NPT resources.	
		3. Permit unregulated businesses on private land.	Would provide facilities for visitors.	Might not solve sanitation problems or overcrowding.
			Would not require outlay of scarce NPT resources.	Would make overall management of area impossible.
Revenues	Required to assure proper management and maintenance.	1. Collect commercial user fees from charter boat, dive tour, and land-based operations.	Those using the natural resources would contribute to their maintenance.	Would place burden of fees on commercial users. Would require fee collection system.
		2. Lease concessions while seeking cooperative solutions to management and maintenance.	Would probably provide very cost-effective management while assuring that those using resources would contribute accordingly.	Would require constant dialogue among concessioners, management authority commercial users, and other cooperators.
		3. Make agreements with commercial users to voluntarily provide all desired services.	Would not necessitate structures for fee collection or concession leasing.	Would require constant dialogue and full cooperation of commercial users.

Stage 3

Background:

Selection of a preferred management alternative follows once the issues and options have been defined clearly. A planner may agonize over the options and feel a responsibility to come up with the "correct" answer. However, in management, there are no "correct" answers, only a range of options. Once the planner sees his role as being to clearly identify those options, and their probable consequences, and to structure the decision-making process so that all relevant parties make knowledgeable inputs, then he will make more progress. The planner's responsibility is not to make the decision, but rather to make sure that relevant information, and the interests of all elements of the management community (resource users, interest groups, managers, researchers, administrators, politicians) are presented accurately and taken into account in the decision-making process.

Aim:

To gain familiarity with the process of selecting from a variety of alternatives a preferred management strategy for a potential Protected Area.

Duration:

4 - 6 hours of classwork, plus preparatory work by groups.

Suitable Location and Materials Required:

As in previous stages of the exercise.

Instructions:

1. The class should divide into teams representing resource users (e.g. fishermen, hoteliers), interest groups (e.g. the local conservation society, or mayor of a neighbouring community), resource managers (e.g. a local fisheries or forestry officer), administrators (e.g. the Permanent Secretary or Commissioner of a ministry or department of government), researchers, and politicians. Each team should take the role of the group it represents and defend its interests against the others.
2. Each team should define the preferred management strategy (based on the interests of the group it represents) in terms of objectives, zoning,

management programmes, development cost projections, expected revenues, cooperation with other agencies, and relations with adjacent land use.

3. With the instructor using his skills as moderator, the class should reach a consensus on a preferred management strategy that all groups can accept (2 hours).
4. After consensus is reached, the students should reflect on the exercise, pinpoint which groups had the greatest differences, and analyse why the differing positions were held. They should also try to determine how compromises were reached and how consensus was built (at least 1 hour).
5. The class should then appoint an editing team to write up the details of the preferred management strategy (as agreed by all groups) (2 hours).
6. While the editing team is doing their write-up, the balance of the class should form a legal team to note the elements that should be included in the legislation declaring the protected area. As a minimum, this should include a description of the boundaries of the area, the defined management category for the area, and a brief summary of the management strategy for the area (1 hour).

Product or Results Expected:

A description of the preferred management alternative for a potential Protected Area and a preliminary listing of the elements that should be included in the legislation to declare the area.

Interpretation and Application to the Problem Area:

The study of management alternatives provides the minimum information required to officially declare a Protected Area. Once the study has been completed, it can be reviewed at the technical levels of government and, once approved, promulgated by the legislative arm of government and passed into law.

Alternative Exercises:

As an alternative approach, a public hearing could be staged, in cooperation with the competent authority for Protected Areas. At the training course hearing, interested parties could be asked to give their views on the preferred management option for the area in question, and a consensus position sought. Students could act as facilitators and observers by clarifying and tracking positions of the various interest groups, and by analysing

how consensus is built. After the hearing, the instructor could guide the students in analysing the dynamics of the process, and in writing up the consensus that emerges.

Further Reading:

ECNAMP 1986. The Baths - a Management Strategy for the Proposed Protected Area. Eastern Caribbean Natural Area Management Programme; 17 pages.

McEachern, J. & Towle, E.L. 1972. Resource Management Programs for Oceanic Islands. Transactions of the 37th North American Wildlife and Natural Resources Conference, March 1972, Washington; 145 - 159.

Putney, A.D., Honychurch, L., James, A. & White, D. 1984. Cabrits 2000 - Development Concepts for the Proposed Cabrits National Park, Dominica. Eastern Caribbean Natural Areas Management Programme & Government of Dominica, ECNAMP Report No. 2; 24 pages.

Other sources as in previous exercises in Chapter 3.

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**Exercise 3.6 DRAFTING A DECREE FOR ESTABLISHMENT AND
LEGAL PROTECTION OF A MULTIPLE-USE AREA.**

Background:

Recommendations on boundaries, management category and preferred management strategy can be used to synthesise a draft decree for legal declaration of a protected area. The final drafting of legal documents will be done in the equivalent of an Attorney General's Office, but it is important for coastal zone planners and managers to be involved at the drafting stage. This ensures that the draft reflects the management objectives and contains accurate technical details, but it must be remembered also that the manager may later be responsible for administering the regulations which he is drafting.

Legal provisions for protection of a natural area can be in the form of (a) **International Conventions**, administered in conjunction with other neighbouring or interested countries and agencies, (b) **Laws**, administered within the state by the central government, or (c) **Bye-laws**, formulated and administered by local government or corporations. All three categories of regulations may be appropriate in the management of a protected area. In general terms, all three categories contain similar clauses in a similar order of priority. The following exercise examines the components of regulations which help achieve some of the objectives of coastal area management. These will be at the level of a national law for establishment and protection of the resources of a Multiple-use Area.

Aim:

To analyse and draft essential components of Natural Resource Area legislation.

Duration:

One day.

Suitable Location:

Drawing Office/Laboratory.

Materials Required:

Data Atlas for a selected Multiple-use Area (see Exercise 3.1).

List of conservation objectives for a Multiple-use Area in order of priority (Table 3.4).

Summary of management objectives.
Summary of chosen management strategy (see Exercise 3.5).
Copies of already existing, similar laws (to study suitable wording).
Writing materials and equipment.

Instructions:

1. As a group, or by assigning tasks to individuals, prepare statements/clauses appropriate to the following components of a proposed law:
 - a. **Title** - a brief statement declaring the subject of the law. (A date will be added when the law is gazetted).
 - b. Statement concerning the **relationship to previous laws** on the same or similar subjects, e.g. "These Regulations replace those of Act No. of 1941".
 - c. **Definitions** - A statement, or listing, of precise boundaries of the Multiple-use Area; of technical terms, such as "Fisheries Zone" or "wildlife"; and of species which are given special status. If the number of species referred to is large, they can be listed in "Schedules" at the end of the document, e.g. "1st Schedule: Animals which may not be hunted".
 - d. **Regulatory Clauses** - A series of clear, unambiguous statements explaining what can and cannot be done in the area. Great care must be taken in formulating these clauses so that loopholes are not left in the law. A Statement such as "No person may hunt a protected animal" can be strengthened by changing it to "No person may catch, kill, or cause to be caught or killed, or have in their possession or offer for sale, any protected animal or part of a protected animal", for example.
 - e. **Punishment Clauses** - the punishment for offences against these regulations must be stated. This is usually in the form of a monetary fine or period of imprisonment, but in both cases a maximum must be stated. It is important that the size of the fine is realistic; for example, if it is in punishment for trading a female lobster bearing eggs, it must be related to the market price for a lobster of that size.
 - f. **Identification of Enforcement Officials** - The officers designated to enforce the law must be listed and their powers of arrest clarified.
 - g. **Exemptions** - In some cases it may be necessary to grant exemptions to the regulations. For example, to give rights of entry to a protected

area by inspectors or by scientists engaged on valid research projects. The latter might include rights to collect specimens of protected species for research. In stating exemptions, the procedure for obtaining the necessary permit must be explained.

- h. **Amendments** - The minister responsible for administering the regulations should be empowered to modify clauses or make additional regulations from time to time, provided this does not alter the 'spirit' of the law.
 - i. **Supporting Documents** - It may be appropriate with a proposed coastal protected area to append a navigational chart or map, which can accompany the schedules of special species or other appendix-like material.
2. As a group, coordinate individual clauses into a main document, review it, and finalise for presentation to local agency personnel for their comments.

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C. MANAGEMENT PLANS

Introduction:

Management plans are documents which guide the development and management of a park or protected area in accordance with the decree or legislation which mandated its establishment. They should not be a compendium of information, but rather concentrate on the analysis of **resource values and potentials**, and prescribe the measures that will be taken to protect and develop these resources.

A model table of contents for a management plan is presented in Table 3.8. This is a simplified model and needs adaptation to the situation of each park or protected area.

Parks and protected areas are not "set aside" from use, but rather are actively managed to protect their resources and produce specific goods and services. The particular mix of goods and services that is expected should follow from the management category of the area (National Park, Wildlife Sanctuary, etc.) and the text of the legal instrument designating the area. How the mix of goods and services is to be obtained from the areas is prescribed in the management plan.

The exercises which follow are designed to familiarise the students with the concepts and tasks required to manage a park or protected area, and teach the student how to set them down in an orderly fashion in a management plan. The exercise is only practicable if it is carried out in a relatively small park or protected area. Since many of the skills required to develop a management plan have been covered earlier in this chapter, the exercises which follow focus on two key aspects not yet addressed - zoning and the design of management programmes.

To be able to develop a management plan, students will need to be familiar with the following concepts:

- the overall planning process (Table 3.1) and steps in the development of a plan (Table 3.9)
- management by objectives
- the different management categories and their objectives
- the park and protected areas system plan for island or region (if available)
- use of maps, hydrographic charts, and aerial photographs
- mapping and overlaying of technical data
- field reconnaissance and interviewing techniques

Table 3.8 Management Plan Outline

- I. Introduction
 - A. Location
 - B. Legislative mandate
 - C. Previous planning work
 - D. Importance of the area

 - II. Synthesis of Background Information
 - A. Biophysical features
 - B. Cultural features
 - C. Resource use
 - D. Limitations and constraints

 - III. Management and Development
 - A. Objectives
 - B. Boundaries
 - C. Zoning
 - D. Management programmes
 - 1. interpretation and education
 - 2. research and monitoring
 - 3. recreation and tourism
 - 4. resource protection
 - E. Administration and maintenance
 - 1. enforcement
 - 2. concessions and permits
 - 3. maintenance
 - 4. institutional arrangements
 - F. Integrated development
 - 1. development areas
 - 2. personnel
 - 3. institutional relations
 - 4. general development map
 - G. Development schedule
- Literature Cited
- Appendices
- A. Site plans for development areas
 - B. List of key references

Table 3.9 Steps in the Development of a Management Plan

1. Review work already undertaken
 - Background information
 - Study of management alternatives
 - Management strategy
 - Preliminary implementation plan
 - Other research
2. Identify for whom planning is being done (user group).
3. Compare the stated goals and objectives of management with the present situation and identify issues, needs, and activities that relate to each objective.
4. Field reconnaissance.
5. Map location of existing stresses and activities by objective.
6. Public review of information, objectives, and expression of needs.
7. Incorporate public input into objectives, issues, and activities.
8. Define management requirements
 - areas of conflict
 - issues to be addressed through area management and regulation
 - use zones
 - development areas
 - infrastructure required outside of development areas
 - personnel requirements
 - synthesis of management programmes
9. Prepare site plans for development areas.
10. Draw up composite development sequence and cost.
11. Draft and distribute preliminary plan.
12. Interdepartmental and public review of plan.
13. Synthesis of final plan.

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- basic administrative organisation

Materials Required:

- model management plan outline (Table 3.8) and description of steps in the development of a management plan (Table 3.9).
- matrix showing categories of protected areas and conservation objectives (Table 3.4).
- narrative description of protected area categories (e.g. Appendix 5).
- summary of current legislation applicable to parks and protected areas in the island.
- reference materials on area to be planned (maps, charts, aerial photographs, previous studies of the area, documentation including data on area, etc.).
- multiple copies of a standard base map for the study area.
- simple drafting and mapping materials and equipment.
- typing or word processing services, or equipment.

Exercise 3.7 ZONING A NATURAL AREA FOR MANAGEMENT PURPOSES

Background:

Many types of managed natural areas will be designed for multiple uses, in which a range of activities can be expected to take place simultaneously or periodically. As Table 3.4 indicates, there may be primary and secondary objectives to be achieved, with the possibility of some conflict resulting. Consequently, activities must be conducted in an ordered manner, to reduce management problems and to avoid deterioration of the resources under protection. The usual way of accomplishing this is to divide the park or reserve into a number of clearly demarcated **zones**, in which only certain activities can take place.

The terms used to describe the zones vary from one country to another, but are based on the same general principles. The nomenclature used by Thalen and Faizool (1980) in their plan for protected areas in the islands of Trinidad and Tobago can be taken as a model. An area is set aside as the **Scientific Zone**, from which the public are excluded totally. This ensures that natural systems and processes continue without interference; this zone would be an important part of Strict Reserves or Biosphere Reserves, and is likely to be located distant from centres of human disturbance. Related to this might be a **Wilderness Zone** in which visitors would be permitted access, but the area would not be developed, i.e. visitors would have the opportunity to experience ecosystems in their natural state. Other parts of the protected area would be included in an **Extensive Use Zone**, in which visitors would be able to spread out and enjoy the resources with the help of special facilities. Provision of guides, tour boats, marked nature trails, board walks and explanatory notices would ensure extensive access throughout this zone. The point or points at which visitors to the park were received would need to provide other facilities, such as parking space, toilets, refreshment outlets or souvenir stalls. These would be **Intensive Use Zones**, with concentrated infrastructure and visitor use. Depending on the status of the resources of the park (see Exercise 4.4), it might be necessary to close off some areas in order that they, or component species, recuperate from previous impacts. A **Recuperative Zone** was used for a portion of the Caroni Swamp National Park, Trinidad, which had been damaged by attempted reclamation, as shown in Figure 4.2.

As an example, in designing a zoning plan for a recreational area, it is necessary (a) to decide what is needed to protect the resources, (b) what visitors are

hoping to see or experience in the protected area, (c) what activities can take place in particular regions, and (d) to establish boundaries that can be clearly distinguished in the field. The following exercise examines some of these aspects, with reference to a coastal park.

Aim:

To produce a zoning scheme for a protected area, in accordance with the designated management objectives.

Duration:

One day.

Suitable Location:

Drawing Office/Laboratory, supported by field visits as necessary.

Materials Required:

All materials used in the previous exercise.

Instructions:

1. Review all materials from the relevant Protected Areas System Plan (see Chapter 3A) and the study of management alternatives (see Chapter 3B), or equivalent information derived from other sources.
2. Develop a plan for supplemental data gathering where necessary (documentation, interviews, and field reconnaissance).
3. Review the specific objectives for management of the area, which have been selected from alternatives discussed in Exercise 3.5.
4. List the management implications of the stated objectives, e.g. if wildlife protection is an objective, it will be necessary to establish a Scientific Zone or equivalent.
5. Identify and map the area or areas where each objective can be realised. Select key areas for activities under each objective, i.e. there may be three or four sites around a mangrove swamp or lagoon where visitors could watch waterfowl. Isolate those sites where visitor activity might disturb the birds for some reason, such as during the nesting season, and choose where it would be easiest to

build observation platforms; place all suitable areas within an Extensive Use Zone, or equivalent.

6. Note (a) opportunities for resource development (see Ex. 3.3.) in the various zones. (b) constraints (see Ex. 3.5), e.g. presence of inhabitants or present land-use, or previous resource depletion. (c) any external influences which impact on a zone or its resources. These might be pollution inputs, navigation lanes, rights of way.
7. In the light of 3 to 6 above, define major management zones and zone boundaries. Indicate these on a study area base map.
8. Outline management specifications for each zone.
9. Within each zone where physical facilities will be required, e.g. mooring buoys or board walks, areas which lend themselves to physical development should be noted and mapped as potential "development areas". To these should be added those sites which will be needed for administrative facilities.
10. The physical developments that will be required in each development area should be indicated, and, based on expected levels of resource use, the required capacities should be estimated.
11. Summarize the management requirements for each of the zones suggested.

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Exercise 3.8 DESIGNING DEVELOPMENT AND OPERATIONS PROGRAMMES FOR PROTECTED AREAS

Background:

In order to outline a full development programme it is necessary to integrate the implementation of the management programmes into a **development sequence** (Table 3.8). Physical, institutional and personnel development must all be addressed. Diagrams or flow-charts giving an overview of all planned development can then be drafted. These would include a chronogram and budget estimate.

Aim:

To identify the logistic requirements for operation of a Protected Area.

Duration:

Two Days (minimum).

Suitable Location:

Drawing Office/Laboratory exercise.

If possible, a field visit should be made to the site of a proposed Protected Area in the host island.

Materials Required:

Either all materials prepared for preceding exercises, or the plans for a proposed Protected Area (including a statement of the management objectives and the zoning scheme).

Instructions:

1. Review the management plan prepared for the selected Protected Area.
2. Define the nature and extent of the (a) Environmental, and (b) Public Use Programmes. Estimate, and list, all infrastructure and facilities which will be needed to run these programmes. If structures like notice boards, viewing towers or tour-boat docks are to be constructed, identify the materials which will be used and estimate quantities as accurately as possible (using information provided by the instructor, or through enquiries at local

businesses).

Make a list of the inputs that will be needed if structures are to be provided for the Park's programmes; e.g. architects, building contractors, surveyors.

3. The day-to-day running of the Park facilities should be reviewed, to decide on personnel, equipment and financial implications. There may be a need for a vehicle, secretarial assistance, water and electricity supplies, for example.
4. A development programme should be designed, i.e. a chronogram showing the dates when activities are expected to commence, or to be completed. This could be in two parts, to deal with developments within the first year of operation and with long-term development of both conservation, public use and research. The activities of the development programme should be translated into cost estimates for each phase of development.
5. A funding strategy, based on cost and revenue estimates, should be defined, drawing on all possible sources.
6. Personnel requirements should be defined for all aspects of Park management. Staffing should be phased into the development scheme, and should include provision for training.
7. Development controls should be outlined, so that implementation relates to the original plan, and impacts on the natural and cultural resources are avoided.
8. All sections of the plan should be assembled into one document by a drafting committee. The steps in the development of this plan are summarized in Table 3.9, and an example of a management presented in Table 3.10.
9. The draft plan can be presented to interested governmental officers, land owners, representatives of interest or user groups, and researchers for review, provided this has been organised well in advance of the exercise. The drafting committee can then revise the draft and produce a final version of the plan for distribution. Alternatively, the draft can be reviewed and finalised by the trainees, directed by the instructor.

Table 3.10 Example of Selected Management Programmes for a Small Marine Park in the British Virgin Islands

1. Research and monitoring

Research carried out within the Park will be of two types: that carried out by or on behalf of the National Parks Trust with the aim of improved management, and that carried out by outside investigators. The Trust's applied research programme will consist of research on existing management problems (first priority), and subjects relevant to management that may be related to existing problems or may lead to later problems. Research programs that require immediate implementation are:

1. Investigation of existence and damage caused by introduced species on Dead Chest Island.
2. Inventory of wreck artifacts.
3. Assessment of potential impact of a trail at Dead Chest on seabird nesting.

All research carried out by outside investigators is subject to approval and supervision by the Trust. The Trust will assist and facilitate research that is directly relevant to management of the Park. Other requests to carry out research will be reviewed on a case by case basis, and approved or denied based on their potential impact both to the natural environment and the human activities being carried out in the Park.

Monitoring of heavily used marine environments is critical to their protection. A long term monitoring programme will be established using two research sites: one in the most heavily used area around the Wreck of the Rhone and a control site in the research zone on the north tip of Dead Chest. Baseline data for both sites are provided in Anderson et al. (1985). Monitoring techniques are described in Appendix B.

2. Resource management

- a. Fishing: All but subsistence level fishing by native BVI fishermen with special permit will be permitted in the Park, and this only in the General Use Zone. This stipulation will permit the very small and dwindling number of Salt Island fishermen to continue a traditional subsistence activity. The Park has in recent years been little used for fishing. A few fishermen from Tortola and Salt Island have set traps within the park, but this is not a

Table 3.10 continued...

commercially important activity. There are indications that the area has been overfished in the past and has not yet recovered. The limitation of fishing to a negligible amount will reduce the safety hazards caused by fishing boats and recreational boats using the area. It will also provide an opportunity for fishery stocks to recover.

- b. Dead Chest Island: Dead Chest currently receives very little visitation. The islet does not currently appear to be used for seabird nesting, which may be because rats are present. The policy of the Trust will be to eliminate exotic predators whenever possible in order to restore the natural flora and fauna. If research indicates that rats are present on Dead Chest, measures should be taken to eliminate them. In order to protect the natural vegetation and fauna of the islet, visitation will not be encouraged, though it will not be actively prohibited unless it increases substantially from existing levels, thereby creating unacceptable impact.
- c. Moorings and anchoring: Anchoring at Lee Bay has damaged seagrass beds, and anchoring around the Wreck has destroyed living corals. Therefore, all anchoring will be prohibited except in the General Use Zone, and visitors by boat will be required to use the moorings at Lee Bay and the Wreck. Moorings should also be provided at Blonde Rock. Descriptions of the types of mooring to be used at each site and other details of the mooring system are shown in Appendix C.

3. Interpretation

Most interpretation of the Park's natural and cultural features is being done to acceptable standards by the dive operators who bring the bulk of visitors to the Park. The dive operators should be assisted and accommodated in continuing to carry out this function for the Trust.

Interpretative materials available on the park include the book, "The Royal Mail Steamer Rhone," by George and Luana Marler, and the brochure prepared by the Trust. The brochure provides interpretative material and also describes use of the mooring system. Copies should be distributed regularly to all dive and charterboat operators, and each charterboat should have a copy on board.

Table 3.10 continued..

The group most difficult to reach is that which visits the park on private yachts. Arrangements should be made to distribute the brochure and other interpretative materials that might be developed in the future through Customs and Immigration Service at each point of entry to all private yachts entering the Territory.

4. Interpretation

The policy of the Trust will be to encourage the use of the Park for marine sports, particularly SCUBA diving and yachting. In order to assure the protection of the resource and the safety of visitors regulations, surveillance, and provisions for accidents and emergencies will be required.

A brochure has been prepared showing the park boundaries, listing regulations, and describing the use of the Park mooring system. Adequate numbers of these should be distributed regularly to dive and charterboat companies and ports of entry to assure that everyone using the Park gets a copy. The brochure should also be updated periodically as needed.

In order to provide surveillance in the absence of NPT staff, formal arrangements should be made between the Trust and the Dive Operators' Association to certify dive operators as auxiliary officers of the Trust. They should not be given law enforcement powers, but would be expected to contact visitors, explain regulations, and assist in emergencies. Dive and charterboat operators working in the Park will also be required to carry adequate accident and liability insurance. Captains will be required to have Red Cross Advanced First Aid certification, and a PADI or NAUI certified Dive Instructor must accompany all boats from which visitors will be diving. These requirements will be spelled out in concession contracts (see Section 6. below). Should serious law enforcement situations occur in the Park, the assistance of the Customs Officers will be requested. Eventually, the Trust will employ three rangers - for Tortola and surroundings, Virgin Gorda and surroundings, and Anegada. The Tortola ranger will have responsibility for the Wreck of the Rhone.

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Alternative Exercises:

1. Segments of the overall exercise can be cut out and tailored to medium length or shorter training sessions. As with the other exercises, the instructor can shorten the exercise by providing the information that would have been produced by the students themselves in the longer version.
2. Another approach that could be taken would be to update an existing management plan, following each of the steps outlined. This would reduce the amount of time required for each step, and yet familiarise students with all aspects of the process. The major limitation is, of course, that few coastal area management plans have been prepared, and thus may not be available for training course use in most tropical island states.

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Further Reading:

ECNAMP 1979. Draft Team Plan for the Management and Development of the Proposed Buccoo Reef National Park. Eastern Caribbean Natural Area Management Program Workshop on Natural Area Management, Tobago, April-May 1979; 37 pages.

Thelen, K. D. & Faizool, S. 1980. Site Plans and Design Analysis: Caroni Swamp National Park. Forest Division, Trinidad and Tobago; 36 pages.

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