

Enviroplan— A Summary Methodology for Comprehensive Environmental Planning and Design¹

Robert Allen, Jr., George Nez, Fred Nicholson and Larry Sutphin^{2/}

Abstract: This paper will discuss a comprehensive environmental assessment methodology that includes a numerical method for visual management and analysis. This methodology employs resource and human activity units as a means to produce a visual form unit which is the fundamental unit of the perceptual environment. The resource unit is based on the ecosystem as the fundamental unit of the physical environment. The human activity unit is based on the activity setting as the fundamental unit of the behavioral environment. Therefore, the enviroplan methodology allows the simple integration of environmental process with the purposes of people by reducing a complex process to its essentials.

INTRODUCTION

This methodology considers the environment as a single, whole process that is made up of physical, behavioral, perceptual, social and economic facets. Simply stated, it combines the physical and behavioral facets to form a perceptual facet. These serve as a medium for the actions of the social and economic facets. The subject for this case study is Daingerfield Island in Alexandria, Virginia, managed by the National Park Service as part of the George Washington Memorial Parkway (see Existing Conditions Map).

Before the physical and behavioral facets are combined, a ranked series of values is developed that provides a framework for the enviroplan process. This is an ordered arrangement of goals, objectives and criteria that ranges from general to specific.

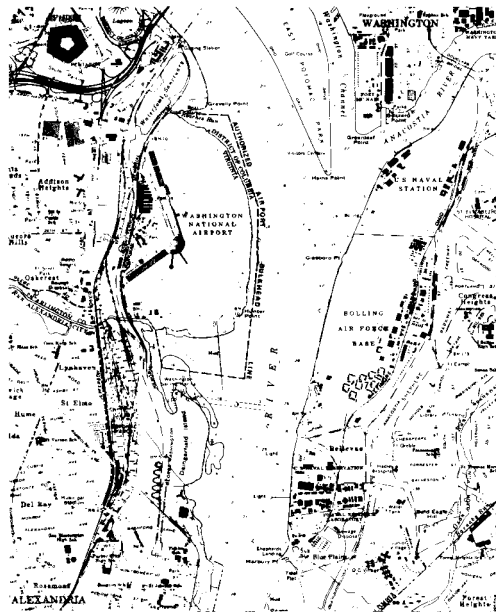
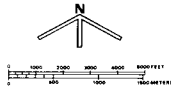
^{1/} Submitted to the National Conference on Applied Techniques for Analysis and Management of the Visual Resource, Incline Village, Nevada, April 23-25, 1979.

^{2/} Park Planner, Landscape Architect; Economist; Writer/Planner; Cartographic Technician; National Park Service, Denver Service Center, National Capital Team, Falls Church, Va.

ENVIRONMENTAL RESOURCE UNIT

The basic unit of the physical facet is based on the ecosystem and is called the Environmental Resource Unit. Its boundaries are based on those of the biotic community, and are modified by cultural features in relationship to physical properties. To arrive at boundaries for the environmental resource units, the physical, biological and cultural subsystems are mapped and described separately. The Physical Properties Map shows the general distribution of nonliving materials, with boundaries based on similar properties for geology, soil and hydrology formations. The Biotic Communities Map shows the patterns formed by living plants and animals, with boundaries based on common inhabitants of plant or ethnic communities. The Cultural Features Map illustrates all manmade or man-influenced characteristics, with boundaries based on similar properties with prehistoric, archeologic, historic and contemporary themes. The Ecological Systems Map summarizes these three subsystems and describes the site's resource units by naming the environment, its physical makeup, its dominant plants and animals, and its manmade facilities or man-affected areas (see Ecological Systems Map and Table).

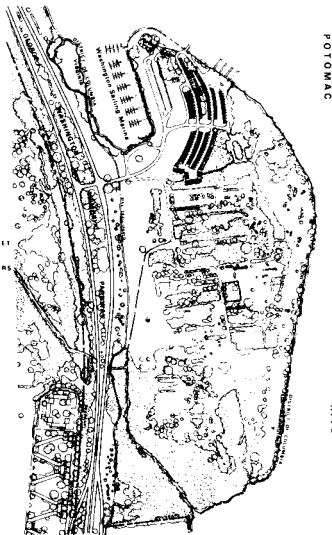
VICINITY MAP DAINGERFIELD ISLAND GEORGE WASHINGTON MEMORIAL PARKWAY VIRGINIA



EXISTING CONDITIONS

LEGEND

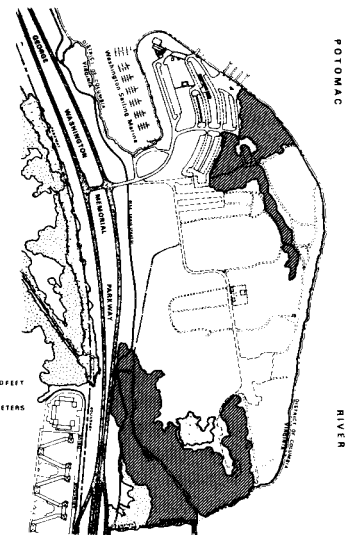
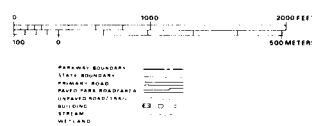
- NPS building/facility
- NPS maintained area
- Concession building/facility
- Concession maintained area
- Concession parking
- Wooded area
- Open grassland
- Wetland



ECOLOGICAL SYSTEMS

LEGEND

- RIVER ESTUARY**
Inundated with low to moderate flow rate
photosynthesis respiration benthic invertebrates
fish and waterfowl
- WETLAND**
Moist high marshes permanent high water table
terrestrial impermeable organic deposits
emergent grasses sedges and rushes
represents amphibians and mammals
- PARKLAND**
Grassland with subject to infrequent flooding
moderately high water table
deciduous trees ornamental trees and shrubs
grasses herbaceous plants
represents amphibians birds and mammals
- BOTTOMLAND HARDWOOD FOREST**
Shaded soils with subject to frequent flooding
moderately high water table
deciduous trees
represents amphibians birds and mammals
- UPLAND HARDWOOD FOREST**
Well drained soils with subject to infrequent flooding
moderately high water table
deciduous trees
represents amphibians birds and mammals



RESOURCE CAPABILITY AND CONCERN

LEGEND

RESOURCE ZONE

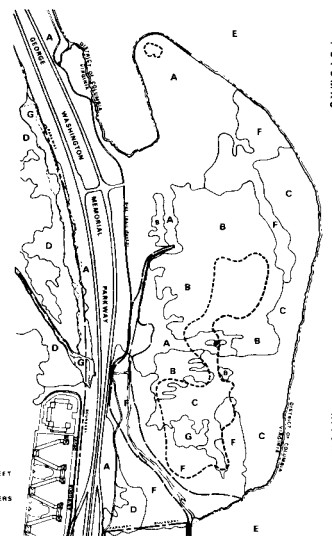
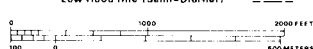
- Parkland A
- Nursery B
- Transitional bottomland forest C
- Upland hardwood forest D
- River estuary E
- Bottomland hardwood forest F
- Wetland G

RESOURCE CAPABILITY

- Medium to High A,B,C
- Medium to Low D
- Low F,G
- Very Low E

RESOURCE CONCERN

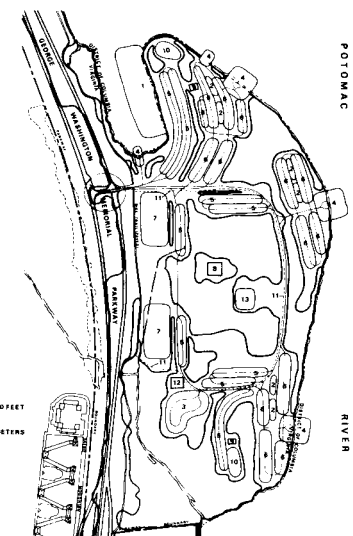
- High flood line (100 year) ---
- Low flood line (Semi-Diurnal) ---



Site Program ALTERNATIVE 3

LEGEND

- ACTIVITY**
- Mooring boat
- Storing small boat
- Repairing boat
- Launching boat
- Parking automobile
- Parking boat trailer
- Playing field sport
- Eating
- Toileting and showering
- Viewing
- Walking, jogging, biking
- Storing sports equipment
- Storing maintenance equipment



EVALUATION

Because each resource unit (essentially resource zones) has characteristic properties for human use and development, the capability to support specific activities and facilities can be estimated. This means that common-attributes affecting use and development within each unit can be judged and assigned a high, medium, or low rating. The resource units must then be adjusted or "fine tuned" to address any resource concerns. These concerns are vital, sensitive, or critical factors, such as flood-prone areas, that cross resource unit boundaries and therefore become important in estimating overall resource capability (see Resource Capability and Concerns Map and Table).

HUMAN ACTIVITY UNIT

Human purpose is combined with environmental process by a planned interrelationship of activities and their settings. The activity and its immediate environmental setting is a distinct unit that has social and spatial characteristics, and is the basic unit of the behavioral facet. User needs and desires are analyzed by using a matrix that compares proposed activities with 14 categories of characteristics for these distinct settings (for an excellent example, see Neighborhood Space, R. T. Hester, Jr., p. 121). The proposed activity zones, circulation flows and their spaces are distributed in relationship to the site's opportunities and constraints as shown on the Capability and Concerns Map (see Alternative 3 site program example).

SITE PROGRAMS

Different alternative site program diagrams can now be made with each showing specific proposed functions, circulation and space in their desired locations on the site. The Site Program Table details the proposed activity as well as the environment and management necessary to carry out each activity. This includes characteristics of the visual space, approximate area to be used by each activity, support facilities needed, density of use allowed, internal and external circulation linkages and construction costs for the proposed facilities.

An environmental impact matrix can also be prepared that compares the resource zones with the activity zones. The resource zones are grouped according to land or water capability. The activities are organized in categories such as built facilities, visitor services and circulation. The possible degree of environmental consequence includes minimal, moderate and major impacts. Also, a Resource Area Table shows the approximate area and type of resource unit committed to each activity unit, in whole or part.

The alternative models are evaluated and tested according to physical, behavioral, perceptual, social and economic criteria derived from the goals and objectives determined previously. The spaces and configurations of the various alternatives will affect different activities in different ways, and the consequences can be evaluated for each criteria. These evaluations are organized into capacities, qualities and cost tables. A rating is assigned for each criteria and is weighted according to the relative importance of that criteria to the whole. An index number of "one" is assigned to one of the alternatives as a basis for a comparative effectiveness rating for qualities and capacities. Construction, operation and maintenance costs are determined for each alternative. A Summary Value Table compares the relative index numbers for qualities, capacities and costs for each alternative. The qualities plus the capacities divided by the costs provide a cost-effectiveness comparison of alternatives. Thus, the enviroplan process results in a numerical ranking of alternatives that contains comprehensive human purposes.

In summary, this methodology has the following applications:

The resource unit and the human activity unit can be used to zone the site environment to show its approximate capability to support specific activities for use and development.

The resource unit can be compared with the human activity unit to approximate the tolerable resource loading versus the tolerable visitor crowding and to determine a designed site carrying capacity.

The resource unit and the activity unit can be compared to determine the approximate areas of each resource unit committed to each activity unit on the site, in part or in whole. The resource unit and the human activity unit can also be compared to determine a preliminary assessment of impacts.

The interaction of the resource unit and the activity unit can be used to generate both visual form and to assign preliminary spatial design qualities to the site.

The resulting spatial configurations and their connections can be judged according to the general amount of increase in social and economic interactions that may occur. A relative ranking of alternatives is accomplished.

Cost can be determined and assigned in order to accomplish an economic cost-benefit ranking of alternatives.

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