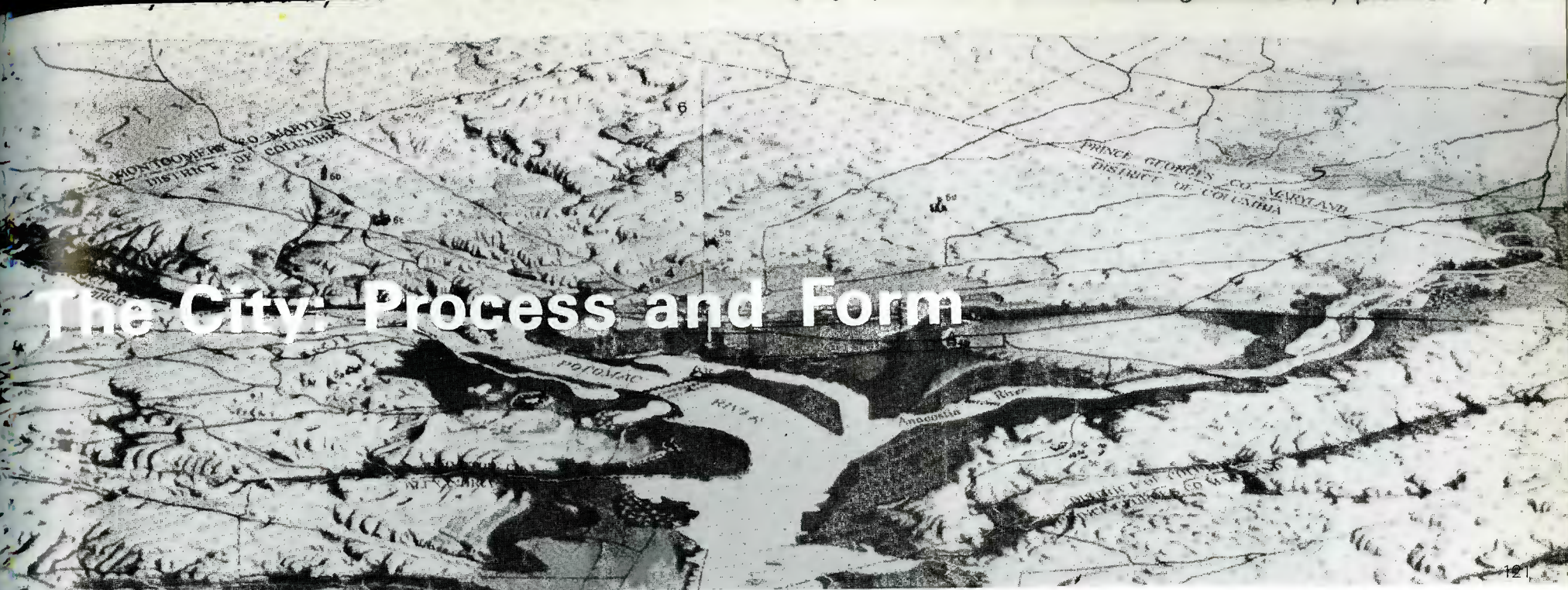


DESIGN WITH NATURE



IAN L. MCHARG

25th
anniversary
edition



The City Process and Form

As was stated earlier, a professional landscape architect and planner is able to pursue only such problems as his clients proffer him. Not long ago I learned that an intense effort was under way in Washington to enhance the beauty of this grand city and that it was taking the form of planting petunias, zinnias, begonias, (flowers that try hardest to look like colored paper) and, above all, Japanese cherries. Now this is a splendid impulse, and much can be accomplished within its view, but it is clear that there are limits. I was asked if I could discern some principles to guide this signal effort and, predictably, turned to the ecological method for enlightenment.

Clearly, the mandate did not allow any examination of such crucial problems as poverty, slums or congestion; it was directed toward the evolution of a method for undertaking a Comprehensive Landscape Plan for Washington, D.C.*

It has been demonstrated that the ecological method is efficacious in confronting a rural metropolitan region in prospect of urbanization. Can it confront the problem of an existing city? Yet the problem remains that of establishing a value system and responding to it. We require to see the components of the natural identity of the city as a value system, offering opportunities for human

use. However, in addition, it is necessary to submit the creations of men—buildings, places and spaces—to the same type of analysis and evaluation. It is, therefore, essential to understand the city as a form, derived in the first instance from geological and biological evolution, existing as a sum of natural processes and adapted by man. It is also necessary to perceive the historic development of the city as a sequence of cultural adaptations reflected in the plan of the city and its constituent buildings both individually and in groups; some adaptations are successful and endure, others are not. Those that have endured enter the inventory of values; others will succumb as unsuccessful adaptations. This enquiry is described as an investigation into the given form—the natural identity—and the made form—the created city.

The major preoccupation is with form and thus leaves aside the locational factors that explain the sites of cities—tidal limits, fords, bridge crossings, mineral and agricultural resources, propitious climates and the like. It seems to hold that memorable cities have distinctive characteristics. These may derive from the site, from creations of man or from a combination of these. Rio de Janeiro, Naples and San Francisco are immediately associated with dramatic sites. Venice, Amsterdam and Paris are initially identified

with the major artifacts that constitute them. Yet, when cities are built upon beautiful, dramatic or rich sites, their excellence often results from the preservation, exploitation and enhancement, rather than obliteration of this genius of the site. Where this lacks intrinsic drama, excellence can be created by buildings and spaces, as is so amply demonstrated in Amsterdam, Venice and Paris. When a city contains such excellent creations, then these enter the inventory of values, the *genius loci*. The total city can then be seen as an exploitation of the intrinsic site—the creations of men seen as conscious adaptations to it—that preserve, heighten and enhance its basic qualities. These become values in their own right.

Can one then state, as a proposition, that the basic character of the city derives from the site and that excellence attends those occasions when this intrinsic quality is recognized and enhanced? Can one state, further, that buildings, spaces and places, consonant with the site, add to the *genius loci* and constitute not only the addition of new resources, but are thus determinants of new form?

If these propositions are true, then we can formulate both the objectives and the method. The former require that the *genius* of the site be discerned as composed of

*Toward A Comprehensive Landscape Plan for Washington, D.C., Wallace, McHarg, Roberts and Todd, U.S. Government Printing Office, Washington, D.C., 1967.

discrete elements, some derived from the natural identity, others from artifacts. These must be evaluated as components of identity, as working processes of value and as containing implications for new formal adaptations.

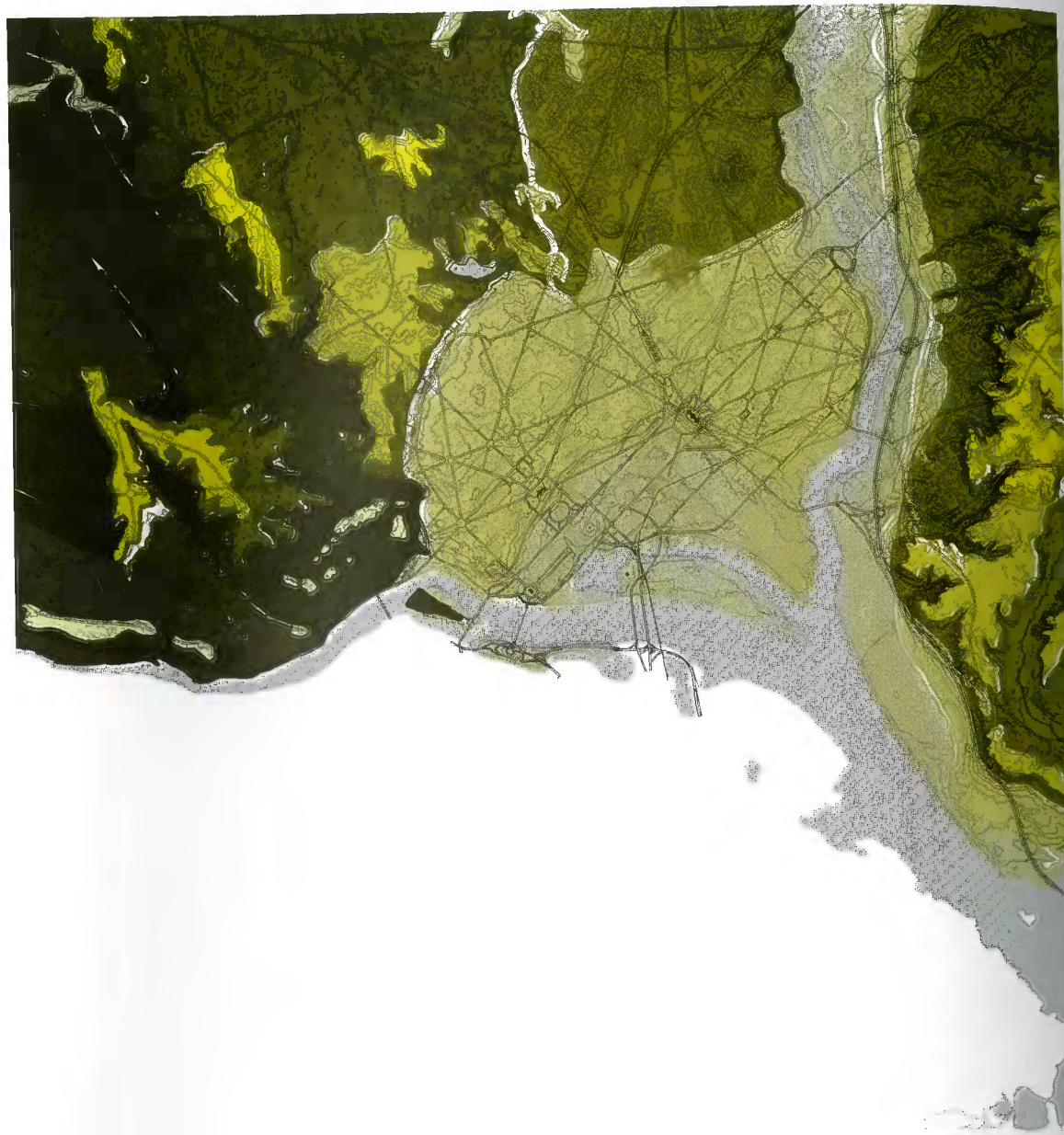
The method should also undertake to develop principles relative to this value system and, finally, principles should be constructed into policies that will ensure that the resources of the city, site and artifacts, are recognized as values and determinants of form, both in planning and the execution of works. Rio differs from Kansas City, New York from Amsterdam, and Washington from all of them, for good and sufficient reasons. They lie, at base, in the geological history, climate, physiography, soils, plants and animals that constitute the history of the place and the basis of its intrinsic identity.

Washington is because . . . It is uniquely itself. In order to understand what composes the unique quality of this city, and which elements above all most contribute to this identity, it first becomes necessary to understand its morphology.

If this holds for the natural identity of the city, it is equally true of buildings and places in the city. As perhaps for no other place in the United States, the identity, the form and aspect of Washington are important to the inhabitants of the city, to the nation and the world. The city can be examined as an evolutionary form, reflecting its history in morphology, revealing adaptations successful and otherwise, containing attributes, some of high and others of little value.

The search for identity must begin at the beginning.











This study was commissioned by the National Capital Planning Commission, Washington, D.C., and conducted under the supervision of Ian L. McHarg by Mr. Narendra Juneja, assisted by Messrs. Sutphin, Meyers, Robertson and Drummond of Wallace, McHarg, Roberts and Todd. The field survey was conducted by Karen and Charles R. Meyers, Jr.



PIEDMONT CRYSTALLINE ROCKS

	Basic Igneous Rocks
	Bear Island Granodiorite
	Sykesville Formation
	Wissahickon Formation
	Kensington Granite Gneiss
	Laurel Gneiss

COASTAL PLAIN UNCONSOLIDATED SEDIMENTS

PLEISTOCENE AND RECENT		Sunderland Formation	
		Wicomico Formation	
		Pamlico Formation and Alluvium	
		Terrace Gravels	
	PLEISTOCENE MIOCENE CRETACEOUS		Patuxent Formation
			Patapsco Formation
		Monmouth Formation	
		Chesapeake Group	
		Bryn Mawr Group	
	Brandywine Gravel		



0 1/2 1 2 3
MILES

GEOLOGY

In the examination of the Potomac River Basin, the physiographic and metropolitan regions, we have seen, at different scales, the expressions of historical geology. In Washington these selfsame processes are perceptible at a more particular scale.

In the broadest terms, the geology of the District of Columbia reveals a very great variability, reflecting the major divisions of Piedmont and Coastal Plain. It reveals a clearly defined Piedmont, a great crescent of undulating Cretaceous sediments, much eroded, forming the backdrop to a scene of equally well-defined terraces and escarpments composed of recent sediments lying at the confluence of the Potomac and Anacostia Rivers. On these, the formal city of L'Enfant sits. The final region is the much-eroded sediments of the Coastal Plain.

A half billion years of geological history are visible in the District; sediments cover hill-tops and speak of ancient seas, while the Flats of the formal city are the most recent of geological expressions.

Variation in geological history will be manifest in physiographic variety, in hills and valleys, plateaus, domes, terraces, escarpments, rivers, streams and marshes. This variety is clearly evident in the National Capital; while the relief is not great, it is certainly consequential.

There are three physiographic divisions that correspond to the geological structure. These are the expression of the Precambrian in the Piedmont, the older Cretaceous sediments and the more recent ones of the Pleistocene. The major dissected plateau, transected by Rock Creek, occupying the west and north, is Precambrian and Lower Cretaceous; the edge of the Coastal Plain, east of the Anacostia, is composed of Upper Cretaceous and early Pleistocene deposits; while the intervening area, mainly the Flats, is of late Pleistocene to recent deposits.

The first of these physiographic regions

reveals its character most clearly in the rock formation of the Potomac Palisades, the steep dissection of Rock Creek and the domes upon the plateau, which consists of Lower Cretaceous sediments. The Little Falls reveals the boundary of this region in the Fall Line.

The second region conforms in much of its physiography to the Piedmont although it consists of the oldest sedimentary material. Stream valleys are less dissected than in the Piedmont. Several sedimentary caps of the Lafayette series are evident above the plateau. The unconsolidated sediments of the Coastal Plain have weathered to produce a much more broken topography than is visible elsewhere. Ridges are flatter and more rounded, valleys shallow with attendant bogs. Oxon Run and Piney Branch reveal these characteristics.

The last of the regions in the city was discerned by L'Enfant and described as the Flats, occurring at the confluence of the Potomac and Anacostia Rivers. These consist of two clearly defined terraces, with intervening escarpments. This is the site of the formal city and it was the intervening escarpment that L'Enfant selected as the appropriate seat for the two most important buildings—the Capitol and the White House.

The Potomac enters the District through crystalline rock into which it has cut a deep and narrow channel; it is contained by the Palisades. As it crosses the Little Falls it encounters sedimentary material and cuts this deeply, revealing the exposed rock face. Beyond the Fall Line, it is no longer constrained and expands into the broad aspect of the estuarine river. In this lower Potomac there are wide floodplains and marshes; these are conspicuous in the Anacostia too.

The District reveals a complex physiographic expression and, as a consequence, there will be an equal richness in native plant communities. The Piedmont contains variants of one forest type, the Coastal Plain represents



PIEDMONT



FALL ZONE



COASTAL PLAIN



PLANT ASSOCIATIONS—Diagrammatic Section

variation of yet another, but in Washington there occurs that special richness which attends their conjunction.

Indeed, the plant communities found in Washington may well be the richest in the basin. There are, or were, swamp cypress stands, magnolia bogs, wild rice marshes, the mixed mesophytic association of Rock Creek and other major valleys, the pitch pine association of the eastern ridges, the great mixed oaks of the plateau with a number of variants, some emphasizing sassafras, others tulip poplar.

The general divisions of plant associations

would conform to the physiographic regions. The north and northwest, consisting of the Piedmont and Lower Cretaceous sediments, support the oak-chestnut forest association with white and black oak as codominants with tulip tree. The ridges in this region are likely to reveal chestnut-oak with pines on particularly well-drained soils. In stream valleys will be found the mixed mesophytic association of beech, basswood and black walnut, with hemlocks on north slopes.

The Anacostia drainage composes the second division, where the ridges are clothed in pines—loblolly, scrub and pitch; oaks occupy the middle slopes, with beech and tulip

poplar being dominant in the lower slopes.

In the last region, the Flats, we find a floodplain, and sweet gum is the appropriate expression. Meadow soils would support loblolly and scrub pine, on loam soils hickory and black gum would be noticeable.

The given form—the landscape identity—is seen from this provisional and exploratory scrutiny to be highly varied. The landscape reveals on its surface, in rocks, physiography and soils, a half billion years of time; it reveals the two major physiographic regions—Piedmont and Coastal Plain—and the great contrasts these regions manifest. This inter-



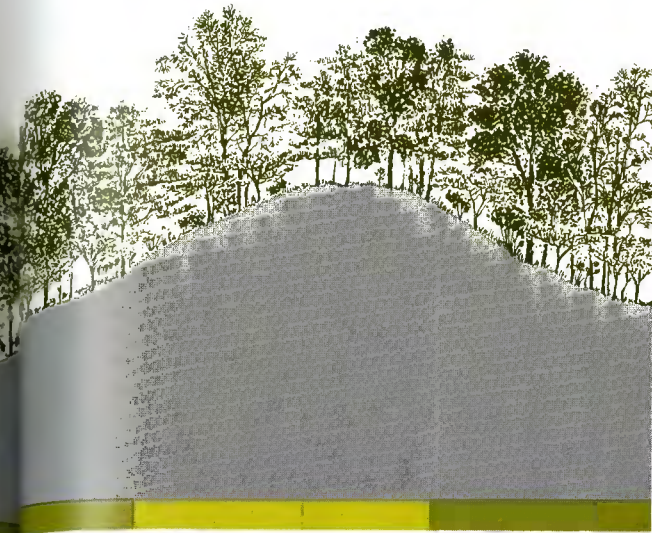
BOTTOMLAND



UPLAND MOIST



UPLAND

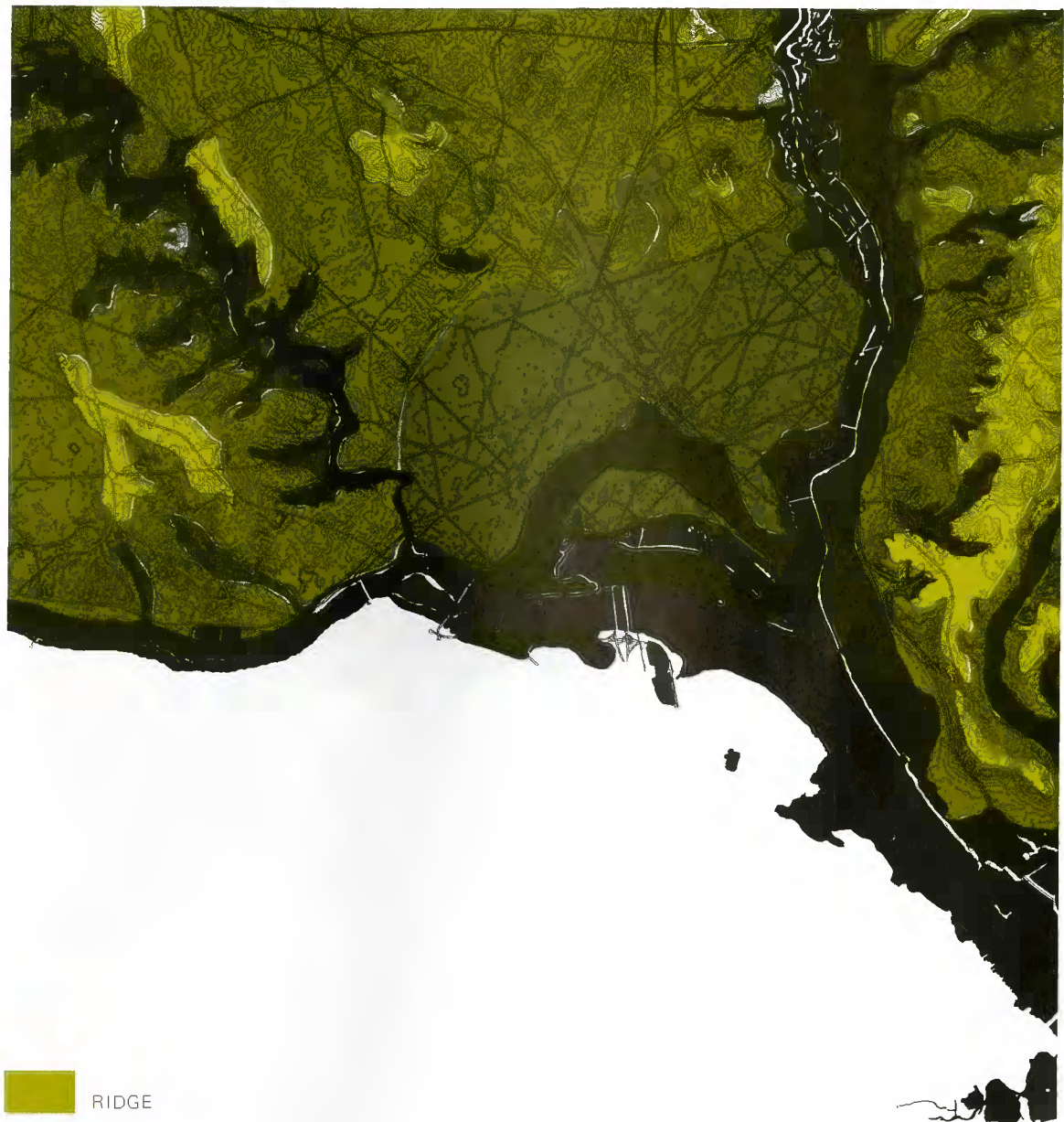


face is dramatized by the Palisades and Little Falls, by the changed aspect of the Potomac in the estuary. It is vivid in the Rock Creek, the surround of hills with their sedimentary caps, the broad valley of the Anacostia and attendant marshes. Not least, there is the precision of the two Pleistocene terraces, the Pamlico and the Wicomico, with their intervening escarpment.

In many cities the given form has been lost irretrievably, buried under undiscerning building, unknown and unexpressed—rivers confined, streams culverted, hills bulldozed, marshes filled, forests felled and escarpments graded into inconsequence. Not so in



RIDGE



0 1/2 1 2 MILES 3

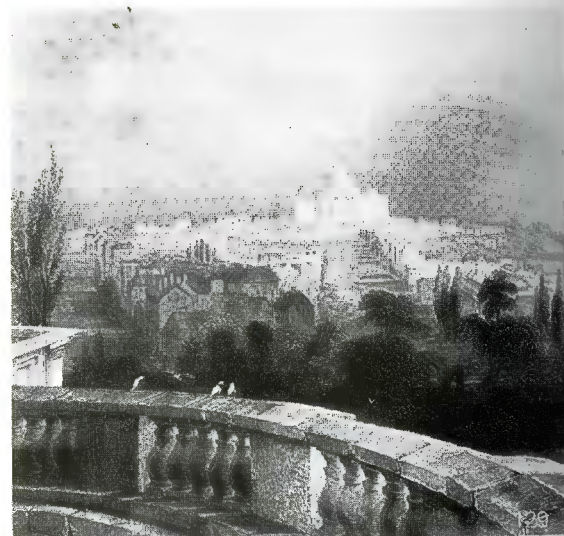
PLANT ASSOCIATIONS



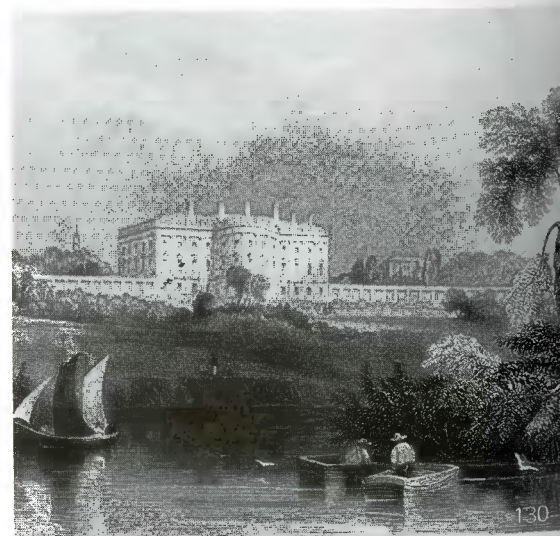
THE GIVEN FORM

Washington, where the major elements still persist, although in various conditions. The surrounding summits are emphasized by Washington Cathedral and the Shrine of the Immaculate Conception. The White House and Capitol achieve their eminence from the escarpment, Rock Creek and Glover Archbold unite the Potomac to its hinterland, the ridges that define the Anacostia are clearly evident, while the Potomac reveals its twin identities, above and below the falls. The natural identity is rich and vivid.

The analysis of the constituents of the made form is, like the preceding examination, directed towards the development of a



THE CAPITOL



THE WHITE HOUSE

method rather than the creation of a plan itself. As a result, the study is fragmentary and incomplete. A historical inventory is essential to the discovery of the made form, not merely a compilation of historic buildings, but rather an analysis of the evolution of those adaptations which in sum create the made form. These can be seen as a hierarchy of values.

In the demonstration of the method, attention is directed exclusively to the historic city as this shows a clear relation to the given form and constitutes a single conception of city form.

As reported by William Loughton Smith in 1791, "Major L'Enfant had noted all of the eminences, plains, commanding spots, projects of canals by means of Rock Creek, Eastern Branch and a fine creek called Goose Creek." After surveying the area, L'Enfant was commissioned to prepare a plan for the city. While his vocabulary of civic design was based upon Renaissance concepts, he was acutely aware of the natural characteristics of the site. In parenthesis, however, it might well be said that it was because of his French Renaissance attitudes that he chose to build upon the Flats. Had he been an Italian Renaissance architect, he would surely have located the city on the classic site, the

southeast-facing slopes of the plateau, above.

Following his site analysis, he said that "Nature has done much for it, and with the aid of art it will become the wonder of the world."

It is something of a paradox that the image of the city, most appropriate for the divine right of kings, became the expression for that confederacy which was to become a great democracy. Louis XIV would not have felt strange on the axis of the Mall in the Capital—it was his symbol. The images of Versailles, Tuileries, Place de la Concorde and the Champs Elysées were incorporated into the plan for Washington and united with the existing site. L'Enfant had an overriding concern for the axial arrangement of spaces, their flanking buildings, and for diagonal avenues, but this he coupled with his perceptiveness to the subtleties of land form.

The most prominent position in the Flats was then called Jenkin's Hill, an aspect of the Pamlico-Wicomico escarpment, which L'Enfant described as "a pedestal waiting for a superstructure." This he reserved for the Capitol. The other prominent location, on the same escarpment, he chose for the White House. The limits of his formal plan, defined by Florida Avenue, corresponded to the Wicomico-Sunderland escarpment, the upper limit of the Flats.

Within this, he united the Capitol and the Potomac with the Mall, created a cross axis connecting the latter with the White House, and from these major features, radiated diagonal avenues into the backdrop of hills and summits. This, he advised the President, was intended to contrast with the general regularity and make the real distance appear less, but also to "afford a greater variety of seats with pleasant prospects which can be obtained from the advantageous ground over which these avenues are chiefly directed."

In addition to the Mall, the plan provided



WASHINGTON BEFORE L'ENFANT

for fifteen squares "to be embellished with statues, columns, obelisks and any other ornament." These were carefully sited on advantageous locations.

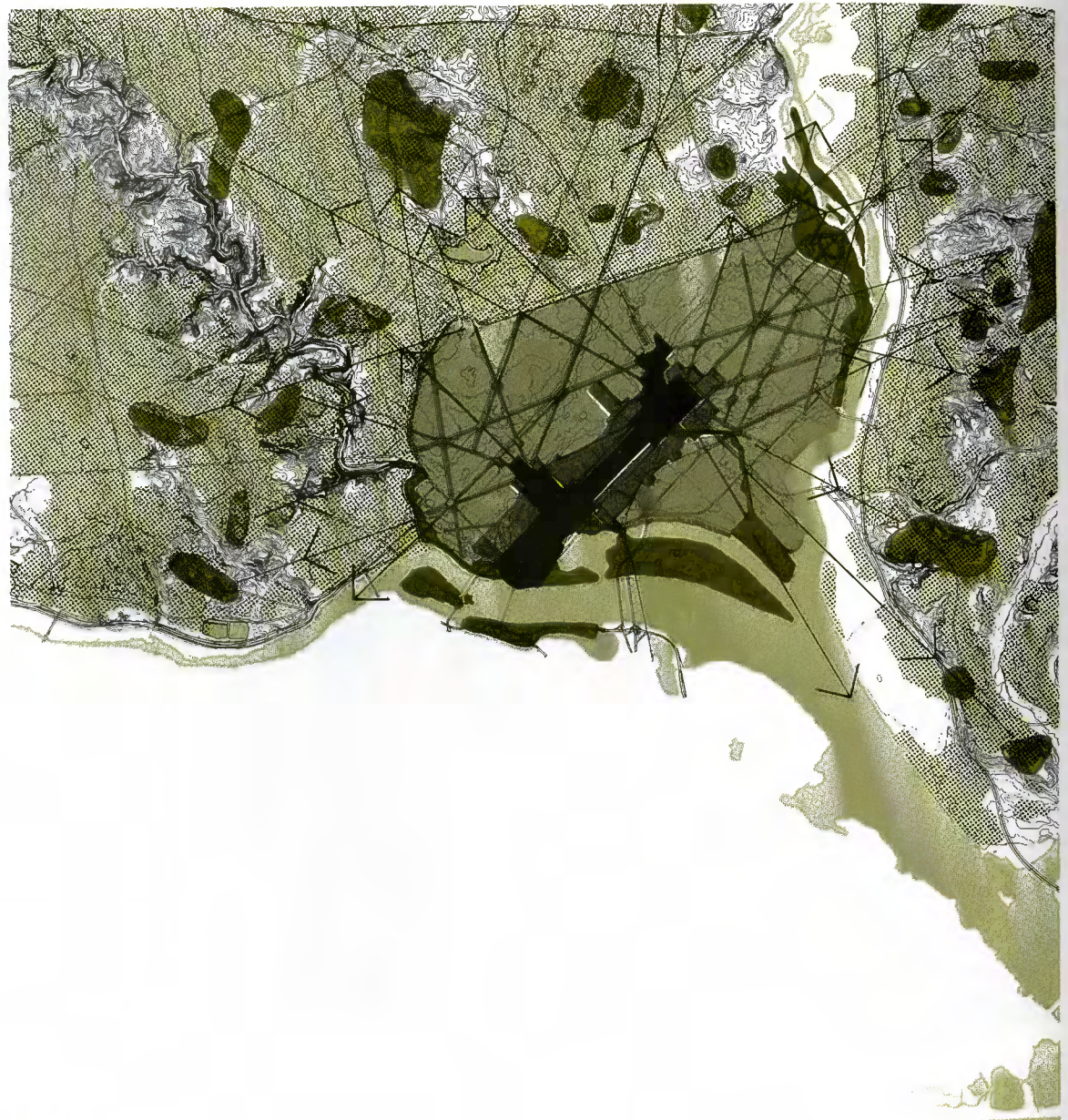
This plan was a single conception, consistent within the canons of Renaissance city design, but it was adapted to the particularities of the site.

Clearly, the most basic division of Washington is between the formal city and the remainder. It is with the former that this study is concerned. Within this area, bounded by the Potomac, Anacostia and the Wicomico-Sunderland escarpment, there are five major elements—the Mall, the Federal Area, the Formal Avenues, the Interstices and the remaining Open Spaces.

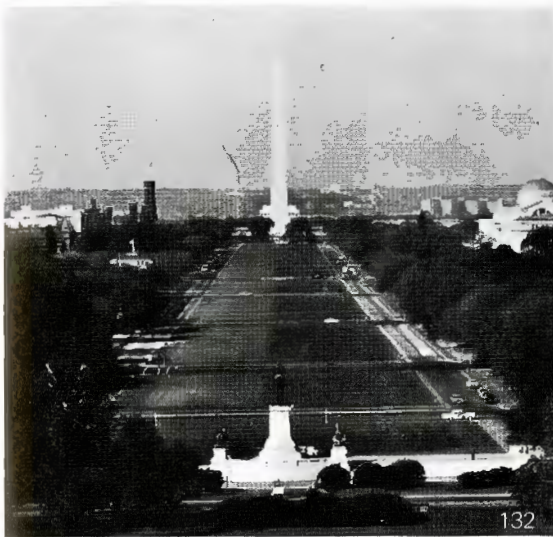
Each of these elements has a distinct identity, and the first three contain the major constituents of the L'Enfant plan. Ecological analysis revealed the given form; we require a method to reveal the identity of the made form. For this we can invoke the intentions of L'Enfant. Renaissance architecture may not be the most appropriate expression of the capital of a great democracy, but it exists and it is irrevocable.

The Mall unites the Potomac, the basic reason for this site, with the most important building, the Capitol: it is the symbolic heart of the Capital and the nation. Clearly, it is the preeminent symbol in the social value system of the city. This above all must be preserved and enhanced.

The symbolic expression of the Federal Government is clearly expressed in the complex of buildings bounding the Mall. They are uniformly neoclassical, heroic in scale and with some consistency of materials, spaces and details. It is clear that this represents a second level in the scale of values, that there is a certain consistency in scale and architecture and that this represents a value and at the same time has implications



THE MADE FORM



THE MALL



OTHER OPEN SPACES



AVENUES

for the form of extensions or adaptations. This Federal Area is of historic importance and should be so considered.

The formal avenues are central to L'Enfant's plan—the great avenues, notably the diagonals, unite the entire formal city with its symbolic heart. These avenues are related to distant hills, ridges and rivers. They terminate at Florida Avenue, where the escarpment rises. These are prospective gateways to the formal city and the processional and structural elements that integrate the entire scheme. The Interstices fall between the avenues and contribute to them only on their frontages. L'Enfant presumably ex-

pected these to be filled in with buildings of domestic scale but consonant with federal architecture. These areas have no symbolic importance in the L'Enfant plan.

From Rock Creek, along the Potomac and Anacostia Rivers is a discontinuous system of open spaces. For the most part, they were not a product of the L'Enfant plan and have resulted from filling operations. These areas derive their identity from the rivers and express a major component of the natural identity. In a special sense, the formal city of Washington could exist as a contrived artifice, bounded by hills to the north and rivers to the south. The contrast would be greatest

if these were retained in a natural condition.

This is a most fragmentary examination—and yet the method shows promise. It is possible to examine artifacts in a hierarchy of social values. Recognizing these artifacts and understanding their value will affect policies toward them—their preservation and enhancement.

The authoritarian form of Washington may not be the most appropriate expression for a democratic confederation but is one of the most consistent and identifiable urban forms created since the 18th century. As has been seen, there is a consonance between the given and made forms, the latter exploiting and enhancing the former while creating new values, conspicuously in the Flats, which had little intrinsic drama. The creation of this made form has not resulted in the obliteration of the given form, although much of it has suffered from subsequent city building outside of the formal city.

The image of Washington is of a great city meeting a great river. The Washington Monument is the single most conspicuous element relating the entire city to its symbolic center. Within a fringe of hills and ridges, and edged by the Potomac and Anacostia, the city sits upon the stepped flats. The Mall unites the Potomac with the Capitol, the cross axis unites the White House, the Tidal Basin and the Jefferson Memorial. It is a city of monuments, tree-lined avenues, green open spaces; its buildings are neoclassical and large in scale, the major spaces are heroic.

In the evaluation of the major elements, the Mall, Capitol, White House and Washington Monument, united as a single complex, assume primacy. The governmental buildings within the formal city would assume a secondary position, the skeleton plan of major avenues and streets third, and finally, the major system of open spaces that accompany the rivers.

Clearly, the method could apply at a finer grain and provide the value system for the made form.

In the development of method, the examples employed are likely to reveal only the obvious. Only when the method is fully applied will its benefits be perceived. However, even in the slender application of the method, it is clear that there is a value in pursuing the identities of the given and made form, using the historical method to establish the components of identity and their relative value.

Historic Washington is, in essence, a neo-classical composition set in a half bowl, defined by two confluent rivers and an escarpment, with a backdrop of low hills. The entire city is like an inclined fan with the symbolic city at the base and the ribs revealed in the valleys of the Potomac, Glover Archbold, Rock Creek, Goose Valley and the Anacostia.

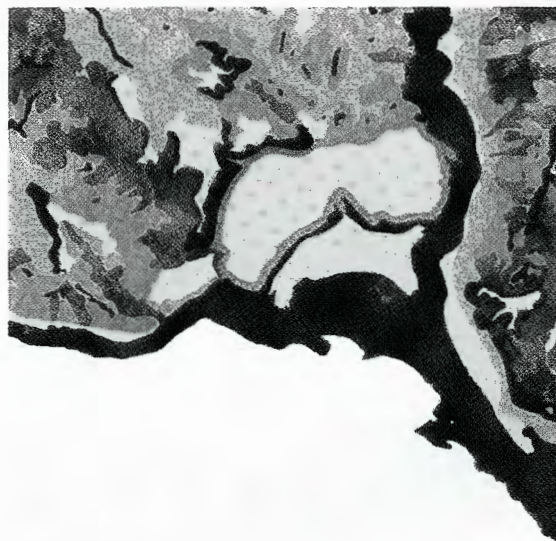
This examination allows us to see that Washington is because... It is not Rio or Amsterdam or Paris. This study has revealed, at least in the broadest outline, why Washington is, as a function of its geological, biological and cultural history. In the adaptations to the site, certain elements have been enhanced, others obliterated, yet entirely new elements of importance introduced. In all of this, a value system has been created, a summation of natural and cultural history. Certain elements are inordinately expressive—hence valuable—others less so. The exercise of an ecological and historical inventory should reveal them.

If it is possible to identify elements and attribute value to them, how then do we respond to this value system? It would be important, in a consideration of the natural identity, to locate and describe the major constituents. We have seen them in brief—the corridors of the Potomac, the Anacostia, Rock Creek, Goose Creek and the Glover Archbold and, in addition, the plateau, vari-

ous summits, ridges and escarpments, the minor valleys and, not least, the Flats: these would be included in the value system of natural identity.

If, indeed, these are the most important elements of the given form, they can be ranked in importance. It would be valuable to see these components in terms of a continuous structure. To what degree are they fully or partially obliterated? Is it important that their continuity be maintained or recovered? How can they be enhanced?

It is clearly possible to select the major physiographic constituents of identity and

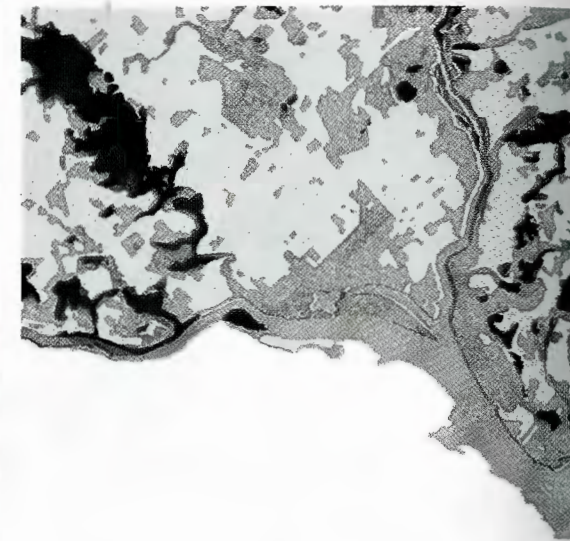


EVALUATION:PHYSIOGRAPHIC EXPRESSION
establish the sum of the most important of these as the primary elements of urban structure and value. When these have been evaluated, it is then possible to ensure their preservation and enhancement.

There is another important constituent of the natural identity: that is the expression of plants. As we have seen, there is an enormous variability in the native plant communities. It would be advisable to prepare a plan of the native plant associations for the entire city and supplement this with information on the changes that occur as a result of adaptations to the environment. This should then become the palette for all

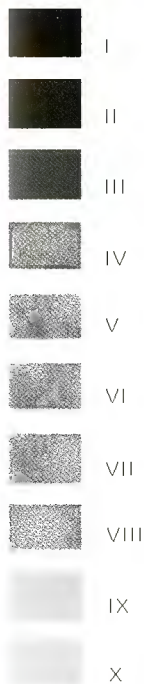
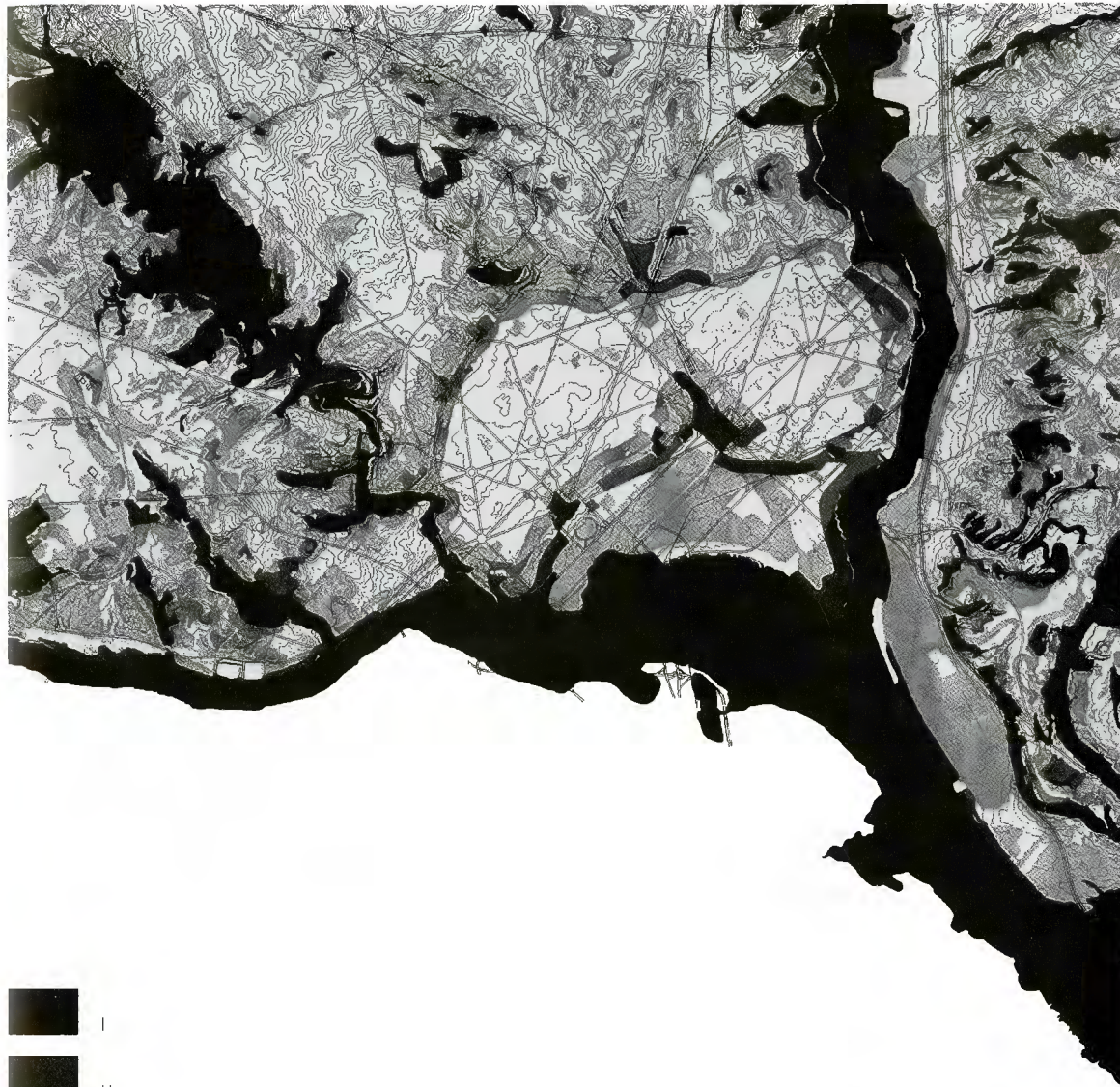
those who are involved in design of projects or the management of land.

Given an ecological inventory and a full description of plant associations—dominant trees, minor trees, shrubs and herbaceous cover, together with descriptions of successions—it becomes possible to establish a palette of plant expression for every site and every project in the National Capital. Given this information, it is possible to select the major elements of expression and ensure representation of the entire dramatic range, not as a dry arboretum, but in a living city—swamp cypress, wild rice swamps, magnolia bogs, the great beech forest that persists in



EVALUATION: ECOLOGICAL EXPRESSION
the Rock Creek Park—each of these dramatic and rich expressions, and many others, could be reintroduced, extended or heightened.

The concept of a palette on the one hand and regulation on the other is just as appropriate for the elements of the made form. There clearly is a palette for the Mall, the Federal Area, the Great Avenues and Streets and for the Open Spaces. These are not as rational as the basis for plant expression, but it is possible to determine rules of consonance and these—rather strangely—derive from the canons of Renaissance city building, architecture and landscape architecture. Strange indeed, but unavoidable.



PHYSIOGRAPHIC AND ECOLOGICAL COMPONENTS OF THE NATURAL IDENTITY RANKED IN A DESCENDING ORDER OF VALUES FROM I TO X.



0 1/2 1 2 MILES 3

SUMMARY EVALUATION

The establishment of such a value system could be of the utmost utility. It can make public the ascription of value to the component elements of the city, and, it is important to observe, this is quite distinct from the normal measures of land and building value that obtain today. At the moment, parks and historic buildings, attractive places, monuments and rivers, are unlikely to be accorded a value that can arrest their transformation into the most commonplace of economic enterprises. By so evaluating the components of identity of the city, one can better confront the destructive instincts of developer or state highway commission, parking authorities or smaller philistines. Moreover, it is then possible to perceive the role of apparently insignificant sites as part of an important and valuable expression. One further value lies in the provision of a palette for the landscape architect. Instead of the capricious vocabulary of kidney shapes and liver-like begonias, salvias or magenta azaleas, the landscape architect can respond to the major structure of native vegetation appropriate to the site. The completion of a large number of projects within this palette would recreate the major plant components of the natural identity.

By identifying the major components of the given and made forms, and establishing the reason for their importance, it becomes much simpler for art commissions and the like to advise on consonance at least and enhancement at best—not as individual projects, but as contributors to the major elements of identity and value in the city.

Such is the method: the search for the basis of the identity of a city, the selection of those elements—in the natural identity and that of the created city—that are expressive and valuable, that exercise constraints and that proffer opportunities for new development. It is a simple method indeed, but it is an advance over the market mechanism of evaluation—it reveals the basis for form.

The place is because . . .