

ESTHETIC CONSIDERATIONS IN THE  
EFFECTIVE USE OF PLANT MATERIALS

A COMPREHENSIVE  
PROBLEM REPORT  
for the Degree of M. L. A.  
MICHIGAN STATE UNIVERSITY  
William Eugene Beery  
1962

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**ESTHETIC CONSIDERATIONS  
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EFFECTIVE USE OF PLANT MATERIALS**

**By  
WILLIAM EUGENE BEERY**

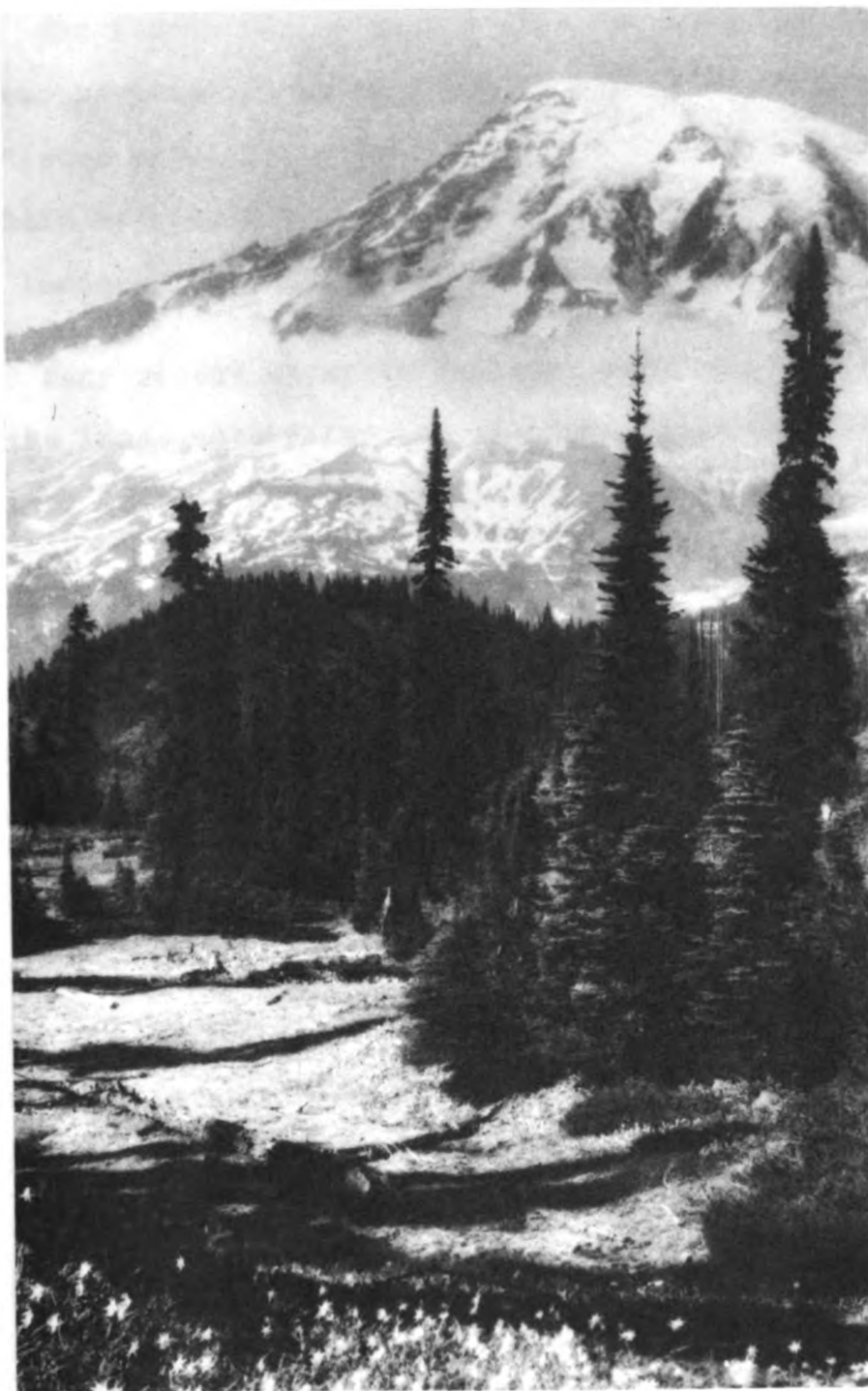
**A COMPREHENSIVE PROBLEM REPORT**

**Submitted to the Department of Urban Planning and Landscape  
Architecture of Michigan State University of Agriculture  
and Applied Science in partial fulfillment of the  
requirements for the degree of**

**MASTER IN LANDSCAPE ARCHITECTURE**

**1962**





The plant grows from its seed.  
The characteristics of its form lie concealed in  
the potential power of the seed. The soil gives  
it strength to grow. And outer influences decide  
its shape in the environment.

Eliel Saarinen

## PREFACE

The reason for my choice of this topic was two-fold. It was perpetuated by an intensive interest to improve my knowledge of planting design and I hope, in some small way, to help refocus a blurred relationship that exists between the landscape architect and plant materials.

Many recent examples surround each of us, that point to the inadequate selection of plant material. Good design, to cite a few examples, is seen in some shopping centers, residential areas, and parks. But a well organized, integrated planting scheme is lacking from most. This is due, in part, to a lack of study and thought; and I suggest the main fault reflects an improper integration of planting with the total design concept.

Why is a basic knowledge in the use of plants not evident today? Such knowledge once gave expression to a basic philosophy in landscape architecture. One logical answer is the widening dimension of practices in the profession. Many of the schools and professionals in the field are having to specialize in order to encompass the various types of projects and to meet the increasing demands created by expanding technology and population growth. Hence, the principles of planting design are being deemphasized and the values of integrating plant materials with the total design concept is lost.

Plants are being used today at a rapidly accelerating rate. Nurseries are stocking more plants than ever before. Many new and hardy varieties are increasing the potential of plant selection through techniques of grafting and controlled propagation. But this, by no standard, is a measurement to insure the proper use, selection, or placement of the plant.

When the architect conceives a design for a structure, he knows before the design is complete, the material of which it is to be built. Cinder block has one texture, color, and feeling, and wood another. Steel does not radiate the same qualities as brick, nor is it intended or expected to. Wood, glass, terrazzo, or brick are all structural materials. Like plants, each have qualities of their own. Each material is integrated into the total concept to meet certain standards and design criteria. The architect must know his material before he can complete each design.

The designer of the landscape, I regrettably believe, does not hold his practice to such rigid requirements. Color, texture, and the feeling created with various plants "may" be inserted after the design is completed. Though more often than not, a catch as catch can procedure of this nature reflects its genesis and fails.

Planting design can help or hinder the landscape architect materially. It is by no means the only essential

design factor as there are many others of equal or even greater importance. Certainly it can be agreed that the landscape architect's training in planting design sets him apart from other creative arts and affords him unimitated ability and freedom to design with plants. Therefore it would be a professional error for the landscape architect to neglect in the smallest degree to utilize the resources of available knowledge in plant selection and design.

The landscape architect should know more about the environmental requirements of plants, the importance ecology plays in the design, and how to meet the site challenge in a clear perspective that each design imposes. He should follow a carefully guided course in the selection and placement of plants and know the role that each is to perform in the composition.

The physical design produced today does not look like the typical design product of one hundred years ago, nor may it be expected to appear any more the same one hundred years from now. With population, technology, and modes of life changing so rapidly, it becomes impossible to have a list of principles, which never vary, in the selection of plant material. There are though, certain general factors embracing a knowledge of guiding considerations to serve in arriving at a sense of belonging in nature for man through the use of plant materials. These considerations

are flexible and broad enough to anticipate most fluctuating conditions of the mind and environment. It is unfortunate that these considerations are little publicized, and found to be discussed only sporadically among other subjects in the professional literature. For this reason I selected to pursue, for my comprehensive problem, a topic that focuses upon these guiding considerations. It brings together related factors for consideration in the effective use of plant materials where esthetic values are sought as a goal.

Webster defines esthetics as: pertaining to the beautiful, as distinguished from the moral, appreciative of, or responsive to, the beautiful in art or nature. In this thesis it will refer to the human mind perceiving a pleasing comprehension of phenomena by the natural vegetation. These natural qualities, or phenomena, are set apart from any other object in space by the sculptural tendencies of the branches and foliage, the color and texture of the plant, and the process of change in time and space.

It is hoped that this comprehensive problem will act as a guide and catalytic agent in helping to understand some of the potential latent richness of plant material under varying geographical locations and design situations. Also, this comprehensive problem hopes to expand and/or improve the reader's list of esthetic considerations in



the selection of plant material and perhaps renew lost status to some old considerations which have been neglected in the past.

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## STATEMENT OF THE PROBLEM

Guiding considerations in the selection of plant material by the landscape architect for esthetic value is the primary function of this comprehensive problem. It is written for the planting designer, and entails general considerations that would apply under most geographical locations and design situations.

In selecting plant material for esthetic qualities, limitations as geographical location or site conditions, immediately invoke certain restrictions on plant selection and use. To discuss all the problems involved in each design situation with infinite variables such as for example, climate, soils, and site character would certainly be facetious if not impossible. The author does not propose such an undertaking.

Rather, this comprehensive problem is based on considerations which are related to varying design situations; factors the designer considers for most any environmental restrictions or physical limitations. Examples used of individual situations are for clarifying points in the discussion and are not intended intentionally to relate to any given location or individual phase of design.

The author wishes to emphasize that esthetic considerations are not a separate phase in design. Nor is it a problem area to be approached individually after the

mechanical aspects have been solved. It is a consideration that should be congruently interwoven during the process of design, so that the end result manifests a totally unified and pleasing composition.

Because of this interweaving that must take place during the process of design, it would be deceiving to believe that any discussion of esthetic concepts could be made without also implicating to a degree the mechanical aspect of design. \* Hence, the main emphasis of this problem will be the esthetic considerations in the effective use of plant material with mechanical aspects discussed only to manifest the relation between the two areas. The overlapping and meshing of the various phases should be borne in mind, both during reading and application of the considerations set forth in this comprehensive problem.

\* The author recognizes that the basic principles of design, such as, balance, rhythm, and continuity, developed over the centuries are clearly understood. Without these principles applied in design, no esthetic quality may be conveyed through any media and serve its full potential. Thus, these basic principles are not discussed individually.

Certain factors involving these principles, however, are drawn upon freely by the author and discussed where esthetic qualities of plant material and their application overlap. It need only be mentioned here that these

principles are capable of variation to suit different materials, purposes and periods. They are flexible and serve only as guides. The fundamentals do not change, but their application does.

It is definitely not the intent to set forth a cut and dried set of invariable "rules" to be memorized by any person wishing to derive the full potential of esthetic qualities from plant material. There is no problem in design that lends itself to such a rigid approach. Design is a personal quality with no two designers solving a problem in the same manner even though both may be correct. As nature never repeats a design identically the same, neither should we. Certainly each design analysis proposes a varying palette from one situation to the next.

Because of this variety that exists in planting design, it is an exciting and challenging endeavor. The surface of plant selection and combination has hardly been scratched.

I suspect that the general principles on which a garden may be constructed differ little, whether the garden is designated for Boston or Brazil. In any surroundings, a garden should be landscaped according to existing topography, and planted in accordance with the climate and soil conditions of the region. In other words, the garden that has the best chances of survival and that needs the minimum amount of care for such survival, will be indigenous. This sounds like an obvious statement but evidence proves the contrary.

Roberto Burle Marx

To attempt designing with plants, without an understanding of why the intended recipient values the designer's efforts, is like beginning at the ladder's top and working down! It would be worthy of the designer's time to pause in retrospect to preview basic plant history before striving to use plants for their inherent qualities of esthetic value.

The human, though physically subordinate in many ways, excels and reigns over lower animals because of one dominant aptitude. That is, his unimitated ability to reason i.e. analyze and synthesize his problems. Using this forceful attribute and applying it to history, man gains insight by relating causations from existing phenomena and the conditions that surround life. Meaningless dreary ways of life are thus avoided by man, and useful vistas of fruitful endeavors expanded. Thus as we gain insight into man's background, the present task becomes simplified.

At the start one might ask, for example, why does man seek nature in his surroundings? What benefits does he derive from the natural vegetation? What esthetic qualities in plants are most desired? When questions such as these are clearly answered, the challenge invoked by each problem may better be met.\* The following discussion is a brief survey of the philosophical growth of esthetic values by man. It merely touches the highlights and extracts data that is pertinent to treat plant material effectively for esthetic value today.



## PART I Man and Nature (The physical pattern)

It took the human, Homo-sapien, thousands of years to understand and revert to his favor, many of the natural phenomena surrounding him. He learned that fire could be useful for cooking food. Later, crude tools were used to ease his daily tasks such as hunting. He learned to till the soil and harvest crops and, of course, still later to discover his greatest invention of all, the wheel.

During this evolutionary process, man lived in the open, near and alongside of nature. Plants were a vital part of his everyday life; stimulating his senses of sight, taste, smell, hearing, and touch. He found that among nature's various elements, plants were peaceful and soothing. The plant was never aggressive or ugly; nor was it a negative constituent to be feared. Here was something obvious and easily understood. Thus a tangible, friendly ally was accepted to give shelter, food, and pleasure to man's senses.

The man-plant relationship was a mutual adaptation more than a one sided conquest of plant by man. Man and plants have always played such a reciprocal relation, each forming and shaping the other; although the weight one has on the other has been shifted with time. \* In the early stages of evolution, man was more dependent upon the plant for his existence than the plant dependent upon man. Today, almost the reverse is true. The plant is dependent more



upon man for its existence than is the man upon the plant. This is not meant to construe that today man can live without the plant. Rather, man may eliminate certain species, propagate and encourage others to best suit his needs.

Regardless of the weight of influence one may have over the other, this relationship has always existed. Perhaps such interdependence, one always relying on the other, explains why man feels himself a part of nature. Whether it were for a practical purpose such as for food, for defense, or for the pure peaceful tranquility that a landscape scene offered, man has always felt the need for vegetation surrounding him. During the entire process of evolution, man has always been near the living landscape, carrying out an interdependent role with plants. He is physically dependent upon the plant for survival. The plant is a constituent which gives pleasure to man's senses of sight, smell, hearing, taste, and touch. Thus it begins to become understandable why man seeks natural vegetation in his surroundings.

During this early stage of development, primitive man's reason was guided in accordance with the laws of nature. He acted creatively to protect himself from the surrounding elements. The landscape determined an expression of his mode of life and was not necessarily esthetic, though undoubtedly it played a subconscious role in pleasing his emotions, lending peace and tranquility to his existence.



In other words, his motives were based on much the same principles as those that are fundamental in landscape design today. Man's aspirations were creative! He created his surroundings to meet his needs and desires. His actions were expressive of his desires, indigenous, direct, and true.

In retrospect then, there is a common bond between primitive man and conditions that exist in the life of modern man. Plants have always been a friendly ally. Unlike the elements of weather, plants afforded a tangible influence that could be understood. Plants still are a vital source in the support of man's existence and also for his senses a pleasure giving feature. In addition to pleasure and life giving benefits, natural vegetation determines and reflects the pattern of man's mode of life.

## **PART II    Civilization    (The social pattern)**

The cultivation of plants or tilling of the soil for any purpose could not take place until people began to take root and group together. This grouping probably resulted for protective purposes and undoubtedly to some degree for companionship. Instead of retreating from the enemy, walls or fences were erected. Shelters were built to ward off the elements of weather.

As people became settled and stationary, they became more and more dependent on plants for food. They no longer moved with the seasons or with game migrations in

quest of food but relied more upon the controlled cultivation of plants. These events can not be studied first hand, of course, but history tells of some of the earliest civilizations growing cultivated vegetables and fruits for food and various herbs and roots for medicinal purposes. As early as 3500 B.C., the Euphrates Valley supported a pastoral and agricultural people. Although it is doubtful that the Sumerians were the first systematic agriculturists, they did introduce a canal system for drainage of marsh lands and control of water flow. Along the canal banks they planted onions, and in the meadows they raised barley. They also planted extensive date orchards.<sup>1</sup>

The most important fact about the Sumerian culture was that it bred others in the field of agriculture.<sup>2</sup> When it arrived in Egypt, gardening began to assume definition. Vegetables and fruits cultivated in Egypt included onions, melons, watermelons, radishes, dates, grapes, figs, bananas, lemons, and pomegranates. They also raised castor-oil plants for medicinal oil, flax for linen, and many other plants for purposes beside dietary consumption.<sup>3</sup>

One fact that is plain during the early stages of gardening, cultivation standards were not equal everywhere

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<sup>1</sup>Richardson Wright, The Story of Gardening (New York: Dodd, Mead and Company, 1934), p. 23.

<sup>2</sup>Ibid., p. 24.

<sup>3</sup>Ibid., p. 27.

or practiced according to plan. Gardens won from the forest regions were quite different from gardens of drier areas, bordered by the desert. This same phenomena holds true today. The plantings of landscapes in different regions are varied primarily due to the ecological influences of adaptation. People, like plants, in different areas adapted to their surrounding ecology. Likes and dislikes grew from background experiences. Thus, both physical and mental adaptations were forced by environment.

This diversification and unequal cultivation of plants is closely related to the growing of plants for esthetic value. \* To a large extent esthetic values bridge from an individual's background experience. For example, childhood memories often accustom one to a set ecological pattern. The contrasts here are even greater than we have seen in the regional patterns. Within one micro-climate, plants for esthetic reasons are grown at an unequal rate.

Observe the suburban homeowner who enjoys his one half acre of lawn and prize rose bed. Note also that he enjoys a weekend outing in the woods but would miss the lights and excitement of the city if he could not return. The farmer on the other hand finds the reverse true. Thus, due to familiar surroundings and background experience, we see plants are valued for varying qualities and grown in unequal proportions from one situation to the next.



A good example of landscape appreciation based on familiarity with the surrounding is a tourist of the middle eastern United States visiting the desert of Nevada or Arizona. Conclusions are drawn in terms common to his middle eastern background. Immediately he sees only a hot dried out piece of parched land, fit only for rattlesnakes and rabbits and extremely boring to him.

Yet the rancher from Nevada or the urbanite from Tucson enjoys the flat "prairie spirit" and the rugged form of the Joshua tree. These men look forward to the spring bloom of the cactus and many other flowers found rich in beauty during the spring months in the desert. The sky and cloud hold an intrinsic form and are considered in high esteem as are the shadow patterns that form on the distant buttes and mountain tops.\* But to the mid-eastern tourist who was born and raised in a background of green grass and trees, the ornamentation of the desert seems superficial and without beauty.

\* Psychological effects created by background are not the only explanation for the unequal enjoyment of plants by people or the varied amount of value they placed on the inherent qualities exerted by plant material. But here is a definite beginning point. It should be borne in mind that the location and background of the intended recipient should play a major role in the landscape architect's selection of plants and that values sought

from the same plant may vary with the individual.

Aside from its significance to the Christian religion, the Bible is an interesting source for the study of vegetation in early civilized times. From Genesis to the end of Revelation, the Bible constantly refers to plants of the countryside. Most of the plants are of Palestine but included are a few from the wilderness of Sinai and some from Egypt.<sup>4</sup> Although the Bible is not our earliest reference about vegetation, it notes the essential role plants formed in life of the ancient Jews and ordinary man's contacts with them. In the religious sense, the Bible shows the whole philosophy of Jesus interpreted as a religion of the fields, not of the cities or towns. To the Prophets, nature was often fearful and awesome; to Jesus it was always near and kindly. Better than they, He saw in all of it the immediate expression of His Father's love. His life was spent out-of-doors, walking through the fields with his disciples and beside the still waters.

The tale of Eve and the apple is probably one of the best known of all Bible stories. However, nowhere in the original Scriptures is it recorded that the tempting fruit was an apple. \*Most authorities agree that whether or not it was a citron, quince, or apricot, it could not have been an apple. It appears that if an apple had been grown in

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<sup>4</sup>A. W. Anderson, Plants of the Bible (New York: Philosophical Library, Inc., 1957), p. 7.

Biblical times it would have been hard, small, and acid. The sweet juicy apples have all been developed in the past one hundred fifty years.<sup>5</sup>

And when the woman saw that the tree was good for food, and that it was pleasant to the eye, and to be desired to make one wise, she took of the fruit thereof, and did eat, and gave also unto her husband with her; and he did eat.

Genesis 3:6

The Bible contains many errors in plant references due to mistaken identity or mis-translation. At this time there were no botanical classifications and thus, forgivable errors, through human imperfection, were common. Too, these early writers and translators were interested in points of theology more than in particular plant names. But doesn't the use of tangible items such as plants, add significance and interest to the reading?

I went down to the nut orchard, to look at the blossoms of the valley, to see whether the vines had budded, whether the pomegranates were in bloom.

Song of Solomon 6:11

We find references to plants in hundreds of verses both of the Old and New Testament, so it is of no surprise that an intense interest in this subject dates back hundreds of years. There was a time, when no one dared to challenge any Scripture of the Bible but as sects and denominations appeared, translations were questioned.

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<sup>5</sup>Ernst Lehner and Johanna Lehner, Folklore and Symbolism of Flowers, Plants and Trees (New York: Tudor Publishing Company, 1960), p. 15.

The earliest recorded book dealing specifically with plants of Biblical mention was that of Levinus Lemmens' book of 161 pages in 1566. Since then, several other works have followed.

The Bible is not the only religious connection with the plants of old civilizations. The Japanese 'Bonsai' and its culture is religious in a sense. It dates back to the Jodo sect of Buddhism in the 12th and 13th centuries. The priests in different temples tried to dwarf nature in scale to communicate with it.

\*Numerous plants were, and still are, held in high reverence, deep rooted in religious significance. The Lotus, for example, has held uninterrupted symbolic history over 5000 years! Though the significance of the symbolism behind it has changed many times with each nationality.

\*A study of ancient folklore with its symbolism of flowers, shrubs and trees can be an interesting as well as beneficial study showing esthetic and other usage of plants in times past. Greek and Roman mythology and oriental antiquity held many poetic and exciting legends of plants. The record of the dark and middle ages of the western world provided many weird stories of strange plants, of witches' brews, and sorcerer's potions.

\*These examples confirm that even after man emerged from primitive life living next to nature, he was still

deeply involved with plant life. The townsmen of the pre-industrial age, for example, were very aware of the influence of the natural ecology and economically dependent upon their surroundings. They were made aware of the passage of the seasons by having fresh vegetables only during the spring and summer months and fresh fruit only during the fall. Most homes were heated by fuel that came after hard labor from a neighboring wood lot.

\* Throughout history plants have been interwoven with human existence. They have been symbols and legends, magical, mystical and medicinal, often admired, held in reverence, and even used for representational purposes. Meanings attached to plants have been handed down through the ages and are still known, and in many cases still used. For example, in Christian communities, plants such as the Madonna lily (*Lilium candidum*) are used in age-old symbolism in association with Easter. The evergreen represents everlasting life in the observance of Christmas. Many other plants are used for such festive occasions as weddings, Halloween, and St. Patrick's Day.

### PART III     The World We Live In

Neither man nor any other animal could exist without plants. They are the direct or indirect source of all food, natural fibers, and rubbers, some fuels and drugs, and many other products without which the progress of civilization would have been impossible. Many interesting

facts may be written and learned about this historical relationship. As it is important to understand the historical background and apply insights gained to present conditions, it is also important to understand the problems surrounding man's relationships with plants today. The present associations between man and plant are different in many ways from the relationship of one hundred years ago. This fact has come about because of expanding technologies shaping every man's mode of life.

Man plus man equals the social pattern; man plus nature equals the physical pattern; the social pattern plus the physical pattern equals the world we live in.

Garrett Eckbo

The author suggests that a clarification of the fundamental conditions surrounding the relationships existing today between man and plant now be made. It is to this concept that the balance of this problem is dedicated. With this association, past and present, a more satisfying evaluation of mankind's esthetic appreciation of plants may then be made.



## THE UNIQUE ESTHETIC QUALITIES OF PLANT MATERIALS

The physical qualities of plant materials are unique to man. In addition to the botanical classifications, \*plants retain inherent esthetic characteristics that are unobtainable through any other media. This is the nature of the basic material with which the planting designer has to work.

The searching out of these esthetic characteristics is a process of imaginative planning which should always be a genuine pleasure to the landscape architect. Plant character may refer to the compounding of differing qualities produced by an individual plant or the product of these qualities initiated through grouping or massing effects. In either case, the plant character is a causation resulting from an interrelation and interaction of these qualities to produce an emotional effect upon the observer.

\*Qualities that combine to produce the plant character may be categorized under four major headings: (1) Form, (2) Texture, (3) Color, (4) Dimension of Time and Space. A designer must be thoroughly familiar with the plant and its qualities: its growth factors, environmental requirements, esthetic qualities, possibilities and limitations in order to use them intelligently and effectively. Once these vibrant qualities of plants are thoroughly understood



and appreciated, the designer possesses a design technique, playing one quality against another, to create desired effects from each classification category.

There are an infinite number of pleasing combinations obtainable; so vast, the surface has hardly been scratched. But the designer should not rely on luck or happenstance for the success of his planting plan. He must know what the outcome of his design will be, before the construction stage, or he may no longer be classed as a professional. He otherwise is no different from the weekend gardener who fills his backyard with an array of plants from the local nursery and then sits back in sheer amazement to watch his creation form. The full success of any planting depends on the planning of a harmonious relation between plant characteristics.

But it must be admitted that there are many points of view about plants: The botanist sees them under a microscope; the tree surgeon for their symmetry; the nurseryman as something to sell; the builder as something to clear from sight; the ecologist in relation to their environment; and the housewife thinks of them as flowers.

James Rose

## HOW THESE ESTHETIC QUALITIES AFFECT PLANT USE

### Form

In landscape design, form has a dual meaning. In one instance it refers to the over-all design organization. From this sense of the word, the well known expression "form follows function" was derived.\* In reference to plant material, however, the term is used in a smaller sense and simply means the structural make-up of the plant.

The most exciting way to achieve a design which will always insure beauty is to think first about plant forms. Other plant qualities may be considered as added assets which seasonally may enhance the scheme. Form is first to attract attention.\* When the planting is pleasing in form by itself, the addition of flower masses, or other features such as fruit may not always be necessary; though often it may be desirable to add a greater esthetic potential to the scene.

\* The Japanese are historically noted for their emphasis on form and are probably the best at the integration of plant forms and nature. The Japanese garden is basically green. Certain shrubs and trees may flower in season but usually a cut flower garden exists in an area apart from the main garden. Often the flower buds are sheared away by pruning to emphasize shape as the important factor.<sup>6</sup>

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<sup>6</sup> Tatsuo Ishimoto, The Art of the Japanese Garden (3rd ed.; New York: Crown Publishers, Inc., 1960), p. 8.



Fig. 1 This Black Locust along a rural road in Michigan beautifully displays the architecture of plant material.

They feel that no plant should be chosen or shaped to create an abnormal effect. Rather, they feel, plants should reflect nature and become indigenous to their surroundings. The difference between the Western style of clipping and the Japanese style is that the West seldom relates mounds, domes, and other forms to the curves and planes of the surroundings.<sup>7</sup>

Form is undoubtedly the most important attribute of any woody plant. Each form conveys a different expression, character of beauty, and appropriateness to a given situation. If the designer neglects to differentiate form in his design analysis, the entire effectiveness of the scheme can be lost. Unlike other seasonal characteristics that remain only a short time, form is residual and seems to be the most inclusive and unchanging characteristic. Though it should be remembered that each plant does alter its form over a period of time and usually retains a

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<sup>7</sup> Emily L. Brown, "Training Woody Plants in the Japanese Manner," Brooklyn Botanic Garden Record, Vol. XVII (Summer, 1961), p. 11.

different appearance in youth, maturity, and old-age.

\* Generally when form is applied in planting design it refers only to the plant outline or external contour. But form is really more than outline or external surfacing. It is a three dimensional entity comprised of height, width, and volume. It takes all three dimensions combined to complete the concept of form. The spacial characteristics of any woody plant are dependent solely upon the line pattern of the branches for its form. \* If the designer visualizes the form of the plant in the sense of "structural analysis", instead of outline, he will expedite for himself an easier and clearer understanding of the plant.

To arrive at a clearer understanding of plant form and what it can do in the landscape, it would be advantageous to differentiate the structural characteristics comprising plant form and discuss each one separately. Because of the misconception that height, width, and depth combine to produce growth habit, the author suggests the following breakdown of form characteristics to eliminate such an error. \* Visualizing the components of form as height, width, and growth habit, the true organic character of form is easily understood. This will simplify the possibility of error in forgetting any form character in the initial staging of the design.

Height, one of the three factors comprising form, should consider the human figure in relationship to the surrounding features of the landscape. It should be remembered that creating emotional effects upon people is the purpose for producing design. It is people who will be viewing and reacting to the creation. If the design is meant to be intimate, natural, or monumental in scale, then plant heights should be considered to reflect this character.

Height of plants may be used to break the monotony of vertical or horizontal lines. It may be considered to emphasize, compliment, or exaggerate the natural features in the landscape; such as water, land, sky, rock, or vegetation. Plant height may also be used to screen unsightly views or frame an exciting vista. \*Always, though, it is considered in relation to the human figure.

Plant heights are generally categorized into three main classifications. First are the ground covers, often considered the foreground planting because anything taller in front of them screens them from view. Because scale is a relative factor, exact height of the ground cover depends upon the vantage point from which it is to be observed. Generally it is defined as anything below eye-level. The forest could be a ground cover from the air or give the same visual appearance on a distant mountain. The second class is called the plants of enclosure. These are three dimensional types of vegetation which define space and

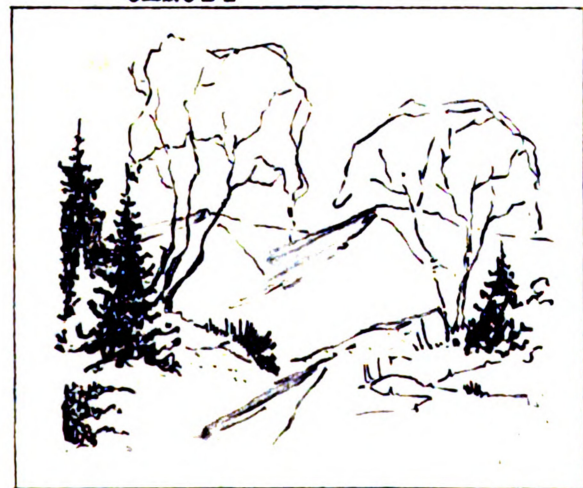
## GROUND COVER



## ENCLOSURE



## CANOPY



obscure the normal viewing plane. Here again, eye level is the determining factor. The last class, the canopy, again defines space but does not obstruct the view. It acts as an element of enclosure by providing a roof out-of-doors. The canopy also provides shade, defines space, and breaks the skyline.

These three categories used in harmony create the visual esthetic appeal of height. Plant height may be used to establish a scale relationship with the observer, to create volumes in space, to screen views or to accent vistas. It may also be used in varying combinations to create other special effects. An example of this is the use of trees and shrubs to soften the harsh lines of architecture.

Fig. 2 A good view made better, by the use of the three height classifications.

One final important quality of height is the silhouette created through massing varying heights of plants. Though it may not be consciously observed by the layman, the silhouette plays a vital role in the design composition. The designer should not limit himself to plan view studies alone, but should also make use of elevation sketches that define the character of the silhouette. It is considered common practice in many cases to draw a desired silhouette in elevation first, and then complete the scheme by filling in the plants to fit the proposed outline. When possible, this method of procedure is heartily recommended to obtain the greatest esthetic benefits.

✕ Width, the second factor of form, is that dimension which is characterized by a circular pattern in plan view. If the planting designer is to master the full esthetic potential of plant forms, he must be able to visualize the plant width and understand its role in obtaining the various form characteristics through spacing techniques. Variable widths from the narrow, fastigiate column to the broad and spreading ovals are available.

By spacing variations, plant form may contribute more versatility to the scheme. Some general form characteristics that may be created by different spacing techniques of plant materials are hedges, specimens, clumps, canopies, and shrub masses. If the aim of the

designer is to create a hedge, for example, the plants are spaced in a row so that the tips of the plant's branching structure either touch or overlap. In a specimen planting though, the branching tips are left to spread naturally.

Spacing may also control the plant width as well as its form, due to the crowding effects of adjacent plants. The specimen plant displays its natural character of height, width, and growth habit i.e. its natural form, but when the plant is placed in a group, it quite often expresses a different character. The plant may lose its individual qualities and exhibit only the character of the group, or if the individual qualities are retained, the form may become altered due to the external forces exerted by the neighboring plants.

Different spacings then, will effect the plant form and no strict rules of spacing will apply to all situations. The designer decides only upon the effect he is trying to obtain and spaces the material accordingly. Through imaginative spacing, countless variations may add excitement, and interest. Just as the elevation studies aid in understanding the height and growth habit, they also should be used to help the designer visualize the effects of plant width and spacing in the planning stage. By neglecting this resourceful aid, worthwhile effects from crowding, grouping, or clumping may be lost. Unless the designer graphically portrays each situation,



he may create a visual pattern which runs counter to his mental image and alters the anticipated design complex. Since it is so simple to sketch an elevation study and thereby be able to observe the properties that will be displayed by the plants, it would seem ridiculous to leave the design proposal to materialize by guess, happenstance, or luck.

Growth Habit, the third and final factor comprising the plant form. It is important in the overall design concept for it is "expressive" of the structural form, "suggestive" of the activities which take place beneath the surface, and usually "symbolic" of the surrounding environment.

If a plant is allowed to grow naturally, that is, all environmental factors balanced, its outline and branching structure will form a definite and recognizable pattern for that species. This pattern is called the growth habit. Thus growth habit is more than outline or external surfacing. It refers to the plant's depth i.e. its "organic" form. Because of this added dimension, the growth habit is a selection for sculpture in space. Volumes of foliage in pleasing proportion are an attribute of planting design that is readily available to add visual delight for the observer.

The classification of growth habit can become so involved that even the most experienced plantsman may be

confused. Because of this fact, in a system of classification it is better to neglect the "seldom found" growth habits and classify plants only under general headings. These headings should be considered flexible enough to include any slight variation.

Listed below is an example of a simplified growth habit, classification system. By a single selection from each group a growth habit may be obtained.

1. Branching structure
  - a. horizontal
  - b. pendulous
  - c. ascending
  - d. irregular
2. Outline
  - a. columnar
  - b. pyramidal
  - c. round
  - d. oval
  - e. vase
  - f. broad or spreading
  - g. picturesque

Note that height and width may be independently selected to combine with growth habit. None of the three major characteristics of form is necessarily dependent upon the other for its choice in the landscape.

Different effects may be created by different combinations. However, caution must be exercised in combining the growth habit of one plant in association with that of another. \*If, in massing of plants, a harmonious blending of growth habits does not exist, the scene is quickly repelled by the eye and no pleasing combination of fruit,

flower, or texture can mend the initial blurred relationship. An aid to procuring a harmonious relationship of growth habits is through a basic understanding of plant ecology. In nature, general relationships in growth habit are common. With the innumerable scenes created, never the same scene repeated, rarely are growth habits conflicting or found not to combine well. If these same general form relationships are applied in a controlled planting, the results will undoubtedly be pleasing. In a controlled planting, however, plants may display a greater esthetic potential through substitution of a plant with the same form relationship for a plant that has been propagated to improve the seasonal effects. A walk through the native landscape, mentally observing the way nature combines plant forms, will always enrich the understanding of obtaining a unified feeling between different plant growth habits.

\* Learn the architecture of plant material. To appreciate the unique beauty of the line pattern of a plant's branches and to value a complimented surrounding, is a fundamental understanding for selection of plant material to build a planting scheme. \* Observe that nature has a long list of plants but the individual settings always appear as if the plants were selected with restraint and discretion.

In other words, rather than to have merely scientific knowledge of all the facts, we must strengthen our instinctive communication with nature so as to learn to feel her.

Eliel Saarinen

The growth habit analysis should not stop at the harmonious blending of one plant to the next, for this would limit its esthetic potential. The character of growth habit should be selected to pursue other purposes as well. This forceful attribute could also be used to stimulate a desired emotional response. For example, the peaceful line patterns of the weeping willow, or the exciting spires of fir create differing moods. Reflect for a moment the inherent feeling of tranquility exhibited by the growth habit of indigenous beech and maple along the New England countryside. Growth habit could also be used to compliment the surroundings as the dogwood's horizontal branches exemplify the level plane of land, while the fir's reaching tips accent the height of a hill. It may be desirable that the growth habit be selected to lead the eye, as the drooping branches of the weeping willow point to its own reflection at the water's edge. Many possibilities exist, and exciting combinations are awaiting the imaginative mind.

#### \*Texture

From variations in structure and silhouette to variations in texture is a step from complexity to infinity.

Garrett Eckbo

The texture of vegetation is controlled by two plant properties, the foliage mass and branching structure. Usually texture is a result of an interaction of the two properties. But where the foliage mass is dense and

obstructs the character of the branching structure or during the dormant months for deciduous trees, only one property may be in control of the plant texture.

Normally the two properties effecting plant texture are the result of a compounding process of several plant features. The texture of foliage may be classed by:

- (1) Size, from the tiny scales of juniper through the opposite extreme of the elephant ears and palms.
- (2) Form, such as linear, lanceolate, ovate, obovate, cordate with intermediates like linear-lanceolate, and cordate-obovate.
- (3) Margin, simple to fine toothed, to coarse toothed, and lobed.
- (4) Surface appearance of glabrous through pubescent.

Also other major foliage characteristics as:

- (5) Thickness and stiffness.
- (6) Petiole length.
- (7) Pinnation.
- (8) Arrangement on the plant structure.

The branching structure has a textural interpolation of:

- (1) Branch thickness.
- (2) Line quality.
- (3) Surface texture.

These numerous qualities that combine to produce texture in plant materials are increasingly complex. To arrive at some kind of order and unity they are classed by an over-all visual appearance. But, even when

considering the general textural classifications of the foliage and structure, the richness of the plant palette becomes increasingly fascinating.

\*If texture is to be used effectively in the esthetic appeal of the planting scheme, the physical plant properties that combine to produce texture should be generally understood. Equally important, if not more so, is the external factor of "scale relationship" that initially established the textural character.

The texture exhibited by plant material is not always constant. It will vary by the distance of the observer from the plant. The landscape is fluent and may be enjoyed from many vantage points. The asset of movement through, across, and around the topography adds versatility and excitement to the design potential. One versatile feature of mobility is the change in scale relation between the observer and his surroundings. The different textural qualities of the plant may change in the distance of a few feet to as much as one hundred yards. A plant's leaves and branching structure may lose their individual identity at a distance and become a soft foliage mass, while the same planting in the foreground may produce a coarse texture.

One feature of scale relationship yet not mentioned but worthy of the designer's consideration, is the



Fig. 3 The coarse line pattern exhibited by a Live Oak. Muir Woods, California.

establishment of a scale between the texture of a plant and its surroundings. Without this scale relationship, a plant could not be classified as either having a coarse or fine texture. Because the human mind works by comparison, unless more than one texture exists where a point of reference can be established, it would be impossible to classify any single texture.

The genesis of plant texture, then, originates through a scale relationship. The textural qualities of the plant will change unless the scale relationship between the observer and the plant remain constant. Secondly, different physical plant properties combine in varying fractions to produce texture. Once these two considerations are established, the benefits that may be derived from textural versatility are unlimited. A distant vista may appear to advance and seem shorter than it actually is by using coarse textures in the distance and fine textures in the foreground. The close intimate garden may be made to appear larger by the

use of finer textured material. One area may be defined from another by a change in texture or allowed visually to flow together in unison by like texture. The coarse and gnarled structure of the oak may exemplify the rugged terrain or add variety to the surroundings, in contrast to the fine texture of the boxwood that may complement the formal garden. The observer may feel different emotional appeals as he passes through the landscape or grasp the total feeling of unity that is being carried out by textural harmony.

### Color

The world would be a drab and gloomy place in which to live if color were denied us. The palette of the planting designer would be less expressive with only form, texture, and arrangement remaining to challenge the visual enjoyment of plant material. Thanks to the physiological functions of the eye and the psychological factors that influence the appearance of the spectrum, our lives are enriched by the vibrant excitement of color.

Yet color is not the beginning nor is it the end of planting design. Other properties may provide more lasting effects. Form, for example, may develop a pattern that is pleasing twelve months of the year. Color is transient and capricious. Even evergreens that display the same foliage year-round are subject to variations, depending upon soil, atmosphere, cultivation, climate,



seasons, light, shadows, and humidity.

Color is a controversial subject. This observation probably stems from the fact that no two people see color alike.\* Like food, color is a personal matter and its quality of appeal originates in individual taste.

Most theories of color can not be readily adapted to the landscape. Any ready-made system for color combinations in planting design should be observed with skepticism. Good taste and restraint combine to make a better guide.\* The common theory of color harmony, based on pigment, does not consider the combinations produced through vision. The spectrum theory of light waves does not consider the factors of environment.<sup>8</sup>

Because color is subject to many variables of plant culture and environmental influences, and, because it is a psychological phenomena based on personal taste, rules for its use defy logical definition. Nevertheless it is important to consider color along with other plant qualities, to create a successful esthetic expression.

The average color problem is a matter of physiological and visual judgment. The landscape architect is more concerned with the result of color stimulation than

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<sup>8</sup> H. Stuart Ortloff and Henry B. Raymore, Color and Design for Every Garden (New York: M. Barrows and Company, Inc., 1951), p. 89.

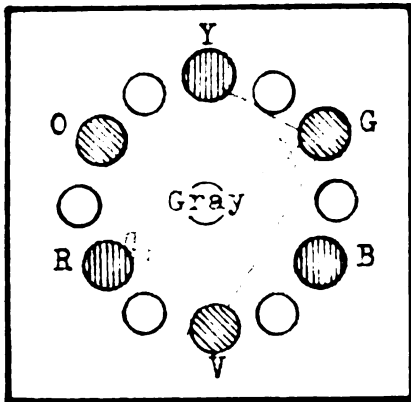


Fig. 4 Color Wheel

with the nature of color itself.

No color is, in itself, necessarily disagreeable. Rather, it is the relation between two colors that determines their appeal. Even the apparent intensity is determined by

other colors with which it is observed. When two colors are viewed simultaneously, they neutralize each other in varying degrees. By drawing a straight line across the color wheel and connecting any two hues, the amount of neutralization may be graphically illustrated. The amount of neutralization, or graying effect, is relative to the proportion of one hue to the other and upon their related positions in the spectrum. The closer the mixture approaches the center of the color wheel, the greater the amount of neutralization. Hence the maximum neutralization is obtained by equal proportion of directly opposite hues. (See Fig. 4) The eye is itself an instrument in color reception. It does not merely record, but actually "creates" effects in and of itself. The color properties of plant material display the same character and may be toned down or grayed with contrast.

Like sound, color is a sensation. To the eye color is a matter of sensation causing emotional responses, associations, and mental judgments. It is gay or depressing, exciting or subduing, restful or stimulating. Color

too, when put together in an orderly manner by a composer, can have harmony, as opposed to discord.

We may associate some colors with mental frameworks and moods, even though no absolute values have been agreed upon. The subject is open to individual interpretation. Research by psychologists has shown that certain general reactions are usual with most people. Below are listed some of the psychological stimulations generally perceived from certain colors. Note that most relationships may stem from natural elements in the landscape.

White-----purity, possible from the association of fresh snow, cleanliness

Blue-----cold, serene, depressing, sedate. -  
Deepness of water or shadows at night

Green-----cool, life, restful, well understood when considering the use made by nature

Yellow-----stimulating, easily associated with fun and the sun and its warmth

Red-----exciting, danger, closely related to blood

Table 1. Psychological stimulations generally associated with selected colors.

Hues are classified as either warm or cold. In general, the longer wave length colors: red, orange, yellow, and amber are considered warm colors. The shorter wave lengths of green, blue, and violet are considered cool colors. Warm colors may be classed as those colors when red equals



or exceeds the other primaries, and the cool colors as those in which greens and blues are predominant.

It is well to remember that some people subconsciously associate warm colors with heat. This phenomenon may be used to advantage in planting design. Very warm colors may, at times, quicken activity, so that people do not desire to remain in one spot. Cool colors may counter this reaction, and on occasion, even result in people feeling chilly. Cool colors seem to recede from the observer, and warm colors advance. Thus a small area may be made to seem larger by using a cool color; or a large area made smaller through the use of warm colors.<sup>9</sup> Nature employs the cool colors in large areas, as for example green forest, blue sky, blue-green oceans, and we associate these colors with space and large dimensions. The warm colors are frequently used by nature more as accent.

A great many factors are involved, apart from physical stimulation of the eye and brain as a consequence of color. The mind may record a certain emotional response to a particular color and later this color will stimulate that emotion whenever perceived. Once a person is conscious of the presence of a certain color he will continue to include this in his conscious recognition. The reaction in feelings may be numerous and varied. It may be that yellow

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<sup>9</sup>While psychological factors play a part in this phenomena, there is also an explanation in optics dealing with the different focal lengths in the eye.

stimulated a joyous feeling from a happy childhood memory of forsythia in bloom outside the door, or it may be that red stimulated a depressed feeling because of an association with an unpleasant past experience.

Restraint is the key to color success. But like other qualities that are monotonously repeated, any single color will crave a change. The amount of color introduced may fluctuate according to individual taste. With adequate planning plus imagination, color may be found to aid in the planting design by adding a vibrant accent. As a number of colors increase in a planting scheme, considerations as to quality and relationships with surrounding elements must be more carefully weighed. As a safety precaution, a dominant color may be adopted to guard against conflicting color schemes. All other color displays are then subordinate, and used only for accent or contrast. This method is often helpful for those whose color perception or understanding is not exceptionally proficient. The seasonal border may be experimented with herbaceous plants without much loss of time or effort. With trees and shrubs, though, the planting is more permanent and not so easily changed.

It is safe to assume that persistent colors of brown and greens, existing in the natural landscape, may be used in quantity without dissatisfying results. It is the unnatural variations that must be used with caution.

To illustrate, the variegated leaves of silver and yellow or the purple leaved plants appear unnatural and project themselves as specimens and appear out of character.<sup>10</sup>

In a situation such as a public display garden where an unnatural environment is the design intent, it may be legitimate and desirable to use golden or purple foliage. Except for a very few well chosen situations, unnatural color variations should remain out of an area that is trying to look natural.<sup>11</sup>

Surrounding Ecological Effects of Color. Most foliage is green, but variations in tone, intensity, and value differ greatly. The most striking contrast in color variation of foliage is noted in the different major climatic zones. The stronger, darker greens with fine glossy surfaces are developed in the humid zones of the tropical and temperate forests. The more arid zones, with extreme ranges in temperature, tend toward gray-greens and brown-greens with dull and fuzzy surfaces that act as protective coatings. (C.F.V.)

A more subtle contrast, but one affecting the environmental adaptation of the plant, is the variation in plant foliage between shade tolerant and sun loving

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<sup>10</sup>Garrett Eckbo, Landscape for Living (New York: F. W. Dodge Corporation, 1950), p. 103.

<sup>11</sup>Henry Vincent Hubbard and Theodora Kimball, An Introduction to the Study of Landscape Design (2nd ed.; New York: Cuneo Press of New England, Inc., 1959), p. 160.

vegetation. Although greens are available in a gauntlet of variations, the designer may find it difficult to obtain the desired value that will tolerate a given exposure. In general, the heavier, darker greens of plants with glossy surfaces require partial to full shade; while the lighter, thinner greens are typical of sun loving type plants. Because certain foliage colors require definite settings the atmosphere, light, and exposure peculiar to any plant should be examined. The designer may try to use the lighter values in shady areas to discourage the feeling of oppression or discomfort. But if environmental adaptations are neglected considerations, both the plant and visual qualities resulting will be disappointing.

The time of intense use, the size of the area, and the existing features present in the area, are three major factors in the design analysis that should be considered in the selection of color. It would seem rather facetious to plan a spring floral bloom or an autumn foliage effect if the expectant recipients were to be absent during the time of its festive display. Yet, if caution is not exercised in planning, an accident of this nature could happen.

There exists a relative proportion between the size of an area and the amount of color that should be used. In a large area, a greater amount of color may be exhibited without dissatisfaction. If the same amount of color is



injected in an intimate space, the results could be disastrous! This proportion of color remains relative to the individual design analysis, and the designer's ability to blend and plan the various seasonal effects of color harmoniously.

Any existing feature that is present in the landscape, either man-made or natural, will affect the color scheme. It may, upon occasion, even dictate the choice of color. The chalky stems of a white birch would lose their effectiveness against a white surface, whereas the same white stems used against a darker surface present a vibrant effect. Such features as rocks, architectural elements, or water may all play an active role in producing the pleasing color combinations of plant materials. When the designer realizes the benefits that may be derived through careful use of these natural features for advantage, the effectiveness of his planting may be made to multiply many fold.

Every feature of the plant is possessive of color though each plant species varies as to its individual color characteristics. Some plants display more outstanding features for esthetic appeal than others.\* Because of this versatile asset, numerous color effects may be displayed twelve months of the year without relying on repetition of identical plant properties. During the spring months, for example, large displays of color may

be produced by floral effects. The summer color may be a combination of flower, foliage, and bark contrasts. As autumn approaches, it is highlighted by deciduous foliage variations, bright colored fruit and fall bloom. The winter months are carried by evergreen foliage, persistent fruit, different colored twigs and bark, and the buds showing promise of blooms to come. When considering plant colors, and how they affect the use of the plants, the individual color problems seem perplexing. But each design analysis usually demands certain criteria. If the designer recognizes these requirements, acknowledges and solves them, the number of individual problems are immediately reduced. Further exploitation of color, though it can be neglected, serves to enhance the scheme to a larger dimension. The solution of individual problems presented by color, as well as other plant qualities, will develop through practice. Although each specific situation will not present itself consciously in the designer's mind, by developed techniques, its application will be present in the final analysis.

#### Dimension of Time and Space

Life is perhaps the greatest differentiating force between the two dimensional painting and the three dimensional landscape. Just as the architect's terrazzo and concrete lie in defiance of time, the artist's composition of a painting never alters with age. Conversely,

the planting designer's materials are never static.\* The rate of growth distinctly points to the plant as a living organism, and obviously a changing design material. Though the momentary change is slight, time produces large alterations in space.

While observing a plant living its yearly cycle, the hour by hour change is considered as a factor in shadow, contrast, and color variation, but these changes can hardly be tied to growth increment or any other life giving quality. The scene is first one thing in January, another in May, and still another in October. With each season though, the plant brings a new, exciting, and different effect. It grows, buds, flowers, seeds, and withers. The seed conceals the potential of a plant's form but growth adds its charm by altering the shape at infancy, to maturity, and old age.

Life, certainly, is deserving of consideration. For one to examine only color, texture, and mass in design, is to concede that planting design is only decorative, an unchanging art that is no different from that of a painting. It is this particular esthetic quality, producing a change in time and space, that lends plasticity to the profession. Because of the challenge of continual change, landscape architecture is incomparable with the other creative arts.



Fig. 5 In old age the plant takes on a different appearance. It becomes open in character, and the plant's form is more easily influenced by environmental factors.

Because growth is constantly altering the plant's character, the wise designer will never create a single image for a living plant. The beauty man enjoys in the annual springtime elongations of new growth on plants is an intriguing effect created by nature's law of plant growth. From the earliest stages of life, a plant's height, width, and growth habit are changing. The life span varies, of course, with the individual species, but most plants follow a general growth pattern. In youth, the plants are more columnar, with a narrow-oval crown, and the growth increment is usually largest. These three growth characteristics may all be attributed to the fact that in youth the plant is striving for mastery over its neighbors by reaching upwards for sunlight. A more definite botanical classification perhaps, is that in youth the upright terminal buds are always stimulated to a greater degree than side terminal buds or any lateral buds. Basically man is observing tender new growth unfolding in an esthetic pattern which on closer inspection is found to conform to a recognizable geometric progression. (See Table 2) At

maturity, the vertical growth is slowed almost to a standstill and the side terminal buds acquire most of the growth. Hence, the plant begins to take on a more rounded, shaped head. In old age, the youthful vigor of the plant is lost and it becomes easily susceptible to insects and disease. The plant becomes open in character or, using the adapted adjective of the landscape architect, "picturesque". More limbs, twigs and foliage are shed than are acquired by new growth.

Thus, the modifications produced by growth present the plant as a living, changing material. A material that does not retain a constant shape, size, or figuration. To overlook such a versatile quality, or create just a single image for a living plant, would be materially limiting the potential of design.

DEPT. OF URBAN PLANNING  
& LANDSCAPE ARCHITECTURE  
MICHIGAN STATE UNIVERSITY

LOCATION OF LEADER GROWTH BUDS ON TREES	RANGE IN AMOUNTS OF WOODY GROWTH BY NEW LEADERS		RANGE IN PROPORTIONS OF LEADER GROWTH		APPROX- IMATE GROWTH RATIO
	TREE WITH MINIMUM GROWTH IN INCHES	TREE WITH MAXIMUM GROWTH IN INCHES	MINIMUM %	MAXIMUM %	
1. TIP WHORL	16"	22"	100.0	100.0	1
2. FIRST LATERAL BRANCH, DOWN FROM TIP WHORL	11"	14"	68.0	63.6	2/3
3. SECOND LATERAL BRANCH, DOWN FROM TIP WHORL	8"	12"	50.0	54.5	1/2
4. THIRD LATERAL BRANCH, DOWN FROM TIP WHORL	5"	7"	31.2	31.5	1/3
5. FOURTH LATERAL BRANCH, DOWN FROM TIP WHORL	2½"	4"	15.6	18.1	1/6

Table 2. Table showing inches of minimum and maximum new growth observed by the author among ten unsheared, eight year old *Pinus sylvestris*, Montcalm County, Michigan, on June 11, 1961.

OBSERVATION: Vigorous amounts of new woody growth appear only in the upper branching structure of scotch pine trees. Growth appearing on the lowest branch is only one-sixth of that found at tip.

CONCLUSIONS: The natural symmetrical pattern of new growth in young scotch pine trees appears to comply with a natural law of mathematical progression. Lower branches are permitted only minimum growth with increasing amounts of energy for growth released to upper lateral branches until the tip receives full maximum growth.\* Thus, man sees in the world of plants an illustration of symmetry and beauty in design based on systematized mathematical relationships.

## SPECIAL EFFECTS WITH PLANT QUALITIES

To list the endless and fascinating effects that might be created with plant qualities, would be far beyond the scope of this thesis. Yet, some specialized creations such as shadows, movement, pruning, and space organization are worthy of discussion to add clarity to the preceding chapter and to give helpful examples for finding the esthetic considerations in the effective use of plant materials.

### Shadows

\* Shadows would certainly be high on the list of esthetic effect created by plant qualities. Against building, screens, and fences, on the patio or spreading across the lawn, the shadow provides a moving pattern; varying in intensity and value and changing with each hour.

The planting designer has little, if any, control over shadows produced by existing architectural elements or clouds. But he may control, in his designs, the shadows produced by plant materials that are needed for shade, excitement in character, and the welcome change in visual patterns. With the proper intensity of illumination, whether the plant is broadleaf or conifer, deciduous or evergreen, ground cover or canopy, shadows are present during all seasons. At noon they are well defined by sharp lines of contrast; in the evening they are deep in value; and at night, when created by







Fig. 6 The "cast shadow" is typified by foliage patterns that play upon the walls, patio, and lawn.

artificial illumination, often weird, mysterious and exciting. The shadows produced by a full moon are one of the most exciting effects to witness that can be created by plants, especially trees. This scene is often further enhanced by movement caused from clouds, wind, or the earth's rotation.

Any object in space, whether organic or inorganic, is capable of exhibiting two different types of shadows: the "cast shadow", and the "self shadow".<sup>12</sup> The average viewer considers them both as just "shadows", following the old proverb "pigs is pigs". But the designer should be more articulate and consider shadows as two types, each playing different roles in the design. The "cast shadow", (See Fig. 6) is that which is projected upon another object. This type of shadow, created by foliage, produces the pleasing visual patterns that play across the walls, lawns, and terraces. Otherwise uninteresting, monotonous walls may be completely redeemed by cast shadows of stems and

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<sup>12</sup>George Howard Opdyke, Art and Nature Appreciation (New York: Norwood Press Linotype, Inc., 1932), p. 98.

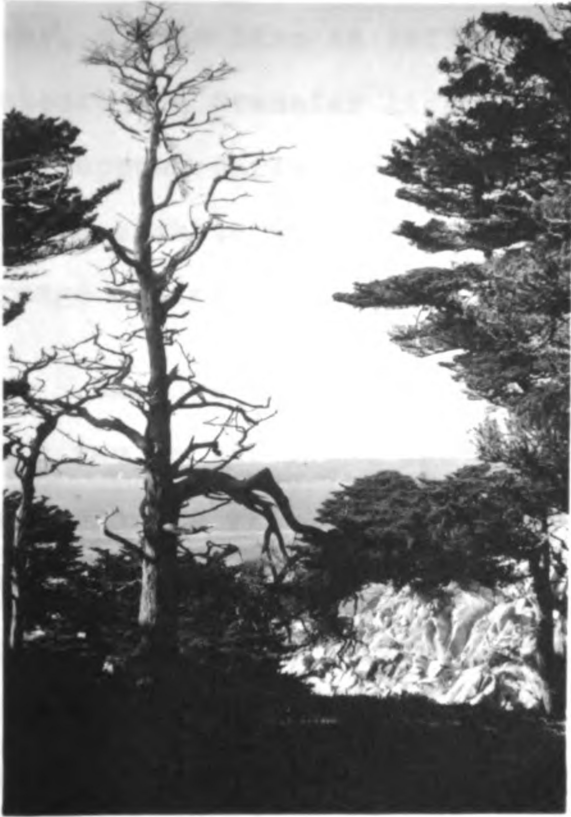


Fig. 7 In this photograph, the "self shadow" is well displayed on the trunk of a dead Monterey Cypress.

leaves. The shape, size, and length of the cast shadow are dependent upon the size of the plant and the angle of light. Its sharpness is influenced by the amount of illumination, the distance the surface is from the shadow and the proportion of translucent quality exhibited by the casting properties.

In contrast, the "self shadow", (See Fig. 7) is the unilluminated face of an

object when light is reflected upon it. Here the sharp lines of contrast are noted on stems and trunk or the gradual softening from light to dark of translucent leaves.

The effect of light on vegetation is very different from its effect on architecture. With foliage, the sun at various times of the day can produce a series of different effects from the same material. The leaves are usually translucent and shadows are soft, ranging from light to dark in a graduated process. The trunks, twigs and branches though, are impervious to the light rays and cause sharp lines of contrast. Unlike most inorganic

surfaces which reflect light in a regular and predictable way, plants have an infinite variety of textures, which absorb and transfer light in various manners. A surface may appear darker with foliage than that of a hard surfaced architectural feature, but still maintain a greater range of tones.

Shadows in vegetation range from the blackness of the yew to the light and soft shadows of a birch. Leaves and flowers when lit from behind by a low sun make the colors seem more intense or when placed in contrast against a darker surface of trees, rocks, or buildings, display deeper tones. Light bounces off thick or waxy leaves giving them a special luster with sharp contrasts of dark and light. The needle-like foliage of a conifer absorbs large quantities of light, making its over-all appearance darker than the broad leaf foliage, and with deeper shadow variations.

Even the length of the patio and the arrangement of the foliage upon the plant influence the character of the "cast" and "self" shadow. Bold, large-leaved plants create deep, eye-stopping shadows that may be used to hold the eye. Conversely, small-leaved plants allow the eye to slide over the plant to something of greater interest.

## Movement

While physical movement is basically a time and space dimension, movement may also be viewed in a simulated sense. The physical swaying of branches and stems, or fluttering of foliage created by wind, accelerates the fluent qualities of a design, but the general intention of simulated movement is revealed through suggestive motion. This is conceived by providing for changes in color, lights and darks, height variations, and texture to lead the eye throughout the design. Because these contrasting changes are closely related to motion, they will contribute as much to the perception of motion as actual movement itself.

Such suggestive motion in the landscape is accomplished by proper use of the principles of design with special emphasis on rhythm and sequence. Sequence adds continuity to the scheme with a succession of visual experiences having connection, while rhythm aids the eye fluently in passing throughout the composition. Although rhythm is essentially repetition, it need not be monotonous repetition of equal proportion. It may be an interest appealing repetition of elements whose differences progressively unfold uniformly. Thus the rhythmic patterns may get larger or smaller as they appear in a landscape.

Just as rhythm in music produces a feeling of movement, so can the use of rhythm in the landscape. But music can only be studied or played one way, beginning at a note in



Fig. 8 Special effects that otherwise would be unobtainable may be procured through lifting the foliage line and exposing the branching structure.

the score and playing to the end. In the landscape, however, rhythm must maintain the capacity to be appreciated in every direction. People live a mobile existence and their experiences are rarely static. Almost always there is physical movement involved in human associations with the landscape. The observation pattern is seldom from one fixed focal point but rather from an infinite number of viewing points. The complexity of the problem,

therefore, requires the designer to combine the principles of design, lights and darks, textures, colors, height variations, and human mobility in achieving the simulation of motion.

### Pruning

Because of inherent growth habits, natural woody plants provide a living sculpture; a unique scene that is by itself, magnificent. Yet through cautious execution of pruning, the scene may be modified to create effects that are otherwise unobtainable.



Fig. 9 A Formal Garden

Pruning is usually done for three reasons: to aid the health of a plant, improve its appearance, or train into an unnatural form. The first of these three reasons adds new vigor to the plant by removal of dead, diseased, and excessive growth. This practice will often accelerate growth and produce a much heartier specimen. Pruning techniques may be employed to provide accent to an interesting plant feature. This technique may yield contorted growth pattern or expose an interesting branching structure. Also, shadow patterns may further be enhanced if some of the foliage is removed, allowing more light to penetrate through the plant. Through pruning to modify appearances, an unlimited potential exists. Sometimes it is not easily discovered because of confusion from large foliage masses. Once found though, just a light pruning will often reveal the most of the richness at hand.

Clipping and training the plant into an unnatural form should not be totally rejected as "outdated" by the contemporary movement of naturalized settings. People have different personalities, and no two people will necessarily favor the same type of landscape. The two schools of thought on formal and informal gardening were once bitter enemies, though today, the purposes of each may be





Fig. 10 This small urban garden by Thomas Church is an example of plant material that has been clipped and trained into unnatural forms with satisfying results.

utilized effectively, each in its own adapted setting, striving to serve the final goal of giving man a sense of belonging in nature.

Pruning from the outside of a plant is often unwisely resorted to when, actually, the plant should be discarded because of age or excessive size. Pruning for no more purpose than

reducing circumference is to be looked upon with skepticism. In fact, shearing or trimming other than for formal effects is generally undesirable for the mere sake of neatness. No project of limiting growth for practical purposes should be considered unless it also serves an esthetic function. If a plant's shape is to be maintained for such attributes as espaliers, pleaching, or trained vines, pruning of the outside foliage may be desirable. Topiary work, however, is time consuming and requires careful execution as well as a suitable place in the landscape.

Some topiary work as seen in formal European gardens and in early American colonial gardens may be well adapted to the small urban gardens of today. Woody plants may need control to keep them in proportion to their surroundings. But the pruning of plants goes far beyond utilitarian

practices. Its fundamental aim should be to please the senses of man.

Pruning can also be an asset to the naturalized landscape planting. Even when plants that are best sculptured by nature are brought into captive surroundings, they often may be assisted by pruning to accentuate, but not change, the basic form.

\* When a dense mass of foliage is not needed for screening or enclosure, the use of pruning shears may create exciting spatial effects.

\* Since the volume of air space in a garden is just as important as the volume of foliage, you may gain more than you realize in scale by lifting the foliage line, clearing out the center or even reshaping trees by major surgery.

Thomas Church

Mr. Church often takes advantage of large existing trees and accents their branching structure by pruning of lower branches, exposing the natural form of the plant. The effectiveness of both large coarse trunks and thin multi-stemmed plants has been demonstrated when some foliage bearing stems are removed.

\* If the designer remembers that pruning is used as a means to an end, a sense of belonging in nature for man, he will concede that all three reasons for pruning are acceptable, and an advantageous function that adds further to the versatility of his profession. But each



method must be used with discretion so that each plant may adapt to its individual setting.

### Space Organization

The purpose of the planting designer is not just the grouping of forms of varying sizes and proportions, in a three dimensional arrangement. Rather, the purpose is to create the kind of space that will orient an individual to nature. What kind of space is inherent in a mechanical civilization? It certainly is not the bareness experienced by the leveling for a new subdivision, the cleared eight hundred foot right-of-way made for an expressway, or the cold expression of a skyscraper. Space in a mechanical civilization that will orient an individual to nature is a relationship that may be created by plants.

\* The plant's structure and foliage, combined with earth and sky, produce the surface, sides, and canopy to define or limit space into volumes of various proportion. As with sculpture in art, the effects depend largely on the interspatial balance that is achieved.

The well planned landscape is a conscious organization of materials in space, contrived in a high degree of order. The relationship of air space should be as important to the planting designer as the foliage mass which he used initially in creating this space. The designer may, by planned intent, establish a volume sequence with plant materials creating a mood of spatial excitement for

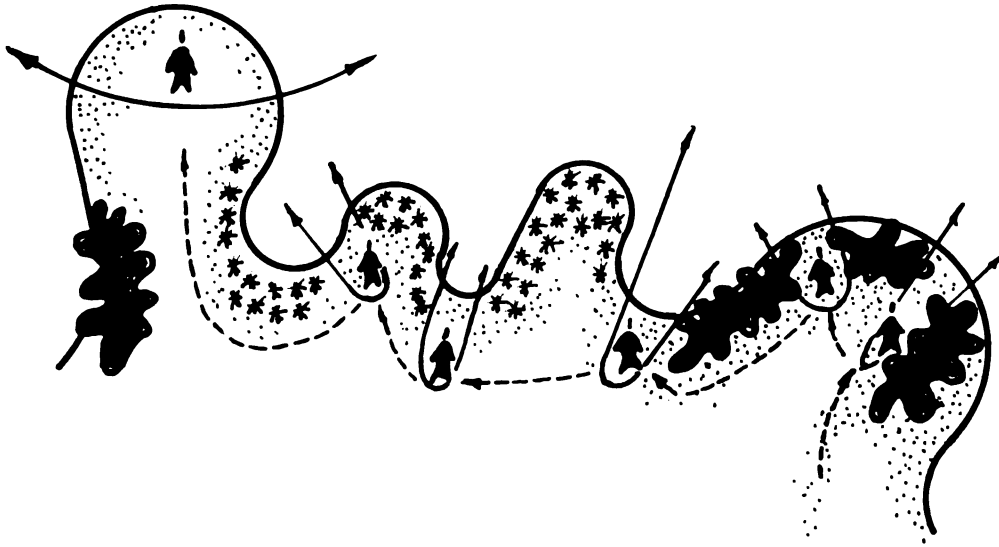


Fig. 11 A figure illustrating a quick passing glimpse through foliage, to a wider enframed vista, to the magnificent dynamics of the panoramic view. Adapted from John Ormsbee Simonds, Landscape Architecture: The Shaping of Man's Natural Environment, p. 117.

the observer as he moves through the landscape. People enjoy moving through space, around and past objects. They derive pleasure in moving from one space to another, with a pleasing volume transition. The opportunity of walking along a trail winding alternately through enclosed spaces, restricted spaces, and open prairies is more likely to offer an exciting experience than one limited in spatial variety.

✓ The observer in motion throughout the design, receives as great a pleasure in sensation from volume transition as from changes in texture, scent, patterns and color. Sometimes the transition is subtle, sometimes powerful. The design may compress plants into tight spaces, creating a relatively small volume. In respect to the movement

of the observer, these volumes may sequentially increase in proportion until the volume is released into a large open space which exhibits a dynamic feeling of awe.

The view is often the reason for the selection of a site. In organization of space, in such a case, the planting designer should study and analyze the view. And he should contrive to dramatize its full esthetic potential. Just as unity alone will crave variety, a view may lose its initial impact. To offset this phenomena, the use of foliage in the foreground develops visual excitement and constant appeal by change, accent, unknowns, enframement, and silhouette. The view enframed by a pine branch or a tree silhouetted against the horizon is often more moving than a direct view itself. The foreground planting produces darks and lights, color contrasts, shadows, balance, textural variations, and the element of unknown by obscuring the full panoramic view.

" Every plant, regardless of shape, size, texture, color, or form, is an object in space and an enclosure of space. The richness that plants may contribute, singly or in masses, as materials for the creation and organization of space is limited only by its cultural limitations and the scope of the design objectives." *Ecology*



## THE RELATIONSHIP OF ESTHETICS TO FUNCTIONAL DESIGN

To draw a sharp line between esthetics and utilitarian design would be a mistake, for it would serve only to confuse the designer in arriving at a sound basis underlying a truly functional landscape design. The functional landscape design must be expressive of the client's desires, as well as creative, indigenous, direct, and true. \*It must also satisfy both utilitarian and esthetic design entities so both aspects blend together congruently and appeal favorably to human emotions and form a pleasing mental response. But if either entity of design does not satisfactorily express its intended purpose, the ultimate goal of functional design is curtailed. / If it be assumed then that beauty serves a useful function, it would be impossible to separate altogether utility from beauty; for both are dedicated to achieving the same goal.

Perhaps an example of a simple residential entrance court could serve to further clarify this fact. If a given problem is to provide ease of access to and from the house, an eight foot wide sidewalk running directly from the parking area to the door specifically achieves this. Why then should the designer carry the project further? A solution of this nature that solves only the economic and mechanical aspects of design would answer only half the challenge. \*Providing for man's well-being and happiness does not arise through utilitarian mechanics

alone. The ultimate function of any design is for complete satisfaction of the emotions. The designer may go a step further and appeal to the psychological nature of man with esthetics. Through the use of form, color, line, texture, rhythm, sequence, balance, harmony, and a host of others, the design can complete its full intended potential. Now the sensory perceptions of sight, smell, touch, and sound are stimulated and the entire emotional system triggers a sense of well-being and satisfaction.

Man has sought from the beginning of time to express his feelings for beauty through painting, sculpture, textiles, architecture, and many other means of expression so that the field of art has become integrated with all our activities. \* In all useful objects society tends to prefer a visual appeal beyond that which results from merely satisfaction of utilitarian requirements. Human needs are not limited to the practical, and certainly there is no reason for them to be.

In the art of landscape planting, unsightly views may be screened out and interesting vistas accented. Textures may be blended, and the fragrance of spring bloom may fill the air to paint a pleasing image. Certainly esthetics may serve a functional mission in the solution of landscape design problems. This is not an aspect of the environment that can be neglected with satisfactory results.

As the landscape designer strives for the ultimate goal of functional design, he should remember the first requirement of beauty is that all objects serve a practical need. Ornamentation can not be justified unless it is properly designed for use. In the selection of plant materials, the designer's choice should be screened for the purpose of making his plants appear indigenous to their surroundings. The satisfaction of an object's appearance is measured in part by its fitness to serve the particular intended requirement. In order for an object or volume to be satisfactory to look upon, it must serve its particular function well. To accomplish this, the planting designer should design volumes in size and shape with materials that best express the use for which they were developed, and that best relate themselves to the surrounding ecology.

## THE PLANTING ANALYSIS

If a design functions poorly, more often than not it is a result of neglect in the infant stages of programing; the total concept not fully understood because the basic analysis was incomplete. It is important that all underlying forces affecting the particular problem be considered if the designer is to arrive at the ultimate functional goal in which his solution answers the problems of utilitarian and esthetic design. To do this, the programing phase must be a carefully planned search for relative information pertinent to the problems so study and synthesis can provide the strongest possible foundation to support the final conclusion. This in fact is design analysis.

In design, there is no dogmatic way of solving any given problem. For each design, there may be as many correct solutions as designers who would choose to approach it. This versatility in the final design should not be accounted for by differences presented in the design analysis but in the designer's ability to solve the problems it presents. That is to say, regardless of the individual's ability to design, the information gathered for a single design analysis should be constant for all who approach the problem. Regrettably, this fact is not always true.

\* The design analysis singles out all the requirements particular to the individual situation. There is no one



factor that would necessarily be intrinsic to every design. Each design in landscape planting presents its own individual problems, from the intangible concepts of line, mass, scale, harmony, and space relationship, to the tangible items of fruit, texture, bloom, and form. If by some miracle the design analysis could be tabulated, like a receipt, our mechanized civilization could be carried to further perfection. But, this advanced stage of evolution will probably never be reached. Somewhere near the extremes of the idealized diagrammatic solution, each designer selects a means that adjusts itself to the topography, influences of environment, circulation, and space restrictions. The degree of success for the final plan will in part reflect the accuracy staged in early programing. In other words,\* the final plan will be limited in success by the thoroughness and accuracy with which the planner initiates the design analysis.

People, plants, and the site conditions are the basic variables of planting design. The planting analysis, which is the main consideration here, is one phase of the design analysis. The two should not be confused. The planting analysis singles out all information pertinent to the plant scheme. The purpose of the planting analysis, like the design analysis, is to focus the design variables for each situation, so the designer may more accurately adjust all the requirements to fit the individual scheme

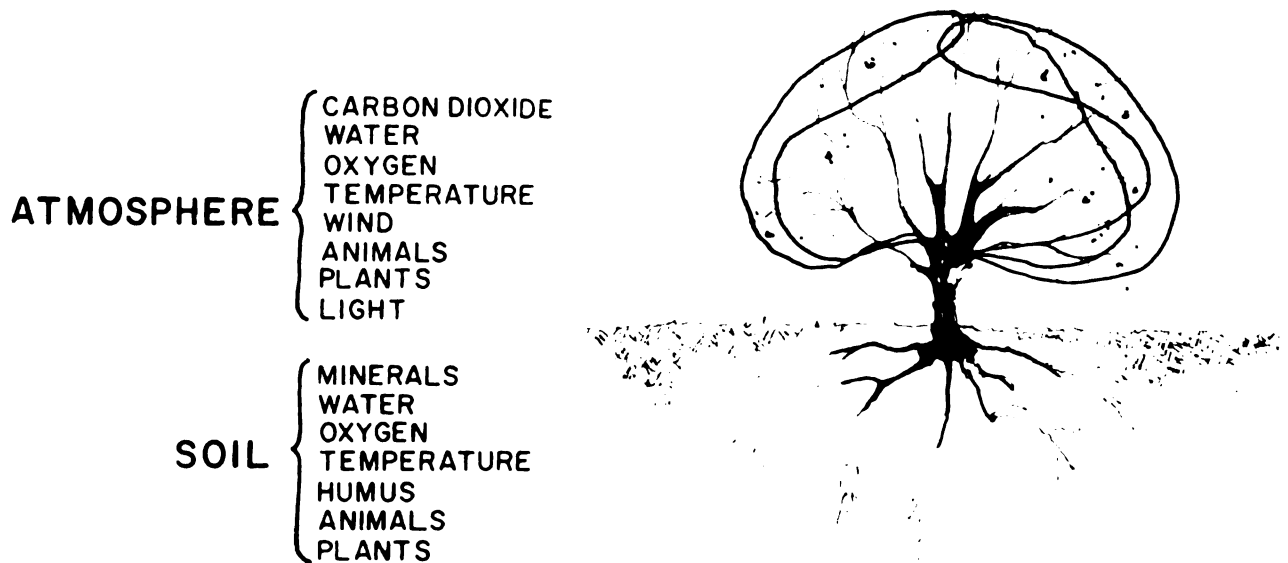


Fig. 12 Diagram showing the principle factors in the environment of land plants.

and insure that the total concept will never be lost to that of its individual parts. Without first considering the entire composition the planting designer can not create individual pieces and expect them to sum up to a unified design. The closer the basic intentions are analyzed, evaluated, and criticized, the longer the composition will continue to please.

### Plants

Plants are growing, living organisms which change with the seasons and alter their form with age. They are much like people, for they too must have certain conditions favorable to existence if they are to sustain life. Special requirements such as soil, climate, air circulation, exposure, drainage, and moisture especially affect the ability of a plant to produce the robust esthetic potential of which it is capable. People have certain associations in their minds about plants as to where they may appear natural when





Fig. 13 Pictured above is the U. S. Department of Agriculture's detailed map of thermal hardiness zones. It is available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.<sup>25</sup>

used in the landscape, or with what other plants they may best harmonize. The planting designer is not free, therefore, to disregard the individuality of the plant material with which he is working.

If the planting list is selected before the planting analysis has been thoroughly studied, mistakes will appear that are not easily correctable after the physical layout is completed. It would seem illogical to attempt solving all planting schemes with the same list of plants that would never permit variation regardless of the design situation. Rather, the plant list should be an outgrowth of the planting analysis and should be selected in relation

to existing features of the site, environmental factors, client's desires, and any other conditions particular to the individual design. ✕ In most cases, the basic design intent is not the individual bloom or plant; but the sequence of line, mass, color, texture, and space relationship that the total composition plays upon the observer's emotions. ✕ The whole should always dominate its parts.

One fundamental concern that does not present itself immediately, and might otherwise be overlooked if it were not for the planting analysis, is the problem of maintenance. Certain plants require more maintenance than others, and often the design may determine the degree of maintenance that can be expected. Because plant habits and growth increments vary, maintenance may be depended upon to sustain a certain feeling, balance or character. ✕ Thus, maintenance becomes a very important factor in the initial staging of design.

## People

There are two distinct types of landscape settings which exist today; the natural, and the humanized landscape. It is evident that the planting designer works with the latter. Otherwise, for what purpose would his efforts exist, if they were not intended for people? The natural landscape removes the human element, plants are untouched and left to grow in their natural character. In the humanized landscape though, plants are usually

protected from damaging influences that might be exerted by external forces. Here plants are disease controlled and also they are often hampered from portraying their natural form. The best conditions of light, air circulation, and soil are afforded the plant. These cultural influences exerted by man upon nature are accepted in the humanized scene. They are the result of pressures from time, economics, and temperament. They exist to adjust the landscape for modern man. None are in strict violation of nature's code. But in many cases, the planting designer does unjustifiably disregard the laws of nature in his adaptation of the landscape for man. Man no longer adjusts himself to nature; but now strives to adjust nature to benefit himself. This is fine, but his conception of paradise will continue to fail if his environment is designed to stand in obvious violation of nature and nature's principles. A planting analysis should place strong emphasis on nature's code, and insure against any faulty conceptions that run in opposition to it.

People live in cities, in the country, on ranches and in suburbs. Interests vary and no two people will view the same scene and observe the same things. To best meet the challenge of these varying situations, the designer should be conscious of how people are affected by their surroundings. An appropriate Arabian proverb explains the phenomenon this way, "The eye is blind to what the mind does not

see". Applying this proverb and studying values placed on various types of plant material by different people is one factor of consideration in the success of a planting design.

When will people be using the design? Will it permit prolonged study or only a sudden glance? Is it to suit a few or a few hundred? These and many other questions will need to be answered in relation to planting design for people. There is not a systematic approach to obtaining all the answers. It is up to the designer to search out the particulars that are important to the success of each design.

#### The Site Conditions

As indicated earlier, the existing site condition is one of three major design variables that must be investigated and analyzed during staging of the program requirements for the planting analysis. It should be dealt simultaneously with the other design variables so all factors may properly integrate in the final design.

The nature of the design will be the foundation on which to build the site analysis. Whether the design is to be a highway planting, park planting, or residential garden, it will immediately dictate certain criteria pertinent to the planting design. As an example, consider the implications involved in highway planting. Because of increased speed, the planting must not distract

the driver from watching the road. And since rapidly moving objects can not be perceived separately, individual plants on the roadside do not read as separate entities. What the motorist does see are areas of texture, volumes, voids, and silhouettes that are constantly changing. The emphasis on detail in this situation is meaningless. In contrast, emphasis on detail is of the utmost importance in the design of a residential site.

The methods and extent of the preliminary investigation will also depend in large measure upon the nature of the design. The designer may, depending upon the design condition, consider such aids as maps of the surrounding area, zoning and deed restrictions, rainfall charts, weather maps, existing and proposed utility systems. He may also consult with people that would closely be connected with the project, as an engineer, architect, maintenance personnel, and employees. Also a contour map is essential in most cases to understand fully the lay of the land. But these graphics should only be a supplement in the programing phase to actual site visitation. Words and symbols are only abstractions and can not replace reality.

How does one graphically or verbally describe a view? It is impossible to convey the initial impact of an existing view, its prolonged effect, its textures, values, tints, and hues. No words can accurately describe the value placed



on a rock outcropping or the dramatic expression of shadows. The designer can never formulate an accurate mental image of the site from only a diagrammatic and written analysis. Regrettably, human imperfection denies us the possibility of conveying through communication skills, the description of a scene with tangible and intangible features accurately portrayed. To counteract an otherwise inaccurate image of this nature, a site visitation study is essential.

An example or two here may serve to illustrate the point that written abstractions may often give a false impression. The author of a book tries to achieve interest and clarity for the reader by using descriptive adjectives that will paint a mental image of his setting. He may describe a small white house with cape cod architecture, surrounded by a picket fence. Immediately from these few points, the reader's mind conceives a complete scene. Windows are placed, construction materials selected, and often it's pictured in a surrounding environment. Yet, these unknowns were never mentioned. Because people are slaves to their cultural past, it is difficult to imagine an incomplete image or not to associate such a setting with a once-known similarity. In art the importance of the same principle is illustrated by value of suggestion. By the artist leaving something unsaid the beholder is given a chance to complete the idea and thus it irresistibly rivets your attention until you seem to become part of it. A vacancy is there for the viewer to enter

and fill up to the full measure of his esthetic potential.

No written analysis can fully and accurately describe reality. Site visitation can stimulate the planner to a greater degree than the best descriptive explanation. Often a natural existing feature of the site, such as a rock outcrop or interesting tree, may become a center of interest with the entire design concept built around it. A designer can accordingly achieve greater clarity in his creative efforts if he uses some visual, rather than all graphic means. If "A picture is worth a thousand words", imagine the value one could place on reality. The designer can study both the good and bad points first-hand. He can understand more clearly the nature of enframement that may be needed for a view. He may also study the existing natural supportive material of rock, water, and vegetation. The sun paths, volumes, breezes, soil conditions, temperature can now be more readily discernible. In other words, he becomes a witness to the environment. To fully understand the problems more than a mere mental visualization is needed. He must "feel" the influences of the site. This is important because it is through all five senses, not just one or two, that the users or observers will come to know his work.

Each designer has his own ideas, his own thoughts, in the selection of plant materials, and his list is inevitably biased. The selection of plant materials for

esthetic qualities though, can not be a subjective choice if the design analysis is to serve its intended function. The designer's selections should be as objective as possible. His personal subjective notions may be inserted only when they do not run contrary to information presented in the basic analysis. A carefully executed analysis will alleviate any danger of subjectivity in selection on the part of the designer. Through processes of questioning people involved, studying existing conditions, visitation to the site, evaluating and reevaluating all information, the planting analysis will begin to form a logical and functional shape. The final planting will emerge as a solution to all the implications presented in the planting analysis.

\* In retrospect then, the planting analysis, like the design analysis, stresses the seeking out of differences for each design condition. It identifies and shows the designer the differences in each situation rather than pointing out similarities to other situations. Each problem is a unique, individual situation and one that arises from its own set of conditions in time and space. Because of shifts in design variables, an adequate solution in one case will not produce a sound solution in another. The designer should see every set of conditions in variable respects as different from anything that he has seen before. That is, he does not preconceive the shape of the design but first studies the particular conditions of

his problem. He should limit his subjective selection of plant material so it conforms with the planting analysis. Contour maps, verbal explanation, and written analysis should only be a supplement, rather than a substitution, to site visitation. The design will thus be staged organically i.e. growing from within the framework of variables particular to each problem area.

## THE ROLE OF PLANT ECOLOGY IN THE ESTHETICS OF PLANTING DESIGN

It is essential that the serious student of the living plant be aware of environmental conditions that would act upon the results of his studies. Unless the plant be permitted to respond favorably to the cultural environment in which it is placed, it may be so abnormal as to be of no functional value. Thus the study of ecology becomes indispensable whenever plant behavior is studied in relation to the management of vegetation. A study of ecology, or a knowledge of the interrelationship between plants and environment, will provide a basis for the intelligent management of plant life for the good of mankind. Is this not a fundamental aim of the planting designer?

Mr. Ernst Haeckel, a zoologist, in 1886 defined ecology as the study of the reciprocal relations between organisms and their environment.<sup>13</sup> For the sake of convenience, ecology is usually subdivided into animal ecology and plant ecology, although in places these subdivisions merge with each other. Plant ecology is the science of the interrelation of plants and their environment. In the study of plant ecology it becomes necessary not only to evaluate the relation of individual plants to

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<sup>13</sup>Haeckel, Ernst Heinrich, German zoologist; b. Potsdam, Prussia, Feb. 16, 1834; d. Jena, Thuringia, Germany, Aug. 9, 1919. A foremost biologist of his day, Haeckel exerted a stronger influence on the direction of biological thought and research than any other individual.

the environment but also it is necessary to compare the relations of plant communities. The ecology of individual plants is called "autecology", while the ecology of plant communities is designated "synecology".

There is a definite and real relationship between ecological factors of the environment and the physical characteristics of plant material. Variations in the natural forms and features of the native plant materials are easily discernible as one moves across the landscape. Plants, in adapting themselves to individual environments, develop distinct plant characteristics, some of which are identifiable with other plants in the same region. The firs, for example, are native in most mountainous regions and adapt well to the heavy snow loads of winter with tall pointed spires and flexible branches. They also blend congruently in form and texture with the native spruce and hemlock, which like the fir, conform in growth patterns to the peaks of the surrounding terrain. Fine glossy surface textures, another physical characteristic in point, develop in the warm thermal zones; and the dull fuzzy plant surface adapts as protective covering in cooler zones. The naturalistic character of color varies with location as the desert foliage of sagebrush is typically gray-green. At the other extreme, lush bog plants characteristically have vivid yellow-green foliage. Local micro-climate variations may assist further in forming and shaping the character of the individual plant

within the region.

Each of these visual patterns, in which a balance is preserved by ecological conditions, could be easily destroyed visually through the introduction of any incongruent plant material. The lesson to be learned from a study of these natural patterns of growth is not considered to be confined to naturalization of plants nor to deal exclusively with natural landscapes. This study will suggest though, a framework of thinking, a logical method of approaching an understanding for the world's vegetation, and principles that may be followed for placing plants in surroundings other than their natural ones.

"Fitness for purpose," is a phrase particularly appropriate to the natural landscape and could easily be an adapted slogan for planting design. In achieving fitness for purpose, the designer may use native plants as a basic list supplemented by, if not always with indigenous material, at least with plants which will "feel" right in the chosen setting and will not destroy the inherent character of the surrounding. Although vegetation is a living material, it is still subject to esthetic laws, and these can easily be formulated by reference to the order found in nature. This procedure will help eliminate the danger of mixing plants which do well together in their environment but generate the wrong character. Working in this context, the plant materials will



Fig. 14 The foliage line may dramatize the natural site profile.

never appear imposed or as preconceived patterns on land forms. It will complement the heritage and visual richness of each landscape region by preserving the valid ecological differences in plant configurations and encouraging the indigenous character of the native landscape. The planting designer should strive to strengthen the heterogeneous characteristics of the natural landscape, so the character displayed by individual regions will continue to reflect their surroundings.

Toward the end of the nineteenth century in England, Gertrude Jekyll introduced a vigorous new approach in planting design which exercised a great



influence on landscape design in England and America.<sup>14</sup> Fundamentally her approach was based on a strong affection for all growing things and a deep understanding of their cultural requirements. She was a pioneer in the art of adapting an arrangement of living material to the site. She insisted that planting should appear to have happened rather than have been artificially designed. Gertrude Jekyll was not alone in her struggle for an understanding of the plant's cultural requirements and for natural beauty in the landscape. Andrew Jackson Downing was also a spoke in the naturalized landscape wheel of evolution. Although he was a collector of plants with a fondness for the rare and exotic, he did abhor straight lines in nature, like those of the formal gardens in Europe. Careful landscaping, in Downing's own words "does not disturb the expression of nature, but serves to give polish and elegance to her forms of colors which indicates a tasteful and refined art and marks the presence of cultivation and habitation, as opposed to wild and savage nature." Frederick Law Olmsted revitalized the natural style and introduced a

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<sup>14</sup>Jekyll, Gertrude, English Landscape gardener; b. London, England, Nov. 29, 1843; d. Busbridge, England, Dec. 8, 1932. A foremost landscape gardener of her day, she established her right to self expression long before women had claimed their present independence in the arts and professions. Intimately loved the English countryside and devoted in sharing with others her delight for nature.

new appreciation of natural scenery.<sup>15</sup> He taught people to admire nature in her own dress. The adaptation of the site with its surroundings was the keynote to Olmsted's work.

Jens Jensen, Danish born landscape architect, became a legend within his own lifetime. As an immigrant to America, trained in Danish and German gardens, Jensen first planted foreign plants in his parks. He soon discovered that in this different landscape, these plants were decorative only and lacked form and expression. He soon began making substitutions by planting the hawthorn, sumac, crab apple and beach plum which were all native to the Illinois prairies. Thus through a kind of ecological trial and error, the finest parks of Jensen's work were to become opposed to the European Baroque expressions. He came to believe that nature by itself was a style and that plants in the landscape held their own expression. He soon became a profound exhibitor of the native flora and would spend every week end climbing the dunes around Lake Michigan or walking through the Illinois woods studying the growth patterns of nature. He loved the hawthorn which was like a symbol with its horizontal branching structure expressing what Jensen knew as the

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<sup>15</sup>Olmsted, Frederick Law, American Landscape Architect; b. Hartford, Conn., April 26, 1822; d. Waverly, Mass., Aug. 28, 1903. Olmsted's distinctive service to the landscape gardening of America may perhaps be defined as having been the originating of the use of natural landscape resources.

prairie spirit. Worn out after a long trek, with his face red from windburn or the biting cold, he would laugh and explain what a delightful outing he had, and what beauty nature held. Here truly was a man who understood nature and was able to express his gift of appreciation.

The study of physical function and limitation of plants, with an accompanying appreciation for natural landscape was obviously an advancement for planting design. It showed the designer that plants found originally in the same environment are likely to go well together as elements in planting design. This phenomena sometimes holds true because of similarity in form, but always for the practical reason that their similar original environment has made them adapt to similar cultural conditions, and also for the associational reason that we are accustomed to seeing these plants together in their native haunts. It would be like taking a step backward though, if all plants were to be considered from the standpoint of absolute ecology. Such a position would consider only the physical adjustment and seek the fullest esthetic potential.

It must not be forgotten that the landscape architect is designing in a humanized landscape. The physical adjustment of plants in the natural landscape does not necessarily consider the functional landscape for man. Nature isn't faced with incongruent dissimilar features of

architecture or automobiles, and doesn't associate in its growth patterns the different situations faced by the designer who is seeking the full esthetic appeal of vegetation. Nature is not limited by factors issuing from a design analysis which the designer recognizes as a limiting force.

If the designer is to maintain the delicate ecological balance on which the existing landscape depends, he will need to study the relationship between plants, climate and soils; between one type of plant and another; and between plants and animals, including man. In arriving at a true humanized landscape, plants should be selected to form some kind of relationship with a feeling for orderliness with visual harmony in form and line, ease of maintenance and natural blending of vegetation. A knowledge of ecology is a reserve power for the planting designer. Equipped with ecology's biological relationships and knowledge of plants to their environment, the planting designer may more easily blend plants harmoniously without strain from foreign objects, and provide a reduction in maintenance, and more easily create a desirable effect. But to simplify the design by the use of only a few native plants can lead to monotony and finally to lack of originality. If the designer uses only native plant material, the esthetic potential of his design is lessened and his creative qualities reduced.

While there is a marked contrast between plant materials from North and South, there is a similarity between plant materials of East and West regions due to similar local climates and latitudinal weather seasons which suggest a natural transferring. Many plant associations in different parts of the world are similar under like conditions of environment, even when the species are not identical. The designer should seek like materials, which appear to be native and avoid exotics or strained effects. He should remember the basic fundamental practices of ecology but remain free to select plants that will fill a certain requirement.

Modern horticultural practices have in recent years introduced through controlled experiments in hybridization, grafting, and propagation thousands of better and stronger plant strains improved in beauty and vigor. Many hybrids retain the same general outward appearances but inherently acquire new and more desirable traits of physical strengths. It may, for example, be that a plant species has a negative frost tolerance and will be killed back by a moderate temperature drop, but now through selection and hybridization a variety of this same plant species with the same physical features may be developed to withstand the moderate temperature fluctuations. A hybrid variety may be an improvement over the natural species in many ways. For instance,

the flower size or the plant rigidity may be improved, strengthening the plant's ability to withstand excessive snow loads. The fact remains, that the designer must know his variety selections, hybrid or natural, in order to avert the possibility of adverse ecological relations.

A foxglove with a taller and more graceful stature, with richer colouring, with a rosy stem or deeper spots inside its corolla may well be more beautiful, as a girl with smoother skin and larger eyes is beautiful; but a foxglove with flowers all around its stem is like a girl with eyes all around her head.

Peter Shephard

The life pattern of natural vegetation is reflected visually in the physical form and cultural adaptations. Through ecology, a science of the landscape, the planting designer can better understand and interpret better plant relationships to his design process. He should learn from nature, and apply his findings in practice, but he should never attempt to copy. Copying the natural landscape in the humanized scene is improbable, if not impossible. As evidence, note a naturalistic planting. Always the hand of man is in evidence. Landscape planting, like art, is an individual process. Only after the student is a witness to the environment, where learning is a matter of experience rather than a matter of authority, can the creative attributes of the designer achieve full esthetic form.

## HOW SENSORY PERCEPTION AFFECTS THE PLANTING DESIGNER

Since planting design is a facet of environmental design, the practitioner must not only comprehend a landscape's character but he must go beyond and discern the processes of sensory perception which enable people to appreciate and benefit from his works. Such breadth of understanding should be one of the designer's basic aims.

The art of modifying a landscape for beneficial purposes may be thought of as an extension of communication skills among humans. It may be used as a technique to transmit deliberately and consciously planned ideas and feelings of inspiration. For example, one learns to perceive a given feeling that may be described as romanticism. Analysis may reveal how in this illustration, the resultant feeling was induced as a response to the stimulation of picturesque combinations of plant characteristics. Nevertheless, similar feeling responses can be the result of designed stimulation of man's senses of sight, hearing, taste, smell, and touch. Discerning people who enjoy the landscape are subconsciously reading and interpreting its messages of subtle meanings and feelings. To appreciate the landscape in its fullest esthetic potential then, one acquires the capacity to exercise more than visual or spatial sensationalism.

The landscapist's position is unique in the realm of professional designers. His materials are derived from an

abundant world of differing plant species and varieties. His resources are unequalled by any other art media. Comparable variety and richness of usable raw materials are denied other design professions.

The architect, engineer, and artist, all creators of new ideas, find expression only through the skillful use of inert, static materials. Their creations remain unchanged by time, except perhaps through natural decay. Unlike these allied professions, the plant designer is uniquely surrounded by multiple assets occurring from the nature of his living material. His ideas must be expressed, not by dead, static materials but by the use of living, maturing flora. Nature's growing materials are always expansionable, always developing to reach or to spread, and change with seasonal modification to effect scenes that can never remain static in time or space. It is in this way that the landscapist's limitations are unequalled in depth by the limitations of other designers.

An integral part of the designer's effort is planning purposeful esthetic appeals for all avenues of sensory perception. His techniques are varied to suit the various senses; yet they must stimulate positive psychological responses in the observer's perceptions or they may fail, and the reaction response becomes negative. Basically, all benefactors of the plant designer's esthetic projections can only value his creative causations through perceiving



their ever-changing impact on all five senses; not just one or two.

All five senses may be exploited in relative proportion to express the uniqueness of planting design. In nature the nose receives the scent of flower, fruit, pungent foliage, and the fresh aroma of out-of-doors. The ears pick up sounds of cascading water and the fine sounds of mist as it breaks the surface tension. The ears are also alert to the wind as it moves the foliage and the rustle of nature's materials underfoot. The tactile sense transmits the many textures found in nature, as leaf venation, bark structure, and foliage size. The observer sees form, color, size, arrangement, and structure. Finally, taste is experienced in growing fruits, and who has yet to walk through nature without allowing some projection of nature's palette to protrude from his mouth?

It is commonplace to sit, view, and enjoy a beautiful scene; seeing the forms created by foliage masses and watching the shadow patterns play on the ground. \* To see beauty is one thing but it is another to know and understand why there is beauty. For this reason, the landscape architect should seek out the answers to why any setting is beautiful; what there is about viewing the landscape that gives delight; and why the observer seeks beauty. \* When these questions are resolved, the designer becomes capable of shaping, in an intelligent manner, esthetic environment in which people may

enjoy living. Intellectually, esthetics may be studied, read, and talked about; but to understand their emotional fundamentals the planting designer's senses should be trained by experience. By really seeing nature, being near it, feeling it, smelling it, hearing it, and deciphering its components, the landscape becomes more than mere fields, buildings and trees.\* It now becomes a symphonic composition of harmoniously blended separate entities for sensual stimulation.

Observation alone accomplishes little. The designer's senses must be trained to differentiate what is observable in the landscape. By knowing what to look for, observation becomes an intelligent approach to nature's fundamentals of enjoyment. An observer's sense of perception can be sharpened by taking frequent walks through the landscape to notice how foliage varies in greenness from tree to tree; how hue, value, and intensity add to his enjoyment; and how the rustle of the leaves and the smell of nature all combine to create the living landscape. If for a moment the observer were to lose just one sense, his scene would be incomplete and the experience would impress upon him that the fullest enjoyment of a landscape is derived from all five senses.

If we analyze the sources of pleasure derived from human sensation, we find that a given sensation will have a satisfying or unsatisfying quality according to the

duration, intensity, and character of the stimulus experience. *Handwritten: 12-20-00 & K. Saarinen*

Perception of an experienced sensation is by its very nature the segregation in the mind of the impressions coming from the stimulus experience. Therefore it is possible when various associated sensations are harmonious or have qualities in common that perception will be attended with pleasure.

Intellection, the process of idea association forming concepts, is the mental comparison of a number of precepts and the discovery of relationships among them. Thus concepts are formed by the production of mental images from generalizations of particulars. In brief, when a new precept accords with sensations conditioned in the mind, satisfying or unsatisfying concepts will follow.

The material part of art can be bought with money, that is true, but the spiritual part of it can be had only through mental appreciation.

Eliel Saarinen

## CONCLUSION

The landscape architect should be vitally concerned with plant material and their use. Plants possess the ability in the environment to perform an economic, esthetic, and utilitarian purpose. Each of these functions is a means to an end; to create a "psychological equilibrium", by producing a balanced environment.

Today's graduate in the profession of landscape architecture has been provided with a thorough background in his own field, and also a composite picture of various related fields. The curriculum is wide, composed mainly of architecture, city planning, engineering, construction, horticulture, and design. A graduate is qualified for various types of employment in both private and public work. He may choose to work, to cite a few examples, in city planning, the highways and parkways, parks department, or teaching. But a landscape architect's main training that sets him apart from the other creative arts is his unimitated ability to design with plant material.

Due to the expanded scope of landscape architecture in recent years, many of the schools and active professionals in the field have specialized in one of the various areas of the profession and knowledge in the use of plants is becoming neglected. <sup>TRUE</sup> The landscape architect should know more about the environmental requirements of

the plant, the importance ecology plays in planting design, and how to meet the site challenge, in a clear light, that each design imposes. He should follow a carefully guided course in the selection and placement of plants and know the role that each is to perform in the composition.

Planting design, like the other creative arts, has no set rules that may be applied in chronological order. Dealing with an ever-changing environment, varying problem requirements, and the human factor, there is no status quo for the landscape architect. Planting design is a personal quality and each composition will vary with the individual situation. If the designer neglects the individuality presented by each situation, his solutions will be imitations of previous work and the plagiarization of past forms. The analysis of form itself will never lead to an understanding of the work. But the idea, the existence from which it was initiated, is the importance of design.

The design's ultimate function is for complete satisfaction of the emotions. Understanding that man's well-being and happiness does not arise from utilitarian mechanical design alone, the esthetic qualities of plant material must also produce a positive psychological effect upon the observer or the plant becomes negative, rather than positive, in the solution of the scheme.

To achieve this psychological effect upon the observer, the planting must be integrated into the total

design staging so the entire concept blends together congruently and does not appear as preconceived patterns upon the landscape. The planting must also be in accordance with the recipient's desires, as well as being imaginative, honest, direct, and true. Through proper use of the unique esthetic effects of plant material, the senses of perception are stimulated and the entire emotional system ignites a condition of contentment and satisfaction. Thus planting design is not an art which practices only visual character of color, form, texture, proportion and structure. The designer must possess an organic understanding as well. If he practices only the visual experiences, the planting designer limits the potential of the profession. One must perceive with all five senses. It is through sight, hearing, smell, taste, and touch that the observer will benefit from the scheme.

The physical qualities of plant material are unique to man. Plants retain inherent esthetic characteristics that are unobtainable through any other media. The searching out of these characteristics is a process in imaginative planning that always should be a genuine pleasure to the planting designer. But to properly arrive at the full esthetic effect, and allow plants to display their full potential, the designer must be thoroughly familiar with his material and its qualities; its growth factors, environmental requirements, esthetic potential, possibilities and limitations. He can not

select his plant material from a book without a basic knowledge of the plant's characteristics. Neither can he use a few select favorites without materially hindering the result of his creations. The designer can not rely on luck or happenstance for the success of his planting, or he no longer may be classed as a professional.

A knowledge of ecology is a reserve power for the planting designer. The more a designer can study nature, the easier it will be to create a desirable effect without strain from foreign objects. His senses should be trained to acknowledge the importance in harmoniously blending each plant with its surroundings. There is a definite and real relationship between ecological factors of the environment and the physical characteristics of plant material. Vegetation is a living material and subject to esthetic laws. These laws are easily formulated by reference to the order found in nature. Conceiving a planting scheme in this context, the designer will complement the indigenous character of each landscape region by preserving the valid ecological differences in plant configurations.

Remember that it is people for whom a design is created. Their satisfaction, well-being and happiness are the prime motivations for all planting design.

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