FAO FORESTRY PAPER 6

national parks planning

a manual with annotated examples

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National Parks Planning

FOREWORD

The Forestry Department of the Food and Agriculture Organization has been, and continues to be, involved in assisting member countries with the planning and management of their National Parks. The original Spanish version of this Manual was prepared by John Moseley, Kyran Thelen and Kenton Miller, while they were members of the team of specialists on the Regional Wildland Management and Environmental Conservation project for Latin America (FAO/REF TF 199). There was, however, an urgent need for a similar publication in other parts of the developing world. In order to overcome this problem, members of the Wildlife and Conservation Branch cooperated with their colleagues in the Latin America region to produce English and French versions of the document.

The manual incorporates experience gained by FAO in this field and is illustrated with annotated examples drawn from the plans of individual national parks of many parts of the world. The contribution which these sources make to the work is acknoledged. Thanks are also due to the individuals who assisted with editing and producing the text. Special acknowledgement is made to Bernardo Zentilli for his assistance, which has ensured timely publication of the manual.

H.J. Steinlin
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NATIONAL PARK PLANNING

Which is the optimum use man can make of his terrestrial home? Which should be man's role as the predominant organic type on earth? The general answer is that man should aspire to the maximum realization of possibilities.

Julian Huxley

The "conservation" has a much wider meaning at present than the mere preservation of our natural resources. It means their rational use and protection, in such a way that an ever greater number of people may benefit from them. Only in the measure in which we achieve this, may our own human resources be enriched.

Laurence S. Rockefeller

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A. MANUAL

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1. INTRODUCTION

Modern administration and development of agriculture, livestock, timber and fisheries and their associated resources and industries require the expertise of many related professions. Few such enterprises can be planned by single individuals in view of the complexity of associated factors and variables.

Similarly, the various types of management applied to unique wildland natural and cultural resources such as those found in forests, deserts, mountains, coasts, coral reefs, archeological ruins, wild fauna, and genetic reservoirs, require teams of specialists. National parks, natural and cultural monuments, wildlife sanctuaries, national forests, recreation areas, watersheds and scenic areas each have peculiar aspects to be studied, values to be analyzed all requiring decisions.

As resources become ever more scarce, it is crucial that decisions for their allocation be based upon the most careful evaluation possible. Two aspects are fundamental: first, an orderly and logical inquiry into the problem and the possible solutions must be made; second the support of all the related professions must be sought in relation to each problem and alternative solution. The first will be called the plan and the second, the interdisciplinary planning team.

Whereas methods and techniques for planning agriculture, forestry and other forms of land use and production have been developed and are presented as part of general curricula in universities and technical schools, methods for planning national parks and related areas have only recently received systematic study.

It is the purpose of this guide, therefore, to present the fundamental steps for planning national parks and related areas. Other units of national park systems such as natural and cultural monuments, wildlife sanctuaries, biological reserves and recreation areas can also be planned by following this guide. It is based upon a synthesis of actual park planning missions in countries and in environments which reflect the variation inherent in Latin America. As with all such attempts at generalization from specific experiences it has been necessary to leave details and exceptions aside in order to seek the basic principles, it is hoped that the annotated examples will serve to demonstrate the application of the principles to actual field case.

Whereas park planners are not available in most countries of the region, it has been demonstrated through practical experience during the past several years, that interdisciplinary teams consisting of foresters, engineers, agronomists, landscape architects, architects, ecologists, biologists, archeologists, economists and sociologists, can work together within a clear methodological framework to produce a plan for a given area. Where certain specialists may not always be available, it has been also demonstrated that professionsals in related or allied fields can cover these subjects through additional reading and by carrying the responsibility during planning sessions. This form of role playing is a necessary and acceptable alternative when the ideal list of specialists for the team cannot be met.

A team member shall be appointed as team leader. He is responsible for coordinating, scheduling activities and overseeing the orderly formulation of the plan.

In order to keep the guide as brief as possible, it shall be assumed that the area to be planned has been designated, or is under consideration, as a national park or similar area. It is assumed that alternative uses for the resources have been already considered, and that overall criteria for wildland management have been set. The method presented in this guide is compatible with criteria promulgated by international conferences, agreements, and organizations. (See appendix 1).

Planning methodology is complex. It is important that the reader comprehend that while a list of ordinate steps are presented to logically guide his way through the problem of planning the management and development of a given area, it will be in fact necessary to consider many steps on a simultaneous basis. He must not be discouraged to find that upon finalizing various steps in the procedure, he will find it necessary to return and review, and perhaps change, earlier decisions.

As experience is gained, the professionals involved in park planning will become familiar with all of the aspects involved in the management, construction, maintenance, administration and budgeting related to the operation of national parks. He will become involved with protection, recreation, research, interpretation and other activities which relate the park to people, and help make it a vital element in regional development and environmental conservation. However, during the period while experience is accumulating, it is important that the professionals related to planning carefully weigh each decision as to its implications for the future. In particular consideration must be given to the risks involved in all human intervention in unique natural and cultural areas.

To keep the problem to a size which can be given careful consideration yet not be overladen with detail, the first phase of planning will concentrate at the conceptual or master plan level. During this phase the basic framework, objectives and norms for long term management and development for the area are decided and carefully documented. These will guide all future activities.

Later, as the conceptual masterplan is implemented, detailed management programs will be required for meeting visitor needs and for safeguarding park resources.

The degree of success reached in park planning is directly related to the adequacy of preparation for the job:

- First, the members of the planning team should systematically gather information on the area to be studied. Among the items to be covered are soils and rocks, vegetation, fauna, land use, land tenure, climate, transportation and the development plans of public agencies and private industries.

- Second, aerial photographs and maps must be gathered. If possible the photographs should be studied by stereo techniques in order to familiarize each member of the team with the study area. Topographical maps should be brought to a scale which will permit their easy use in the field.

- Third, the historical aspects involved in the establishment of a national park often result from long term movements of political activity, public spirited campaigns, and deliberations on the part of individuals and organizations. Team members should interview and consult these individuals and groups to learn their ideas and aspirations, and benefit from their experience. They are often among the most familiar with the local terrain and the history of the area.

- Fourth, the information gathered from previous steps can now be located upon the aerial photographs and topographic maps, and a field base map can be prepared. Each team member should have his own copy in order to draw in-roads, fence lines, property lines, water courses, wildlife sightings, archeological or historical remains, landslide and poor drainage sites, caves, springs, unique resources, established bench marks, and the like.

- Fifth, field trips require careful preparation. The inspection of large wild or semi-wild areas often require expeditions to the field with duration of several days or weeks. Initial trips normally require that the entire interdisciplinary planning team travel together and work and live as a group to ensure close interaction and interchange in their evaluations of the resources, problems and opportunities for management and development. Prior to such trips it is necessary to prepare field equipment and supplies, and to prepare travel routes, have base maps for each team member, and have the plan outline and specific responsibilities clearly in mind.

- Sixth, during the field studies care must be given to evaluate the salient features of the area. The team should climb highly elevated points from which sweeping panoramas and overviews can be obtained. The use of aircraft at the outset of field studies usually will result in an overall saving of field study budgets and also provide a clear orientation of the topography and resources.

Several general guidelines can be stated for the field work:

- Emulate the practice of experienced planners by being less concerned with details, but more interested in general facts. The preliminary investigation will not provide sufficient time nor yield enough information to permit the planning team members to become authorities on the study area. They should, however, have assimilated enough of the study area into their thinking, into their notebooks, onto their base maps and on films, that they become fully aware of the areas' general character, influences, orientation and moods.

- All park areas are different, each having one or more particular identities. These are the influences that must be captured by the planning team, for they can favourably affect the development and management plans to be prepared subsequently.

- The first field studies should be accomplished as a team activity, permitting an interdisciplinary overview of the planning problem. Such joint undertakings will improve subsequent communications between team members, often helping to stem conflicts between ecologists and engineers, or between foresters and archeologists and others regarding appropriate management and development proposals.

- On subsequent field studies, team participation will depend upon the particular management or development aspects to be considered. Biologists, engineers, architects, archeologists and others have different investigation techniques and face different time frames for pursuing their individual tasks. Together, these individual tasks form elements in one unified management planning effort, which are regularly submitted for the consideration and discussion of other team members.

- Finally, each team member must be thoroughly familiar with the outlines for the preparation of the plan. Each individual must understand the entire programme of work, be clear on his own responsibilities, and also be aware of the tasks assigned to each of the other members. It is fundamental that while individual work must be performed, in order to break a very complex problem into smaller more easily handled parts, that the individual team members relate to others and seek concensus decisions from the group.

2. THE RESOURCE

Natural and cultural features of the resource under study are documented in this chapter. This will not be a detailed listing of flora, fauna, rocks and cultural remains but a general examination of physiographic, ecologic and cultural values found within the study area. Park resources are significant elements of a nation's heritage, meriting thorough and careful analysis. Proper treatment of this section will give purpose to the plan. Information documented here will become the basis for later decision-making.

Search, review and analyze existing literature and other sources of information. In some situations this information may be almost non-existent, necessitating a resource survey. Such a survey should not be minutely detailed research but rather a study which clearly sets forth significant features. Universities are often helpful in providing resource survey assistance.

All resources, man-made and natural, having a bearing on planning will be included. Their evaluation will be expressed in terms of scenic, recreational, educational, scientific and other resource conservation potential. Evaluations will be made as objectively as possible and will not prejudge the use that the study area will be planned to receive.

Resources will be considered under two broad headings: natural resources and cultural resources. The order of their appearance in the planning document will follow their importance in the area under study.

2.1 NATURAL RESOURCES

2.1.1 Geology

This section will be broken down into broad geological headings, i.e. stratigraphic, paleogeographic, structural and morphological features. Geomorphological processes such as volcanism, glaciation and other mass movements will be documented. Moreover, man-caused modifications or changes in the geologic resources also will be noted.

Descriptions will be written to proceed from the general to the specific.

2.1.2 Water

Seashores, lakes, rivers, streams, estuaries, swamps and springs will be described. Where applicable consider size (length, width, depth), water characteristics (chemical content, sediment, clarity, color, temperature, the presence of pollution, navigability, currents, tides and hazards), shorelines (beaches, gradients, flooding), and the watershed and downstream implications.

2.1.3 Flora

Briefly describe the ecological zones found in the study area and list the representative species and plant assemblages for each zone. (The Holdridge "life zone system", for example, is widely used in Latin America).

Following this broad classification of botanical types, smaller and more specific elements will be documented such as important and endemic species, introduced species, or specimens of outstanding size or age. Note significant changes brought about through natural or man-caused activities. Note rare and endangered species as well as recently eliminated species.

2.1.4 Fauna

Important species will be listed and associated with ecological assemblages and habitats. Broad classes will be documented (mammals, birds, reptiles, fish, etc.) Also noted will be seasonal phenomena such as migration, nesting, or spawning. Note rare and endangered species as well as recently eliminated species. Note feral animals occuring within the study area, along with an estimate of their number. Fish will be listed by principal species, whether native or introduced and by major environment (ocean, bay, freshwater). Note waters in which only native species occur or where there are no fishes from either natural or artificial causes.

2.1.5 Specific Genetic and Ecological Features

Describe special ecological assemblages which have particular interest or value and warrant special treatment for the conservation of genetic materials. Indicate samples of ecological units or sites for environmental monitoring. Examples include plant and animal species with potential for breeding in agriculture and medicinal purposes, unique ecological transition zones, or major geological phenomena which are found in a natural, pollution-free state within the park.

2.2 CULTURAL RESOURCES

2.2.1 Archeology

Appraisals or studies of archeological sites require the services of a competent professional archeologist. His services should be engaged to document the following: a description of the culture and the approximate span of time that it existed at a particular location; a determination of whether archeological investigations have been made, if so by whom and what was discovered, the extent of the excavation, and whether portions of the site have not been investigated; and a description, to the extent possible, of what the site or structures originally looked like with a notation of the condition of any physical remains still in existence. This information will be shown graphically on a cultural history or archeological base map.

Evaluate the resource, relating the site to the total culture of which it is a part. State clearly any particular significance the site possesses. Demonstrate important facets of the culture with notations of any other factors affecting the value of the resource.

2.2.2 History

If the study area contains historically important resources (grounds, terrain, structures or objects) the principal details or events associated with these resources will be described. Important closely related antecedent and subsequent events, whether they took place in the study area or not, should be noted. Develop a clear picture of what the area probably looked like during the historic period. Describe the historic physical remains and general scene that exists today and compare the two to demonstrate the changes that have occured. If significant, an historical base map will be prepared to facilitate future management and development decisions.

Achieving success in preserving and interpreting historic resources often depends upon the quality of the environment surrounding the resource. Take note of adjacent visual or audible man-caused factors which might violate the integrity of the historic resource under study. Document future development proposals for these peripheral lands that might impinge on the environment of the historical resource.

2.2.3 Contemporary Culture

National park boundaries are usually drawn to exclude areas of human habitation. However, when park goals cannot be otherwise achieved or when the presence of an anachronistic culture is judged to be necessary to the retention of park values, consideration will be given to their inclusion. Although the touristic value of indigenous cultures, isolated from the main stream of modern development is well recognized, the problems stemming from their management as tourism attractions can be manifold without the establishment of proper controls. These controls must respect the social and religious customs of the indigenous people and should be directed only at the preservation of values that appear in the landscape.

In the case of lands occupied by non-indigenous cultures it is imperative that these lands be acquired and that their occupants be relocated. Often such relocations can be implemented through existing agrarian reform programmes; through land exchanges; or through conditions of deferred tenancy.

2.3 STATEMENT OF SIGNIFICANCE

Completion of the items outlined in the Resource chapter of the Masterplan will give the planner an understanding of park values. Careful consideration should now be given to the formulation of the Statement of Significance. This statement is of great importance for it creates the frame of reference for the Masterplan. The reasons for the areas establishment as a national park should be clearly expressed in this short paragraph.

3. BACKGROUND INFORMATION

Along with the Resource chapter, this chapter (which corresponds to Chapter II of the plan) will form the foundation upon which the plan is constructed. It will be concerned with present and existing factors, the realities, forming the basis for later management planning and decisions (Chapter III). The concise compilation of pertinent information placed in this chapter is intended to assist the planners and subsequent plan users to understand and logically justify management and development activities.

If information placed in this chapter does not reinforce planning and management decisions, it should not be included.

3.1 LOCATION

This section will geographically locate the study area. A short description will be accompanied by a location map showing the parks' relationship to important cities, tourism objectives, and transportation systems.

3.2 REGIONAL ANALYSIS

To prepare a plan that is integrated with other social, economic, and political influences that presently or in the future will affect the park, it is essential that a thorough study be conducted of the region in which the park is located. Although regions

have no absolute size or configuration, they are usually composed of surrounding or adjacent areas that are reasonably cohesive; economically, geographically and politically.

Awareness of the interrelationships between a study area and its surrounding region is a prerequisite to park planning. These interrelationships are both subtle and obvious, simple and complex; they are often numerous and they must be understood. Remember that parks do not exist in a vacuum.

Give specific attention to these headings:

3.2.1 Land Use and Economy

Document present land use as well as trends and plans for future development of the region. The plans of both the public and private sectors concerned with agriculture, agrarian reform, forestry, water management, mining, power, industrial and commercial development, urbanization, etc., should be noted for their possible positive or negative effect on the park. Make contacts both formally and informally with representatives of these interests to assure that proper coordination can be maintained.

In some cases a leadership role must be taken by the national parks organization. Plans for parks may very often include recommendations for land use outside or beyond park boundaries. The search for regional land use inventory should begin with the highest planning authority. In most instances this will be the national planning office. Other sources are individual agencies and organizations concerned with land use.

Establish relationships with provincial and local governments to determine how they view the park area from a local standpoint. Find out what plans or ideas they may have. Remember too, that the park locality - its neighbours - are profoundly interested in "their" park and its plan for the future.

3.2.2 Regional Transportation System

Examine access to and the transportation system within the region. Identify and note the condition of principal access roads. Learn of proposals for new routes or improvements for existing roads. Likewise there should be an examination of existing and planned facilities for air, rail and water transportation. Show, if possible, statistics or projections of the number of percentage of people who use or will use public transportation to reach the region. Analyze how visitors will reach the park.

3.2.3 Population Characteristics

Study the regional population pattern. Give the names of population centres and their distance to the park. Note population trends and shifts in the region. Compare these characteristics to those country-wide. Examine any important effect population growth will have on the park. A careful analysis of these data is important. Information recorded here will later be used as a basis for physical development, management services, and concession investment determinations.

3.2.4 Tourism Services and Recreation

Study the existing and proposed regional outdoor recreation and tourism infrastructure, both privately and publicly operated. Note pertinent information regarding use. The implications for noting this information are obvious in determining facility needs in the park.

3.3 PARK LEGAL STATUS

For an existing national park, give a summary of its legal history. This will include actions which have resulted in boundary changes, and land status. Management and development history of the area also should be noted so that its present status can be better understood. Document legal provisions for any special land use such as mining, grazing, timber cutting, etc. Copies of pertinent laws and documents will be placed in the appendix.

3.4 EXISTING LAND USE

An important consideration for proposed or established parks is a thorough knowledge of existing land use. Existing uses and their economic, social, political and scientific implications should be thoroughly documented. The success or failure of a park plan may well hinge on an acceptable solution or compromise of present park land use problems.

The land use study should proceed as follows:

- Determine, if practicable, the number of individual land parcels, the size and the names of their owners both private and public. Prepare this both in narrative and map form. Much of this information will be placed in the appendix.

- Tabulate, at least in approximate accuracy, the existing uses of land by type and land area, i.e. cultivated, grazing, forested, mining, residential, etc. These will be shown on a map to be labelled Present Land Use. Also include electric power and telephone lines, pipe lines, electronic communications structures, roads, railroads, other major structures and developments.

- Evaluate land use changes. Note any significant changes in economic trends affecting land use, i.e. forest land being converted to agricultural use, increase in mining, intrusion of squatters, etc.

3.5 VISITOR USE OF RESOURCE

For existing parks, the patterns of visitor use, the facilities and services provided for that use, and the effects of various kinds of visitor use on the resource should be considered. Consult the park manager and his staff. From their experiences much information will be revealed.

List the various activities in the area, an estimated number of participants by week or month, and if available, the number of visitors during the last year and five year periods. Break this down as nearly as possible to type of use such as picnicking, boating, camping, fishing, environmental education, scientific study and collection, etc., and the percentage of visitors participating in each use.

3.6 VISITOR ANALYSIS

In planning parks that are presently receiving use, analyze the users. Determine where visitors are from; information about their age, sex; kind of group, number in group; socio-economic characteristics; activities participated in; means of transport; and length of stay. This information is best obtained through programmed visitor opinion polls or surveys within the park. However, when information from those more structured visitor sampling methods is not available, consult park personnel for their observations.

If there is no present use, make an hypothesis about who might be expected to visit the area. Such educated guesses can be based on knowledge of similar situations elsewhere.

This information is important for it indicates to the planners the kinds of visitors they can expect in the park. It likewise will be important to the park manager and to those people of the design professions who will be called in later for detailed development plans.

3.7 CLIMATE

A systematized presentation of data on temperature, precipitation and other climatic phenomena will be placed in this section. Follow this with a narrative description of the role of weather as a controlling or influencing factor on use, management and development. If climatic conditions vary substantially from place to place within the park, this should be reflected in both the charts and narrative. If detailed information is not available, use conservative generalizations.

Temperature: On a chart show average maximum and average minimum air temperatures by months. If available give average day-night temperature differences, extreme lows and highs. Indicate length of the construction season as determined by temperature. Note any special effects of temperature on use, management or development of the park. For water oriented areas include data on water temperature.

Precipitation: Give average rainfall and snowfall by month on a chart. When available give snow depths and duration of normal snowpack. Describe drift characteristics. Note any special effects of precipitation on the use, management and development of the park.

Wind: Give prevailing wind direction and velocity by seasons. Indicate maximum velocities (storm winds), their direction and dates of occurrence. Note any effects of wind on visitor use, management or development in the narrative.

Insolation: Show graphically the incidence of sunshine, the number of sunny days throughout the year. This information is particularly important for areas being planned for visitors seeking sea and sun.

3.8 SPECIAL CONDITIONS

Describe the type, frequency, and length of storms and note any special conditions such as lightning, fog, smog, hurricanes, etc., that might affect development and use. When relevant note portions of the park subject to avalanches, land slides, soil creep, slumping, mud flow, and other special factors induced by geography and climate.

3.9 FIRE HISTORY

If known give a general summary of the fire record, highlighting unusual vegetation fire occurrences and identifying fire potential. Give inclusive dates of the normal fire season. For proposed parks, state susceptibility to fire of various vegetative types.

3.10 TERRAIN AND SOILS

Terrain and soils affect physical development and public use. It is therefore necessary to describe the general nature of the terrain along with information on soil mechanical properties. If significant differences exist between major regions of the park, describe these differences. Describe the presence of marshes, soil permeability, frost penetration, permafrost, depth of water table, special soil and foundation problems, susceptibility to erosion or compaction, etc.

4. MANAGEMENT AND DEVELOPMENT

Chapters one and two are concerned entirely with existing conditions. They are the inquisitive portions of the planning process. Where is the resource? What is its significance? What are the natural and man-caused conditions and problems bearing on the resource? Who are the present and future resource users? An analysis of the information acquired for these chapters becomes the basis for management and development planning.

4.1 PARK OBJECTIVES

Next comes the formulation of park objectives. Objectives are to plans what rudders are to ships, they give direction. Relate objectives to specifics, not lofty, self-serving statements of environmental and social goodness. Although concise, they must be thorough and meaningful statements, capable of achievement through management programmes. Often they become the most cited portions of the plan.

With objectives now defined, overlay the park base map with a good grade of tracing paper (paper that will take much erasing), begin the preparation of a Preliminary Schematic Masterplan.

Much collected data, notes, photographs, sketches and diagrams evolving from master-plan studies will not appear in the final document. However, these graphic methods of recording, analyzing, studying and testing often form the bridges to problem solving.

The preliminary masterplan schematic will locate boundaries, fragile areas, unique resources, points of interest, roads, trails, and tentative development sites. After input from other team members and consultants (usually with many corrections) the preliminary masterplan schematic will evolve as the first graphic statement of the aspirations and goals for park use and development.

Follow the schematic with a narrative summarizing its content. Explore the "whats, wheres, and whys" of the schematic. This often will reveal bad or overlooked features that then can be corrected.

4.2 BOUNDARIES

Many factors must be considered when boundaries are selected. After tentative (gross) boundary lines have been placed on the preliminary masterplan schematic, consider these questions:

a) Are boundary considerations consistent with management objectives? For natural areas consider the significant resources, i.e. eco-systems (both terrestrial and marine), shorelines, off-shore islands, geological systems, animal migrations, ecotones, etc. For a cultural area, determine if sufficient lands have been provided to not only protect the cultural resources but the setting as well. Views looking from protected areas are often more important than views looking into these areas.

b) Can boundaries be easily defined and identified? Park management becomes much easier when visitors, park employees, and adjacent land owners know when they are in and when they are out of a national park. Relate boundaries to natural features: streams, shorelines, ridgelines, mountain peaks, etc. Existing roads, property lines and fence lines are often used as easily identified boundaries.

c) Has sufficient throught been given to watershed protection? For highly elevated country, consider boundaries which will give absolute watershed protection to park values.

d) Can park objectives be met regardless of the future use of lands adjacent to park boundaries? Consider the possibility of adverse uses on lands surrounding the park - visual, air, and noise polluting developments. This is most important at or near park entrances and developed areas.

e) Have sufficient lands been included to provide road access and unobtrusive sites, necessary for public use and management development? Consider the possible need for future expansion.

f) In the case of privately owned lands, have boundary lines been placed to minimize severance damages? Avoid leaving residuals of private properties that are too small for continuing economic land use.

After considering these factors, consider the realities of the changes that national park management will bring about over present land uses. There is little if any unwanted land left in the world. Because competition for land uses is increasing, it will be necessary to identify and evaluate, either in whole or part, feasible alternative uses for lands which have been identified for national park management. Such analysis will consider:

a) the significance and reason for including the desired land within the park;

b) present use and ownership;

c) the capabilities and limitations of the land under present use;

d) the environmental impact of proposed park physical development;

e) the physical, economic, social, and political aspects of the region which have a bearing on alternative uses.

Very often as a result of a careful analysis of alternative uses it will be necessary to compromise difficult situations in order to reach conservation objectives.

Keep in mind that regardless of how ill-conceived and potentially detrimental competing land development schemes may be, they are difficult to stop without well documented plans establishing a higher and more beneficial land use in the national interest.

4.3 ZONING

Once boundaries have been set, a system of evaluating and classifying park land and water areas becomes necessary. This basic step of separating the entire park into management zones is taken to provide proper recognition and protection for park resources. As a tool for resource management it will indicate where physical development can be placed and equally important, where it will not be placed. A careful evaluation of appropriate zones by the planning team will provide a basis for making many other masterplan judgements. As applicable, indicate appropriate zones on the preliminary masterplan schematic. In the narrative section of the Masterplan define each zone. Describe specific park lands (qualities) and quantities) and formulate objectives for the zones selected. Document the norms for each zone.

In Latin America as in other parts of the world there is increasing acceptance, at least in principle, of the following land classification system which provides for the segregation of park, lands into as many as seven separate and distinct management zones:

Primitive-Scientific Zone: These lands represent the most important and often the most fragile natural values within the park. Nothing in the way of human activity will be permitted within this zone that will degrade these values. Only those structures, necessary for management and preservation of the wilderness qualities of this zone will be permitted. Most often this will consist of only a simple unobtrusive guard outpost.

Primitive Zone: These natural environment lands often abut the Primitive Scientific Zone. They too contain outstanding natural features. However, the lesser overall environmental quality of these lands and/or the need to make the park's significant features available to visitors brings about the need for this zone. Primitive Zone lands also serve as transition or buffer areas, often separating Primitive Scientific Zones from more accessible park zones. Exotic plants and animals will not be introduced and if possible will be eradicated in this zone. Physical development will be restricted to rudimentary trails, simple campsites, guard outposts, and minimal research facilities. Roads and motorized vehicles will be prohibited.

Extensive Use Zone: This classification is necessary to provide visitors with high quality park environment that is easier of access. Within this zone, park roads (usually one-way), trails, simple campgrounds, scenic overlooks, and vista clearing will be permitted. Development, however, will preclude facilities that will encourage high density use such as visitor centres, hotels, ski lifts, etc. Every effort will be made to reduce the environmental impact of physical development on this zone. As with the Primitive Zone, these lands will often function as a buffer or transition to more protected zones.

Intensive Use Zone: This is the zone of high-density visitor and management use. Such lands, usually comprising a small percentage of the park's total area, designate lands to be used for two-way roads, visitor centres, visitor supply stores, formal campgrounds, overnight accommodations and park administration offices. These are the lands that are most affected by visitor use. As with development in other zones, extreme care must be taken to lessen the impact of physical development on park values. Caution must be exercised to prohibit development either in kind or in degree that will hint of urbanization. Facilities for public use placed in this zone should be the minimum required to promote visitor enjoyment and safety as well as resource protection.

Historic-Cultural Zone: This classification is given to lands within the park boundary containing nationally and internationally significant archeologic, historic or contemporary cultural resources. This classification is important, for it directs attention to the importance of protecting and interpreting these vestiges of the nations cultural heritage. Often it becomes desirable to provide a setting for these zones with abutting Primitive or Extensive Zone lands. Physical development will be only that necessary for the preservation, restoration and interpretation of cultural values. Public use activities are generally limited to sightseeing and education.

Zone of Recuperation: Lands within park boundaries that have been altered by the introduction of exotic animals, plants, mining, cutting, burning, colonization, farming, etc., bring about a need for this zone. Once the future management goal for these lands has been determined (see Resource Protection) an action programme will be set in motion, directed at recuperation. In some cases restoration to original land forms may be necessary. Installations and equipment necessary to facilitate the implementation of these programmes will be permitted within this zone.

Special Use Zone: This zone is used for designating lands required for basic management services such as employee housing, maintenance and storage facilities, water and electric plants, communication towers, sanitary land fills, borrow pits, etc. Insofar as possible these installations will be visually and acoustically isolated from visitor use areas. This zone also is used to designate lands which support land use practices incompatible with park objectives. In the latter case these designations are transitory being only necessary until corrective action can be taken through park management or land acquisition programmes.

4.4 MANAGEMENT PROGRAMMES

It is essential that there be included in the Masterplan the guidelines, requirements and specifications of the various management programmes that are needed to attain Park Objectives. Management programmes common to all parks fall into four groups, those concerned with resource management and protection, those required for public use, those needed for physical development, and those concerned with park administration and maintenance activities. Their number will depend on the size of the park and the complexity of its management needs.

4.4.1 Resource Management and Protection

National park management is concerned with the well-being of total environments as opposed to the protection of individual features. However, in the preparation of resource management programmes it is desirable to break apart the total problem of management into more easily handled segments.

For natural areas consider the need for management procedures, directed as safeguarding vegetation, wildlife, and other natural features against impairment or destruction. This will involve more than the passive protection, prescribed by land-use zoning. It will require action programmes involving the application of ecological management techniques which are often necessary to neutralize the unnatural influences of man on the landscape. Typical resource protection categories include, but are not limited to, fish and wildlife management; fire control; insect and disease control and water pollution abatement control. Each park will have specific problems which will require evaluations and solutions.

Parks with cultural features will require additional management programmes that are concerned with historical and archeological investigation and restoration as well as programmes designed to establish procedures for arresting the damaging effects of nature and man on cultural remains. Typical management programme needs at historical areas are those concerned with the maintenance of buildings, their settings, furnishings, equipment and grounds. In areas where living history programmes are appropriate, these activities will require action programmes.

Protection problems concerned with the visitor also will be treated in this section. These will vary with the kinds and numbers of visitors who are expected to use the park and the type of activities and facilities available. Typical protection activities will be those concerned with search and rescue in mountain and forest areas, life-saving if water use is expected, and the operation of public health and safety programmes.

In the development of these programmes clearly document programme implementation needs in terms of people, facilities and equipment.

4.4.2 Public Use

Park management for serving park visitors will be considered under four major categories.

Recreation: This use will often bring about the need for specific management programmes. After a thorough examination of park resources along with an understanding of visitor characteristics, decide what recreational opportunities will be offered to visitors. In a general way state where they will take place. Such activities will be in keeping with the character of the park and must not conflict with other objectives. Determine the demand for various recreation activities. Suggest the kinds of facilities and equipment that will be needed. Indicate how visitor participation will be managed. Indicate if a separate management programme will be required. Typical recreation activities requiring management programmes include but are not limited to interpretation, mountain climbing, cave exploring, scuba diving, organized group camping.

Interpretation: In a national park context, interpretation is the learning activity which reveals meanings and relationships of natural and cultural features. For this purpose facilities and services are provided in parks to: orient visitors to park opportunities; enhance visitor enjoyment and understanding of the park; and accomplish through interpretation the basic management objectives of resource protection and visitor safety.

Because learning in a park is a recreational activity, it must be carried out in such a way as to stimulate visitor interest and curiosity. Programmes for this purpose are usually called interpretive programmes and utilize such media as personal contact, slide or film shows, guided or self-guiding walks, publications, exhibits and recorded messages.

Scientific Use: In most national parks scientific research and study concerned with the retention of natural and cultural values is an important management objective. As appropriate, programmes must be planned in terms of research and study needs for the park as well as for meeting the needs of the scientific community. Consider the demand for scientific use. This will depend upon the characteristics of park resources and the interest of scientific institutions who may wish to use the park. Cite specific research projects that will be needed in the park, research personnel if the situation warrants, and research facilities and equipment needs. Scientific uses will be carried out by permission and be controlled by the local park administrator.

Educational Use: National parks and park personnel can make significant contributions to the advancement of education, concerned with man's relationship to his environment. Because national parks are ideal laboratories for this activity, a broad programme to promote environmental education becomes a necessary management programme requirement. The plan often involves the cooperation of schools, universities, publishers and other organizations for assistance in communicating an environmental consciousness both within and beyond the park.

In parks near population centres, environmental education programmes must be carefully planned because of the usual large demand for such programmes.

Other educational uses often include the use of parks by groups from conservation organizations, writers, nature photographers, and university level environmental planning students.

4.4.3 Administration and Maintenance

Essential to all parks, large or small, are management programmes concerned with administration of park business and the maintenance of physical developments and equipment. This is the housekeeping function related to personnel, finance, procurement, contracts, and the upkeep of all park installations.

Staff: In order to carry out the functions required for operating the park, the following types of personnel are normally employed:

- Management: the manager is the director of a given park; he is the leader of the park staff and must integrate, coordinate and stimulate them to achieve the objectives for which he is responsible. He must deal with other government agencies and organizations and local leaders, and must present and defend the image and overall programme of the park.

- Protection: the park guard is responsible for the protection of park resources and park visitors. He deals directly with the visiting public introducing them to the park and guiding them to enjoy their activities in ways compatible with overall park policy and regulations. He spends a great deal of his time in the interior of the park where he represents both law enforcement as well as the key source of information to the visitor.

- Interpretation: the interpreter is responsible for the information, orientation and educational aspects of the park. He "interprets" the values and features of the park and presents them to the park visitor in a manner which can be appreciated at all levels of language and culture.

- Maintenance: the maintenance specialist is responsible for the proper functioning and upkeep of all park installations and facilities.

- Administration: the Administrative Officer is responsible for the overall operational aspects of the park. He works closely under the park manager and reports to him on the execution of park projects, financial status, personnel and inventories of equipment and supplies.

Organization: A brief description and organization diagram is presented to demonstrate how the functions of park management are to be carried by individual staff members as well as to specify their hierarchal relationship. In large parks or in cases where topography clearly requires that key park functions be separated into geographic units, it is useful to establish districts to give responsibilities for the management of local areas.

Concessions: The operation of certain types of facilities, such as hotels and restaurants, can often be most efficiently managed by private enterprise. In such cases, contractual arrangements by the parks authority must clearly specify the controls and regulations of design, services, prices and health standards which are required. Decisions, plans and regulations on all management, development and operations within park boundaries are to be made by the parks authority in accordance with the Masterplan and overall policies and laws. Cooperative agreements with other organizations can be useful and lead to greater efficiencies in cases such as fire control, highway construction and maintenance, tourism transportation, communications and law enforcement.

4.4.4 Physical Development

Drawings: For masterplan purposes drawings are usually prepared at large scales, (1:25.000 or larger). The scale selected should permit the entire park to appear on one sheet. At these large scales the planner is required through necessity to show only the essential organization of the park: management zones, circulation (roads and trails) and developed areas. As scale increases, so does the level of generality. However, this is not to mean that generality excuses the planner from careful and studied decisions which lead to the location of these features. Information placed on masterplan drawings is the result of a painstaking study of the existing situation (Chapters 2 and 3) with the underlying objective of protecting and enhancing existing features which will guarantee appropriate resource management and provide visitors with high-quality experience.

The information from the working drawings and base maps will be integrated onto one unique Preliminary Schematic Masterplan. Following careful cross-checkings to assure compatibility of all elements, the information is transferred onto a final map appropriately named the General Development Plan. It will serve as the index for the various drawings that follow.

As need dictates, separate drawings will be prepared using the park-wide General Development Plan as a base. These may include, but are not limited to, information relating to physiographic provinces, life zones, geology, history, archeology,and land ownership.

Drawings for development areas require, for best results, topographical base maps in the magnitude of 1:1000, to 1:2500. Aerial photographs, enlarged to these scales also can be used with good results.

Normally, masterplanning carries the planning process to the level whereby development areas and the general requirements are determined. The following planning level requires the participation of design specialists including landscape architects and civil engineers. They work with more refined topographical maps at smaller scales (1:400 or 1:500 with 1 metre contour intervals) to permit the presentation of existing and proposed features in more exacting detail. Drawings at these scales are known as site plans wherein consideration is given to aesthetics, spacial framework, topographic adjustment and the location of structures. Finally, these site plans, accompanied by the necessary details, provide the basis for construction plans or working drawings.

Circulation: In any park situation, large or small, existing or proposed, movement of visitors and management personnel to and within a park is an issue of basic concern. Circulation can involve the following transportation media: trails (pedestrian, bicycle or horse); roadways (arterial, collector or minor) for use of visiting vehicles, or for the exclusive use of park operated vehicles, tramways and elevators, water and air.

Consider these questions before deciding how visitors and management personnel will gain access to the park and its features: Can visitors get to where they want to go easily? Failure to follow this basic planning concept invariably brings about confusion, bad feelings and an increased need for direction signs. Circulation to major park attractions should provide easy, direct, unobstructed and logical routing. Have conflicts between vehicular movement and the movement of pedestrians, horses and bicycles been minimized? The conflicts arising from a beach separated by a road from other shoreline activities are obvious. What about the impact of visitor movement on the resource? Road construction, regardless of terrain or correctness of design is a destructive force. A thorough study, therefore, of alternative methods of people movement in parks is an important prerequisite to national park public use development.

Once the planning team has decided upon a circulation system for the park, test its workability. Put yourself, visually, in the place of a visitor, a park ranger or a maintenance man. Move through the park as they will be required to do - in the case of visitors, usually as complete strangers.

Environmental Design Theme: In this section of the masterplan, the planning team sets criteria and parameters for the park's man-made features. This information will give environmental designers (architects, landscape architects and engineers) park requirements and general guide specifications without telling them as designers what to do. These requirements will differ from park to park. However, one requirement will remain valid for all parks established to protect natural values: man-made or man-caused features must be subordinated to the environment in which they are placed.

Development Areas: In any park, it is unlikely that all development will be placed on one site. Different activities, facilities and services require different space requirements, terrain conditions and orientation. In this section of the master-plan, describe the purpose of each developed area along with an indication of special requirements brought about by the site's use and location. Indicate administrative requirements and visitor capacities.

Visitor demand predictions are largely the result of empirical analysis. Installed visitor facility capacities may, therefore, prove to be inadequate. It is, therefore, advisable, when site and visitor carrying capacities permit, to plan physical development for possible future expansion.

Information relating to the various developed areas will be used later by the design professions to locate and determine the arrangement and sizes of roads, parking areas, buildings and utilities.

Management and Development Schedule: A management and development schedule sets forth in tabular form the priority of all major activities and elements, necessary to

masterplan implementation. As a "what, where, when" and optionally at "how much cost" analysis, its primary value is to show management and development juxtapositioned with park personnel needs.

Consider these cardinal points when setting priorities:

- the establishment, through land acquisition, fencing, public proclamation, signing and stationing of personnel, the physical presence of national park sovereignty over park lands;

- protect the park's natural and cultural resources from harm caused by man or by nature;

- develop the accomodations required to meet the public's needs and those of the park's administration; and

- carry out the environmental research, which is a prerequisite for the development of the physical installations and for preparing the interpretive programme.

The programming of management and development activities is based on technical criteria so as to establish the logical sequential order in which management programmes are to be carried out. The ordered flow of activities provides the framework to ensure that all factors have been taken into account satisfactorily and that they follow each other in such a way as to produce completely functional units, capable of fulfilling protection, public use and other management objectives of the park.

In this way, the masterplan analyses and establishes the activities to be carried out and the order for their execution. These decisions are based on technical criteria and it is assumed that they are constant.

Non-technical factors, such as budgetary and institutional limitations and considerations of a political nature, affect the programme's time factor. These factors affect parks development rate and, ultimately, they also affect the sequence of the programme's execution. Nevertheless, these factors can only be dealt with at a higher executive level, where matters related with the programming of all the park's activities and other units of the wild area system are considered.

APPENDIX

I. DECLARATION OF PRINCIPLES

Guideline for the Formulation of a National Parks Policy

Prepared by the FAO Forestry Department for the Third Session of the National Parks and Wildlife Committee of the Latin American Forestry Commission, held in Quito (Ecuador), on 11th and 12th November 1970.

1. Growing demands on natural resources, above all as regards their territorial extension, make it necessary to establish national parks and equivalent areas of extraordinary natural scientific, historical or aesthetic interest as reserves for their management.

2. In general, the objectives sought when creating national parks or equivalent areas may be listed as follows:

a) manage and preserve natural, physical and environmental values, for the purpose of insuring their perpetuation;

b) make it possible to study the mentioned characteristics for the purpose of determing the orientation of resource management and their development within and outside the national parks and obtain more basic data on natural ecosystems;

c) provide the public with the opportunity to learn to appreciate the value of national parks; and

d) provide recreational services, that will allow the public to enjoy the national parks values, such as outdoor museums and the marvels of a natural environment free of the dominating influence of man on the changing aspect of the planet.

3. Among the benefits of the management of national parks or equivalent areas are the following: regular flows of pure water, a deposit of genes, soil stabilization and preservation of the flora and fauna; to which is added, and this must be emphasized, public education, research and recreation, all of which contribute to the economic development of rural areas, as a result of tourism and the funds provided to research, as well as to new employment and investment opportunities.

4. After making a survey of the country's ecologic systems and areas of outstanding scientific, historic and aesthetic values, it is recommended to reserve at least a sample of each type and manage it as a national park or equivalent area for its perpetuation.

5. Sites selected for management as national parks or equivalent areas must include those of major natural or historic interest, trying to include all the country's beauties, but avoiding repetitions as far as possible.

6. National parks, or equivalent areas, should be large enough to include a complete natural ecologic unit for the purpose of protecting the area's unique values from the conflicts that may arise from the use of neighbouring areas and, in addition, contribute to education, research and recreation.

7. To insure the permanence of natural parks or equivalent areas, it is preferable to create them by law and not by simple decree or ordinance.

8. Negotiations for purchasing the land are usually difficult and time consuming, but in the long term, it is advisable for the entire area of the national park to be State owned.

9. The utilization of forest products and other natural resources such as minerals is incompatible with national park objectives and management practices.

10. Research is a fundamental element of national park plans and must serve as a guide for the management of natural resources within the park and neighbouring areas, as well as for the interpretation of their educational interest.

11. Teaching, through nature interpretation programmes, may be very important when it is desired to influence the attitude of the public in connection with matters such as the management of resources and natural beauties and the conservation of wildlife and the environment, because of which conservation should be taught at all schools and through all communication means, especially decisive aspects of natural resources and environmental management.

12. Recreational services provided by national parks or equivalent areas as, for example, those connected with camping, mount climbing, picnics, study of nature, swimming, etc., provide the public with the possibility to make constructive and healthy use of their free time and at the same time learn to appreciate the environment in its natural state.

13. National parks, or equivalent areas, may constitute viable focal points for promoting tourism, recreation and economic development. It is essential, however, that such activities are adjusted to overall management objectives.

14. Activities in national parks or equivalent areas comprise two large types, according to their management, i.e.:

a) Provide the area with appropriate protection and administration and carry out the necessary research to plan management and future nature interpretation teaching programmes.

b) Create public recreational facilities, when the ecology, the national budget and demand justify the required investments.

15. To plan the management of national parks, it is necessary to make a sufficiently detailed multidisciplinary study of the social, ecologic and economic aspects of the area.

II. CRITERIA FOR NATIONAL PARKS AND QUIVALENT AREAS, IN ACCORDANCE WITH THE WASHINGTON AGREEMENT, 1940

PANAMERICAN UNION. Convention for the protection of the flora and fauna and natural scenic beauties of the countries of America. Washington, D.C., 1940, OAS Series on Treaties, N° 31, 25 pages.

"a. NATIONAL PARKS will be understood to be :

"Regions established for the protection and conservation of natural scenic beauties and of the flora and fauna of national importance, which the public may enjoy better when placed under official supervision.

"b. NATIONAL RESERVES will be understood to be:

"Regions established for the conservation and utilization, under official supervision of natural resources, in which the flora and fauna will be given protection compatible with the purposes for which such reserves are created.

"c. NATIONAL MONUMENTS will be understood to be:

"The regions, objectives or living animal or plant species of aesthetic interest or historic or scientific value, are given absolute protection. Natural monuments are created for the purpose of conserving a specific object or a determined species of the flora or fauna declaring a region, an object or an individual species, an inviolable natural monument except to carry duly authorized scientific research or government inspections.

"d. RESERVES OF VIRGIN REGIONS will be understood to be:

"A region administrated by the public authorities, where there are primitive natural conditions of flora, fauna, housing and communications with the absence of roads for motor traffic and where commercial exploration is prohibited.

"e. MIGRATORY BIRDS will be understood to be:

"Birds belonging to given species, all of whose individuals or some of whom, cross the frontiers of the countries of America during any season of the year. Some species of the following bird families may be mentioned as examples of migratory birds: Charadriidae, Scolopacidae, Caprimulgidae, Hirundinidae."

B. ANNOTATED EXAMPLES

TABLE OF CONTENTS

1. INTRODUCTION

1.1 NATIONAL PARK

A national park is a relatively extensive area (1) in which one or more ecosystems have not been physically altered by human exploitation and occupation, where plant and animal species, geomorphologic sites and habitats are of special scientific, educational and recreational interest, or where the natural scenery is of great beauty; and (2) with respect to which the country's highest competent authority has adopted measures to prevent or eliminate exploitation or occupation of the entire area in the briefest possible time and to effectively compel respect for the ecologic, geomorphologic or aesthetic features which led to its establishment, (3) where visitors are allowed under special conditions for inspirational, educational, cultural and recreational purposes.

(International Union for the Conservation of Nature and Natural Resources (IUCN))

1.2 MASTER PLAN

The Master Plan is a conceptual planning document which establishes the guidelines for the general use, preservation, management and development of an area belonging to a national parks system. It identifies the purposes of the area; its values as regards resources; its relationship with neighbouring areas; human needs that should be met, its management objectives; and presents a land classification and general development plan for its management. The Master Plan constitutes the control document which guides and directs the preparation of more detailed management plans.

2. THE RESOURCE

2.1 NATURAL RESOURCES

2.1.1 Geology

Master Plan, National Park of "Köprülü Canyon" in Turkey, 1971. The most important morphologic characteristic of the area is the presence of an overlaying valley of an altitude of 100 m in the area of the Canyon.

The conversion of a canyon into an overlaying valley took place as follows: The sequence of events was started with the cutting by the ancient Irmak Kopru of the soft marls deposited by the Miocene sea, as it sought its way towards the sea. The main eroding activity was the solution of the limestone and sandstone, cementing the elements that joined the masses of rock. A large part of the cutting was caused by karstic erosion. In the meantime, as silica cement was released, the slopes of the valley reached the angles of the steps that may be observed at present. When the softest covering material was completely eroded, the overlaying valley formed by conglomerates was established in the form of a deep canyon.

There are surprising examples of lapies, a typical feature of karstic topography over the canyons on the slopes near the old Selge. The most interesting forms are called "Devil's rocks" or "the rocks of men", by the villagers who are very superstitious. These formations, generally on the slopes, look like the chimneys of Goreme's fairy tales.

Essentially, the formation of these lapies is due to the solution of the weakest limestone and sandstone cements, which are under the more resistant silika cements, which remain in thick layers. The red soil (terra rossa) around the basis is composed of dissolved limestone cement.

The formation of the floodbed is at the point where the river leaves the narrow canyon and becomes wider.

The base level in this valley is at 50 m and the slopes at 7 m. The low and high water levels are clearly marked. The land surrounding the valley is abrupt and cut by valleys of the tributaries which come in through the valleys in the form of a V and may be considered as canyons. Good examples of these valleys may be found in the districts of Burmahan and Karadag. Another characteristic of the tributaries is the presence of oenotes with depths of as much as 6 m. These are cut into the sandstone by cascades of 2 to 3 m.

2.1.2 Water

(Preliminary Master Plan for the "Terra Nova" National Park, Canada, 1966)

The Park has a front of approximately 44 km along the various arms and coves of Bonavista Bay. Prominent headlands, rugged cliffs, low exposed glacial deposits, frequent sea inlets, combine to give shape to an abrupt and beautiful sea coast. The southwest arm, protected by a mew dyke with bridges is somewhat warmer than the other salt water arms and sounds and should be used as a centre for aquatic recreational activities.

The park's fresh waters eventually reach the sea and where the waters meet an aquatic transition or ecotone area is established. High and low tides do not permit establishing permanent boundaries for this area and create a dynamic environment for its flora and fauna. Fresh water streams and lagoons constitute 5.4% (2.140 ha) of the park. Dunphy lagoon is the largest body of fresh water and, together with the big pond, represent more or less half of the parks aquatic area. Water temperatures in these lagoons are much warmer than those of the salt water which makes them attractive for aquatic recreational activities.

2.1.3 Flora

Above the superior edge of the rain forest, at about 2 600 to 2 700 m altitude, is the beginning of the heather forest which extends upward through the marsh. The heather beyond "Mandara Hut" and in other parts around the mountain grows to a height of more than 9 m. It is smaller at higher altitudes and frequently mixed with other shrubs forming dense scrubland on the mountain slopes. The most conspicuous plant in the marsh if ragwort (Senecio kilimanjari) which grows in humid areas, on the stony slopes and along streams. It grows up to a height of 4.5 m, it has a thick and woody trunk and dense foliage crowns. Senecios are found on the mountain, some of them above 4.600 m altitude.

The endemic giant lobelia (Lobelia deckenii) is another conspicuous plant. Its hollow stem and terminal spike with blue flowers grow to a height of 3.7 m. This plant grows along streams and in the better drained areas of the Alpine swamps. Red hot pokers, orchids, thistle, iris and clovers are among the most attractive plants and shrubs with flowers which give colour to the mountain slopes. Porters often make garlands with the attractive flowers which are always green to crown the heads of those who reach the top of Mount Kibo.

Few plants can survive above 4 300 m altitude in the Alpine desert of the "Montura" where yearly rainfall is below 15 cm. The two varieties of ragwort and other herbs, which can resist extreme temperatures and low rainfall, are eventually replaced by mosses and lichens which can be found at the top of Mount Kibo. It is interesting to know that plants grow even in the interior of the crater of Mount Kibo, near the mouths of the fumaroles, where temperature increases counter balance conditions which would otherwise be arctic.

Although Kilimanjaro is not very rich from the floristic viewpoint, there are endemic ragwort herbs, giant lobelias, grasses and heathers which are not found in other parts of the world. In addition to these, Kilimanjaro has representatives of flowers from Europe, South Africa, the Cameroon Mountains of Western Africa and of Madagascar.

Study of the Mount Kilimanjaro National Park, Kenya, 1967.

2.1.4 Fauna

The fauna sustained by the unique vegetation of the Galápagos and the surrounding sea is equally extraordinary and draws even more attention from visitors. It includes mainly invertebrates, reptiles and birds, with a total absence of amphibians and a near total absence of mammals. Many of the limited number of species existing on the archipelago, are subdivided because of isolation and adaptation to different habitats. The influence of the cold Humboldt current and the warm Nino current makes these islands into the meeting area of species both of tropical as well as temperate origin. This combination of features confirms the extraordinary value of the islands as a place to carry out studies on evolution and adaptation. The notable tameness of the animals, attributed to the absence of large predatory mammals, provides visitors with a unique opportunity to watch them at a close distance in their natural state.

Reptiles: All the reptiles of the islands, except two species of marine turtles, are endemic. The giant endemic turtle Geochelone elephantopus, which gave the archipelago its name, is a remnant of the giant turtles which once inhabited most large continents. The eleven subspecies surviving on the archipelago are found on seven of the larges islands: Isabela Island has a different subspecies in each one of its five volcanoes. Two other subspecies have been extinguished by man and a 14th (Fernandina) was probably extinguished because of natural causes. Turtles usually live on the higher land and feed on herbs, leaves, parts of low shrubs and pieces of fallen prickly pear. Females migrate from June to December to nest in the lower arid zones.

Two endemic species of terrestrial iguana, Conolophus subcristatus and C. pallidus, live in the dry areas of some islands. They are of a yellowish brown colour and live in colonies digging burrows in the soft dry soil and feeding on a great variety of plants.

The marine iguana, Amblyrhynchus cristatus, is the only iguana in the world which has become adapted to living partially in the sea. These reptiles live along the rugged lava covered coasts of most of the islands, feeding on marine algae when the tide is low and sunning themselves on the warm rocks. They are black, and sometimes have red and green spots, they swim in the calm waters turning their bodies and tails sideways. They can stay under water for one hour or more and have been found at a depth of 11 m.

The islands are also host to a great number of lizards, Tropidurus sp., and star lizards, Phyllodactylus sp. and non-poisonous snakes Leimadophis sp., all of them endemic.

Birds: Nearly one hundred species of resident and migratory birds populate the islands; of the first (species and subspecies) nearly two thirds are endemic. There are many marine birds; and of the terrestrial birds some of them live in or around salt water lagoons and in the lakes in the craters of volcanoes. Some of the most unique species include: etc.

Master Plan, Galápagos National Park, Ecuador 1974.

2.2 CULTURAL RESOURCES

2.2.1 Historic Summary

(National Organ Pipe Cactus National Monument, U.S.A., 1974)

Although the Organ Pipe Cactus National Monument is primarily a natural area, there is a very interesting historic sequence. The greatest part of this inhospitable desert has barely been touched by man due to its great shortage of water. It constituted a district which provided some hunting and a few seasonal harvests to its old inhabitants, but not an incentive for settlement. To others it was known only along the paths they followed to obtain salt and shells from the Gulf of California.

The arrival of Father Kino to the Sonoita river watershed introduced white man's way of life in the region, but it soon became clear that activities depended on the availability of water. It was not until the first decades of the 20th century when manually dug wells made it possible to expand agricultural activities beyond the area of the Sonoita valley and Quitobaquito. Even then, the desert exercised its limiting influence and maintained activities at a marginal level. Only the strongest of the ranchers could adapt to the conditions imposed by this rugged environment.

Except for extensive copper deposits from Ajo towards the north, mineral production in the area of the Monument appears to have been scarce. Although some mining properties have been explored and exploited sporadically, no rich gold or silver veins were found to cause unrestrained land purchases.

2.2.2 Contemporary Culture

(Master Plan for the Use and Protection of Göreme National Park, Turkey, 1971.)

Cultural resources which form part of the mode of life of present villagers are found within the proposed park and its neighbouring areas. They are related with a historic period of several centuries when Christian monasteries and hermitages of the region were alive with the presence of pious and ascetic monks. They are associated with the natural environment found by these two peoples - those of the past and those of the present. The vineyard, the dovecotes, the small garden, the threshing floor, the horse drawn carts, embroidered bags and hand woven rugs, ceramics and the kiln, the water powered flour mill and the basket laden donkeys, and especially rural villages with an architecture in harmony with the splendour of the natural scenery; all combine to provide the park with an environment which brings to mind what the scenery of two centuries or more ago must have been. These aspects of the historic environment are as significant for the impact that the park may have as the natural scenery and the churches sculptured on stone. These give the park life, they constitute a vignette of what it was; without them, the park would be the architectonic remains of a remotely gone period of history.

Inside the park, the villages of Avcilar and the oldest parts of Cvusini, are examples of an agricultural and village life related with the past culture of the zone of Göreme.

2.3 SIGNIFICANCE

(Master Plan, Playa de Manuel Antonio National Park, Costa Rica, 1974).

Against a background of steep forested slopes, the extense white sand beaches, high sea rocks and picturesque coastal islands of the Playas de Manuel Antonio National Park possesses an unequalled unity of unaltered natural components in Costa Rica.

3. BACKGROUND INFORMATION

(Directive Plan, Gran Sabana National Park, Venezuela, 1974)

The National Park of the "Gran Sabana" is located in Venezuela's Southeastern tip, in the state of Bolívar at 1 248 km approximately from Caracas and 633 and 522 km. Cuidad Bolivar and Ciudad Guayana respectively (as far as Kavanayén) in the zone which is physiographically known as "Tierras Altas de Guayana" (Guayana highlands). It constitutes a vast territory with few roads and covered by mountains and jungles, rivers and savannas, which, until a few years ago, was only inhabitated by indians, missionaries and miners.

Presidential Decree No. 72 of 11 June 1969 divided the country into eight regions for administrative and planning purposes; of these the Guayana is the eighth region. It includes the state of Bolívar (excluding the District of Cedeño on the west of the Caura river) and the Federal Territory of the Amacuro Delta.

It is one of Venezuela's richest regions as it possesses the largest source of hydroelectric power; the dams built on the Caroni river generated 4 057 kwh in 1970. This region also has the largest forest reserves; Imataca with 3.2 million ha; Caura with 5.1 million ha; and Paragua with 0.8 million ha representing 78% of Venezuela's total forest reserve.

The population, which in 1950 was of 161 000 people, increased to 270 000 in 1961 and reached 440 000 in 1971, with a 5.9% rate. It is estimated that the population will reach 541 000 people in 1975. The great affluence of people from various parts of industrialization process has accentuated the need to improve and increase public services mainly road networks, housing and educational and medical-assistance buildings.

The population level of the region in 1971, whose area is of 279 261 km2 gives a concentration of 1.57 inhabitants per km2. The national coefficient is of 11.4 inhabitants per km2, i.e., much higher than the average in that region. According to the National Statistics Department of the Ministry of Development, the projection on population for the 1970-1975 period shows a yearly growth rate of 5.3% for this region.

The population's composition by age shows that 28% of the people are over 30 years old.

The regional economy is mainly based on mining, the industrial complex of the city of Guayana, trade and serves and in a lesser degree on agricultural activities; the latter have always been very limited because of the low natural fertility of the soils which places agricultural yields below the national average.

The mining potential has not yet been adequately developed or used so that its participation in the gross territorial product is only 1%. The main export products are iron, gold and diamonds. Industrial iron production was started in 1950 and it is currently Venezuela's second export item. Its production rate has not grown except during the 1965-1970 period; exports show the same trend and represent 96% of the production of this mineral.

In the industrialization process of iron the plant of briquettes has been installed, from which it is expected to obtain iron concentrate and agglomerate with the content of 58% to 86%. A plant for flat products is being installed to meet domestic requirements.

The exploitation of gold deposits dates from 1870. In recent years production shows a decreasing trend which is partly due to low yields; as in 1971 its value only reached Bs. 3 093 000, equivalent to 1.4% of the total value of mineral production.

Diamond exploitation was started in 1880 and is carried out mainly under the system of free utilization. The main deposits are in the sectors of Santa Elena, Paraitepui, Los Caribes, Icabarú and La Paragua. Diamond production in 1971 was of Bs. 22 965 000, which is equivalent to 3.1% of total mining production in the region.

As a result of plans to create a development pole in Guayana City, the region has received large investments for the establishment of big industries and infrastructural works. Small and medium enterprises have also emerged for the production of consumption goods and intermediate products for factories. Among the latter group the greatest number is devoted to the branch of metal products. There are a total of 516 enterprises in the region which give employment to 14 811 people.

In 1971 industries contributed with Bs. 798 691 139 to the gross territorial product; out of this total Bs. 47 708 148, equivalent to 5.97%, corresponded to factories.

There are 7 489 establishments in the commercial sector which give employment to 14 118 workers. This sector contributes with Bs. 229 709 226 to the gross regional territorial product. The services subsector (public services, government, private workers, transportation, communications, etc.) give employment to 31 968 people and its contribution to the gross regional territorial product was of Bs. 859.5 million in 1971.

The region has a good communication system, in spite of the fact that its present road network, concentrated practically in the north of the state of Bolivar, is not as dense as that of other regions of the country. In addition to the roads connecting Ciudad Bolívar with Caicara on the Orinoco towards the west and with Ciudad Guayana to the east, highway No. 10 towards the South has been built as far as the border with Brazil and it connects all the populations existing between Puerto Ordaz, El Dorado, Santa Elena de Uairén and Icabarú; the highway will cross the eastern sector of the Gran Savanna National Park.

Boat transportation is served by 78 river ports, mainly on the Orinoco; the most important of these are Ciudad Bolívar, ports Ordaz, Palúa, Matanzas, San Félix, Tucapita and Pedernales. In 1969 a total of 656 boats touched port and this represents 11.5% of the country's coastal trade shipping.

There are over 80 airports for air transportation, most of which are simple landing strips built by private initiative. The airports of Ciudad Bolívar and Puerto Ordaz have modern equipment.

At present, the main access to the Park is by plane, although approximately 125 km. of the highway, which was recently inaugurated, cross the eastern sector joining El Dorado with Santa Elena de Uairén. Now access to a large part of that sector is possible, as a road branches off from the main highway at La Ciudadela and leads towards the Mission of Kavanayén, located 70 km to the southeast.

Transportation of passengers, which in 1953 totalled 90 000 people, increased notably in the following years, as it exceeded 167 000 people in 1963, an increase of 10.8%, which is much higher than the national average, which was only 5.3% for the same period.

Canaima National Park, which is located in the Guayana region, has been practically bypassed by regional economic development as, in spite of its natural and scenic resources of great value, the lack of facilities for visitors has not made it possible to stimulate touristic flows of any importance. But it is certain when these deficiencies are overcome and recreational areas, lodging and transportation means at reasonable prices are provided, this reserve will contribute to create sources of work in the zone and will become the motive force for the development of economic activities, especially those connected with touristic activities and indigenous crafts. The growth of the city of Guayana and the region's general expansion expected in the next few years, make it necessary to activate the development of recreational areas and facilities for national and international tourism which will most certainly attract appreciable numbers of visitors.

It is to be expected that the expansion and economic development of Guayana City will have a direct and important influence on the prosperity of the park's activities. It may also be expected that the growth of other regions in the country and the improvement of the standard of living of Venezuelans will certainly affect the volume of the flow of vacationers and tourists who will be attracted by this natural reserve in increasing numbers.

3.1 PRESENT LAND USE

Tribal Use

(Master Plan, Petra National Park, Jordan, 1968)

Approximately 200 members of the Bdul Bedouin Tribe occupy land lying within the park's boundaries from Wadi Sabra as far as Jebel Beida, including the region of the Petra watershed. Among the different uses they make of the land are the production of wheat and barley crops under dry farming conditions, potatoes and tomatoes produced under irrigation from wells on small farms, hunting of the few species of wild fauna remaining in the park, and breeding of large herds of black goats and a few sheep. They keep a few donkeys and some camels, but have no horses. Men occasionally find work in archeological projects carried out within the tribe's territory. They also excavate the sites of the park where there are antiques, especially near the Petra watershed, to seek objects for sale to tourists. The Bdul have established some cabins for the sale of drinks at tourist concentration sites.

Various trails cross the park, providing Bedouins with traditional travel routes, from Wadi Araba as far as the plateau of Jordan. The intensity with which these routes are used is unknown, but it is believed that they do not constitute important access routes. In the Petra watershed there is a school for about 30 students, a hotel and a restaurant (Nazzal's Camp), and the Museum of the Department of Antiques. Part of the hotel, the museum, lodging for employees and storage areas, are located in old caverns. Even Khazna, the most famous temple in Petra, has not escaped this misfortune - storage facilities were installed in one of its chambers.

3.2 CHARACTERISTICS OF VISITORS

(Management Plan, Juan Fernández National Park, Chile, 1974)

Although no studies have been made on the characteristics of visitors to Juan Fernández, the experience of the administrators of the island's touristic installations and of the administrator of the park have provided sufficient information to draw some general conclusions in this respect. People visiting the island remain there from three days up to two weeks, with an average stay on the island of six days. Apparently, many of them would like to stay longer, however, the system for making reservations for air travel make it difficult to change departure dates.

Due to a mistaken idea that visitors have about the island, sometimes because of rather inaccurate information or maybe simply because of a preconceived image of an "island", many of them arrive at the park expecting to find an environment which is different than what exists. For example, they expect beaches with sand, palm trees and consequently sunny days. Neither are they prepared for the rather rustic conditions encountered on various stages of the trip. Once they have adapted to reality they generally enjoy their visit. A limited number of people return to visit the island.

Most of the visitors are from Santiago and Valparaiso. Approximately 10% are foreign tourists. Around 50% of the visitors to the park are single people or couples without children - from 20 to 30 years old.- Families with children make up about 30% of the visitors and aged couples - without children - another 20%.

The following is a distribution of visitors by months for the 1972-73 season [1] which is considered to be representative:

1/ There is practically no tourism during the remaining months because of the climate.

Month	No. of visitors	% of visitors
October	20	2.1
November	7	1.5
December	51	10.8
January	95	20.3
February	176	37.5
March	103	22.9
April	27	5.9
TOTAL	469	100.0

The figures on visitors indicate a higher number of tourists during the month of March than was expected on the continent.

3.3 CLIMATE

(Master Plan, Tikal National Park, Guatemala, 1972)

The climate of northeastern El Petén is tropical and moderately humid. Unfortunately, no accurate climatic data are available because meteorological stations are too far apart, there are no adequate measuring periods and rainfall varies greatly from one year to another.

Data available in Tikal indicate a small annual fluctuation in temperature. Temperatures below 10°C (50°F) and above 38°C (100°F) are very rare. The difference in mean temperatures for the hottest and coldest month is only about 7°C (12°F). The warmest months (May and June) typically register daily temperature increases of 30°C - 35°C (85° - 95°F) and drops of 21°C - 24°C (70° - 75°F). The coldest months (December - February) register increases of 24°C - 27°C (75° - 80°F) and decreases between 16°C - 18°C (60° - 65°F).

Northeastern El Petén lies along a slope with increasing rainfall from the north of the Yucatan Península (with nearly 100 cm or 40 inch of yearly rainfall) as far as southern Petén (with nearly 250 cm or 100 inches of rainfall) and the highlands of Alta Verapaz (with 380 cm or 150 inches rainfall). Tikal records suggest that average yearly rainfalls between 150 cm (45 inches) and a maximum of more than 225 cm (90 inches) have been recorded in 12 month periods. The rainy season usually begins around mid-May with 75-80% of yearly rainfall decreasing in the May - October period. September and June are the rainiest months with 25-30 cm of rain each (10-12 inches). February and March are normally the season's driest months, with 3-5 cm (1-2 inches) of rain each. April may also be dry, but some years it has been a moderately rainy month. Humidity is relatively high (constantly over 80%) and fog in the early mornings, even during the dry season, alleviates "xeric" conditions and makes the existence of relatively lush forest vegetation possible. Tikal has a moderate rainfall during 120 - 140 days per year with rain nearly half of the days during the rainy season. December and June are the nicest months for visitors to Tikal. August, September and October are the most unpleasant months, with dense fog, heavy rains and hosts of stinging insects. These insects are rare during the dry season.

4. MANAGEMENT AND DEVELOPMENT

4.1 OBJECTIVES OF THE PARK

(Management Plan, Torres del Paine Park, Chile, 1974)

In accordance with the purposes for which the Torres del Paine national park was created and the resource analysis, management will be guided by the following specific objectives:

a) Conservation of geo-morphologic features of the Paine massif and its contour.

b) Protection of autochtonous scenic beauty of the Paine massif including such elements as the scenic contours, such as lakes, rivers, glaciers and pampas.

c) Conservation and development of autochtonous wild flora and fauna, and genetic resources of the eco-system.

d) Support of the economic development of the province by incorporating the Paine as a touristic attraction.

e) Providing recreational opportunities to provincial, national and international visitors in relation with the knowledge and appreciation of the glaciers, patagonic fauna, the spectacular scenery and fishing.

f) Provide opportunities for orientation and education within and outside of the park to achieve a better appreciation and understanding of the environment preserved in the park.

g) Promote and provide facilities to carry out research on the phenomena of the eco-system for the purposes of supporting its management and education.

h) Integration and development of the park into the provinces' general development.

4.2 BOUNDARIES

(Proposal for the Desierto de Sonora National Park, Arizona, U.S.A., 1965)

A careful analysis of the number of factors involved confirms the conclusion that the Organ Pipe Cactus National Monument, the Cabezas Prieta hunting grounds and the volcanic field next to Pinacate in Mexico, constitute an integrated unit of the undamaged Sonora desert. The biologic, geologic, historic, scenic and aesthetic values of the entire area under study are so outstanding and have such a high recreational potentiality so as to fully justify any measure required both for the adequate preservation of the area, as well as to put it at the disposal of the public.

A logical and advisable solution would be to combine both the monument and the faunistic reserve, so as to form the national park of the desert of Sonora. The attached map shows the boundaries of the proposed desert of Sonora national park. After eliminating a small segment of the eastern end of the faunistic reserve, the addition of an area of 32 400 ha toward the western extreme, the total size of the park would be approximately 502 800 ha.

4.3 ZONIFICATION

(Management Plan, Fray Jorge National Park, Chile, 1974)

Intangible Zone

Definition: This zone normally consists of natural areas where alteration by man has been minimum. They contain unique and fragile eco-systems, species of flora or fauna or natural phenomena which deserve full protection for scientific or environmental control purposes. Roads and the use of vehicles are excluded.

The general management purpose is to preserve the natural environment allowing only non-destructive scientific uses and protective or administrative activities.

Description: It includes a major part of the relict Valdivian forest and a representative section of the desert environment. It covers approximately one third of the southeastern sector of the present area of Fray Jorge Park. In addition, most of the area of Talinay is included in this zone.

Specific objectives:

- Protect the Valdivian type forest and the eco-system of the semi-desert with minimum intervention.

- Promote research to help determine the causes of the forest's regression.

Regulations:

a) No scientific or administrative activities involving the destruction of resources are permitted.

b) Scientific studies will be restricted to those approved by the administration.

c) General public use is not allowed.

d) Constructions will be limited only to a few simple trails for scientific or administrative use.

e) The use of motor vehicles is not allowed.

f) The use of horses is allowed for patrols by the administration.

Primitive Zone

Definition: This zone normally consists of natural areas where human intervention has been minimum. It may contain unique eco-systems, species of flora or fauna or natural phenomena of great scientific value which are relatively resistant and may tolerate moderate public use. Roads and the use of motor vehicles are excluded.

The general management objectives are to preserve the natural environment and at the same time make it possible to carry out scientific studies, environmental education and recreation in a primitive form.

Description: The zone includes around 50% of the present area of Fray Jorge National Park and includes the entire coastal area, the remainder of the forest on the northern side of the main forest massif and part of the desert not included in the intangible area.

Specific objectives: Provide opportunities for out-door recreational experiences in a primitive form in the coastal zone and the forest.

Regulations:

a) Limited public use restricted to walks and primitive camping is permitted.

b) Scientific research and administrative activities that will not harm natural resources are permitted.

c) Constructions are not permitted except a few simple trails for administrative and recreational purposes, and wells and rustic sanitary installations if they are required in the future.

d) The use of vehicles is not allowed.

e) A minimum of rustic signs are permitted.

f) Any type of scientific research for which natural resources need to be altered in any measure must be authorized by the administration.

g) Trails will be constructed with minimum destruction of vegetation and soil and should maintain a constant slope not exceeding 7 degrees.

Extensive Use Zone

Definition: This zone consists mainly of natural areas, but it may also have a certain degree of human alteration. It contains the general scenery and samples of the most significant features and its topography and resistance is suitable for developing roads and educational and recreational activities within an environment always dominated by the natural milieu. It is classified as a transition sector between locations with a higher concentration of public zones without access for motor vehicles.

The general purpose of management is to maintain the natural environment keeping the impact of humans on the resource at a minimum, but at the same time, facilitating access and public use of the area, without major concentrations, for environmental education and recreational purposes.

Description: This is a relatively large area of the desert northeast of the present Fray Jorge National Park. It includes a road system. It consists of a strip along the main road as far as a small forest which will be used for interpretation. It also includes a sector near the present administration and its access road. Its border meets the intangible area in two sectors, one south of the present administration and the other to the south of the end of the main road.

Specific objectives:

a) Provide opportunities for public education on the relict forest of the Valdivian type and on semi-desert ecology.

b) Provide opportunities for extensive recreation in the two aforementioned environments.

c) Prevent possible damage to the intangible zone.

Regulations:

a) Non concentrated general public use is allowed.

b) Low speed roads, trails, interpretation posters and signs and some rustic tables and benches are permitted.

c) The use of motor vehicles is permitted on the roads indicated for this purpose.

d) Signs compatible with the objectives of the zone are allowed.

e) Roads will be located and built in harmony with the topography and the scenery minimizing cuts and fill-ins which should be of the minimum width required for the proposed use and with a constant slope of less than 4 degrees.

f) Installations and roads shall be located in such a way that the scenic beauties will be altered as little as possible.

Intensive Use Zone

Definition: This zone consists of natural or intervened areas. It contains outstanding scenery, resources that are suitable for relatively dense recreational activities, and a topography that may be developed for the passage of vehicles and accessory installations. Although it is desired to maintain the environment as natural as possible, the presence and influence of visitor concentrations and the necessary facilities are accepted.

The general management purpose is to facilitate development for environmental education and intensive recreation in harmony with the environment and causing the least possible impact on the latter and on scenic beauty.

Description: It is a relatively small area consisting of six sections, centre-north of the present Fray Jorge National Park. It is a representative part of the desert with undulating topography which allows a good view of the forest, and it has drinking water.

Specific objectives: They are all included in the general objectives.

Regulations:

a) Commercial activities will be restricted to the sale of refreshments, sandwiches and souvenirs.

b) The design, material and paint of constructions must harmonize with the desert environment.

c) Sanitary installations must be located at a level below the drinking water well and at a minimum distance of 100 m from the latter.

4.4 MANAGEMENT PROGRAMMES

(Master Plan, Galápagos National Park, Ecuador, 1974)

The management of the Galápagos National Park will be carried out through two basic programmes: one aimed at the protection and management of the resource and the other aimed at its use. The park's personnel will prepare detailed plans on the basis of the following guideline.

4.4.1 Resource Management

The protection of the Park's resources will include the extermination of introduced species, prevention of the transfer of organisms, regulation of tourism and the activities of the local population within the park, protection and management of species which are in danger of extinction.

Extermination of introduced species: All the species introduced by man and which managed to establish themselves on the islands altered the indigenous eco-systems, and in many cases have resulted in the extermination of native species. Herbivorous animals (goats, pigs, donkeys), especially, cause irreversible damage to the eco-systems because of the erosion resulting from the destruction of the plant cover. Predators (cats, dogs, pigs, rats), on the other hand, represent a threat to certain species.

The present distribution of the mammals introduced in the park is shown in fig. 1.

In addition, introduced plants and invertebrates have become established in the park as a result of the direct action of man and of the mammals that were introduced. They intensify and perpetuate the ecologic changes caused by this action.

Control of herbivorous animals will be intensified: Efforts will be made to keep introduced plants from spreading in so far as possible, and control and extermination methods will be formulated in the case of the introduced predators.

All of these activities will be carried out by the Park's professional staff; the group will be increased to 18 people. Tourism for purposes of sports hunting is not permitted. After a few years of intensive extermination, the number of guards employed in this task may possibly be reduced. In this case a team of 10 guards would continue with eradication activities. Wild cattle existing in the National Park should be used and at the same time exterminated. The National Navy and the National Park will underwrite contracts for the exploitation of the cattle in Cerro Azul and Sierra Negra, Isabella Island, keeping the activities of the contract holders under strict supervision and keeping a representative group of this cattle outside of the Park for studies and breeding purposes.

Prevention of the transfer of organisms: In order to avoid additional introductions of organisms that may turn into plagues in the Galapagos environment, a control mechanism will be established at the archipelago's ports and airports. This control will be of equal importance for the province's agricultural health, and the National Park's ecologic integrity.

Therefore, the population of this province will be strictly forbidden to introduce any type of living organism in the archipelago which is of no or little economic value. If such value can be proven, the provincial government may grant permission for the introduction of the organism. This decision that will be based on the reports of the authorities of the National Park, veterinary and plant health officials of the Ministry of Agriculture and the Darwin Station, taking the following points into account: etc., etc.

4.4.2 Public Use

Protection: The protection of visitors is a moral responsibility and in many cases a legal responsibility of the park's administration. Consequently, a constant effort will be made to provide visitors with the greatest possible safety by the following means:

- establishment of detailed safety regulations for the park's licence holders, whose enforcement should be insured by the park's personnel.
- training in first aid and emergency procedures will be given to all the park's personnel.
- first aid stations, duly equipped, will be established at the guard posts and on board the park's patrol boats, all of which will be connected with the administration by radio.
- negotiation of contracts with the Ecuadorian Air Force to obtain the assistance of maritime patrol airplanes in case of emergency.

Information and Interpretation

(Master Plan, Playas de Manuel Antonio National Park, Costa Rica, 1974)

The interpretative programme will be designed in order to orient visitors toward the use of the installations and activities that may be carried out, for the purpose of increasing the enjoyment and understanding of the Park, and to attain some management objectives such as the distribution of visitors within the Park, the protection of the resource by making visitors aware of this aspect.

The interpretive talk for Manuel Antonio will focus on the transition of the terrestrial to the marine environment. This provides a conceptual framework which can be divided in the following subjects:

a) The humid tropical forest: a terrestrial environment with influences of the marine climate.

b) The mangrove: an environment both with marine as well as terrestrial influences.

c) The beach and the tidal area: the interface of terrestrial and marine environment.

d) Shallow marine areas: a marine environment with terrestrial influence.

e) The relationship of man and his impact on Manuel Antonio in the course of time: a view of man's interaction with physical forces and the use he makes of the products of such forces, which are our natural resources.

To interpret these subjects there will be two entrances, a visitor's centre, nature trails, guided boat excursions, in situ exhibits and evening programmes. These will all be carried out in such a way as to affect the Park's natural scenery as little as possible. Every possible effort will be made to design installations and programmes that will arouse the curiosity and interest of the visiting public.

Entrance posts:

The posts located at the entrance to the Park will serve for control purposes as well as to provide information to visitors. Uniformed forest guards will collect the price of admittance, and distribute a booklet. This booklet will include a map of the Park indicating the locations where facilities and services are to be found; brief information about the points of interest; and data on the Park's natural and cultural history.

Visitor's centre:

A visitor's centre will include three basic units: a reception counter, exhibit room, and a small projection room.

Reception will be in charge of a uniformed naturalist, who will answer the visitors' questions and sell the pertinent information, both in Spanish and English, as well as photographs of the Park.

After passing the reception counter, the visitor will enter the exhibit room, where he may find information on the following subjects:

a) Objectives of national parks.

b) Zones of life.

c) Human history.

d) Orientation to the visitor.

e) Visitors' safety.

After having seen the exhibits, visitors will be prompted to attend the regular slide projection programmes. A series of different subjects presented during the day will include the following subjects:

a) "Costa Rica's National Parks";

b) "The Maritime Life Zone";

c) "The Zone of Life on the Beach"; and

d) "The Zone of Life in the Tidal Area".

Nature Trails:

There will be three nature trails in the Park, one of them will be guided. The guided trail will begin at the visitors' centre and follow along the rocky coast. The uniformed guide will interpret many of the fascinating aspects of the tidal zone of life. One of the self guided trails will interpret the mangrove swamp, while the other will interpret the secondary forest and the virgin forest on the peninsula beyond the visitors' centre.

Guided Maritime Excursions:

Excursions by boat will be guided by the concessionnaire and will start at the dock located at the Punta Catedral Base. A uniformed naturalist will be present on these excursions and will be in charge of interpreting the Park's features during the trip, such as islands, tidal zones, geologic formations and the marine life zone. He will also answer questions and will try to arouse the interest of visitors in the Park's natural aspect.

In situ Exhibits:

In situ exhibits will be placed strategically at visitor concentration points. There will be a total of 4 exhibits that will provide interpretation of the lagoon at the base of Punta Catedral, the zone of life on the beach, the tidal zone of life, and recommendations for the safety of bathers.

Evening Programmes:

Evening programmes will consist of a talk illustrated with slides presented by a naturalist of the Park in the dining-room of the organized camp. These programmes will include the following subjects:

a) National Parks of Costa Rica

b) Man and his Environment

c) Points of Interest in the Manuel Antonio National Park

d) Conservation and quality of life

Interpretation outside of the Station's site:

Programmes dealing with man and his environment will be presented in the school and local colleges. Emphasis will be placed on the inclusion of environmental education programmes in the courses given at these teaching centres. An important part of these programmes will include field trips, which will be organized and guided by park staff.

4.4.3 Staff Organization

(Master Plan, Pamukkale National Park, Turkey, 1971)

Superintendent: The superintendent will be the chief administrator of the Park as the field representative of the Director of the Department of National Parks. He will be responsible for interpreting the policies, providing general direction and orientation on all activities related with the Park's management and visitor services. He will plan the Park's activities and will be responsible for coordination between the different agencies, as well as for public relations, through cooperation with agencies interested in conservation, tourism, and recreation and active participation in their activities.

Administrative Officer: This employee will be responsible for all administrative services and will supervise and direct the activities of the Park's staff, in relation with fiscal accounting, negotiations and titles of ownership, staff, management of records and administrative reports.

Chief of Visitor Services: The supervision, direction and training of the uniformed staff of Park guards will be the main responsibility of this employee, who will act as Chief of Park Guards. Among his general responsibilities are the programmes related with information for visitors, interpretation, protection of the Park's resources and protection of the visitors to the Park.

The specific activities of the staff should include:

Both routine as well as random supervision of all the Park's property, for the purpose of discouraging vandalism, grazing of domestic cattle, the loss of antiques through illegal excavation, and hunting of the Park's wild fauna.

Park guards should be trained to provide visitors with information, interpretive services and protection, and in law enforcement, first aid, fire prevention and control. Contact should be maintained with the district's police and traffic officers.

Maintenance Chief: This employee, who should be qualified in the general field of construction activities, will be responsible for supervising the maintenance and repair of all structures, utilities and modern equipment in charge of the government existing within the Park. These responsibilities should be divided into two categories: a) maintenance of roads, trails and fields; and b) maintenance of buildings and public utilities, each of them in charge of a foreman.

Roads, trails and fields: Activities in these aspects should include the necessary preventive and corrective measures to maintain roads, trails, parking areas and fields in safe, clean conditions and in the form in which they were built. Gathering of waste from trails and roads, garbage from the hotel and camping area and the Park's village, should be carried out daily.

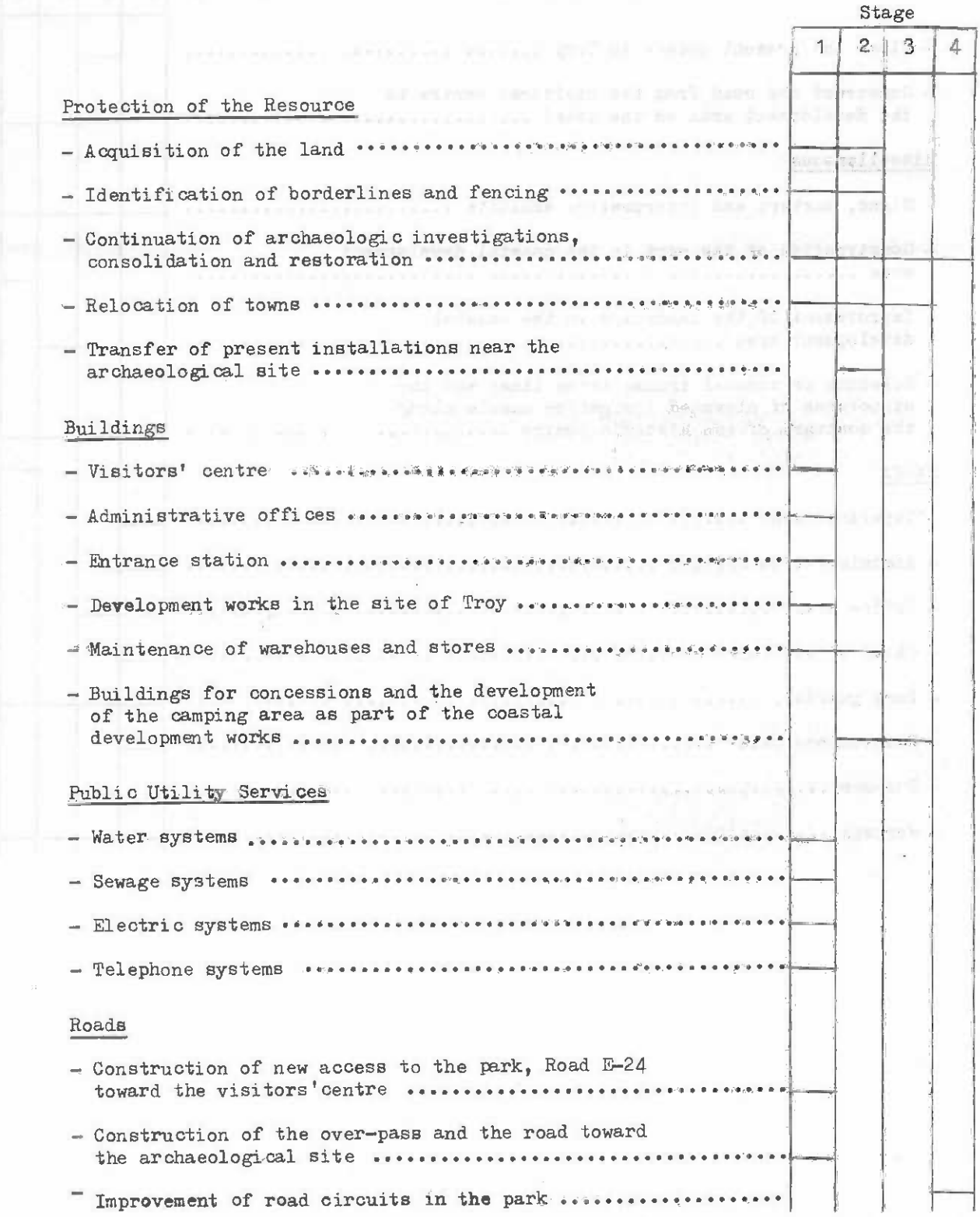
An important task of the field maintenance team will be the maintenance of thermal springs and the direction of the flows and watersheds for the purpose of obtaining a maximum area of active travertine deposition.

Buildings and public utility services: Strict regulations aimed at ensuring a high degree of maintenance and cleanliness of the buildings and other installations for public use should never be relaxed. The world over, these are factors that have a great influence on the impression that people gather and preserve on their trips. Activities related with the maintenance of buildings, fixed mechanical equipment, and the efficient, clean and safe operation of services should be carried out on a routine basis.

4.4.4 General Development Plan

Projections of the Management Programme

(Master Plan, "Troy" Historic National Park, Turkey, 1971)



	Stage			
	1	2	3	4
- Close the present access to Troy				
- Construct the road from the visitors' centre to the development area on the coast				
Miscellaneous				
- Signs, markers and interpretive exhibits				
- Construction of the port in the coastal development area				
- Improvement of the landscape in the coastal development area				
- Relocate or conceal transmission lines and the structures of elevated irrigation canals along the contours of the historic centre				
Staff				
- Superintendent				
- Administrative Officer				
- Office staff				
- Chief of visitors' services				
- Park guards				
- Maintenance Chief				
- Foremen				
- Workers				