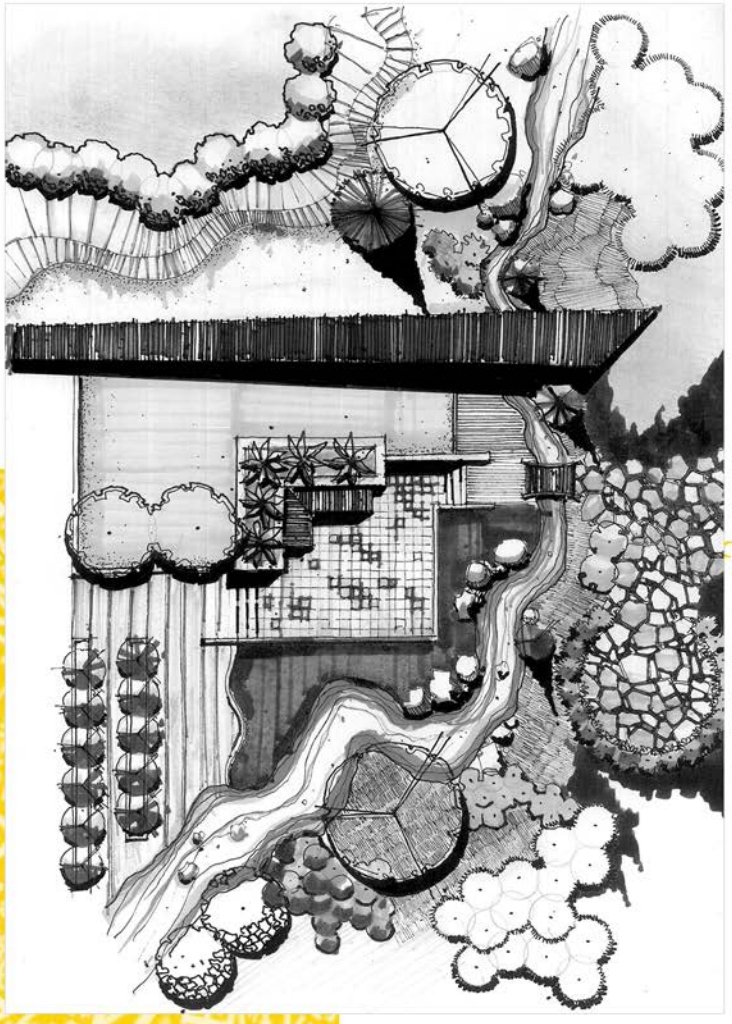

Technical English for
Students of Landscape Architecture

Assoc. Prof. Sima POUYA

İNÖNÜ
ÜNİVERSİTESİ
YAYINEVİ

Technical English for

LANDSCAPE ARCHITECTS

Assoc. Prof. Sima POUYA

MALATYA 2020

İNÖNÜ
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Doç. Dr. Sima POUYA

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PRESENTATION

Landscape architecture, as a branch of science, deals with fields of design, planning, and management by combining science, art, engineering, and technology and taking into account natural, cultural and social factors. Landscape architecture bounds tightly with other planning and design professions as its study area covers a wide range of topics and scales. Given this, landscape architecture is often regarded as a bridge that connects the social sciences, the natural sciences, the art science, and the society and nature subjects.

Professional English, which expresses a usage form with terminologies and sentence patterns on a field basis, is supported by abbreviations valid in business life. Professional English, which requires the ability to communicate and write appropriate terms according to the sector and its specialty, is learned within a language education aimed at dominating certain terms and patterns. It is even more important in some more comprehensive sections One of which is the Landscape Architecture branch.

In Turkey, graduation in landscape architecture has initiated since 1937. Despite having a long history of education on this major, the lack of scientific resources in Turkish is strongly felt as the major sources are in English language. To educate the students studying in landscape architecture better, they need to have adequate command of English. Hence, I believe this work will be a solution addressing the main challenge exiting in the field.

I would like to wholeheartedly thank the editor and the author of the book: Technical English for Students of Landscape Architecture, Assoc. Prof. Sima POUYA, who sincerely and diligently worked to during the preparation of the book. I also like to express my gratitude to all the authors who contributed to the book. Finally, I hope the book will be a useful source among the other landscape architecture related resources.

Prof. Dr. Ahmet KIZILAY

Rector

TAKDİM

Peyzaj mimarlığı, doğal, kültürel ve sosyal etmenleri dikkate alarak, bilim, sanat, mühendislik ve teknolojiyi bir araya getirerek, alan tasarımı, planlaması ve yönetimiyle uğraşan bilim dalıdır. Peyzaj mimarlığı geniş konu ve ölçekleri kapsayan çalışma alanı nedeniyle diğer planlama ve tasarım meslekleri ile etkileşim hâlindedir. Bu bağlamda peyzaj mimarlığı; sosyal bilimler ve doğa bilimleri, sanat ve bilim, toplum ve doğa konularını birleştiren köprü konumundadır.

Alan bazında terminolojilere ve cümle kalıplarına sahip bir kullanım şeklini ifade eden mesleki İngilizce, iş yaşamında geçerli kısaltmalarla desteklenir. Sektöre ve uzmanlık alanına göre uygun terimlerle iletişim ve yazma yeteneği gerektiren mesleki İngilizce, belli terimlere ve kalıplara hâkimiyet kazandırmaya yönelik bir dil eğitimi dâhilinde öğrenilir. Özellikle geniş kapsamlı olan bazı bölümlerde mesleki İngilizcenin önemi daha da fazladır. Bu bölümlerden biri ise Peyzaj Mimarlığı bölümüdür.

Türkiye'de peyzaj mimarlığı 1937 yılından itibaren mezun vermeye başlamıştır. Bu kadar uzun maziye rağmen peyzaj mimarlığı alanında Türkçe bilimsel kaynak sorunu mevcuttur ve yazılan önemli temel kaynaklar İngilizcedir. Peyzaj mimarlığı eğitimi alan öğrencilerin daha iyi yetişmeleri için mesleki İngilizce konusunda yeterli düzeyde olmaları gerekmektedir. Bu noktada eserin, alana ait önemli bir soruna çözüm olacağına inanıyorum.

"Peyzaj Mimarlığı Öğrencileri İçin Mesleki İngilizce" kitabının hazırlanmasında büyük emek harcayan, kitabın editörü ve yazarı Doç. Dr. Sima POUYA'ya ve kitaba katkı sunan tüm yazarlara teşekkür ederim. Kitabın peyzaj mimarlığı kaynakları arasında faydalı bir eser olmasını temenni ediyorum.

Prof. Dr. Ahmet KIZILAY

Rektör

PRESENTATION

Today, English language is accepted as the common language of science by researchers and scientists. New findings and results in the scientific fields are usually published in English. Besides, the articles presented at international conferences or published in scientific journals, textbooks, scientific documents, websites, etc are read by many readers when they are published in English. In this way, they can benefit wide resources published in the English language and can unlimitedly establish a more efficient relationship with the world of science. Each discipline has its specific terms and scientific concepts, and it is not possible to study a discipline without knowing its scientific terms. Students and researchers from different scientific fields should not only know the English language, but know the English technical concepts and terms related to their disciplines and educational branches. The main purpose of the book of Technical English for Students of Landscape Architecture is to transfer the most important terms and concepts in the professional sense to the landscape architects and similar professional experts and to improve their English knowledge comprehension skills.

To achieve these goals, the issues of landscape architecture, landscape design principles, landform, urbanization, urban climate, urban ecology, urban landscape design, cultural landscape, three-dimensional graphics, geographical information systems, plant design, coniferous, rural landscape design, playgrounds, recreation areas, etc. Have been addressed in this work.

The book consists of 45 units dealing with the most significant technical topics that any landscape architect should know. Units were prepared by faculty members and academicians who are providing education in landscape architecture and close professions at the universities especially at İnönü University. Addressing a certain subject in each unit, primary vocabularies, and terms in the text are explained with the related pictures. Another part of this book is the English-Turkish landscape architecture dictionary. The Turkish version of the related terms and phrases which are mostly included in the book is covered in the dictionary.

In the realization of this work, I would like to thank our Rector Prof. Dr. Ahmet Kızılay, INU Publishing House, Prof. Dr. Cengiz Yakıncı, the chapter writers; Prof. Dr. Atila Gül, Prof. Dr. Banu Çiçek Kurtoğlu, Prof. Dr. Bülent Yılmaz, Prof. Dr. Osman Uzun, Prof. Dr. Öner Demirel, Assoc. Prof. Elif Bayramoğlu, Assoc. Prof. Sara Demir, Assoc. Prof. Serap Yılmaz, Assoc. Prof. Sevgi Görmüş, Assist. Prof. Mehmet Inanc Onur, Dr. Sahar Pouya and Majid Aghlmand (PhD student) for their contributions, and also to Salman Hedari who designed special drawing to book cover.

Assoc. Prof. Sima POUYA

SUNUŞ

Günümüzde İngiliz dili, araştırmacılar ve bilim insanları tarafından ortak bilim dili olarak kabul edilmektedir. Bilimsel alandaki yeni bulgular ve sonuçlar genellikle İngilizce olarak yayımlanmaktadır. Ayrıca, uluslararası konferanslarda sunulan veya bilimsel dergilerde yayımlanan makaleler, ders kitapları, bilimsel veriler ve belgeler vb. Bu nedenlerle araştırmacılar ve yazarlar İngiliz dilini daha çok kullanmaktadır. Bu sayede İngiliz dilinde yayımlanan geniş kaynaklardan yararlanılabilmekte ve sınırsız olarak bilim dünyasıyla daha verimli bir ilişki kurabilmektedir.

Her bilim dalının kendine ait ortak terimleri ve bilimsel kavramları vardır ve bu terimleri bilmeden bilim yapmak mümkün değildir. Farklı bilimsel alanlardaki öğrenciler ve araştırmacılar sadece İngiliz dilini bilmekle kalmamalı aynı zamanda belki de daha da önemlisi, kendi disiplinleriyle ilgili İngilizce teknik kavramları ve terimleri bilmek durumundadır.

"Peyzaj Mimarlığı Öğrencileri İçin Mesleki İngilizce" kitabının temel amacı; peyzaj mimarları ve benzer meslek disiplinleri için mesleki anlamında gereken en önemli terimleri ve kavramlarını aktarmak ve İngilizce metin anlama becerilerinin geliştirmesi olmuştur. Bu amaca ulaşmak için ele alınan konular; peyzaj mimarlığın anlamı, peyzaj tasarım ilkeleri, arazi formu, kentleşme, kent iklimi, kent ekolojisi, kentsel peyzaj tasarımı, kültürel peyzaj, üç boyutlu grafikler, coğrafi bilgi sistemleri, bitkisel tasarım, iğne yapraklılar, kırsal peyzaj, oyun alanları, rekreasyon alanların tasarımı vb. konulardan oluşmuştur.

Kitap, peyzaj mimarların bilmeleri gereken en önemli mesleki konuları kapsayan 45 üniteden oluşmaktadır. Üniteler, İnönü Üniversitesi başta olmak üzere farklı üniversitelerdeki peyzaj mimarlığı ve yakın meslek gruplarında eğitim veren değerli öğretim üyeleri tarafından hazırlanmıştır. Her ünitede belli bir konuyu ele alınırken metin içinde bulunan önemli kelime ve terimler, ilgili resimlerle açıklanmıştır. Bu kitabın diğer bir özelliği de İngilizce-Türkçe peyzaj mimarlığı sözlüğünün olmasıdır. Sözlükte daha çok kitap içinde bulunan mesleki terimlerin Türkçe karşılığına yer verilmiştir.

Bu çalışmanın gerçekleşmesinde, Rektörümüz Prof. Dr. Ahmet Kızılay'a, İNÜ Yayınevine, Prof. Dr. Cengiz Yakıncı'ya ve değerli bölüm yazarları; Prof. Dr. Atila Gül, Prof. Dr. Banu Çiçek Kurtoğlu, Prof. Dr. Bülent Yılmaz, Prof. Dr. Osman Uzun, Prof. Dr. Öner Demirel, Doç. Dr. Elif Bayramoğlu, Doç. Dr. Sara Demir, Doç. Dr. Serap Yılmaz, Doç. Dr. Sevgi Görmüş, Dr. Öğr. Üyesi Mehmet İnanç Onur, Dr. Sahar Pouya ve Majid Aghlmand'a, ayrıca kitap kapağına özel çizim tasarlayan Salman Heidari'e katkılarından dolayı teşekkür ederim.

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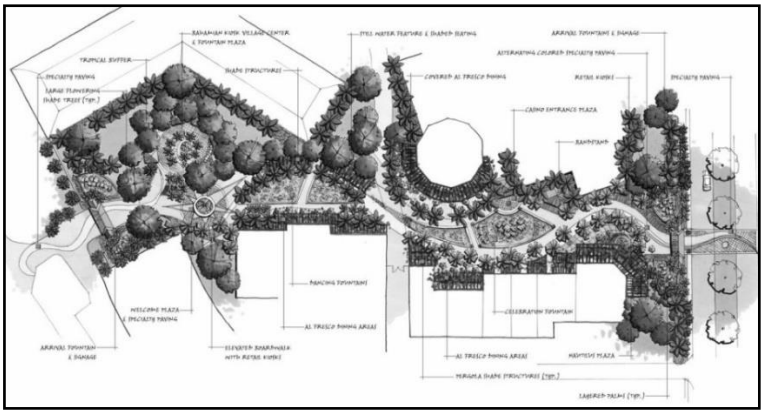
CONTENTS

UNIT 1

What is a Landscape Architecture?



Landscape Architecture

Landscape architecture translates as the design of almost anything under the sky. Think of iconic places like New York City's Central Park and the FDR Memorial in Washington, D.C. But also consider your downtown square, your local park, or even your own backyard. Green roofs, urban farms, corporate campuses—all define landscape architecture. Landscape architecture covers a huge spectrum, perhaps best understood by the profession's mantra: achieving a balance between the built and natural environments. It requires a multidisciplinary approach involving environmental science, art, ecology, and much more, leading to extraordinary results: restoring endangered wetlands, reducing hospital stays, securing government and other buildings, removing toxins from rainwater. These aren't pie in the sky. It's what landscape architects are designing right now.

Green roof

Landscape architects typically hold a bachelor's or master's degree in landscape architecture, covering a broad spectrum of design, science, and technical know-how. Topics include site design, historic preservation, planning, grading and drainage, horticulture, and even subjects like psychology. All 50 states require landscape architects to earn a license to practice. This not only involves earning a university degree, but usually several years of work experience, passing of a rigorous exam, and taking continuing education courses.

It's easy to confuse landscape architects with other landscape professionals, but the difference is straightforward. Landscape architects design, often working with landscaping or other construction companies to install those designs. Think of the fashion designer imagining an outfit while a clothing manufacturer makes the apparel, or an artist designing a wall poster that's printed by another company. Landscape architects and contractors are complementary but highly distinct professions.

Designing: How Landscape Architecture Happens

Design isn't as simple as just breaking out a sketch pad or loading computer design software. Creating the spaces we use to live, work, and play requires many steps—especially for larger-scale landscape architecture projects.

Sketch pad

Learning the Landscape

Design starts here. Landscape architects need to know what they're getting into and what the client needs. The designers speak with the client, visit the proposed site, conduct an analysis of its history, research possible uses, and, depending upon the project type (especially if it's a public project like a park), solicit input from the community.

Solar panels

Concepts

Will a park include an amphitheater or an athletic field? Should the space use a green roof, water system, or solar panels?

Landscape architects use initial drawings or 3-D models to propose the big ideas. If it's a large public project, there may be more opportunity for public feedback.

Designing

Instead of simply proposing a green roof, now the drawings or computer models will include the exact look of the green roof. Many projects require a series of drawings to cover the whole project, all brought together into a final master plan for the client to approve. From there, a whole new set of construction drawings covers the minutiae of exactly what type of materials to use and where each individual plant, stone, fountain, or bench should go.

Fountain

Breaking Ground and Beyond

A landscape architect's job doesn't end with the final plan. The designers routinely visit the site, meet with the client, and work with the construction team to ensure all goes smoothly. After completion, landscape architects evaluate the success of the project and, depending on the client, continue to oversee management of the site post-construction. Many cities and counties have their own landscape architects on staff to manage all the parks and public land.

EXERCISES

A) Complete the blanks with appropriate words.

the project type - contractors – master plan - the built

1) Landscape architecture achieves a balance between …… and natural environments.
2) The designers speak with the client depending upon …… .
3) Landscape architects and …… are complementary.
4) Many projects require a final …… for the client to approve.

B) Answer the following questions.

1) Which areas of science does Landscape architecture include?
……
……
……
……
2) How can designers make sure of a perfect job?
……
……
……
……
3) How are great ideas introduced by landscape architects?
……
……
……
……

UNIT 2

Landscape Design

Landscape design

"Landscape, originates from French word "paysage" which means scenery. Nowadays, the word encompasses a wider and deeper meaning. While in the medieval period, "landscape" was used as a synonym for "region" and "territory" in most of the Germanic languages, beginning from the 15th century landscape became a pictorial genre. The use of landscape as a term in science is relatively new. Today, landscape refers to not only a phenomenon described and analyzed by scientific methods, but also a subjective experience which has perspective, aesthetical, artistic and existential meaning". Design is the creative process of responding to conditions and concentrating meaning; and landscape design is the creation of responsive, evocative, meaningful, sustainable, and regenerative landscapes. In other words "landscape design is the art and science of organizing and enriching outdoor space through the placement of plants and structures in agreeable and useful relationship with the natural environment".

A designer must handle both aesthetics and function at the same time in the designs. Because one cannot exist without the other in quality design.

Especially, when the area is considered for children, function is more important. Because children evaluate the environment with its functional rather than its esthetical features. The aim of the landscape design is to build up qualified spaces in open areas for people. Open areas that are the interest of landscape design may be urban or rural and private or public. In this article

urban landscape will be emphasized. "From a wider perspective, urban landscape is a part of urban matrix. Therefore, the design of urban landscapes should be considered as an integral part of urban design. Urban landscape design is clearly not urban design, but a crucial part of it. Hence, factors influencing urban design also influence the form and functioning of urban landscapes. There are lots of spaces, having different functions, that can be subject of landscape design in urban. Some of them may be ranged as urban squares, public gardens, playgrounds, open areas of public institutes such as education, health…etc. and yards. Each of these spaces requires different activity fields according to their users and locations. Among these spaces, children's play areas have an important place because playing in open areas in the childhood period is extremely important for children's healthy development.

Landscape designers work on a canvas that is distinctly different from other art forms. The "art" is always changing as the plants grow, environmental conditions change, and people use the space. For this reason, landscape designers use a design process that systematically considers all aspects of the land, the environment, the growing plants, and the needs of the user to ensure a visually pleasing, functional, and ecologically healthy design.

Elements and Principles

The design process begins by determining the needs and desires of the user and the conditions of the site. With this information, the designer then organizes the plants and hardscape materials, which are collectively referred to as the features. The features can be physically described by the visual qualities of line, form, color, texture, and visual weight—the elements of design. The principles are the fundamental concepts of composition—proportion, order, repetition, and unity—that serve as guidelines to arrange or organize the features to create an aesthetically pleasing or beautiful landscape. Knowledge of the elements and principles of design is essential to designing a landscape and working through the design process. This publication describes each of the elements and explains the principles and their application.

Elements of Design

The elements of composition are the visual qualities that people see and respond to when viewing a space. Visual qualities can illicit many different emotions and feelings, and the more positive those feelings, the more likely people are to enjoy and use a space. Perhaps the most common element in a

composition is line. Line creates all forms and patterns and can be used in a variety of ways in the landscape.

Line

Line in the landscape is created by the edge between two materials, the outline or silhouette of a form, or a long linear feature. Lines are a powerful tool for the designer because they can be used to create an infinite variety of shapes and forms, and they control movement of the eye and the body. Landscape designers use lines to create patterns, develop spaces, create forms, control movement, establish dominance, and create a cohesive theme in a landscape. Landscape lines are created several ways: when two different materials meet on the ground plane, such as the edge of a brick patio meeting an expanse of green turf; or when the edge of an object is visible or contrasts with a background, such as the outline of a tree against the sky; or by the placement of a material in a line, such as a fence. Figure 1 shows common landscape lines, including bed lines, hardscape lines, path lines, sod lines, and fence lines. Lines can have one or more characteristics, such as those described below, but they typically serve different purposes (Figure 1).

Brick patio

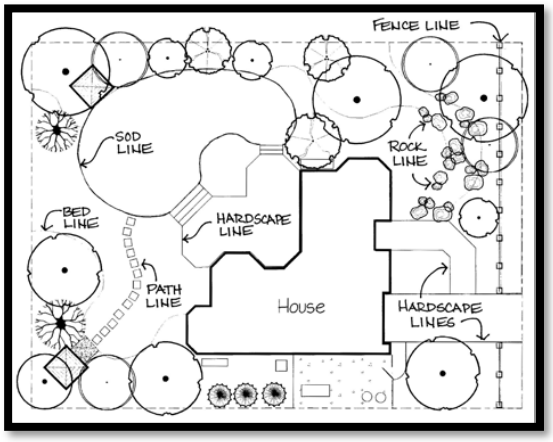


Figure 1 . Lines in the landscape

Properties of Lines

The properties of lines determine how people respond to the landscape, both emotionally and physically. Straight lines are structural and forceful; they create a formal character, are usually associated with a symmetrical design, and lead the eye directly to a focal point. Diagonal lines are straight lines with an intentional direction. Straight lines are most often found in hardscape edges and material. Curved lines create an informal, natural, relaxed character that is associated more with nature and asymmetrical balance. Curved lines move the eye at a slower pace and add mystery to the space by creating hidden views.

Vertical lines

Vertical lines move the eye up, making a space feel larger. An upward line can emphasize a feature and has a feeling of activity or movement. Vertical lines in the landscape include tall, narrow plant material, such as trees, or tall structures, such as an arbor or a bird house on a pole.

Horizontal lines

Horizontal lines move the eye along the ground plane and can make a space feel larger. Low lines are more subdued and create a feeling of rest or repose. Horizontal lines can spatially divide a space or tie a space together. Low lines are created by low garden walls, walkways, and short hedges. Lines are used to draw forms on a plan. In a plan view, they define plant beds and hardscape areas.

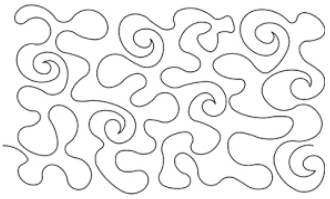
Short hedges

Lines are also created by the vertical forms of built features and plant material. There are three primary line types that create form in the landscape: bed lines, hardscape lines, and plant lines. Bed lines are created where the edge of the plant bed meets another surface material, such as turf, groundcover, gravel, or patio pavers. Bed lines connect plant material to the house and hardscape because the eye follows the line, moving the gaze through the landscape. Hardscape lines are created by the edge of the hardscape, which delineates the built structure. Line can also be created by long and narrow materials, such as a fence or wall.

Turf

Form

Shape is created by an outline that encloses a space, and form is the three-dimensional mass of that shape. Form is found in both hardscape and plants, and it is typically the dominant visual element that spatially organizes the landscape and often determines the style of the garden. The form of structures, plant beds, and garden ornaments also determines the overall form theme of the garden. Formal, geometric forms include circles, squares, and polygons.



Meandering lines

Informal, naturalistic forms include meandering lines, organic edges, and fragmented edges. Plants create form in the garden through their outlines or silhouettes, but form can also be defined by a void or negative space between plants.

Geometric Forms

Circular form

Circles can be full circles, or they can be divided into half circles or circle segments and combined with lines to create arcs and tangents. Figure 2 shows the use of circle segments for hardscape and lawn panels. Circles can also be stretched into ovals and ellipses for more variety and interest. Circles are a strong design form because the eye is always drawn to the center, which can be used to emphasize a focal point or connect other forms.

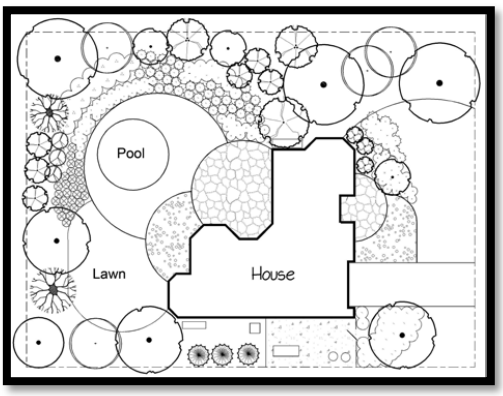
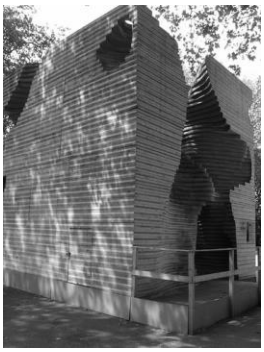


Figure 2. Circular forms in hardscape and lawn panels

Square form

Squares are used for a variety of features, including stepping stones, bricks, tiles, and timber structures, because they are an easy form to work with for construction. The square form can also be segmented and used repeatedly to create a grid pattern. Unlike circles, squares are stronger on the edges, which can be lined up or overlapped to create unique patterns and more complex forms.



Timber structures

Irregular polygons

Polygons are many-sided forms with straight edges. Triangles, for example, are three-sided polygons. The angled edges of polygons can make interesting shapes, but they should be used cautiously because the forms can become complex; simplicity is best.

Meandering lines

Meandering lines often mimic the natural course of rivers or streams and can be described as smooth lines with deeply curved undulations. Meandering lines (Figure 3) work well for pathways, plant bed lines, and dry stream beds. Meandering lines can add interest and mystery to a garden by leading viewers around corners to discover new views and spaces.

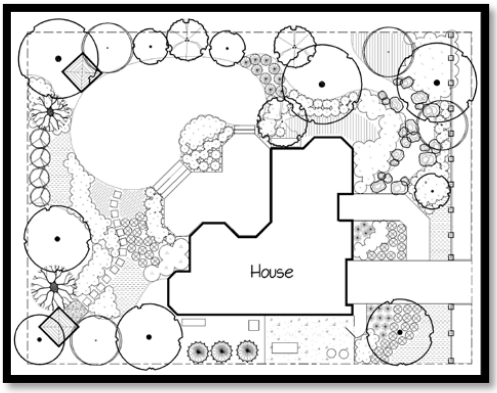


Figure 3. Meandering lines in the landscape

Organic edges

Organic edges mimic the edges of natural material, such as foliage, plant forms, and rocks, and can be described as rough and irregular. Organic lines can be found in rock gardens and along dry creek beds or purposely created on hardscape edges (Figure 4).

Rock gardens

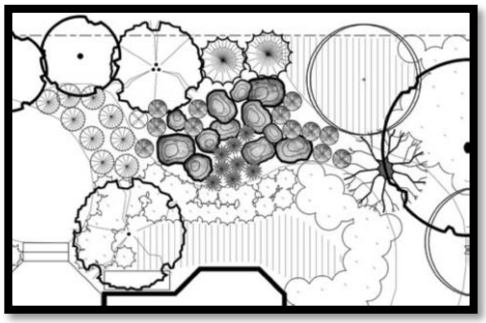


Figure 4. Organic edges: irregular edge of rock garden

Fragmented edges

Fragmented edges resemble broken pieces scattered from the edge, such as stones or pavers, and are often used to create a gradually disappearing edge on patios or walkways (Figure 5).

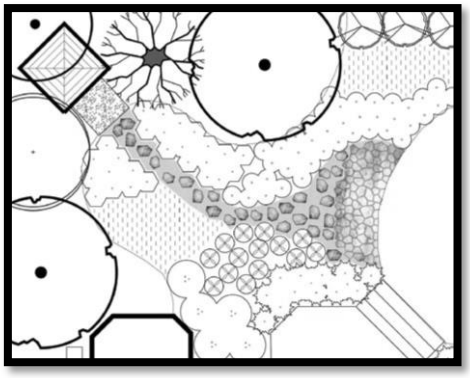


Figure 5. Fragmented edges: stepping stones in pathway

EXERCISES

A) Complete the blanks with appropriate words.

the natural environment - region – aesthetics – outdoor- straight lines- visual weight

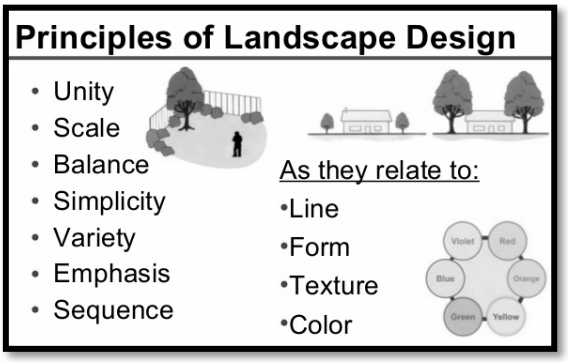
1) In the medieval period, "landscape" was used as a synonym for .....
2) Landscape design is the art and science of organizing and enriching ..... space through the placement of structures in agreeable and useful relationship with ..... ".
3) A designer must handle both ..... and function at the same time in the designs
4) ..... are structural and forceful; they create a formal character, are usually associated with a symmetrical design
5) A composition where all features have high ..... often looks chaotic.

B) Answer the following questions.

1) How is a design process defined?
……..
……..
……..
……..
2) Which shape is considered as a strong design form? And why?
……..
……..
……..
3) What are the applications of meandering lines?
……..
……..
……..
4) What is the role of color in architecture?
……..
……..
……..

UNIT 3

Principles of Design



Design principles guide designers in organizing elements for a visually pleasing landscape. A harmonious composition can be achieved through the principles of proportion, order, repetition, and unity. All of the principles are related, and applying one principle helps achieve the others. Physical and psychological comfort are two important concepts in design that are achieved through use of these principles. People feel more psychologically comfortable in a landscape that has order and repetition. Organized landscapes with predictable patterns (signs of human care) are easier to "read" and tend to make people feel at ease. Psychological comfort is also affected by the sense of pleasure that a viewer perceives from a unified or harmonious landscape. Users feel more physically comfortable, function better, and feel more secure in a landscape with proportions compatible to human scale.

Proportion

Relative proportion is the size of an object in relation to other objects. Absolute proportion is the scale or size of an object. An important absolute scale in design is the human scale (size of the human body) because the size of other objects is considered relative to humans. Plant material, garden structures, and ornaments should be considered relative to human scale. Other important relative proportions include the size of the house, yard, and the area to be planted.

Proportion in plants

Proportion can be found in plant material relative to people the surrounding plants, and the house. When all three are in proportion, the composition feels balanced and harmonious. A feeling of balance can also be achieved by having equal proportions of open space and planted space. Using markedly different plant sizes can help to achieve dominance (emphasis) through contrast with a large plant. Using plants that are similar in size can help to achieve rhythm through repetition of size.

Proportion in hardscape

Features are most functional for people when they fit the human body. Benches, tables, pathways, arbors, and gazebos work best when people can use them easily and feel comfortable using them. The hardscape should also be proportional to the house—a deck or patio should be large enough for entertaining but not so large that it doesn't fit the scale of the house.

Gazebos

Proportions in voids

Human scale is also important for psychological comfort in voids or open spaces. People feel more secure in smaller open areas, such as patios and terraces. An important concept of spatial comfort is enclosure. Most people feel at ease with some sort of overhead condition that implies a ceiling. The enclosure does not have to be solid; in fact, an implied enclosure, such as tree branches, serves as a good psychological enclosure that still allows light and views of the sky.

Ceiling

Order

Order generally refers to the spatial layout or organization of the design and is most often achieved through balance. Balance is the concept of equal visual attraction and weight, usually around a real or imaginary central axis. Form, color, size, and texture all affect balance. Balance can be symmetrical,

asymmetrical, or perspective. Order can also be achieved by massing features or elements into distinct groups and arranging them around a central point.

Symmetrical balance

Symmetrical balance is achieved when the same objects (mirror images) are placed on either side of an axis. Figure 1 shows the same trees, plants, and structures on both sides of the axis. This type of balance is used in formal designs and is one of the oldest and most desired spatial organization concepts. This is because the mind naturally divides space by assuming a central axis and then seeks an even distribution of objects or mass (visual weight). Many historic gardens are organized using this concept.

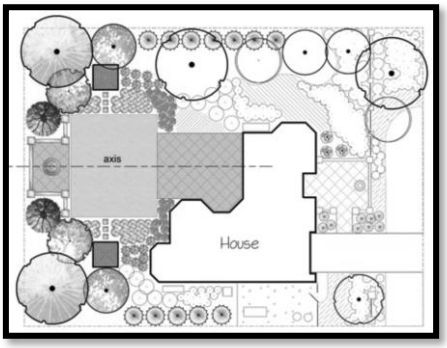


Figure 1. Symmetrical balance around an axis

Asymmetrical balance

Asymmetrical balance is achieved by equal visual weight of nonequivalent forms, color, or texture on either side of an axis. This type of balance is informal and is usually achieved by masses of plants that appear to be the same in visual weight rather than total mass. Figure 2 shows groupings of trees and structures that are approximately equal in visual weight on either side of the axis. The mass can be achieved by combinations of plants, structures, and garden ornaments. To create balance, features with large sizes, dense forms, bright colors, and coarse textures appear heavier and should be used sparingly, while small sizes, sparse forms, gray or subdued colors, and fine texture appear lighter and should be used in greater amounts.

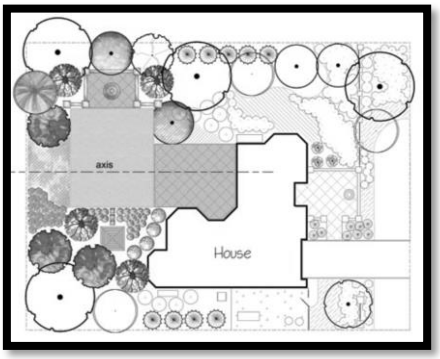


Figure 2 . Asymmetrical balance around an axis

Perspective balance

Perspective balance is concerned with the balance of the foreground, midground, and background. When looking at a composition, the objects in front usually have greater visual weight because they are closer to the viewer. This can be balanced, if desired, by using larger objects, brighter colors, or coarse texture in the background. In most cases, either the foreground or background should be dominant.

Mass collection

Mass collection is the grouping of features based on similarities and then arranging the groups around a central space or feature. A good example is the organization of plant material in masses around an open circular lawn area or an open gravel seating area.

Gravel

Repetition

Repetition is created by the repeated use of elements or features to create patterns or a sequence in the landscape. Repeating line, form, color, and texture creates rhythm in the landscape. Repetition must be used with care—too much repetition can create monotony, and too little can create confusion. Simple repetition is the use of the same object in a line or the

Repetition

grouping of a geometric form, such as a square, in an organized pattern.

Square

Repetition can be made more interesting by using alternation, which is a minor change in the sequence on a regular basis—for example, using a square form in a line with a circular form inserted every fifth square. Inversion is another type of alternation where selected elements are changed so the characteristics are opposite the original elements. An example might be a row of vase-shaped plants and pyramidal plants in an ordered sequence.

Gradation, which is the gradual change in certain characteristics of a feature, is another way to make repetition more interesting. An example would be the use of a square form that gradually becomes smaller or larger. Repetition does not always create a pattern; sometimes it is simply the repeated use of the same color, texture, or form throughout the landscape. Figure 3 illustrates repetition of a square form in an entry courtyard, lawn panels, a patio, and a water feature.

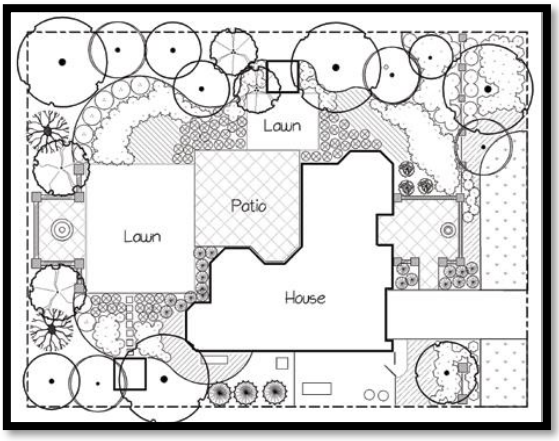


Figure 3. Repetition of square form

Repetition in plants and hardscape

Using the same plant repeatedly in a landscape is simple repetition. A grass garden is a good example of subtle plant repetition. Gradation can be achieved with a gradual change in height or size (e.g., using small grasses in front, backed by medium grasses, and then large grasses). A more obvious gradation

is plants that transition from fine to coarse texture, or from light green to dark green. Material can be used repeatedly throughout the yard for unity, but interest can be created by slightly varying the size, texture, or color of hardscape material. Repetition and pattern can be made most obvious in the hardscape because duplication is easiest with built materials that are manufactured to exact dimensions.

Unity

Unity is achieved by linking elements and features to create a consistent character in the composition. Unity is sometimes referred to as harmony—the concept of everything fitting together. By comparison, scattered groupings of plants and unrelated garden ornaments are the opposite of unity. Unity is achieved by using dominance, interconnection, unity of three (described below), and simplicity to arrange colors, textures, and form. Although hardscapes and plants can be unified by the blending of similar characteristics, some variety is also important to create interest. The simplest way to create unity is through the use of a design theme or a design style. Design themes and styles have a well-defined set of features that have maintained their popularity over time because they are visually pleasing to many.

EXERCISES

A) Complete the blanks with appropriate words.

Gradation - adjacent objects – fitting -asymmetrical balance – Mass collection

1) This type of balance is informal and is usually achieved by masses of plants. It is …….
2) ……. is the grouping of features based on similarities and then arranging the groups around a central space or feature.
3……. is the gradual change in certain characteristics of a feature; it is another way to make repetition more interesting.
4) The ability of an object to capture attention usually depends on contrast with…….
5) The concept of ……. in is referred to as "genus loci," or having a sense of place.

B) Answer the following questions.

1) How is a harmonious composition achieved?
……..
……..
……..
2) How can ordinary plants be used for emphasis?
……..
……..
……..
3) What is spatially dividing a yard into separate uses often referred to?
……..
……..
……..

UNIT 4

Earth's Landforms

What makes places like mountains, rivers, and canyons so special? All are different kinds of landforms. What other kinds of landforms can you think of? How do you think they are formed? What is a landform? A landform is a natural structure on Earth's surface. Most landforms are formed slowly over millions of years. They form Earth's geography, or physical structure. Scientists who study geography are called geographers. Landforms are always changing. Most changes happy so slowly, you would never notice them without special tools. Scientists use these tools to make very precise measurements over long periods of time (Figure 1).

Figure 1. The Grand Canyon is a 277-mile Gorgen Northern Arizona.

What are different types of landforms?

Landforms come in different shapes and sizes. Four common landforms are mountains, hills, valleys, and plains. You can use certain characteristics to identify each type.

Mountains

Mountains are large rock structures with pointed tops. Some mountains are so tall that their upper heights are covered in snow year round—even during the summer! Groups of mountains are called mountain ranges. The longest mountain range in the western United States is the Rocky Mountains. The longest mountain range in the eastern United States is the Appalachian

Mountains. In Texas, the tallest eaks are in the Guadalupe Mountains. The Guadalupe Mountains are not as tall as the Rocky Mountains.

Hills

Hills are land formations that are similar to mountains. Unlike mountains, however, hills are not peaked on top. Instead, hills have soft, rounded tops. They are made of grass, dirt, and rocks. Hills are usually not as tall as mountains. Northern California and Texas Hill Country are good examples of hilly regions.

Hill

Valleys

Valleys are mostly flat areas between two mountains or hills. A valley can be large or small. It depends on the distance between the two mountains or hills. Rivers flow through many valleys. The Rio Grande River runs through the Rio Grande Valley in Texas. As water runs through the valley, the valley gets wider over time through weathering and erosion. Weathering is the breakdown of rock into smaller particles by the water. Erosion is the movement of soil from one place to another.

Valley

Plains

Plains are the flattest landforms. Just like valleys, plains are flat. But unlike valleys, plains are not surrounded by mountains or hills nearby. Plains can be very large. The Great Plains of the United States stretch from the Mississippi River to the Rocky Mountains. The Panhandle area of northern Texas is also a plain. What are some landforms where you live? How do you think they formed over time? Career Corner: What does a surveyor do? A surveyor is a person who measures

Plain

landforms to create detailed drawings called surveys. Surveys give information about the height and width of each landform. Surveys are important when planning new buildings or roads. How are landforms created? Landforms are made as rocks and soil are added or removed from a place over millions of years. For instance, mountains form when pieces of Earth are pushed upward. When rocks and soil are added from above, it is called deposition. Think of it as depositing (or putting) stuff somewhere. Where does the soil come from that is deposited? It is soil moved to a new place by erosion. Remember that moving water can cause erosion. Wind can also cause erosion as it blows over a region. Moving sheets of ice called glaciers can also cause erosion. Earth can push a landform upward to create hills. Water, wind, or ice can move the land at the top. As the land erodes away, or is pushed away, that force smoothest the tops of hills.

Glaciers

Valleys are also made by erosion and deposition. Water and a glacier, a large piece of moving ice, moving down mountains causes erosion. This creates a valley between the two mountains. The dirt that is carried away is deposited downstream. The deposited dirt forms plains. The shape of a valley tells scientists how the valley was created. A new river moving through mountains makes a V-shaped valley because the water moves very fast. Over time, erosion around the river makes the river wider. Glaciers can also form valleys. As a glacier melts, it creates a U-shaped valley. The valleys are in spaces where the ice was pushing against nearby mountains. Over time, erosion makes the valleys wider.

EXERCISES

A) Complete the blanks with appropriate words.

ranges - surveyor – hills – valleys
1) …….are land formations that are similar to mountains.
2) Groups of mountains are called mountain……..
3) …….are mostly flat areas between two mountains or hills.
4) A …….is a person who measures landforms to create detailed drawings called surveys.

B) Answer the following questions.
1) What are the four common landforms?
…….
…….
…….
2) How are landforms created?
…….
…….
…….
3) How are hills created?
…….
…….
…….

UNIT 5

Landscapes and landforms

Landscape: The visible features of an area, including:

- natural elements of landforms (such as mountains, valleys, coastlines) and water bodies (such as rivers, lakes, seas and oceans)
- living elements of land cover (including vegetation and wildlife)
- human elements (including different forms of land use, buildings and structures)
- changeable elements (such as weather conditions).

Landform: The shape (morphology) and character of the land surface that results from the interaction of physical processes. For example, the action of water (fluvial action), action of wind, glacial action and weathering, and the movements within the earth's crust.

Geomorphology

One of the important parts of geography that involves the study of the interaction of the atmosphere (air), biosphere (living things), hydrosphere (water) and lithosphere (rocks), and the shapes that make up the physical environment of the earth's surface. It also includes the relationship, and the results of the relationship, between people and the earth's surface.

Geomorphic processes

Landscapes develop because of the geomorphic processes that have taken place over time. Two of the most important agents of these processes are:

- Erosion (for example, the sand-blasting of wind in arid environments, the power of glaciers in alpine areas, running water in rivers and waves on coastlines)

- Deposition (for example, the laying down of silt deposits on the flood plain of a river in humid environments). Some of these processes are the products of internal forces working in or below the earth's surface. For example, volcanic eruptions which produce molten rock (volcanism) and earthquakes which involve movements along fault lines. Other processes such as the movement of water and the action of wind also shape the earth's surface into landform features. The movement of water can take the form of either liquid (for example, streams and rivers) or solid (for example, glaciers or ice sheets).

Volcanic

Landscape types

It is possible to classify natural landscapes in a variety of ways. Some of the more commonly recognized types are listed below.

Arid landscapes: An environment in which streams and river channels are dry for most of the year and may not flow at all for many years. There are two types of landform in desert environments:

- Those where wind is the main agent of erosion
- Those where water is the main agent of erosion.

Coastal landscapes: An environment in which water is the main geomorphic agent. Water, in the form of waves, can either gently lap or violently crash against the coastline. Wind can also be a geomorphic agent in this environment. Both water and wind create many coastal landforms such as cliffs, caves, beaches, dunes, reefs and islands.

Caves


Dunes

Glacial landscapes: An environment in which water, in its solid state (ice) is the main agent of erosion. Approximately 10% of the earth's surface is covered by ice. It can be either in the form of glaciers (which are like rivers of ice flowing down valleys) or ice sheets (such as those that cover most of Antarctica and Greenland). Glaciers have expanded and contracted throughout the geological history of the earth. Today it is possible to see two types of glacial landscapes:

- Mountainous regions where glaciers may still be found and in which there is much evidence of more extensive glaciation in the past
- Lowland regions where glaciers retreated during past geological times.
  Humid landscapes: An environment in which water has eroded the land surface to produce different types of landscapes and landforms. In humid environments the action of water takes place throughout the year via the work of continuously running streams and rivers.

Volcanic landscapes

An environment in which molten rock acts as a geomorphic agent. The process is called 'volcanism' and results in the molten rock being forced into the earth's crust or out onto the surface of that crust (the earth's surface). Volcanism produces landforms that are:

- Intrusive features, found underneath the earth's surface (for example, dykes)
- Extrusive features, found above the earth's surface (for example, a volcanic cone).

EXERCISES

A) Complete the blanks with appropriate words.

Glacial - humid – Geomorphology– Deposition

1) …….. includes the relationship, and the results of the relationship, between people and the earth's surface.
2) …….. is the products of internal forces working in or below the earth's surface.
3) …….. : It is an environment in which water, in its solid state (ice) is the main agent of erosion.
4) In …….. environments the action of water takes place throughout the year via the work of continuously running streams and rivers.

B) Answer the following questions.

1) What are two of the most important agents of geomorphic processes?
.....
.....
.....

2) Name different types of landscapes.
.....
.....
.....

3) Define volcanism and its results.
.....
.....
.....

4) What are the features of landforms produced by Volcanism?
.....
.....
.....

UNIT 6

Urbanization

Urbanization

Urbanization has become a worldwide phenomenon after the second half of the last century. Today more than half of the world population lives in urban environments. Urbanization is a complex and multidimensional concept with its spatial, ecological, economic, social and cultural aspects. While urbanization is widely accepted as a foundation of modernizing it has also caused environmental and socioeconomic challenges. Consequently planning and design of urban areas are faced with challenges to create both ecologically and economically sustainable cities. Urbanization has become a worldwide phenomenon after the second half of the last century. Today more than half of the world population lives in urban environments. Urbanization is a complex and multidimensional concept with its spatial, ecological, economic, social and cultural aspects. While urbanization is widely accepted as a foundation of modernizing, it has also caused environmental and socioeconomic challenges. Consequently planning and design of urban areas are faced with challenges to create both ecologically and economically sustainable cities.

Urban design as a profession might be considered relatively new, but historically it has played a major role in forming cities. The concept of urban design has emerged as a bridge between planning and design in response to need for management of modernizing cities in the late 1950's. However, there does not exist a commonly agreed definition of urban design yet, mainly due to its interdisciplinary character. While some try to create a precise and universal definition, some argue that it is unnecessary. Appleyard (1982) states that there shouldn't or can't be a single definition of urban design and points out if the existence of different kinds of urban design is recognized, then it is possible to get a better understanding of the nature of it. There are many viewpoints on what urban design actually is. Traditionally, urban design has been regarded either as a subset of planning or as extension of architecture. On the other hand, one cannot abstract open and green spaces out of an urban environment. Hence, the role of landscape architecture in urban design needs to be

understood and accepted as a key part in creating sustainable urban environments.

Urban design can roughly be defined as the art of creating and giving form to urban environments. Urban design involves many stakeholders whose interests and priorities may conflict and the physical product of urban design should serve the community's needs and expectations with its social, cultural and economic outcomes. This makes urban design a highly complex phenomenon; as a result the definition can or should not be limited to physical design.

Urban design and urban life quality

Under the course description of "Urban Design: City-Building and Place-Making" at University California, Berkeley, urban design is explained as follows:

"The discipline of urban design is concerned with notions of the "good city." It is concerned with how urban environments work for people and support human needs, how physical designs may facilitate or hinder human behavior, how cities look, and what cities mean. It is concerned foremost with environmental quality, measured in many ways but particularly in terms of access, connectivity, comfort, legibility, and sense of place."

This statement supports the idea that urban design is strongly linked to life quality. Like urban design, there is no universally accepted definition of quality of life (QoL). The term was first used in USA in the post-war period and later was adopted by many fields such as education, health and, economic and industrial growth. Despite the technological development and increased income levels, it has been recognized that quality Livability and sustainability are two basic concepts related to urban life quality. Livability of an urban environment is determined by physical environment as well as social environment conditions, hence urban life quality is a result of two kinds of input; physical/objective and psychological/subjective.

For this reason, livability and consequently urban quality indicators might vary from one city to another. Parfect & Power (1997) suggest a situation assessment where weaknesses, deficiencies, inherent strengths and advantages are identified before identifying urban quality in urban design. Such an assessment could help to determine the priorities and deficiencies in urban development strategies and policies in both national and local context.

Transportation

Determination of priorities is also important in terms of finance, since cost of urban development is generally very high. As an example; United States

Environmental Protection Agency (EPA), the U.S. Department of Housing and Urban Development (HUD) and the U.S. Department of Transportation (DOT) have formed a partnership to coordinate decision and policy making efforts in housing, transportation and energy efficiency. In 2009 the partnership identified six livability principles to guide the federal investments. Developing such principles regarding both natural and cultural values could be useful and guiding in urban design. The principles are as follows:

- Provide more transportation choices: Develop safe, reliable, and economical transportation choices to decrease household transportation costs, reduce our nation's dependence on foreign oil, improve air quality, reduce greenhouse gas emissions, and promote public health.
- Promote equitable, affordable housing: Expand location and energy-efficient housing choices for people of all ages, incomes, races, and ethnicities to increase mobility and lower the combined cost of housing and transportation.
- Enhance economic competitiveness: Improve economic competitiveness through reliable and timely access to employment centers, educational opportunities, services and other basic needs by workers, as well as expanded business access to markets.
- Support existing communities: Target federal funding toward existing communities through strategies like transit oriented, mixed-use development, and land recycling to increase community revitalization and the efficiency of public works investments and safeguard rural landscapes.
- Coordinate and leverage federal policies and investment: Align federal policies and funding to remove barriers to collaboration, leverage funding, and increase the accountability and effectiveness of all levels of government to plan for future growth, including making smart energy choices such as locally generated renewable energy Value communities and neighborhoods: Enhance the unique characteristics of all communities by investing in healthy, safe, and walkable neighborhoods rural, urban, or suburban.

Suburban

Livability principles are strongly related to the concept of sustainability. The environmental damage caused by urbanization is in the heart of sustainability debates. It has become a key issue in development after The United Nations Conference on Environment and Development (UNCED) in 1992, which expressed the concerns for the future of the environment in global scale.

Agenda 21 is one of the resulting documents of this conference. It is an action plan and comprises four main sections; (i) social and economic dimensions, (ii) conservation and management of resources for development, (iii) strengthening the role of major groups, and (iv) means of implementation which include detailed policies for sustainable development. Besides, local participation is also necessary to find out psychological/subjective indicators for urban quality.

It is generally implied that the dynamics and rhythm of urban life decreases the life quality of citizens in many aspects. Contemporary urban lifestyles are fast paced and exhausting for many. Despite the fact that cities are the hearts of economic growth and cultural diversity, citizens might experience difficulties in enjoying the amenities of a city in context of time and space. During our busy daily schedule, mainly between work and home, we hardly find time to ourselves. When we have some spare time, we seek to enjoy what the city offers to us. On the other hand cities are densely built and populated environments which causes the feeling of "lost in space". People want to access and circulate through their living environments easily. Furthermore they need places where they can escape the stressful rhythm of urban life. This is where landscape architecture takes the leading role; design of open and green spaces to provide livable and accessible outdoor environments, as well as to support urban ecology. Further benefits of urban landscape, that affects the urban life quality, will be explained in the next section.

The role of landscape architecture in urban design

Landscape architecture is the art and science of creating and conserving outdoor environments with respect to cultural values and ecological sustainability. It uses both nonliving and living materials for design and planning, therefore the outcome is always dynamic and changing. Until recently, urban design was associated mainly with architecture and urban planning, and the role of landscape architecture was neglected. Landscape architects have been criticized for their urban design practices with low density, little formal sensibility, and too much open space which at the end look like suburban environments. Today, on the contrary, urban landscape is considered crucial to creating sustainable urban environments. Although the word "landscape" is often used to describe natural and/or rural environments, there is certainly more to it. A landscape is shaped by both natural and cultural dynamics which also influence human life

Cemeteries

styles.
Therefore an urban landscape is not only about green spaces within an urban environment. It is comprised of various land uses such as streets and squares, playgrounds, railway and canal corridors, cemeteries, bicycle and pedestrian paths, and waterfronts. Even structures in a city influence the urban landscape character.
Today urban environments have also a vast pressure on rural environments due to decentralization which causes loss of boundaries between urban and rural environments. Therefore it has a negative impact on natural resources which provide goods and energy for the urban dwellers. That is why sustainability has become the most important goal in urban design and planning more than ever. Urban design approaches should not neglect the natural processes which shape and influence the quality of life in urban environments. Since ecological principles are fundamental to landscape design and planning, urban landscape design plays an influential role in creating sustainable urban environments in context of resource management.

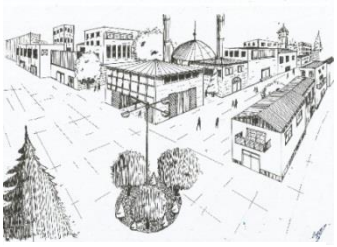
Urban landscape

Urban landscape is basically formed of open and green spaces within an urban environment. However, it is not totally independent from the surrounding buildings and structures. Altogether, they form the character and identity of a city, and sense of place. It contributes to the cityscape by means of aesthetics and function. It also supports urban ecology. It is dynamic and constantly evolving. According to von Borcke (2003) it is not an add-on but rather forms the basis for creating places. Urban landscape elements function as separator and/or connector agents between different land uses. They can form a buffer zone between conflicting uses (e.g. between industrial and housing areas) while they can facilitate movement of citizens throughout the city (e.g. greenways). They have the flexibility to serve for multiple uses and for different group of users in the community.


greenway

Urban landscape also contributes to the cityscape in terms of visual quality. Within dense built environments, it creates a sense of openness and more attractive places to live. Urban landscape helps to balance human-scale in city centers where vertical effect of buildings and structures dominates. It softens the "hardness" of buildings and structures. Well designed and managed urban landscape can improve citizens' quality of life in many other ways as well. The benefits of urban landscape are explained below.

Landscape design in urban environment



Perspective

In this section landscape design is discussed in urban context. From a wider perspective, urban landscape is a part of urban matrix. Therefore design of urban landscapes should be considered as an integral part of urban design. Urban landscape design is clearly not urban design, but a crucial part of it. Hence, factors influencing urban design also influence the form and functioning of urban landscapes. It is advised that points stressed out in the previous heading "Urban design and urban life quality" should also be kept in mind while reading this section. Design is a creative process influenced by designer's experiences, values, beliefs and vision. Hence it is mostly subjective, so is landscape design. Landscape design is the art of creating and designing aesthetic and functional outdoor environments. Because every landscape is unique, it is hard to define a universal guideline for design process. Nevertheless designing sustainable and liveable environments requires understanding of some basic principles which will guide the designer. Here, I will explain some of the principles which I believe are essential for urban landscape design.

EXERCISES

A)Complete the blanks with appropriate words.

physical - socioeconomic - runoff - Urban landscape-parks

1) …….is basically formed of open and green spaces within an urban environment.
2) Ecology has been neglected in urban planning systems of most developing countries which mostly focus on the relationship between …….and…….aspects of an urban development.
3) Vegetation cover and soil in urban landscape controls water regime and reduces…….
4) Urban …….were referred as being "lungs of the city",

B) Answer the following questions.

1)How do you interpret urbanization? And elaborate its significance.
……..
……..
2)How does City-Building and Place-Making are defined according to California University Point of view?
……..
……..
3)What is the role of landscape architecture in urban design?
……..
……..
4)Define 'design' as a process.
……..
……..

UNIT 7

Urban Climate

The climate of any place depends on many natural and manmade factors like: Location, Altitude, Latitude, settings with respect to land profile, location of water bodies, lakes, rivers or ocean in the surroundings, rate of rainfall or precipitation, sun shine, wind direction, and speed of winds, type, size, location and intensity of vegetation and buildings or structures. The air temperatures in densely built urban areas are often higher than the temperatures of the surrounding countryside. The term "urban heat island" refers to increased surface temperatures in some pockets of a city, caused by an ever changing microclimate. The difference between the maximum city temperature (measured at the city center) and the surrounding countryside is the urban heat-island intensity.


Island

Normally, the central business district (CBD) or the center of a city experiences higher temperature than the other parts. This is because the CBD mainly consists of concrete buildings and asphalted roads, which heat up very quickly due to radiation from the sun. Most of this heat is stored and released very slowly sometimes even up to the night. The phenomenon does not allow the daily minimum temperature to become too low. Though it may be a welcome phenomenon in cold regions during winters, it makes life unbearable for people in the hot regions. Thus, in tropical climates, the provision of sufficient ventilation and spacing between buildings is required to allow the cumulated heat to escape to the atmosphere easily. Street patterns and urban blocks can be oriented and sized to incorporate concerns of light, sun, and shade according to the dictates of the climate.

For example, the densely built areas produce, store and retain more heat than low-density areas. Thus, the temperature differential between urban areas and the surrounding countryside increases as the surrounding areas cool at night.

As a result, cooler air from the surrounding countryside flows towards the center. This kind of circulation is more pronounced on calm summer nights and can be utilized to flush dense areas of heat and pollutants.

To achieve cool air movement, a belt of undeveloped and preferably vegetated land at the perimeter of the city, can be provided to serve as a cool air source. Radial street patterns can also be designed for facilitating movement of air from less dense to more dense areas. A system of linear greenways or boulevards converging towards the city center will help to maintain the movement of cool air. Provided the soil is adequately moist, a single isolated tree may transpire up to400 liters of water per day. This transpiration together with the shading of solar radiation creates a cooler environment around the tree.

Greenway

On a hot summer day, the temperature can drop significantly under trees due to cool breezes produced by convective currents and by shading from direct sunlight. Planted areas can be as much as 5-8°C cooler than built-up areas due to a combination of evapotranspiration, reflection, shading, and storage of cold. Local wind patterns are created when the warm air over a dense built up area rises, and is replaced by cooler air from vegetated areas. Having many evenly distributed small open spaces will produce a greater cooling effect than a few large parks. Studies suggest that for a city with a population of about one million, 10-20% of the city area should be covered by vegetation for effectively lowering local temperatures. As the vegetation cover in the city increases from 20 to 50%, the minimum air temperature decreases by 3-4°C and the maximum temperature decreases by about 5°C The heat released from combustion of fuels and from human activities, adds to the ambient temperature of the city. Air pollution, caused mainly by emissions from vehicles and industries, reduces the long wave radiation back to the sky thereby making the nights are warmer.

Global solar radiation during daytime is also reduced due to increased scattering and absorption by polluted air (this can be up to 10-20% in industrial

cities). Pollution also affects visibility, rainfall and cloud cover. Effective land use to decongest cities, and the provision of proper vegetation would mitigate the effects of pollution. It is also important to use cleaner fuels and more efficient vehicles. Meteorological studies and remote sensing by satellites can be used to ascertain drastic changes in the climate, land use and tree cover patterns. Remote sensing can also be used to map hot and cool areas across a city by using GIS tools (Geographical Information System). Such mapping can help to reduce unplanned growth of a city, in preparing a proper land use plan, and to identify future vulnerable areas (those devoid of natural vegetation, parks and water bodies). These measures would certainly help in reducing urban heat island intensity Microclimate. The conditions for transfer of energy through the building fabric and for determining the thermal response of people are local and site-specific.

Pollution

These conditions are generally grouped under the term of 'microclimate', which includes wind, radiation, temperature, and humidity experienced around a building. A building by its very presence will change the microclimate by causing a bluff obstruction to the wind flow, and by casting shadows on the ground and on other buildings. A designer has to predict this variation and appropriately account for its effect in the design. The microclimate of a site is affected by the following factors:

- Landform
- Vegetation
- Water bodies
- Street width and orientation
- Open spaces and built-form

An understanding of these factors greatly helps in the preparation of the site layout plan. For example, in a hot and dry climate, the building needs to be

located close to a water body. The water body helps in increasing the humidity and lowering the temperature by evaporative cooling.

EXERCISES

A) Complete the blanks with appropriate words.

pollution - increased scattering – local wind – GIS- absorption

1) Effective land use to decongest cities, and the provision of proper vegetation would mitigate the effects of ……..
2) Remote sensing can also be used to map hot and cool areas across a city by using ……..tools
3) Global solar radiation during daytime is also reduced due to …….. and ……..by polluted air.
4) …….. patterns are created when the warm air over a dense built up area rises, and is replaced by cooler air from vegetated areas.

B) Answer the following questions.

1) What are the elements affecting the climate?
……..
……..
……..
2) What are the features of the conditions for transfer of energy through the building fabric?
……..
……..
……..
3) Which factors affect the microclimate of a site?
……..
……..
……..

UNIT 8

Urban Design

Prof. Öner DEMİREL

Concept

What is "urban architecture" in our language of "urban design" action for shaping urban physical environment, pre-west public areas design (civic design)?

The first identification on urban design field was made as civic design in 1909 (the dictionary meaning of the word civic is given as "urban, urban, municipal, civic and civilized".)

This is "urban design". The development of the concept in the world and in our country

U.S.A.

This concept has been discussed in the urban design conference which was made at Harvard university in the USA in 1956 and that the physical dimension of planning is understand. It is recorded that the urban design term is used at a conference meeting at Harvard university.

Later, in 1957, it reached the occupational public with the publishing the American architecture institute.

The urban design field as a new specialty area is a new expertise to fill it by rejoining the space between architecture and planning disciplines in the 1960s notes. Urban design is described between the both disciplines as a transition in terms of scale.

England

It can be said through the 'action plan' as a parallel to the increase of 'slum clearance' projects in the post 1960 city centers in the UK, the 'the future of town planning' system was proposed with the 'planning advisory group' (pag) report of 1965 which brought a new plan stage and understanding.

This report is based on the legal framework of the 'town planning act' new planning system dated 1968.

'urban design' programs have been in Oxford Polytechnic School in Sheffield, Edinburgh, Manchester architecture facilities since 1971.

Turkey

At the beginning of 1980, in Turkey, first urban design graduate education programs in the city and regional planning department of Mimarsinan university and in Metu city and regional planning department, were established in the middle of 1990.

Definition

Urban design: it is a detailed regulation method in the urban space, consisting of the multidimensional, urban detail in the physical, socio-cultural and socio-economic contexts.

Content

Urban design as a regulation and implementation for the constructed environment, includes analytical studies, the synthesis and the estimative values of this environment. Also, it includes the study of visual and environmental values associated with urban life quality and the creation of urban view goals.

Urban design is also expressed as an artistic initiative; urban design art is described as the art of building a city or shaping.

Urban design is related to the physical order of the environment and the fiction of psychological requirements of environmental users.

Search For Different Approaches To The Case Of City

The economic floor approach: this approach is investigation of land use, land values and accessible relations that affect it. In this context, cost matters.

Formal-intuitive design approach: the designer sees himself as a superior position in infecting society by interfering in the physical environment he has in the mind.

Perceptional approach: this approach is linked to the spatial-physical components of the city and focuses on how the city is taken more meaningful. Those approach disables historical development.

Social and historical approach: it is accepted that the city is not born as a coincidence, and that the city is a social and historical product.

Urban morphology approach: urban morphology approach includes functional and economic approaches. At the same time, the public can take historical and invasive approaches. Urban morphology tries to conduct an objective analysis of the city.

Urban Space

The structured and unbuilt areas that make up the settlement fabric of cities create an urban space. Urban space is the whole of the places where the actions of the four main functions (peace, work, entertainment/listening and access) about human life are passed.

Urban spaces are mainly based on property;

a) private, b) as public spaces;

When we approach responsibility, maintenance and supervision;

private spaces can be identified as urban spaces separated in trade, whose users own property, public spaces can be identified as urban spaces open to the use of society.

Public Space

Public Space: it is planned and organized for society and is the area benefited by the community. Public space is a three-dimensional concept.

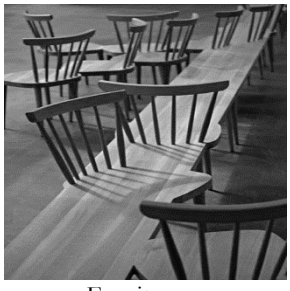
Urban public spaces are places where urban people meet each other. There are some objects that people use in these places. They form site street furniture.

- Organized areas (pedestrian roads, parks, entertainment areas, sports areas, children's playgrounds, etc.),
- Shopping spaces
- Crossing spaces (removals, passes, v.s.)
- Squares as place of meeting form unbuilt areas.

Lighting

Urban design is the most important category in organizing public spaces. Then the public spaces design is a whole:

- Information Communication Design
- Lighting Design
- Furniture Design
- Rest / Entertainment Spaces
- Design Of Green Covered Areas
- Traffic Design
- Material Design Should Be Treated



Furniture

Urban Mobile Design Among These;

- Flooring
- Square Elements

- Water Games
- Garbage Boxes
- Seating Benches
- Removals
- Bike Runway

Flooring

- Running Path
- Parcel And Garden Limiters
- Borders
- Other Separator Items
- Bus Stops
- Rest / Entertainment Areas
- Ceremony Areas
- Flower Pots Tree grids can be identified as a design and similar elements

Ceremony Areas

When dealt with a systematic approach according to the functions in the city mobiles use,

- Protection purpose
- Information-making purposes
- Signaling purpose
- For decoration purposes
- For hosting purposes
- For entertainment, play, resting purposes
- For sale or shopping purposes can be used

Aims of Urban Design

Urban design can be done for different purposes; the common goals can be listed as follows:

- To make the basic in order to investment or land marketing decisions in urban areas
- to produce ideas for urban development, to develop subprojects and to build their ability,
- to ensure the integration of planned big projects with the city and its inner circle,

- to strengthen the existing urban identity profile or create a new spatial identity profile,
- to bring the proposal to local policy decision-making,
- to prepare construction projects for implementation

Thematic Planning

By prioritizing the single issue, many examples can be given to urban projects and action plans prepared in cooperation between different disciplines:

- projects aimed at the needs of children and the elderly, which improve their living conditions,
- projects to revive bazaar and urban square
- making attractive concepts of touristic urban infrastructure
- projects that reduce the negative effects of traffic and create the infrastructure of the main bike and walking paths,
- projects for establishing the green areas system,
- projects to acquire archeological areas into the city.

EXERCISES

A) Complete the blanks with appropriate words.

Public spaces – archeology – slum – urbanized

1) …… .means a house or an area of a city that is in very bad conditions, where very poor people live.
2) During the nineteenth century Britain became the world's first modern ……. .society.
3) The streets and ……. .had to be seen to be safe, from both criminals and demonstrates.
4) …….. is the study of the societies and peoples of the past by examining the remains of their buildings, tools, and other objects.

B) Answer the following questions.

1) What is the definition of " urban design"?
……..
……..

2) What is site street furniture?
……..
……..
3) What are the common goals of urban design?
……..
……..

UNIT 9

Urban Landscape Design

Urban landscape

Nowadays, the word encompasses a wider and deeper meaning. While in the medieval period, "landscape" was used as a synonym for "region" and "territory" in most of the Germanic languages, beginning from the 15th century landscape became a pictorial genre. The use of landscape as a term in science is relatively new. Today, landscape refers to not only a phenomenon described and analyzed by scientific methods, but also a subjective experience which has perspective, aesthetical, artistic and existential meaning. It is dynamic and constantly changing. Antrop identified four driving forces of landscape change; (i) accessibility, (ii) urbanization, (iii) globalization, and finally (iv) calamities. This chapter is about urban landscapes; therefore urbanization will be the beginning point of this study. Urbanization has become a worldwide phenomenon after the second half of the last century. Today more than half of the world population lives in urban environments. Urbanization is a complex and multidimensional concept with its spatial, ecological, economic, social and cultural aspects. While urbanization is widely accepted as a foundation of modernizing, it has also caused environmental and socioeconomic challenges. Consequently planning and design of urban areas are faced with challenges to create both ecologically and economically sustainable cities. Natural landscapes have been dramatically transformed by the urbanization process throughout the world. Consumption of resources is highest in urban environments, which causes negative impacts on physical environment. Traffic, air, water and soil pollution, improper land use and greenhouse gas emissions are some of the major issues due to urbanization. The effects of urbanization process are not only limited to ecological damage,

but changing sociocultural and economic structure also affects the quality of physical environment by influencing human behaviors and lifestyles. Indeed, there is a mutual relationship and interaction between physical environment and quality of life. Therefore planning and design of physical environments requires a holistic and comprehensive perspective.

Urban design as a profession might be considered relatively new, but historically it has played a major role in forming cities. The concept of urban design has emerged as a bridge between planning and design in response to need for management of modernizing cities in the late 1950's. However, there does not exist a commonly agreed definition of urban design yet, mainly due to its interdisciplinary character. While some try to create a precise and universal definition, some argue that it is unnecessary. Appleyard (1982) states that there shouldn't or can't be a single definition of urban design and points out if the existence of different kinds of urban design is recognized, then it is possible to get a better understanding of the nature of it. There are many viewpoints on what urban design actually is. Traditionally, urban design has been regarded either as a subset of planning or as extension of architecture. On the other hand, one cannot abstract open and green spaces out of an urban environment. Hence, the role of landscape architecture in urban design needs to be understood and accepted as a key part in creating sustainable urban environments.

Landscape architecture is the art and science of creating and conserving outdoor environments with respect to cultural values and ecological sustainability. It uses both nonliving and living materials for design and planning, therefore the outcome is always dynamic and changing. Until recently, urban design was associated mainly with architecture and urban planning, and the role of landscape architecture was neglected. Landscape architects have been criticized for their urban design practices with low density, little formal sensibility, and too much open space which at the end look like suburban environments. Today, on the contrary, urban landscape is considered crucial to creating sustainable urban environments. Although the word "landscape" is often used to describe natural and/or rural environments, there is certainly more to it. A landscape is shaped by both natural and cultural dynamics which also influence human life styles. Therefore an urban landscape

is not only about green spaces within an urban environment. It is comprised of various land uses such as streets and squares, playgrounds, railway and canal corridors, cemeteries, bicycle and pedestrian paths, and waterfronts. Even structures in a city influence the urban landscape character.

Today urban environments have also a vast pressure on rural environments due to decentralization which causes loss of boundaries between urban and rural environments. Therefore it has a negative impact on natural resources which provide goods and energy for the urban dwellers. That is why sustainability has become the most important goal in urban design and planning more than ever. Urban design approaches should not neglect the natural processes which shape and influence the quality of life in urban environments. Since ecological principles are fundamental to landscape design and planning, urban landscape design plays an influential role in creating sustainable urban environments in context of resource management.

Greenhouse

Urban landscape is basically formed of open and green spaces within an urban environment. However, it is not totally independent from the surrounding buildings and structures. Altogether, they form the character and identity of a city, and sense of place. It contributes to the cityscape by means of aesthetics and function. It also supports urban ecology.

Waterfront

It is dynamic and constantly evolving. According to von Borcke (2003) it is not an add-on but rather forms the basis for creating places. Urban landscape elements function as separator and/or connector agents between different land uses. They can form a buffer zone between conflicting uses (e.g. between industrial and housing areas) while they can facilitate movement of citizens throughout the city (e.g. greenways). They have the flexibility to serve for multiple uses and for different group of users in the community. Urban

landscape also contributes to the cityscape in terms of visual quality. Within dense built environments, it creates a sense of openness and more attractive places to live. Urban landscape helps to balance human-scale in city centers where vertical effect of buildings and structures dominates. It softens the "hardness" of buildings and structures. Well designed and managed urban landscape can improve citizens' quality of life in many other ways as well. The benefits of urban landscape are explained below.

Ecological and environmental benefits

Contemporary urban ecology assumes that urban areas are ecosystems since they have interacting biological and physical complexes. McHarg played a major role in emergence of ecological landscape design approaches in urban development. His work "Design with Nature"(1969) displays how nature and city might coexist together. However, ecology has been neglected in urban planning systems of most developing countries which mostly focus on the relationship between physical and socioeconomic aspects of an urban development. Urban green spaces are fundamental in sustaining the urban ecology. Some of the environmental and ecological benefits of the urban landscape are listed below:

- Urban green spaces provide flora and fauna with a habitat to live and therefore support biodiversity conservation.
- They also act as ecological corridors between urban, per urban and rural areas. They support movement of living organisms between these areas.
- Vegetation cover in urban landscape helps to improve micro-climate of urban areas where climate is warmer than their surroundings due to dense built environment and human activities. Vegetation cover raises humidity levels, reduces the stress of the heat island and mitigates the less desirable effects of urban climate. Daytime temperature in large parks was found to be 2-3°C lower than the surrounding streets.
- Vegetation helps to decrease carbon emission levels in cities. Through photosynthesis process in plants CO2 in the air is converted to O2. Therefore, urban vegetation cover helps to reduce excess CO2 in the urban atmosphere. Although the degree of trees' drawing carbon

emissions from the air is affected by their size, canopy cover, age and health, large trees can lower carbon emission in the atmosphere by 2-3%.

- Vegetation cover also filters out other particles and dust in the air.
- Green spaces absorb and reduce the noise generated by human activities, especially trees act like noise barriers.
- Vegetation cover and soil in urban landscape controls water regime and reduces runoff, hence helps to prevent water floods by absorbing excess water.

Water floods

- Trees can also act like wind breaker.
- Humans are the dominating elements of an urban environment. Social interaction, as a basic need for humans, is essential in developing sense of community, belonging and security. Social interaction in cities is possibly the highest in public open and green spaces.

Urban open and green spaces offer citizens various activity choices including recreational and sports activities which promote social cohesion. In 1992, researchers from Pennsylvania State University have conducted a nationwide study to investigate American public's perceptions of the benefits of local recreation and park services. They concluded that local parks and recreation services are linked to sense of community. Furthermore people from different demographical backgrounds share public urban landscape in their everyday life. While today democracy is regarded as the only legitimate form of government throughout the world, urban open and green spaces possess the notion of democracy in their nature. These places are designed and serve to everyone in the community. On the other hand this raises the issues of accessibility, equity and participatory planning which will be discussed in the next section.

EXERCISES

A) Complete the blanks with appropriate words.

cultural - urbanization – natural – urban- ecosystems

1) Natural landscapes have been dramatically transformed by the ……. process throughout the world.
2) A landscape is shaped by both ……. and ……. dynamics which also influence human life styles.
3) ……. landscape design plays an influential role in creating sustainable urban environments in context of resource management.
4) Contemporary urban ecology assumes that urban areas are ……. since they have interacting biological and physical complexes.

B) Answer the following questions.

1) What are four driving forces of landscape change based on what Antrop defines?
……..
……..
……..
2) What are four of the environmental and ecological benefits of the urban landscape?
……..
……..
……..
3) What are open and green spaces economic benefits ?
……..
……..
……..

UNIT 10

Landscape Planning

Assoc. Prof. Osman UZUN

According to Keleş (2004) planning is an action which keeps the balance of necessities and resources by adopting certain reasonable priorities to reach certain goals (Uzun 2015). According to Anonymous (2000), planning is a means of management which paves the way for social, environmental, and economic development, efficient usage of the existing resources, and coordination between usages. It is an action which is flexible in terms of time, and it has internal consistency. In most of the countries, integrity of planning is realized by both a hierarchical approach; providing flexibility at the same time, and foreseeing implementation tools and the necessary institutionalization for planning stages (Uzun 2015).

According to European Landscape Convention (ELC); landscape is a field which consists of the interaction of human and nature factors, and it is shaped by the way people perceive it. However, according to Forman (1995) landscape is a mosaic which is a mixture of local ecosystem or a land use which is repeated in similar forms on vast areas for miles (Uzun 2015).

Landscape planning which aims conversation of natural process during protection and usage balance becomes crucial in terms of ensuring the sustainability of spatial areas. Landscaping planning, protection and management keep up to date in the frame of "European Landscape Convention" signed in 2000. This convention suggests that the necessity of practice of landscape planning should be regarded either as a separate plan or all together with the residential planning practice (Uzun 2015).

According to the report of Leitao & Ahern's (2002) publication in Booth (1984) planning cannot be achieved without taking ecology into consideration. In 19 and 20 centuries, presenting society's priorities and internalizing ecological principles in planning have taken time. Ecology based methods and theories in land planning and management have been developed in 19 and 20 centuries. Some of these methods include Landscape Planning, Environmental Impact Assessment, Landscape Ecology, Rural Planning from an

Environmental Systems Perspective, Landscape Ecology Planning (Uzun 2015).

Ndubisi (2002), beginning of landscape planning studies dates back to Frederick Law Olmsted, (1822-1903) who is the founder of Landscape Architecture job discipline. He also made a plan of Yosemite Valley in California in 1864. In this valley plan which is still given as an example for ecological planning, Olmsted created national strategies about management of areas whose national beauties are similar and devised a plan about valley landscape's development (Uzun 2015).

Spatial planning process in Turkey can be studied by using development plans in 6 stages which are spatial strategy plan, regional planning, environmental plan, master development plan and implementary development plan and planning specific to sector.

After the European Landscape Convention in 2003, there have been important developments in terms of landscape planning with the help of projects that were conducted by Ministry of Forestry and Water Affairs (now, the Ministry of Agriculture and Forestry). Information about the projects that were supported by Ministry of Forestry and Water Affairs especially after the academic developments in landscape planning is given below. Studies on Landscape Planning can be conducted in 4 periods in Turkey (Uzun 2015):

Landscape Planning Studies before 1970

These studies are the ones which have been conducted during the first years of departments of Landscape Architecture. The studies that form basis for profession have been carried out during the time when the profession started to gain popularity. The studies especially focus on plants and inventory of natural and cultural landscaping features in this period of time (Aran, 1965; Koç, 1971) .

1970-1995 Landscaping Planning Studies based on Suitability Analysis Parallel with the approaches of landscape planning in 1960s (McHarg, Angus Hills, Lewis etc.), overlay methods which started to be applied in Turkey stand out on the basis of ecological units and planning square in these studies. Mathematical modellings which are based on planning squares are done through these studies. These modellings consist of natural and cultural

landscaping features in relation to landscape planning on the basis of the detail of the studied scale. In ecological units' methods, homogeneous ecological units are used during decision process and in planning (Altan, 1974; Altan, 1982; Başal, 1981; Başal, 1974; Başal et al., 1983; Kırzıoğlu, 1983; Önsoy, 1984; Yılmaz, 1987; Alparslan, 1991; Kaplan, 1995; Ortaçeşme, 1996; Mansuroğlu, 1997; Yılmaz, 1998).

1995-2005 Landscape Planning Studies based on Ecological Analysis

Together with the effect of Rio conference in 1992, these landscape planning studies vary. Some examples are associated with landscape planning such as environmental impact assessment (Akpınar, 1994; Yücel, 1997; Say 2004), basin planning and methods, protected areas (Gürkal, 1999; Hepcan, 1997; Uzun, 2003; Karadağ, 2007), wetland areas (Şişman, 2003), biotope mapping (Yılmaz, 2001a), determining the potential of landscape/tourism (Kelkit, 1996; Kalem, 2001; Sertkaya, 2001; Yılmaz, 2001b; Topay 2003; Bulut, 2006). In most of the studies, process of studies including mutual interaction between natural and cultural landscape planning is examined (Karadeniz, 1995; Şahin, 1996).

Landscape planning studies based on landscape ecology since 2005 and landscape character analysis

The studies that examine the process of the water in landscape and synthesize natural and cultural data by presenting the function, structure and change of landscape in parallel to the development of landscape ecology in the world, have made a great progress (Gönensin, 2001;Uzun, 2003; Deniz, 2005; Ünlükapan, 2008; Hepcan, 2008) In this period of time, studies in which methods for landscape character assessment are used, stand out. With the agreement of the European Landscape Convention in 2003, character assessment projects are supported by Ministry of Forestry and Water Affairs (Uzun et al., 2012; Atabeyoğlu, 2011; Görmüş, 2012; Şahin et al., 2013; Erdoğan, 2014; Uzun et al., 2015).

Some Project of the Landscape Planning in Turkey

Ministry of Forestry and Water Affairs, General Directorate of Nature Conservation and National Parks which was a side in European Landscape Convention and was also a focus point in the convention has started to

conduct and support a project by Landscape Protection Branch. The most important 3 projects in this context have been mentioned below. Landscape Management, Planning and Protection Project in Konya, Bozkır, Şeydişehir, Ahırlı, Yalıhüyük have been conducted between 2008 and 2010. This project is aimed at determining landscape character types on the basis of the method of landscape classification which is prepared nationally, regionally and locally. It also aims to create the first official landscape planning in which sectoral landscape policies have been defined with the landscape ecology based approach and to present landscape management in application of landscape planning. Landscapeplan made after this project was created based on landscape development strategies, sectoral landscape guides, landscape statues, upper scale planning studies and the factors that exert influence on the change of the landscape (Uzun et al., 2012). (figure 1).

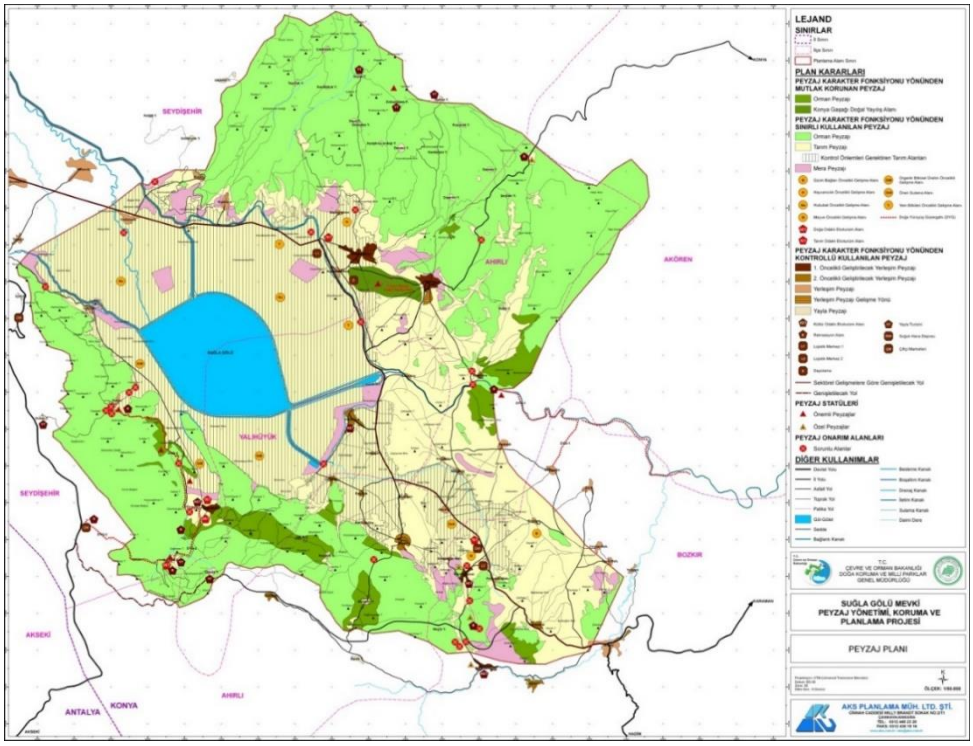


Figure 1. Landscape plan Suğla Lake (Uzun et al., 2012).

The project titled as "Landscape Character Analysis on city scale and Evaluation of it in terms of Tourism/Recreation" was carried out in Malatya between 2012 and 2014. This project was supported by Scientific And Technological Research Council of Turkey Public Research Support Group 1007 program. The Ministry of Interior General Directorate of Local Administration, the Ministry of Environment and Urbanisation General Directorate of Spatial Planning, the Ministry of Forestry and Water Affairs General Directorate of Nature Conservation and National Parks of Turkey are the foundations that participate in this project. After the project, a national guidebook about definitions, analysis and assessment of landscape characters has been prepared by creating Landscape Character Analysis and Assessment National Technical Guidebook on a regional and sub-regional scale. Furthermore, within the scope of this project, Landscape Information System, Data Base Structure, how to do coding and symbology and how to integrate the data base of Landscape Information System with other national information systems have been explained. National guidebook which was also established in the document of "Landscape Character Analysis and Assessment of it in terms of Tourism/Recreation – the city of Malatya pilot area" has been applied on the city of Malatya. In this study; landscape protection in Malatya, management strategies, detailed landscape guides that can be seen even in villages especially in terms of recreation and tourism are included (Şahin et al., 2013). Points which need to be considered during the process are summarized in 6 items.

1. Assessments according to landscape characters in landscape planning and management are necessary in ELC. However, every landscape assessment may not be based on characters. (exp: some environmental assessments) (figure 2)
2. It is of great importance to include the relevant groups in the process of landscape protection and development.
3. Approaches towards analysis and assessments based on characters can vary given the purpose and the content. Reasons for the approaches that will be adopted should be clearly specified with the help of scientific sources.
4. Landscape functions should be based on assessments. Beside this, potential functions should be taken into consideration.

5. If an area has a high value in terms of landscape functions that have been evaluated, the value of this area increases. If an area has a high value for one or more landscape functions, the value of this area is still high in terms of functions.

6. Information produced with landscape analysis is the basis for the maps of strategic landscape assessment and with the combination of these assessments, synthesis maps are formed. Landscape planning is prepared by generalizing the information in this detailed synthesis. In this plan, detailed provisions are defined as planning notes and strategic landscape assessment and synthesis maps are seen as related maps in landscape planning.

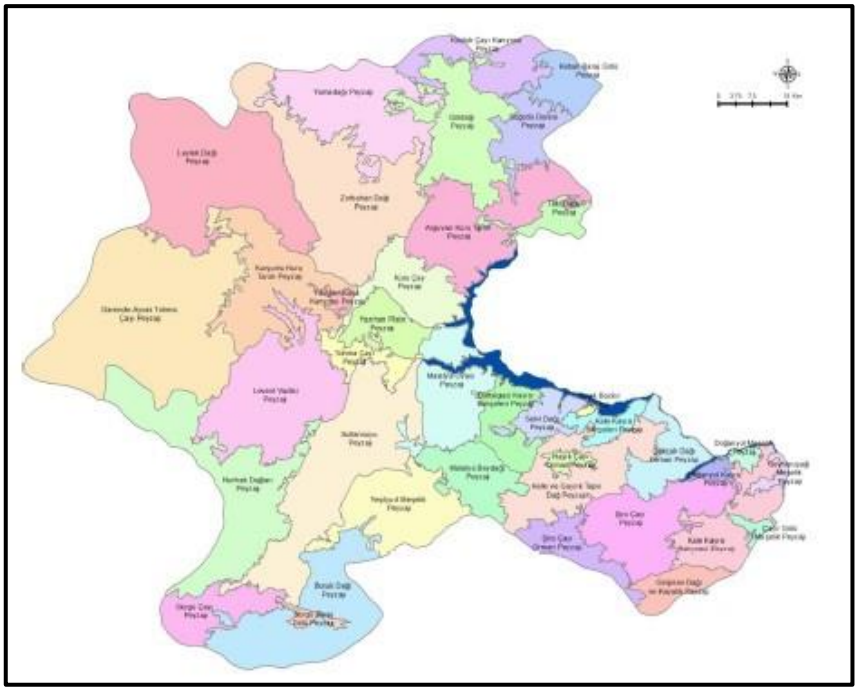


Figure 2. Malatya province landscape character areas map (Şahin et al., 2013).

Yeşilırmak Basin Landscape Atlas (Landscape Character, Variety of Landscape and bio-diversity, Qualification of Landscape, Landscape Strategies) Project was conducted between 2012 and 2015. This project is intended to form sectoral landscape guides by determining landscape development and

protection strategies. Furthermore, it is meant to prepare Yeşilırmak Basin Landscape Atlas in which types of landscape characters and landscape character areas, diversity of landscape and biodiversity are determined, and landscape quality map is prepared by evaluating landscape character (landscape character analysis, landscape function analysis, change and pressure analysis and visual landscape analysis) on the basis of assessment of landscape character (Uzun et al., 2015).

In this project, landscape planning approaches are shaped in terms of the micro basins, and protection, management and planning decisions are developed accordingly. In this context, project analysis is comprised of landscape function analysis performed in conjunction with ecosystem functions, human usages examined in the title of landscape indicators, analysis landscape effect-change-pressure and some indicators relating to assessments of basins, stream and its immediate environment, socioeconomic structure.

Firstly, factors that improve the quality of landscape are determined in the light of the factors that decrease and increase the quality of landscape under the title of landscape quality, and objectives of landscape quality. Landscape quality objectives on the basis of micro basins are described with the help of combination of the factors that were mentioned above with the factors that decrease the quality of landscape. These landscape quality objectives are mapped and determined spatially (Uzun et al., 2015).

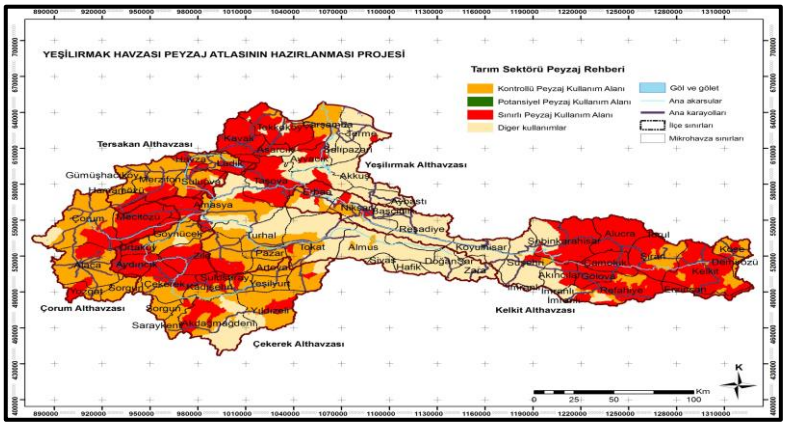


Figure 3. Agriculture Sector Landscape Guide (Uzun et al., 2015).

In conclusion, Yeşilırmak Basin Landscape Atlas can be a guide to managers of the public and an institution (governor, district governor, city manager, village headman and field services of ministries etc.) and the members of civil society organization. It is straightforward to use the atlas since it is created in a language and a mapping system that enables everyone to understand. Furthermore, "the project of preparing Yeşilırmak basin landscape atlas" is a project that will be an inspiration to make up the deficiencies in spatial and sectoral plans of Turkey. However, the most effective way to carry out these projects is to enact the law on landscape protection, management and planning making it applicable (Uzun et al., 2015). With the related projects, Turkey has made a great progress in terms of fulfilling the commitments in European Landscape Convention.

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EXERCISES

A) Complete the blanks with appropriate words.

Tourism – ecosystem – landscape – nature – environmental

1) The construction of dams has changed the character of the ……..
2) The rapid decline in the number of great sharks is disrupting the marine …….
3) There also is the obvious ……. benefits to biking, since it reduces air pollution and reduces traffic.
4) ……. is an important part of Turkey's economy.
5) We grew up in the countryside, surrounded by the beauties of …….

B) Answer the following questions.

1) What is the definition of landscape according to European Landscape Convention?
……..
……..
2) What points should be taken into consideration in relation to landscape analysis?
……..
……..
3) What are the benefits of Yeşilırmak Basin Landscape Atlas?
……..
……..

UNIT 11

Hardscape and Softscape in Landscape Architecture


Arbor

In the context of landscape management, hardscape and softscape essentially refer to the heavy or light landscape materials used respectively. While the stone, flagstone and rock are referred to as hardscape, trees, soil, flowerbeds, vegetable gardens, grass and shrubs comprise the softscape. A great combination of hardscape design and softscape decision guarantees a landscaping masterpiece. The difference between hardscaping and softscaping is the same as that between walls and wallpaper.

While hardscape is all about brick and mortar, it is softscaping that infuses poetry in the landscaping project. Hardscape takes care of the spaces, proportion, patios, driveways, arbors and gates. Softscape recognizes plants, flowers, color scheme and pattern of plantation.

Hardscape includes all those installations that prevent the absorption of water, even from natural rains or artificial sprinklers. However, in some cases, a trivial bit of water absorption is possible. This typically includes the use of gravel and bricks that are slightly permeable. Hardscaping is employed in the early stages of landscaping to render the area a desired shape and add-on features. For instance, walls are erected to demarcate the property boundary and shape, swimming pools and fountains are installed for recreation or ornamental beautification, and can be termed as hardscape. Hardscaping protects the soil. By the construction of vertical walls, pools, stone benches or paved walkways, the loosening and erosion of soil is considerably curbed.

Bench

Softscaping is the living, animated part of a landscape. Due to the advancement in landscaping design programs, softscaping can easily be experimented with before implementing the subtlest of ideas and changes in a landscaping area. Softscaping can be both permanent such as evergreen trees and shrubs as well as temporary, such as seasonal plants which lend their color and character to pathways and driveways. Planning and arrangement of these elements in an aesthetically appealing manner is the cornerstone of effective softscaping.

With over 30 years of experience in gardening and landscaping, Scarlett's Landscape Inc. is a premier company that offers optimum landscape design, installation and maintenance solutions at extremely cost effective prices.

Hardscape Elements

Hardscape covers all the spaces and proportions, and it also includes the installation of sprinkler systems and systems that prevent the absorption of water. For these reasons, hardscape features are the ones that landscapers start with as they lay out the boundaries and shape of the yard. Examples of hardscape features include:

- Walkways
- Driveways
- Patios
- Swimming pools
- Fountains
- Stone benches
- Arbors
- Gates
- Heavy materials like stone, flagstone and rock

Softscape Elements

When the hardscaping is complete, it's time to add the living part of the landscape, which is the softscape. Softscape features may be permanent, such as evergreen trees and shrubs, or they may be temporary, such as with perennial flowers. This is what makes softscaping so much fun, as it's always changing to fit the season and vision of the homeowner. Examples of softscape features include:

- Grass
- Trees
- Shrubs
- Flowers
- Soil
- Vegetable gardens

No landscape is complete without elements from both categories, but there are pros and cons to think about as you find harmony in your space. First, hardscaping elements are typically much higher in cost. And, if you need a change of scenery in a few years, you'll need to go through the redesign and replacing of hardscape features. Softscaping, on the other hand, is more affordable and can be easily changed. At the same time, softscape elements require more care and maintenance.

EXERCISES

A) Complete the blanks with appropriate words.

softscape - walls – hardscaping – wallpaper- animated

1) …….. protects the soil.
2) …….. recognizes plants, flowers, color scheme and pattern of plantation.
3) The difference between hardscaping and softscaping is the same as that between …….. and……..
4) Softscaping is …….. part of a landscape.

B)Answer the following questions.

1) Explain the role of hardscape in architecture.
…….
…….
…….
…….
2) What are some features of hardscape?
…….
…….
…….
…….
3) Is landscape complete without elements from both categories? Explain how.
…….
…….
…….
…….

UNIT 12

3D Digital Graphics in Landscape Architecture

3D software

Landscape architects are often charged in tackling interdisciplinary design tasks, where visual communication becomes a key in demonstrating project outcomes to audience groups of all kinds. Development of 3D digital graphics was first led by architecture and industrial design, and then rapidly adopted in landscape architecture. Pervasive arguments for using 3D technologies are that they constantly innovate and may fundamentally change the way that design is perceived and communicated. As a result, an increasing number of landscape architects are applying 3D technologies in order to supplement the traditional 2D methods of design representation. 3D technologies have unique capabilities in creating visualizations that convey complex design ideas to the clients in a meaningful way. Moreover, current 3D technologies allow landscape architects to integrate various data sets and analyses (e.g. hydrology, visual impact assessment) into their work. With the growth of environmental consciousness since the 1970s and the migration of public agencies' data into digital formats, landscape architects are held accountable for using best available information to inform their design and fulfill environmental stewardship. Despite these encouraging aspects, some early studies found that the high cost and time commitment in learning have prevented designers from using 3D technologies. However, little research has been conducted on the current status of using 3D technologies in the realm of landscape architecture. Moreover, little is known about practitioners' perceptions on whether 3D technologies are suitable for their work.

Who are using 3D Technologies in Landscape Architecture?

For the question about how frequently professionals use 3D software in their daily work, only 30% of the respondents stated that they often or very often use 3D software during the design process. Only 20% of them considered

themselves as experienced/expert 3D software users. Among the eleven 3D software programs examined in the survey, respondents suggested that Google Sketch Up, ArcGIS, AutoCAD Civil 3D, 3D Studio Max, and AutoCAD Map 3D are most used. Use Frequency and Levels of Experience are compared to examine whether experienced users take advantage of 3D software more often than less experienced users (Figure 2). It is obvious that in the expert/experienced groups, more than 50% of the respondents use 3D software often/very often. However, in novice/new user groups, fewer respondents suggested that they use 3D software frequently. The results show that more experienced users would adopt 3D software more often than novice/new users. An interesting finding is that although some respondents did not consider themselves as experienced users, they reported high frequency of 3D software use.

The history of 3D software application in landscape architecture, both in education and practice, is relative short compared with other related disciplines (e.g., architecture, interior design). It was not until the 1990s that 3D technologies were introduced to landscape architecture. Considering this background, it can be assumed that senior landscape architects would use 3D software less frequently than junior professionals. Figure 3 actually shows that there are 20% of the senior landscape architects seldom or never use 3D techniques. However, when comparing the years of work experience with the frequency of 3D software use, insufficient evidence was found to suggest that there are substantial differences among user groups with varying years of work experience.

Furthermore, there is a weak correlation between the frequency of 3D technology use and years of firm establishment. Generally speaking, younger firms (1~5 years of history) have relatively higher percentages in the category of rarely or never use 3D software, older firms (more than 20 years) reported higher frequency of adopting 3D software. But again, the evidence is not sufficient to conclude that there is a correlation between the frequency of 3D software use and the firms' year of establishment. Other factors that were hypothesized to be important for the frequency of 3D software use, did not show huge significance. For example, male and female participants reported similar levels of use frequency. Also, education background does not suggest itself as an important factor that influences the frequency of use.

What 3D Software Programs are being used in Landscape Architect
There are many 3D visualization programs currently available. In landscape

architecture, the most commonly used 3D software packages include Google SketchUp, ArcGIS, AutoCAD, 3D Studio Max, Maya, and VuE.

These packages vary in platform, price, and their main applications. Some programs focus more on 3D visualization and representation (e.g. Google SketchUp and Studio Max). Some are very comprehensive and include 3D analysis and visualization functions (e.g. ArcGIS).

The most popular 3D software program being used by landscape architects is Google SketchUp. This is likely because of the low learning curve and the low (or minimum) investment on license. In fact, Google SketchUp (non-professional version) is the only one that is free and sets no limitation on the license period. AutoCAD and ArcGIS suites are also popular. For example, for firms that involve large-scale planning work, ArcGIS offers powerful 3D analysis and visualization functions. AutoCAD Civil 3D is also instrumental in storm water related analysis and cut-and-fill calculations, presented in a 3D manner.

What are 3D Software Programs used for in Landscape Architecture?

Communication plays an important role during the design process and landscape architecture is no exception. Communication becomes particularly critical between designers and clients. In this study, participants were asked to rate the effectiveness of 3D programs in communicating to different targeted groups. Majority of the respondents agreed that 3D programs are overall effective in communication. To be more specific, the general public, concerned groups, and policy makers were groups to whom 3D programs are most effective for conveying design messages (55.2%, 42.5%, 37.9% respectively, rated as Most Effective) (Figure 1). The above groups are considered to have limited training and knowledge of design. Therefore, 3D programs show an advantage in facilitating the design process of engaging layman audience.

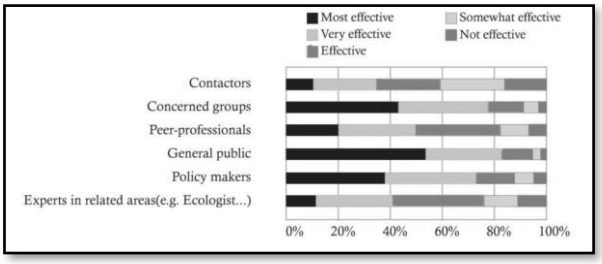

Figure 1. Effectiveness in communication with different groups using 3D software programs

The participants were also asked in respect to how 3D programs were applied in different design phases. Figure 2 shows a fairly even distribution across different design process, with the most extensive use occurs in the project final output. Other phases such as public involvement, planning alternatives, and preliminary draft were reported to have less, but still decent frequencies of use.

The findings have corroborated the perception that 3D programs are mostly successful in performing communication tasks. When communication is addressed to audience groups that have limited knowledge in landscape design (e.g. clients, stakeholders, and policy makers), it is valuable to take advantage of 3D programs for clear and easily comprehensible project presentations (Sheppard and Meitner, 2004).

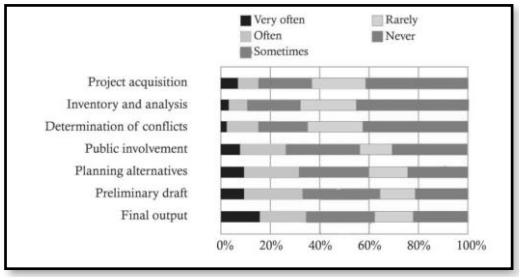

Figure 2. Frequency of 3D software program use in different design phases

Benefits and Challenges of using 3D Technologies in Landscape Architecture

Although the respondents' knowledge level of 3D technologies varies, most of them consider 3D technologies helpful for the profession. The most compelling benefit is a better communication between designers and clients (reported by 89% of the participants), and as a result increasing clients' satisfaction. It is evident that a healthy designer-client relationship will not only help designers accomplish projects smoothly, but also contribute to long-term client retention. In contrast, traditional 2D communication venues (e.g., plan renderings, 2D line-work plans and maps) have not been fully successful in engaging clients and stakeholders. Based on their experiences, designers can rely on 2D drawings to visualize design proposals in a 3D format; whereas average client may be overwhelmed by sophisticated 2D drawings and experience difficulties in picturing landscape design visions. In this sense, 3D

technologies complement traditional 2D design languages and increase the versatility of presentation.

Another major benefit of 3D visualizations is that they allow the proposed design to be put in the real context (e.g. showing the surrounding landscapes). Because these visual simulations are done by computers (versus physical models), it makes designers' job easier in making design amendments after receiving feedback. These simulations also enable the comparisons of different design alternatives in a speedy manner. Potential design problems that may not be easily identified through 2D drawings may stand out more easily when presented in a 3D format. In addition to 3D visualizations, some software packages (e.g. ArcGIS) can perform suitability analysis and landscape performance evaluation. Other advantages of using 3D programs are also notable, such as the capability of performing time-series analyses through animation and the ease of project collaboration via model sharing. Challenges also follow. The most noteworthy ones are significant time commitment and steep learning curve, reported as 79.3% and 68.3% by the respondents, respectively.

curve

In addition to these two major hurdles, respondents also requested future 3D programs to provide fast, yet photorealistic rendering, increase the compatibility with ArcGIS and other geoprocessing tools, provide more and higher quality symbols, and improve modeling accuracy. Participants also expected future 3D programs to include more features, such as sophisticated lighting design options, rich material and texture libraries, and intricate rendering effect of reflection. The main technical barrier currently, however, is the programs' lack of ability in building models and delivering high-quality simulations rather quickly. Practitioners have little choice but to omit details in performing model development and visual simulations.

EXERCISES

A) Complete the blanks with appropriate words.

2D drawings - high cost – Google SketchUp- time commitment – building

1) The ……and ……in learning have prevented designers from using 3D technologies.
2) …… is the only one that is free and sets no limitation on the license period.
3) Designers can rely on …… to visualize design proposals in a 3D format.
4) The main technical barrier currently, however, is the programs' lack of ability in …… models and delivering high-quality simulations rather quickly.

B) Answer the following questions.

1) How was 3D digital graphics first initiated?
…….....
…….....
…….....
2) What are the most commonly used 3D software packages in landscape architecture?
…….....
…….....
…….....
3) What is the role of communication during the design process?
…….....
…….....
…….....
4) What are the benefits and challenges of using 3D technologies in landscape?
…….....
…….....
…….....

UNIT 13

Landscape Architecture And Evolving GIS

Landscape planning supports sustainable development by creating planning prerequisites that will enable future generations to live in an ecological intact environment. It breeds to a full-coverage strategy with the aim of maintaining landscape and nature as well as facilitating municipal and industrial development. Contrary to the design approach it has been developed to an institutionalized planning system based on analytical processes. Objectives will be derived from scientifically based analysis and normative democratically legitimized goals. Existing Geographic Information Systems (GIS) offer the needed capabilities concerning the whole planning cycle. Data capturing for inventory purpose, scientific-based analysis, defining objectives, scenarios and alternative futures and planning measures can be carried out by using GIS. For the implementation and sometimes necessary updates environmental information systems can be developed for specific purpose.

Nowadays required models (e.g. process, evaluation, decision) can be defined and interchanged for different scopes. The technical evolution of hard- and software enable planners and designers to improve participation processes and decision-making using visualization and WebGIS-technologies. Transforming the existing planning process to a process-oriented one with new ways of interaction technical enhancements are necessary as well as a new planning and design style. Therefore teaching methods must be changed to a more process- and workflow oriented thinking using the advantages of the different software tools like GIS, CAD, visualization and Building Information Models (BIM) Geo Design as a "new" term had been discussed the last years. While some planners contribute that they are doing this for years requirements had been defined for a more collaborative and process-oriented planning. In this paper the different terms will be explained and the special German definition of landscape planning will be described. Based on this definition the use of GIS in the different working steps will be described and useful methods (e.g. habitat suitability analysis) will be explained. The needs for standardization and

existing information management will be discussed and future improvements realizing the Geo Design framework will be shown.

A GIS is an organized assemblage of computer hardware, software, spatial data and operating instructions designed for capturing, storing, updating, manipulating, analyzing, and displaying all forms of geographically referenced information. This model began emerging as the first automated mapping products and military satellite imagery appeared in the late 1950's. Through the 1960's and 1970's, landscape architects were instrumental in developing analysis methods that would be incorporated into developing software systems, while government and academic institutions developed hardware and data standards. As computing power exploded and costs declined in the 1980's and 1990's, GIS systems became available for desktop processing and became increasingly common in government and business offices. Concurrently, new satellite sensors, the Global Positioning System, and the Internet enabled the production and distribution of massive volumes of geographically referenced data. By the end of the 20th century, geographic analysis had become cheap, efficient, and accessible to millions of users.

Common GIS Applications

From a landscape architecture perspective, Ian McHarg set the stage for modern Geographic Information Science in his 1969 book, Design With Nature. In it, McHarg outlined the Overlay Method. (Figure 1) The overlay method assigns values to thematic data (land cover, property lines, etc.) that are a measure of the ability of that condition to accommodate a particular use. Multiple data layers are then overlaid and their overlapping values summed. The results indicate the most desirable locations for the use in question. Or overlays can be used estimate the combined effects of multiple properties; pollution potential in this case. The method has become a standard practice in site suitability analysis and is extremely effective for incorporating natural resource information into planning and design processes. But as with all techniques it does have some shortcomings, most notably is its absolute rationalism. Any GIS operator with the same data and the same method will reach the same conclusion. Design, however, is a fluid process that embraces nebulous and qualitative aspects of human experience. Deterministic

decisions based solely on the overlay method (data in, answer out) are severely lacking in this dimension.

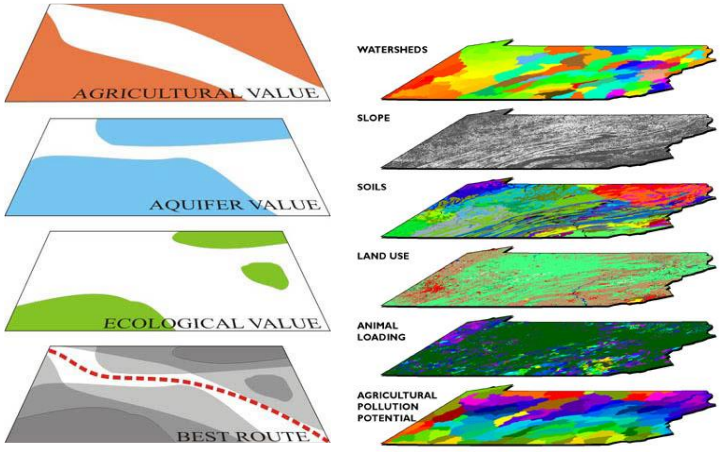

Figure 1: Overlay Method

The second great contribution to GIS analysis methods by a landscape architect comes from Carl Steinitz of Harvard University. Steinitz elaborated on the overlay method to produce a model for evaluating landscape change and future impacts of design alternatives. Steinitz designed a framework for understanding and organizing the landscape planning process. The framework is essentially a classification system that identifies and orders the main purposes of models according to the type of questions they address. In a design process, the 6 stages of the Steinitz Model are passed through a minimum of three times. The first pass moves from Representation Models to Decision Models and helps define context and scope of the design problem. The second pass moves in reverse, from Decision to Representation Models, to identify the unique methodology needed to answer the design problem in context. In the third pass, from Representation to Decision Models, analysis is applied to the specific question at each stage. Reaching a "no" decision at any level in the framework demands reassessment of prior decisions. Analysis continues until a positive "yes" outcome is achieved. In theory, this method reveals the best and most defensible design intervention on a particular site. These two

methods, coupled with a massive expansion of free and easily distributable data, have evolved GIS into a powerful tool for landscape architects and planners. Yet while GIS is now ubiquitous in planning departments, it finds relatively limited application in practicing landscape architecture firms. Although with a rising emphasis on sustainability, this trend may be changing.

EXERCISES

A) Complete the blanks with appropriate words.

software systems - GIS – sustainable development – process-oriented

1) …….offer the needed capabilities concerning the whole planning cycle.
2) Landscape planning supports …….by creating planning prerequisites that will enable future generations to live in an ecological intact environment.
3) Transforming the existing planning process to a …….one with new ways of interaction technical enhancements are necessary as well as a new planning and design style.
4) Landscape architects were instrumental in ……. methods that would be incorporated into developing.

B) Answer the following questions.

1) Name one of the contributions of GIS analysis method?
……..
……..
……..
2) What is the role of the technical evolution of hard- and software?
……..
……..
……..
3) What does existing Geographic Information Systems (GIS) offer?
……..
……..
……..

UNIT 14

An Introduction to Remote Sensing and Its Engineering Applications

Majid Aghlmand & Assis. Prof. Mehmet İnanç ONUR

What is Remote Sensing?

Remote sensing is a recognition and supervision process without any physical contact. It is usually done by using satellite or aircraft. In this method, the physical properties of a district can be obtained through measuring the radiation reflected or emitted from Earth's terrestrial and aquatic atmospheric ecosystems.

In this method, researchers make use of photos taken by special cameras to gather information. These photos cover a wide range of districts so that we could see more objects compared with the time when we stand on the ground.

Importance of Remote Sensing

The advent of the science of remote sensing was in line with the daily increase of modern society. This science makes it possible to access risky and inaccessible zones as it is an unlimited approach that allows its users to collect and analyze their intended information without encountering any serious hurdle. This method, in fact, replaces the costly, slow, and old methods of data collection.

Remote sensing has good characteristics, such as complete and quick coverage of the Earth and also the capability of repeating data collection procedure in a very wide area. Todays, this method is of great importance and use in weather forecast, climate changes, and natural disasters reports. Additionally, remote sensing data has increasingly been used in research studies. Some of these researches are related to issues such as flood and forests fire control, deforestation, drought, chemical density, earthquake, and animals and species that are at danger of extinction.

Electromagnetic Spectrum in Remote sensing

Electromagnetic energy spreads through the atmosphere and vacuum of space. The wavelength and frequency differ. Shorter waves have longer frequency,

such as radio and Microwave and infra-red waves. Also, ultra-violet ray, X ray, and Gama Ray have shorter frequency. What stands between long and short radiations is visible light limit. Human eyes can merely detect this part of energy.

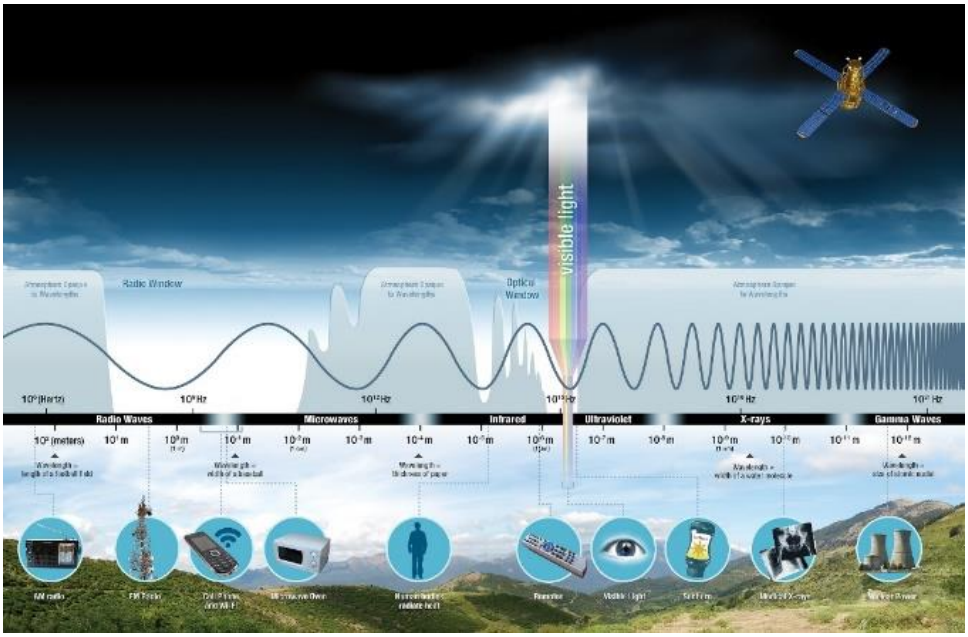

Fig 1. Different wavelengths (ARSET)

Water vapor and carbon dioxide are among the elements that exist in the atmosphere. Waves display different reactions while encountering these elements. Some of them are absorbed or reflected by these elements and some others continue their path as the elements cannot affect them. Visible light can pass through the atmosphere largely due their wavelength. Microwave energy can also pass through clouds because of its wavelength. The existence of such a feature in microwave energy has made it useful to be employed in communication and weather forecast satellites.

The sun is the main source of energy which is observed by satellites. It glows the earth and its light is reflected from the earth. The extent of the reflection of the sun light depends on the roughness of the surface and its albedo. As an example, the surface of oceans have little albedo and can reflect only 6% of the

sun energy. But snow, because of its high albedo, can reflect almost 90% of the sun energy and only 10% of it is absorbed. The surfaces that absorb energy usually re-emit it in longer waves. This action in oceans happens in form of infrared radiation.

Whatever exists on the earth shows a unique reaction against energy in one of these three ways: reflection, absorption, and transmission, which have their own wavelengths. As fingerprint is unique for every person, all objects on the earth also have their specific spectral. This feature along with other extracted information can be used to study and analyze different properties of earth and also different mineral and stones. The high number of spectral bands in satellites is a great help to study the materials of the earth more precisely. The following image shows the spectral signature of earth features for varying surfaces.

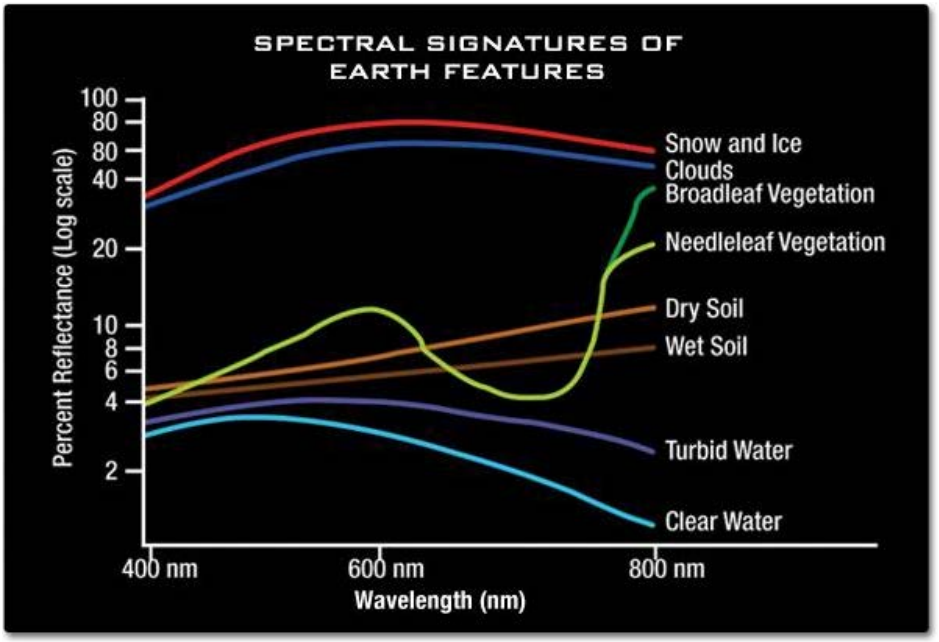

Fig 2: Spectral Signatures of Earth features (ARSET)

What is Remote Sensing Used For?

Nowadays, remote sensing technology has extensively been used in many of scientific studies and fields of study. Remote sensing techniques can be employed in many of scientific fields of study related to Earth sciences

including, but not limited to, meteorology, geology, hydrology, mapping from the earth, geography, discoveries, ecology, environment, oceanography and glaciology. Additionally, remote sensing has military uses as well. It can be used to gain information regarding different locations. It has also been used in commercial, economic, planning, resources management, and humanitarian purposes. Some of the uses of remote sensing are as follows:

- GIS remote sensing: Geographical Information System (GIS) and satellite remote sensing complement each other. Satellite remote sensing is a source of providing spatial data and GIS is used to examine, revise, save, manage, analyze, and extract satellite remote sensing results.
- Remote sensing in agriculture: in agriculture, remote sensing might be used in irrigation management and also soil moisture monitoring.
- Doppler radar measures meteorological events such as speed and direction of wind and also the severity and place of rainfall. Another program is air traffic control.
- Remote sensing is typically used in weather monitoring systems to control and examine the severity of rainfall and its place, and also to measure the direction and velocity of wind.
- Remote sensing in monitoring and controlling the volcanoes' activities. Two special satellites called MODIS and AVHRR, having two thermal sensing and mid infrared sensing, monitor volcanoes.
- Interferometric Synthetic Aperture Radar (INSAR) is used to predict and announce early warnings about potential landslides.
- Light Detection and Ranging (LiDAR) is also used to monitor vegetation. It is also used to determine and measure the chemical density of different chemical substances in the atmosphere.
- Spectroscopic Imaging is used by researchers in the research laboratories of the U.S.A army to track their targets or to identify the objects made by humans with their polarimetric signatures, which are not found in natural objects.
- Numerous destructions usually happen at the time of earthquakes. Remote sensing satellites can be of great help by sending photos before and after the event so that the precise place of event could be identified and consequently, help and rescue activities would be done faster.
- Data obtained from remote sensing satellites can also be used in coastal mapping and prevention from erosion. This kind of data can help to adopt more effective strategies to better management of natural

disasters and to minimize the fiscal and life damages. It should be pointed out that urban development has caused numerous damages to the environment and satellite information can significantly help to conserve the environment.

- Remote sensing is also one of the viable methods to monitor and manage oil and gas sites management. Using remote sensing techniques can help to estimate surface out crops and also monitor and manage hydrocarbon seepage.
- Remote sensing for oil and gas is a vital tool for upstream and downstream operations as it can help to access suitable information regarding infrastructures and planning for oil and gas sites. Spectroscopic analysis is highly critical for evaluating surface outcrops and hydrocarbon seepage.

Application of Remote Sensing to Climate Change

Today, a large part of data related to research into climate changes are obtained through remote sensing and its pertinent tools. These kinds of studies are typically done by studying the climate system and its changes and also quantifying obtained data and modeling them for running the analysis process. Observing conventional climate models cannot provide us with complete and correct information regarding climate system. Thus, we have to make use of satellites and different sensors to measure the cooling effects of increased stratospheric aerosols and the spatial pattern of sea-level rise.

It is sought to use global climate change response strategies in researches related to climate change. To this end, it is essential to employ technologies that make it easy to study the spatial variables of terrestrial ecosystems. Hence, in recent years, the data obtained through remote sensing science has exploited big data from Earth observation platforms and also has used remote multi-satellite, multi-sensor, and long-term series data methods.

Application of Remote Sensing to landscape architecture

Landscape refers to a set of human and natural elements in a specific area that interact. The beauty of a landscape highly depends on the cooperation and interaction of various factors such as geology, geo-morphology, weather, soil, vegetation, hydrology, and human activities.

In recent years, given the technological advances, remote sensing along with field studies has been used in many research works related to landscape. Spatial data analysis and their modelling are also done by means of GIS. It could, then,

be stated that these advances have caused traditional methods and tools to be used less.

Precise information could be gained by using remote sensing tools and also satellite data. As an example, satellite data can be utilized to gain useful information regarding the earth temperature, soil moisture, and type of minerals in a specific area. Additionally, height, slope, vegetation, and raifall rate are also issues on which valuable information can be obtained via these techniques. The extent of air pollution can also be measured by using satellites recently been located on the earth circuit.

In a research study related to the development of Isfahan city in Iran, free data from land set satellite was used. In this research project, six classes were selected and their changes were examined in 1986 and 2019. The two following photos show changes related to roads, urban space, green space, barren, and water in this city during 33 yeras. Using remote sensing tools and GIS science can help to reach more information from these two photos and use the extracted information in plans and models of urban development, landscape, and urban management programs.

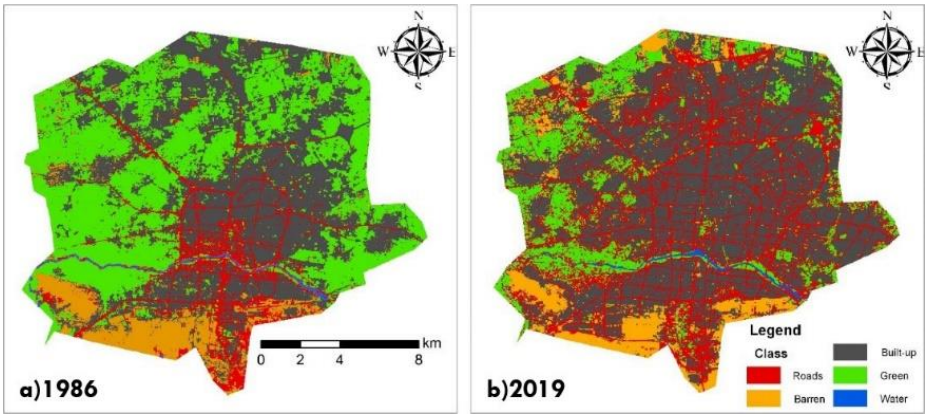

Fig. 3: Isfahan city in Iran in 1986 and 2019

In another research project in Azmit city of Turkey, Land set satellite data were used in 1986 (Figure 4). This is a raw figure without any analysis on it. Only three bands of Land set satellite were used to produce RGB photo. Further, the photos of the same city in 2019 was also extracted (Figure 5). A simple non-naked comparison of these two photos can easily show the rate of urban development during these years. Increase in roads and decrease in green space

are among noticeable changes. Researchers can examine other indices from these photos and present their obtained information to urban mangers.

Fig 4: Image of the Turkish city of Izmit in 1986

Fig 5: Image of the Turkish city of Izmit in 2019

The following satellite images are also related to Lake Urmia, which is located in Iran. The 1986 and 2017 images clearly show the changes that have taken place and the drought. The lake was flooded due to poor management of water resources and rivers flowing into it, and research is underway to revitalize the lake.

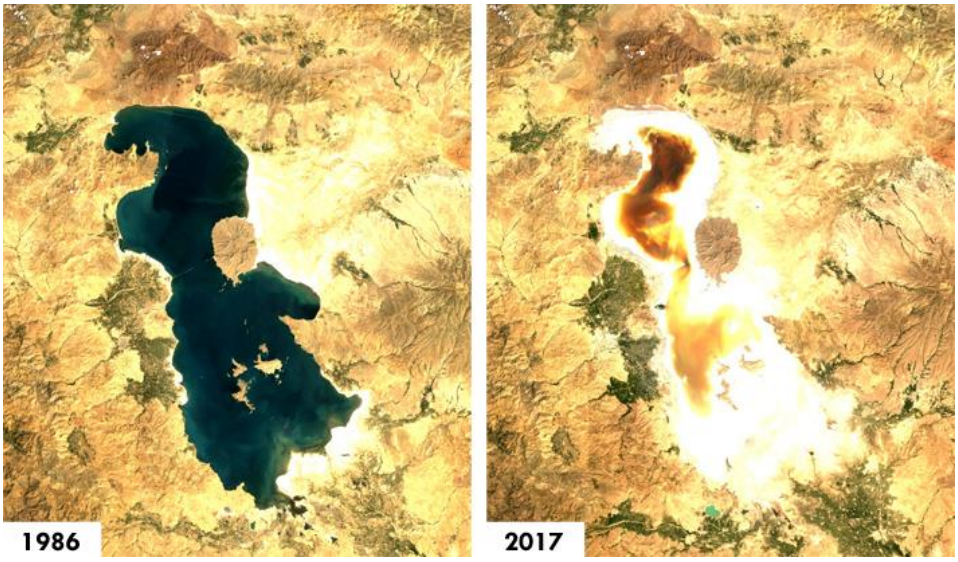

Fig 6: Satellite images of Lake Urmia in 1986 and 2017

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EXERCISES

A) Fill in the blanks using appropriate words

Hydrocarbon - re-emit - visible light - natural disasters - costly, slow, and old - speed and direction - light Detection and Ranging

1.Remote sensing, in fact, replaces the ……. methods of data collection.
2.....can pass through the atmosphere largely due their wavelength.
3.The surfaces that absorb energy usually ……. it in longer waves.
4.Doppler radar measures meteorological events such as ……. and … of wind.
5.…… (LiDAR) is also used to monitor vegetation.
6.Data obtained from remote sensing satellites can help to adopt more effective strategies to better management of ……
7.Using remote sensing techniques can help to estimate surface out crops and also monitor and manage …… seepage

B) Answer the following questions

1) Explain the importance of Remote Sensing.
……..
……..
……..
2) The sun light reflection depends on which factor/s elaborate with example.
……..
……..
……..
3) How Remote Sensing can be used in agriculture?
……..
……..
……..

UNIT 15

Right Plant, Right Place

One of the most important steps in landscape design and management is appropriate plant selection and placement. Indeed, the principle of "the right plant in the right place" can prevent many common problems associated with landscapes and potentially reduce maintenance requirements. "Right plant, right place" is a short phrase that embodies many art and science based concepts for landscapes. The fundamental concept is choosing plant species, varieties, cultivars, provenances, or genotypes that are adapted to the location and situation in which they are placed. Fulfilling this concept requires knowledge of plant and site characteristics, including environmental and growing requirements, function, and aesthetics. It also is useful to remember that a successful planting design often is a compromise between the science of growing plants and the desire for artistic expression with plants.
Function, Aesthetics, and Environmental Requirements Choosing the right plant and location requires knowledge of the site and the activities that take place there. Three questions to ask about plants are:

1. Functionally: What do you want the plant to do?
2. Aesthetically: What do you want the plant to look like?
3. Environmentally: What conditions does the plant need to grow?

A site inventory and analysis help guide plant choices by asking what environmental conditions exist on the site. The site inventory is a plan or aerial view showing the location of environmental conditions, including areas of sun and shade, dry and wet areas, soil type, views, wind direction, circulation routes, spatial dimensions, architectural features, and facilities needed for activities. An inventory also includes needs and desires of the client or users of the space. An analysis of the inventory determines the type of plants needed to fit the existing environmental conditions, the functional requirements of the space, and the aesthetic desires of the user.

Site Conditions and Functional Characteristics of Plants

Plants serve many functions in the landscape, including human comfort, screens and barriers, and soil protection. When choosing plants for a particular function, consider characteristics such as size, shape, density of foliage, texture, root mass, and rate of growth. Plants should be selected based on their ability to create the desired functional effect and thrive in the growing conditions of the site.

Climate Control

Plants can effectively modify the microclimate for human comfort by affecting humidity, air temperature, and air movement. Trees and other vegetation cool air temperature through the reflection of solar radiation, which creates shade, and through transpiration (water evaporation) from the leaves. Trees also can provide windbreaks to block cold air or funnel air to increase cooling breezes.

Windbreaks

Visual Control

Plants can be arranged to either partially or fully screen unwanted views from a building such as roads, trash cans, utilities, or parking lots or to direct views to building entrances or pedestrian zones. Plants can create privacy from outside views into a building, such as from roads or parking lots, and provide pleasant outdoor gathering areas by creating the feeling of enclosure with vegetation overhead. Visual comfort also can be influenced by the use of plants overhead to reduce glare from sunlight. Additionally, plants on vertical surfaces reduce reflected light bouncing off the surface.

Trash cans

Physical Control

Plants are useful for controlling the physical movement of people or animals. Tall, dense plants provide physical barriers that prevent access and cannot be seen through. Shorter, less dense, but wider plantings create implied barriers that separate areas and discourage access, while still allowing views. When using plants to control or direct pedestrian movement, wear resistance is a consideration, particularly in places where pedestrians or pets may walk on plants. Some species tolerate foot traffic well, while others do not.

Erosion and Water Control

Water flow

Plants prevent erosion in several ways: leaves break the impact of raindrops, rough bark and twigs slow water flow, and fibrous roots near the surface trap and retain soil. These same characteristics control and hold storm water on site by slowing the speed of water flow across the soil surface, allowing for greater filtration and cleaning of the water. A plant buffer is helpful along waterfronts to block the flow of pollutants carried by water, such as pesticides and fertilizer, into larger water bodies.

Noise and Odor Control

Sounds and odor can be mitigated with plantings. Effectiveness depends on the type, density, height, and location of the plants. Locating plants to block the prevailing wind that comes from the source of the odor or noise serves this purpose well.

EXERCISES

A) Complete the blanks with appropriate words.

landscapes - colors – plants – textures- visual

1) "Right plant, right place" is a short phrase that embodies many art- and-science based concepts for ……..
2) ……..can create privacy from outside views into a building.
3) ……..and ……..of the architectural material of the building or landscape elements often influence plant choice for aesthetic value.
4) Color is the most attractive and …….. characteristic of plants.

B) Answer the following questions.

1) What is the role of the famous principle of "the right plant in the right place" ?
…….
…….
…….
2) How is a successful planting design developed?
…….
…….
…….
3) What are the functions of plants in the landscape?
…….
…….
…….
4) How can plants modify the microclimate?
…….
…….
…….
5) How can plants prevent erosion?
…….
…….
…….

UNIT 16

Selecting Landscape Trees

In selecting a tree species or cultivar – a species is a particular type of tree, like a Norway maple; a cultivar is a cultivated variety of a species selected for certain characteristics, like a 'Crimson King' Norway maple – our goal should be to have a tree well-matched to its planting site so it survives and thrives. The tree must also achieve our goals for size, shape, function, and appearance and must be affordable. Unfortunately, people usually only pay attention to visually obvious characteristics like flower color, presence or lack of fruit, and crown shape or size. Though such characteristics may be important, they usually have little to do with whether the tree will do well on its planting site. Lack of knowledge of a tree's site-related needs results in disappointed tree owners and a lack of well-adapted trees in our landscapes.

A tree's site-related needs and its ability to withstand environmental extremes are rooted in its native origins. All landscape tree species and cultivars were once native to a certain climatic or geographic region or have been bred from native trees. These native trees were well-adapted to their surroundings and these adaptations usually carry over into the cultivated trees we see (with the exception of some species like fruit trees that have undergone intensive breeding). For example, though a white fir (Abies concolor) at a nursery may have been grown in a nursery in bright sunlight, it still has its native characteristic of shade tolerance that allows it to seed-in under the shade of a forest canopy. Cottonwoods (Populus species) are native to bare river flood plains which helps explain their preference for moist soils and bright light. Though you may not know much about a

Cottonwoods (Populus species)

particular tree's native habitat, remember that trees have specific site requirements that vary between species and cultivars. Matching your site conditions to a tree that you like is the key to tree selection.

Soil Conditions

Soil provides trees with physical support, water, mineral elements (sometimes called nutrients), and oxygen for the roots. Certain properties, such as soil pH (alkalinity or acidity), drainage, density or compaction, texture, salinity, and structure affect a soil's ability to provide these benefits to trees. Modification of these properties at planting time may be possible and will be discussed later.

Cold and Heat Tolerance

Some trees are very cold hardy and withstand extremely cold temperatures, while others are killed by a mild frost. In some cases a tree may be fairly cold hardy while dormant but may become active too early in the spring and suffer damage by a late frost. Other species may be able to tolerate very high temperatures and some withstand both extreme cold and heat quite well.

Shade Tolerance

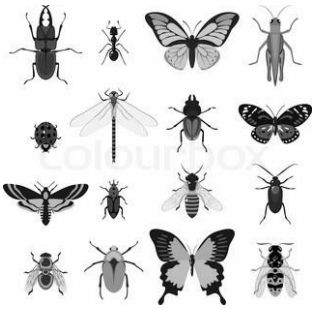
A tree's shade tolerance can vary from very intolerant to very tolerant and is important if you have a very shaded or very open planting site. Shade intolerant trees rarely do well in shaded areas. Though shade tolerant trees do best in at least partial shade, some also do well in sunny locations.

Water Requirements

Some tree species are very drought tolerant and can grow in near-desert conditions, while others need access to abundant water at all times. Many heat tolerant species are also drought tolerant. In much of the populated area of Utah, including the Wasatch Front, precipitation does not provide enough water for the needs of many of the trees we plant. Irrigation is necessary on such sites in most years for all but the most drought tolerant trees. However, trees also can be weakened or killed by over watering.

Pest Resistance

Some tree species or cultivars are highly susceptible to insect or disease pests while others are nearly pest-free. For example, Lombardy poplar (Populus nigra 'Italica') is very susceptible to a stem canker and is almost certain to die within 5 to 15 years. Ginkgo (Ginkgo biloba), on the other hand, has few known pests and is also very pollution tolerant. Serious, life-threatening pests like borers and cankers deserve much more attention and concern than late-season leaf feeding insects or other non-life-threatening pests. Stressed trees are often much more susceptible to pest attack and damage.



Insects

Growth Rate

Fast growth rate is one of the main interests people have when selecting a tree. Cottonwoods (Populus species) and silver maples (Acer saccharinum) can grow many feet in height a year and quickly become large trees. Such fast-growing trees, however, are often short-lived, weak wooded, or quickly outgrow their site. Though planting of some fast-growing trees to quickly establish a landscape may be fine, some slower-growing but longer-lived and more desirable trees should also be planted.

Crown Size

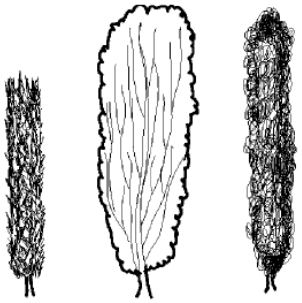
Choose a tree with a mature size that matches the space you have available. Only short trees should be planted near overhead obstructions like power lines (a service line to an individual home is of less concern than a line that feeds several homes or a neighborhood). Strong-wooded tree crowns can be allowed to overhang a roof, but weaker trees should be planted about one-half of their mature crown width away from a building. Trees in groups can be planted

Crown

close enough that their crowns overlap when they are older, but avoid over-crowding that will lead to poor growing conditions and unhealthy trees.

Form

Tree species and cultivars vary widely in form or crown shape, depending on their branching pattern. Crowns can be tall and narrow (columnar), short and wide, weeping, round, conical, or vase-shaped. Some trees keep their lower branches and foliage as the crown grows (for example junipers (Juniperus species), spruces (Picea spp.), true firs (Abies spp.) while others readily lose their lower branches as they are shaded from above (for example most pines (Pinus spp.), cottonwoods, elms (Ulmus spp.). Preferred crown form is a matter of personal taste, but crown form also may be an important factor in matching a tree to a site or to the function it will serve. For example, columnar trees are useful in narrow areas, trees used in windbreaks and visual screens need to retain their lower branches and foliage, and sidewalks and driveways should not be obstructed by low or weeping branches.



Columnar tree forms

Driveways

Shape

Tree shape varies widely and is an important consideration when selecting a species or cultivar. Common shapes include pyramidal, rounded, columnar, weeping, broad, oval, vase-shaped, layered, and shrubby.

Rooting Area or Volume

Below-ground space for roots is as important as above-ground space for crowns. Though no firm formula exists for calculating the soil area or volume needed for ascertain sized tree, figures have been reported of up to 1,600 square feet of soil surface area needed to eventually grow a 20 inch diameter tree (assuming a good soil one foot deep). This area can be of any shape and long narrow areas can be used to connect larger open areas to achieve adequate rooting space. Soil conditions under paved areas often are unfavorable for root growth, though roots can grow along cracks or in voids under pavement and can do quite well under paving bricks or blocks.

Longevity

The typical life span of a good tree in a suburban neighborhood is 30 to 50 years, while downtown trees may only last 5 to 10 years. As mentioned previously, people tend to plant fast-growing trees that often have fairly short lives. While some of this is alright, homeowners and communities should also plant trees that might grow slower but that are longer-lived.

Ornamental Characteristics

Ornamental characteristics are important factors in tree selection, though they usually have little to do with whether a tree can do well on its site. Ornamental factors include flower and fruit presence and appearance, foliage color and texture, bark characteristics, shade density, fall color, and winter appearance. Some trees have thorns or spines, objectionable odors, a tendency to have basal or root sprouts, or maintenance-related needs that should also be considered.

Utility Locations

Be particularly cautious about the location of overhead and underground electric lines when selecting a planting site and a tree species or cultivar. Only very short trees should be planted under or directly adjacent to overhead electric lines. Medium height trees should be offset 15 to 20 feet horizontally from electric lines and large trees should be offset 30 feet. Wider-crowned trees like elms or maples (Acer spp.) should be offset more than narrower-crowned trees like spruces or firs. If you suspect that you

are planting in an area with underground electric lines or other buried utilities, call Blue Stakes at 1-800-662-4111 (532-5000 in Salt Lake City area) to have these utilities located and marked.

EXERCISES

A) Complete the blanks with appropriate words.

short trees - span – branching pattern– native origins

1) A tree's site-related needs and its ability to withstand environmental extremes are rooted in its……..
2) Tree species and cultivars vary widely in form or crown shape, depending on their……..
3) Only very ……..should be planted under or directly adjacent to overhead electric lines.
4) The typical life ……..of a good tree in a suburban neighborhood is 30 to 50 years.

B) Answer the following questions.

1) What aim should be followed when choosing a tree species?
.....
.....
.....
.....
2) What is the supportive role of soil for tree?
.....
.....
.....
.....
3) What do ornamental factors include?
.....
.....
.....
.....

UNIT 17

Trees for Landscape Containers and Planters

Planting trees in aboveground containers and planters is becoming a common practice on sites that are not suited for in ground planting. Containers differ from raised planters in that they are usually smaller in volume and moveable, whereas planters are generally larger, and often built as part of the permanent hardscape (paving, etc.). The greatest challenge in selecting trees for containers and planters is in choosing trees that can survive temperature extremes, and that can establish roots in a limited volume of substrate (potting soil). Consider several factors when selecting containers and trees including environmental influences, container and planter design, substrate type, and tree characteristics.

Environmental influences

In the landscape, soil buffers temperatures at the cold extreme, with soil temperatures below a frozen crust seldom dropping below 20°F to 30°F. Tree roots are generally several degrees less cold hardy than tree stems. This means that roots of trees in containers and planters, whose stems might ordinarily be hardy to sub-zero temperatures, may die when a substrate temperatures drop below freezing. If the substrate freezes, wind may cause leaves on evergreen trees to dry out because roots are unable to absorb water from the frozen root ball. Wind can also speed container substrate temperature decreases.

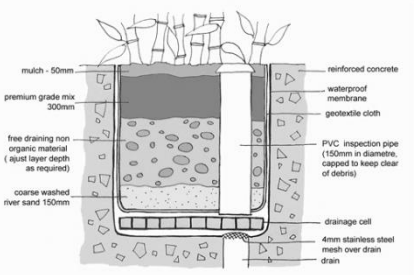
Tree roots in containers and planters may die during the summer when substrate temperatures frequently exceed air temperatures, often going above 120ºF. Wind, as well as heat from pavement, can increase water evaporation from containers, leading to dried out leaves (Figure 1).

Figure 1.Trees can be planted in both moveable containers

Container and planter design and size

Containers and planters for landscape trees can be constructed of a variety of materials in many different shapes and configurations. Coordinate the appearance of containers and planters with the landscape site. Also, determine how much time and money is available for container and planter maintenance and select accordingly.

With regard to container or planter size, a confined tree root system ideally should have two cubic feet of substrate for every square foot of tree canopy. Consider the mature size of the desired tree and design or select containers or planters with adequate root volume. Remember that the greater the substrate volume in the container or planter, the greater the temperature buffering, and the reserve of water and nutrients. In exposed and windy areas it may be desirable to line containers and planters with supplemental insulation.



Container or planter

Drainage is very important when designing or selecting containers and planters. For containers, and planters with constructed bottoms, be sure that channels exist to drain away excess water. Planters that are open to the ground should be built atop soil through which water readily drains.

If containers must be used to permit seasonal relocation to more temperate conditions during winter months, select small containers and trees. To avoid container damage or structural collapse if containers are used on above ground patios, rooftops, etc., keep the total weight of the container, substrate, trees and water in mind.

Even with careful container and tree selection, trees may outgrow the volume of their containers. Periodic tree removal for root pruning and substrate replacement is one method of controlling size (a technique used in bonsai). Removal and root pruning can be labor intensive, however, especially with large trees. Rather than root pruning, consider transplanting trees into larger containers or planters, or into the landscape, if they grow too large (Figure 2).

Figure 2. Small trees (topiaried junipers) and containers were used in this exposed area to permit easy relocation to a more protected area during the winter.

Substrate type

One advantage of growing trees in containers and planters is the opportunity to blend a substrate that may be better than the existing site soil. The substrate should have good aeration and drainage while retaining adequate water. Field soil is a poor container substrate because gravity cannot pull excess water out of the container, leaving field soil too wet for container use. In addition, field soil can be contaminated with weed seeds, insects and diseases. A variety of organic and inorganic components can be used to blend a substrate including pine bark, compost, sand and expanded clay products. Avoid using peat moss that is difficult to rewet if it dries out, and perlite and vermiculite that are light and may float. All soilless substrates need to be supplemented at least yearly with a complete slow release fertilizer with micronutrients. Substrate composition should be tied to irrigation method. If the only available water will be rain, use a substrate with smaller pore spaces to retain more water. To increase the water-holding capacity of a substrate, add sand to create smaller pore spaces in which water will be held. If regular watering or irrigation will be available, a lighter substrate may be adequate.

clay

EXERCISES

A) Complete the blanks with appropriate words.

substrate - volume – wind – lighter- compaction

1) …….. can also speed container substrate temperature decreases.
2) Substrates for containers and planters should resist changes in …….. and …….. due to rain and irrigation.
3) If regular watering or irrigation will be available, a …….. substrate may be adequate.
4) Field soil is a poor container……..

B) Answer the following questions.

1) What is the difference between planters and Containers?
…….
…….
…….
…….
2) What is the greatest challenge in selecting trees for containers and planters?
…….
…….
…….
…….
3) What organic and inorganic components should be used in substrate?
…….
…….
…….

UNIT 18

Conifers

Conifer Characteristics

Trees come in two kinds:

Trees that are conifers, and trees that are not. Conifers can be big and tall, or squat and small. Whatever their shape, they have several characteristics in common:

Leaves called needles. Most conifer leaves are narrow. They have a wax coating that helps keep water inside the plant in winter and other dry times.

Cones. Conifer seeds grow in cones. Most Minnesota conifers have male and female cones on the same tree. The male cones produce pollen. The female cones make eggs. The pollen and eggs combine to make seeds, which can grow into new trees.

Special tubes. The tubes that carry water from a conifer's roots to its top are called tracheids. Conifer tracheids are small, so they are not likely to form big flow-blocking bubbles when air is released by water freezing inside them.

Red Pine (Pinus resinosa)

The red pine is Minnesota's state tree. It probably got its other name, Norway pine, because it reminded early settlers of a tree species that grew in Scandinavia. Its needles come two to a cluster. Its bark is reddish, and if you pick at it, it flakes off into bits that look like pieces of a jigsaw puzzle. Most common in northeastern Minnesota, red pines like to grow in sandy soil.

Red pine

Jack Pine (Pinus banksiana)

The jack pine is a rugged-looking conifer. Like the red pine, it bundles its needles in clusters of two. It often has stubby, commashaped cones clustered in its branches. In the spring, male jack pine cones release huge amounts of yellow pollen. The pollen can be so thick that it looks like a cloud above the trees. It collects on the edges of lakes and ponds,

Jack pine

making yellow lines along shores. Porcupines gnaw on jack pine bark. People use jack pine wood to make paper, telephone poles, railroad ties, and other items.

Eastern White Pine (Pinus strobus)

The white pine carries its soft needles in clusters of five. Its bark is gray and furrowed. White pines grow slowly at first and then speed up. A seedling might take five years to grow to be 12 inches tall. When older, this pine might grow more than 4 feet in one year! White pines regularly live for 200 years but occasionally survive to be more than 400 years old. White pines were among the biggest of the big trees that brought logging companies to northern Minnesota in the 1800s. Loggers cut millions of huge white pines for wood to build houses, shops, hotels, and other buildings.

Eastern White Pine

White Spruce (Picea glauca)

This tree gets its name from a waxy whitish coat that covers its poky needles. A spruce's conical shape and flexible boughs help it survive winter. When it snows, the snow slides off rather than clinging to and breaking the tree's branches. Young white spruce trees often grow from seeds that sprout on rotted wood on the forest floor. Like black spruce, white spruce also can reproduce by layering. Squirrels, chickadees, and other birds eat white spruce seeds. Deer find shelter among spruce trees. Loggers harvest spruce trees to make paper and lumber for building.

White Spruce

Black Spruce (Picea mariana)

The black spruce thrives in soggy soil. It grows on peat and along the edges of wetlands. Its needles are short and sharp. Its broad, needle-covered branches make good winter shelter for squirrels, hares, spruce grouse, and other animals. Along with sprouting from seeds, black spruce trees have another way to make new black spruce trees. Branches that droop down to the ground can sprout roots and a new stem. This way of reproducing is called layering.

Black Spruce (Picea mariana)

Black spruce wood makes good paper. Long, tough fibers from black spruce roots are used to sew together birch bark canoes.

Balsam Fir (Abies balsamea)

This small to medium-sized conifer has smooth bark with small blisters. Its soft, flat needles are arranged so branches are fairly flat. The cones are purple when young. They stand upright rather than hang down from the branches. Deer, snowshoe hares, and grouse use balsam fir for shelter in winter. People use balsam for Christmas trees, wreaths, and pulp for making paper.

Balsam Fir (Abies balsamea)

White Cedar (Thuja occidentalis)

This tree has gray bark with ridges. Its needles are shaped like layers of overlapping scales. Its tiny cones are brownish yellow. White cedar is also known as arborvitae, or "tree of life" in French. A French king gave it that name after he learned that tea made from its needles could help cure scurvy, a disease caused by eating too little food with vitamin C. Some white cedar trees that grow in the Boundary Waters Canoe Area Wilderness are more than 600 years old. Because white cedar wood resists rotting, people like to use it to build decks and other things that will be exposed to weather.

White Cedar

Eastern Red Cedar (Juniperus virginiana)

This conifer grows on dry, rocky soils and along the edges of big rocks. It has peely red bark. Its leaves are shaped like strings of soft, flat scales. Its cones look like blueberries. Cedar waxwings, ruffed grouse, rabbits, and coyotes eat the cones. Unlike most other Minnesota conifers, eastern red cedar trees are dioecious—male and female cones grow on separate trees.

Eastern Red Cedar

Tamarack (Larix laricina)


Tamarack (Larix laricina)

Another name for the tamarack is larch. In northern and central Minnesota, this fast-growing tree with flaky gray bark sprouts in sunny spots in bogs and other habitats with damp soil. The only deciduous Minnesota conifer, tamarack does not keep its needles over winter. In autumn its soft but bristly-looking clusters of needles turn yellow and fall off. A new set of needles grows in spring.

Eastern Hemlock (Tsuga canadensis)


Eastern Hemlock

Hemlock is only found in a few places in Minnesota. It grows very slowly but can survive in very shady places. Its feathery branches carry short, flat needles, usually in clusters of two. Its olive-sized cones turn from green to brown as they mature.

EXERCISES

A) Complete the blanks with appropriate words.

larch - tracheids – white cedar – Hemlock

1) The tubes that carry water from a conifer's roots to its top are called ……
2) …… is also known as arborvitae, or "tree of life" in French.
3) Another name for the tamarack is……
4) …… is only found in a few places in Minnesota.

B) Answer the following questions.

1) What are common characteristics of conifers?
……..
……..
2) Why can some white cedar trees live long?
……..
……..
3) How does white spruce reproduce?
……..

UNIT 19

Lawns and Groundcovers in Landscape Design

Prof. Atila GÜL

The Groundcover Plants

The groundcover plants are defined as "annual or perennial herbaceous, semiwoody or sometimes woody plants, evergreen to deciduous plants, whose above ground parts grow closely to soil surface and cover soil surface densely with approximately 30 cm in height.

In this context, the groundcover plants include a wide range of plant types from evergreen to deciduous, woody or herbaceous plants, creeping or climbing plants in different families. There are a groundcover.

The Classification of Groundcover Plants

Groundcovers plants are divided into two classes: one includes all turf grass species and the other groundcover plants.

1- Lawns (Turfgras)

Lawns (Turfgras) which exclusively belong to Poaceae (Gramineae) family is the best known and most commonly used living ornamental groundcover.

"Lawns" for landscaping purposes are made only from a certain number of cultivated perennial and annual lawn plants in the Poaceae (Gramineae) family.

Grass is a herbaceous plant that is usually very close to the ground and covers the land tightly. Grass plants are the most important materials that bring the best green cover in nature in terms of function and vision, and the best soil protectors. The grass plants are most commonly used in all landscapes, especially in parks and gardens, sports and playgrounds. It is the best floor covering with premium quality especially for soccer and golf playgrounds because it is a durable green cover that renews itself and continues its development against chewing and crushing. Grass plants are widely grown with a wide range of species and cultures under natural climate and soil conditions.

In the world there exist over 600 genus of *Poaceae (Gramineae)* family belonging to more than 10.000 species. Especially the grass species used for landscaping purposes do not exceed 20-30. However, today, researches on the production of new varieties are ongoing.

Climatic conditions (especially environment and soil temperature) are the most important criteria for classification of grass species used for landscaping purposes and can be classified under two groups.

a- Cool climate grass species have an optimum growing temperature of 10-21˚C and are cold tolerant species. These plants are ; *Agrostis canina, Agrostis canina subsp. Montana, Agrostis tenuis, Agrostis stolonifera, Cynosurus cristatus, Festuca ovina, Festuca arundinacea, Festuca rubra, Festuca ovina, Lolium perenne, Poa pratensis, Poa nemoralis* and others and varieties.

b-Hot climate grass species are between 18-24 ° C and are resistant to temperature. These plants are *Cynodon dactylon L. Cynodon transvaalensis, Zoysia japonica (Japangrass)* and others and varieties.

Advantages of Lawn Plants for Landscape Purposes

a-Aesthetic properties;

- It creates order and integrity in landscape spaces,
- It provides a natural and aesthetic image with homogeneous color and texture,
- It provides an organic transition between high-tall plants such as trees and shrubs and the ground,
- It creates a flexible flooring etc.

b-Functional Properties;

- Its functions include expanding the landscape and creating perspective,
- It creates its own microclimate in the landscape,
- It cools the environment (air condition effect),
- It holds dust and other particles in the air and acts as a filter,
- It prevents water and wind erosion.
- It prevents the top soil from being worn and moved,
- It is resistant to frequent and short cutting,
- It resistants to food traffic,
- It creates the most ideal, healthy and flexible ground for sports games and other recreational activities,
- It has positive effects on human psychology with green leaves.

Erosion

2. The Other Groundcover Plants

Groundcover

Other groundcovers plants outside the grass are annual and perennial herbaceous or woody plants, and belong to many families, consisting of a large number of genus, species and varieties. These plants might be viewed often inconspicuous elements of a landscape plantation design. These covers serve many functions and aesthetics for landscape plantation design such as helping to link ornamental plants together. One of the common characteristics is groundcovering characteristic. These plants must have some special features for aesthetic and functional aims. Therefore, it is preferred perennials and evergreen plants that have rapid and suitable grow up, assist in aesthetic to landscape spaces with characteristics of plant portions, and is resistant to stress and closely or shorth cutting. A healthy, low maintenance lawn can be made up of a diverse mixture of groundcover species. These plants can be hardier and better adapted to a range of conditions than traditional turf grasses. As there are various species present, the lawn will be better able to survive pest infestation or disease outbreak because not all species will be equally susceptible. Groundcovers can reduce or eliminate the need for mowing or watering once established. They also come in a variety of colours and textures and many will bloom at some point through the growing season to provide an attractive, interesting lawn. Some groundcovers, such as clover, can tolerate foot traffic. Others are especially beneficial for areas that are difficult to grow grass on steep banks and sandy slopes).

Advantages of Other Groundcovers Plants

a-Aesthetics advantages:

- Its covers not only have leaf properties, but also visual and decorative effects with a wide variety of flowers and berries (Thymus, Hypericum, Veronica and others).
- It proves to be effective when confined and shaped of grass areas, other plant compositions or structural elements.
- It covers the soil surface frequently and intensively, providing a homogenous view to the landscape and bringing order.

- It can be contrast in other plant compositions in the landscape.
- It contributes to plant diversity and offers higher wildlife value than a monoculture of turf grass.
- It creates different visual effects in different seasons.
- Apart from green color, leaves, flowers and even fruit colors create various visual effects and contrasts at different times.
- It balances and establishes an organic link between the grass area and other trees and plants.
- It does not obstruct the angle of view in the places in which it is used and offers a wide perspective to the landscape.
- It provides a limited passage at the places of use.
- It provides an informal contribution to landscape spaces and helps to identify the space.

b-Advantages of Functional

- It is very common in stone and rock gardens.
- It tends to close faster, especially with rhizome and stolon growth.
- It does not want to be mowed often.
- It has less maintenance and saves money and energy.
- It adapts to the toughest climatic conditions and the most extreme weather conditions and develops in poor soil.
- Absorbs or reflects the sun's rays, and adjusts to the humidity of the environment.
- It keeps dust and particles in the air and acts as a filter in the environment.
- It prevents evaporation in the upper soil and covers the top soil tightly.
- It reduces both wind and water erosion and helps to stabilize the topsoil.

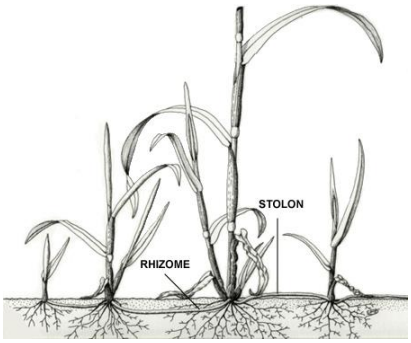

evaporation

- It prevents the light from reaching the soil with the frequent and intensive development of plants

- It provides control of weeds.
- It resistant's at places where there is heavy traffic.
- It can be used on sloping surfaces to absorb noise or partly absorptive.
- It does not need fertilizer or pesticides.
- It provides food, shelter and protection for wildlife.
- The groundcovers species belonging to the leguminous family improves soil and contributes to the nitrogen.
- It is less susceptible to disease or weed infestation.
- It adapts to environmental conditions than grass plants.
- It reduces competition from turfgrasses.
- It adapts to foot traffic, mowers and string trimmers when used around trees.
- Some of groundcovers are resistant to pressure.

Criteria For Ideal Other Groundcovers For Landscape Aims;

Plant selection is the first principle of plant design. The right plant for the right place should have basic target for successful design. It can be very difficult to find an ideal groundcover with all the criteria mentioned above. Species that produce rhizomes or stolons or that spread by offsets or tip layering are good choices for ground covers. Ideally, they will develop rapidly into a dense cover.



rhizomes or stolons

- **Ability to adapt to environmental conditions or life**: The plant possesses the ability to adapt to environmental conditions (soil, climate, etc.), long life, continuous improvement and slow aging.
- **Strong growth and development capability:** Rapidly developing species with particularly stolon and rhizome development properties should be preferred. Competition against foreign weeds in the area should be high and serious.

- **Resistance to disease and harm**: It must be resistant to harmful fungi and other diseases.
- **Resistant to frost**: Species susceptible to frost damage should be used in consideration of climatic conditions.
- **Resistant to mechanical effects**: They must be mechanically resistant to the effects of people pressing or damaging, against rain drops, snow pressure and pruning. It should be preferred that it is a structure that can prevent horizontal development, frequent texture formation, soil erosion or migration.
- **Easy to produce and grow**: Species that are easy to produce with seed and vegetative and that can be cultivated in all seasons should be prioritised.
- **Low maintenance**: Maintenance work should be minimal and should not take time. Labor cost should be low as well. For this reason, it should be able to provide aesthetic and functional services and contributions without any maintenance.

Having visual value; Although these plants primarily desire to cover the soil, they must also have visual values in terms of leaf, flower and fruit characteristics. For example, some of plants (Arabis caucasica, Achillea tomentosa, Cerastium tomentosa and others) have gray-green foliage.

Arabis alpina L.

Ajuga reptans rubra

Alyssum saxatile L.

Aptenia cordifolia

Cerastium tomentosum

Dichondra repens

(Mesembrianthemum cordifolium)

Lippia repens Hort. ex Vilm.

Trifolium pratense L.

Cotoneaster dammeri Lowfast

Calluna vulgaris (Syn. Erica vulgaris)

J. communis L. subsp. Nana

Juniperus sabina Tamariscifolia'

Thymus serpyllum

Juniperus squamata 'blue carpet':

Euonymus fortunei 'Coloratus'

EXERCISES

A) Complete the blanks with appropriate words.

Aesthetic – resistant – ornamental – maintenance – species

1) ……can be defined as a set of animals or plants in which the members have similar characteristics to each other and can breed with each other.
2) A gardener comes in each week to trim the …….trees and bushe.
3) From and …….point of view, it is a nice desi
4) The eggs are highly ……. to climatic extremes, and can survive for years on the ground.
5) ……. is work needed to keep a road, building, machine, etc. in good condition

B) Answer the following questions.

1) What does "groundcover plants" mean?
……..
……..
2) What are the benefits of lawn plants for landscape purposes?
……..
……..
3) What are the aesthetic advantages of other groundcovers plants?
……..
……..

UNIT 20

Roses in Landscape

Roses have many landscape uses. They can be placed as accent plants or used to form hedges or groundcovers. They offer a rainbow of colors and a variety of forms and fragrances, and their sizes range from miniatures to tall climbing plants. Roses may be grown under many climatic and soil conditions and, with care, thrive and produce flowers for many years.

Figure 1. Roses in Landscape

Height/Spread

Roses range in size from tiny miniatures of 8 inches tall to tree climbing giants that will reach 50 feet or more. Hybrid tea roses typically grow to 4 to 6 feet tall and floribundas generally range from 3 to 4 feet tall. Most popular pillar and climbing roses reach 8 to 15 feet tall.

Growth Rate

Most roses grow fairly rapidly. Tea roses may reach their full height after only three to four years and grow to that height each year despite being cut back each year. Many of the modern roses will only live six to 10 years unless given exceptional care. Some species and climbing roses will live 50 years or more.

Ornamental Features

Roses are grown for their beautiful blooms, either as landscape color or for cutting. Many are highly valued for their fragrance. Landscape uses are quite varied because of the many different types of roses.

Landscape Use

Roses prefer a full day of sun. Give roses at least six to eight hours of direct sun a day. Morning sun is especially important because it dries the leaves, which helps prevent disease. The area should have good air circulation. The site should be located away from fruit trees to reduce shared insect and disease problems. Avoid competition from roots of other plants.

Roses need loose, well-drained, well-aerated soil that contains plenty of organic matter. A raised bed can provide roses with ideal soil conditions.

You can plant bare root roses in late fall, late winter or early spring in South Carolina. Container-grown plants can be planted later in the spring. Dig a hole large enough for the roots to spread out in their natural position. Prune any damaged roots and spread the roots down around a mound of soil in the hole. Set the plant so that the graft union is just above the soil level. Once you set the plant at the correct depth, fill in the soil. The soil mixture should be about one fourth peat moss or well-rotted manure and three-quarters native soil. As you fill soil in around the roots be sure to eliminate any air pockets. Water thoroughly.

Rose Classifications

Classification lines and gradations are not clear since roses are highly crossbred, so a functional system is used to classify them. How roses are used depends on their growth habits (as bushes, hedges, shrubs, climbers) and flowering characteristics (number of flowers per stem, single versus double flowers, fragrance). The following classifications are based on the functional uses of outdoor roses.

Bush roses

Bush Roses

Bush roses are self-supporting and grow upright. They bear flowers primarily at the top of the plant. Some types of bush roses are landscape or shrub roses, hybrid teas, floribundas, grandifloras, and miniatures.

Hybrid teas are nearly always double-flowered, but some are semi-double-flowered or single-flowered.

Floribundas

In most cases, the flowers are borne singly. Buds are usually long and pointed. Hybrid teas grow from 2½ to 5 feet tall, and their stems tend to be long, making them excellent for flower arrangements.

Hybrid teas do not produce as many flowers as some other rose types. They also do not form a strong bush, but many canes arise from the plant base. They vary in hardiness and frequently need winter protection. Many are fragrant.

Floribundas are probably the most popular class of roses worldwide because of their profuse blooming. Their relatively large flowers are borne in clusters. Floribunda stems are shorter than those of hybrid teas, making them less suitable for flower arrangements. The plants are bushier in appearance than hybrid teas and ideally are planted in groups of three or more. Fifty plants massed in a bed create a real show.


Grandifloras

Grandifloras are vigorous plants with the free-flowering, clustering characteristic of floribundas and the perfect form of hybrid teas. Their flowers are larger than those of floribundas but not quite as large as those of hybrid teas. The plant is taller than floribundas and hybrid teas (5 to 6 feet tall) and makes a good background plant. Flower colors are not quite as vivid as those of hybrid teas, but they provide a mass of color for garden decoration and have individual stems long enough for cutting.

Miniature roses (patio roses) are compact, well-branched, dense plants with leaves and flowers that complement their small size. They flower profusely, and many are hardy. Miniatures are used as both garden and indoor plants. Since miniature roses have come on the market, everyone—even people who live in apartments or on small lots—has room for roses. For each small plant, a soil volume of one-eighth of a cubic foot (6-by-6-by-6 inches) is all that is required. A full cubic foot of soil is better for larger miniatures and patio roses. Mini-flora roses are a new classification for roses that have flowers too large to be considered a miniature, but still distinct from floribunda or hybrid tea types.

Heritage or Old-Fashioned Roses

Old Garden Roses (OGR) is the American Rose Society designation for rose types that existed before 1867, when the first hybrid tea rose was released.

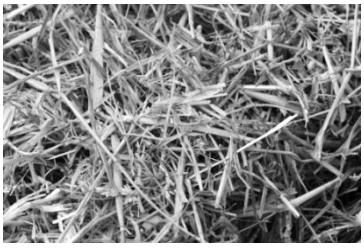
Modern rose classifications include hybrid teas and any other class that was created in 1867 or afterward.

Heritage or old-fashioned roses have irregular growth habits. They are extremely hardy and often resistant to diseases and insects. An ordinary garden can turn into a wonderland of color and form by adding some old roses. Many are also incredibly fragrant.

Damasks, albas, centifolias, gallicas, mosses, and species are spring-blooming old roses. Hybrids of some old roses bloom repeatedly and may be pruned any time of the year (as with modern roses). Repeat-flowering OGR classes include: China, tea, Portland, and hybrid perpetual roses. Varieties that bloom once a year should not be pruned until after they bloom in spring. Such varieties bloom on old wood, so pruning in winter and early spring removes potential flowers. The beauty of old roses is in large, well-established plants, not tightly pruned, little bushes.

Prune the top portion of the newly planted rose back to 6 to 8 inches above the graft union. When fertilizing newly planted bare root plants, care must be taken not to burn the new roots. Apply organic amendments to the soil at planting time, but wait until after the plant has produced its first blooms to apply chemical fertilizers.

For best performance, fertilize when the plant first leafs out and repeat after each flush of bloom until six weeks before the earliest frost date for your area. Use a rose fertilizer or slow release tree and shrub fertilizer applied according to label instructions. Composted manure can be used as a top dressing and provides organic matter in addition to nutrients.



Straw

Scratch dry fertilizers into damp soil beneath the leaves - but not touching the canes or graft union - and water well. Reduce the amount of fertilizer applied during June, July and August by half but continue to feed after each bloom cycle.

Roses require lots of fertilizer, but excessive fertilizer can burn the plant. Always make sure that the soil is moist before applying fertilizer and water well after application. A 3-inch mulch of pine straw, leaves, pine bark, or wood chips will conserve moisture and reduce weeds. Leave some space clear of mulch against the stem. Replace the mulch early each spring to decrease disease.

Roses need lots of water. If roses do not get enough water they will wilt, drop leaves, grow smaller leaves or stop blooming. Too much water is indicated by bottom leaves turning limp and yellow and falling off.

Deep watering promotes a deep root system. Deep root systems help the rose to survive droughts. Frequent, light watering causes roots to form too near the soil surface, making the plant more susceptible to summer baking. Soaker hoses provide moisture to the root system while keeping foliage dry. Avoid getting the leaves wet when watering, especially late in the day. As cold weather sets in, reduce the amount of water, but do not allow roses to completely dry out. Plants need water during dry spells, even during the winter months. Stop fertilizing your roses six weeks before your expected first frost date. Add additional mulch to protect roots and conserve moisture. Roses grown in containers need to be put in the ground, container and all, in a protected area of the yard. To prevent wind damage on large bushes, cut the canes back to 3 feet.

EXERCISES

A) Complete the blanks with appropriate words.

Bush - fertilizing -Heritage – Miniature – watering

1) ……..roses are self-supporting and grow upright.

2……..roses are compact, well-branched, dense plants with leaves and flowers that complement their small size.

3) ……..or old-fashioned roses have irregular growth habits.

4) Deep ……..promotes a deep root system.

5) Stop ……..your roses six weeks before your expected first frost date.

B) Answer the following questions.

1) What are the uses of roses in landscape?

……

……

2) Why is morning sun especially important?

……

……

3) On what factors does roses usage depend?

……

……

UNIT 21

Using principles of landscape design in farm planting

Landscape design is concerned with the functional, spatial and visual layout of a site so that the site is functionally efficient but also develops maximum aesthetic effect. Design principles can be applied at any scale and to a wide variety of sites, so how can the key elements of landscape design be applied to farm plantings? First, by developing a coherent spatial and visual organization so that the site looks interesting and provides a stimulating 'journey' as we move through it. Here we manipulate pattern, mass and space, enclosure and openness, views and viewing lines, focal points and finally circulation – these ideas are outlined in the following section. Second, by organizing planting so that areas of green mass complement and enhance the spatial organization. Here we manipulate combinations of visual characters of plants (line, form, color, texture) to create scenes that have the right balance of theme and contrast, and then arrange those scenes over the whole property in a sequential organization – these ideas are outlined in the section of principles of plant composition.

Principles of site layout

For most people landscape design is perceived at a subconscious level – we know we like a particular site, but may not be able to identify why it is 'right'. The theory of landscape preference shows that certain factors trigger a 'liking' response in most viewers and not surprisingly these factors are closely related to the principles of landscape design. Several of those preference triggers relate to the need for coherent organization in a site; in design terms this is some kind of repeated idea or theme that holds a design together and which establishes unity. In most designs techniques such as pattern, proportion, materials, and planting are used to generate unity. Another group of preference triggers relate to spatial organization that provides an interesting 'journey' as the viewer progresses around the site. Design techniques here include

manipulation of spatial character and enclosure, circulation, views and viewing points, and focal points.

Unity through pattern, planting and materials

Unity is a key design outcome. Unity is achieved when the viewer feels (usually subconsciously) that a design 'holds together' – a feeling that everything makes a coherent whole. This response is related to the preference factors of complexity and structure, i.e. the number of elements in a scene, their organization and the relationship between them. Getting these organizational matters 'right' is the whole point of a design plan, and there are several useful approaches.

Unity is usually achieved through ground pattern, with a repeated idea appearing in each space. In this plan (Figure 1) a circle (or parts of it) and a rectangle are repeated to generate the ground layout. Often the underlying device is simple (e.g. a rectangle of certain proportions), but these usually make good designs as they are easy for the viewer to 'read'.

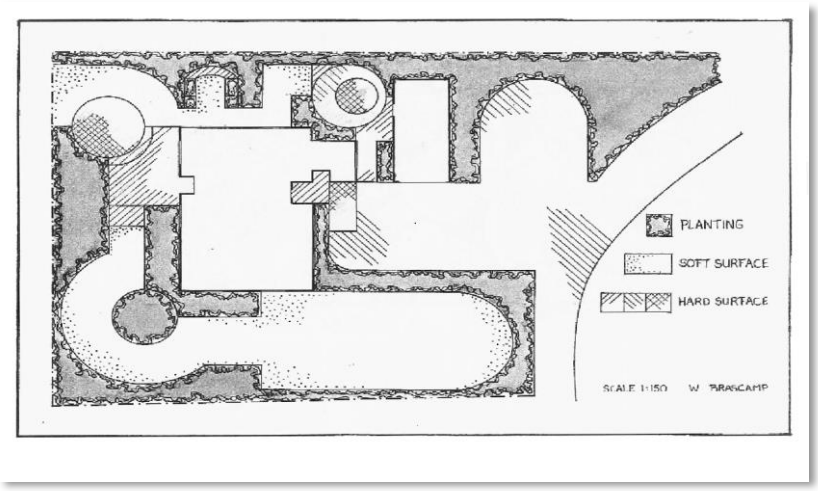


Figure 1. Coherent organization of a site is generated with a repeated pattern idea.

While geometry is an obvious form of ground patterning for urban areas and around houses, freeform approaches are also used, particularly in large gardens and on rural sites. Figure 2 shows a largely freeform layout for a small park area; note the consistency of shape and size of spaces even though the spaces are not geometric. In this respect repetition of a certain proportion within the pattern is most important – proportion is read subconsciously by most viewers, nevertheless it is a powerful connecting factor when used well. Poorly established proportion makes most viewers feel uncomfortable even though they might not be able to identify a specific problem.

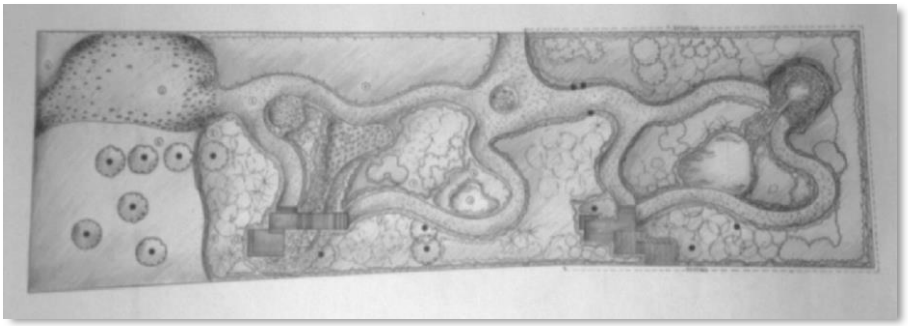


Figure 2. An example of freeform pattern for the Karaka Grove.

Which pattern type to use, in which circumstance, and of which form, is a skill designers spend considerable time learning. Pattern forms may be suggested by landform or existing vegetation and structures. Patterns are often in sympathy with the surrounding landscape but in some cases we develop deliberate contrast. Good use of pattern and proportion triggers the preference factor of complexity, where most viewers prefer landscapes that are neither too simple nor too busy and occupy a satisfying middle range.

Paddocks

In addition to ground pattern, unity is also supported with repeated materials and styles of built elements. Unity may also be conveyed through a repeated planting color, species, or placements. In

the best designs all of the aforementioned methods work together to create that feeling that the whole site belongs together. How do we do this on the farm? Repeated color and form in planting are an obvious choice, supported by repeated planting placements, e.g. repeated avenues or ridge top plantings. Repeated materials and styles in buildings and other structures can also be used. Ground pattern is less likely as the shapes and sizes of areas are driven by your farming operations, but you may be able to take advantage of the coincidental patterns of shape and size that your paddocks make.

Spatial manipulations

As we develop the pattern of the design we also manipulate several factors that influence the 'journey' that the viewer experiences as they move through the landscape. Progression through a series of spaces of different shapes and sizes, with varying enclosure and views, makes for an interesting and stimulating passage through the site. There are two key factors: what kinds of spaces there are and how we move through them. In design terms these are spatial and circulatory manipulation and they are controlled by a series of interacting factors, namely enclosure, views and focal points. Variable use of enclosure creates spaces of different sizes, and influences both views and circulation. The importance of enclosure in determining spatial character is illustrated below (Figure 3) where the forward placement of enclosure in the right hand scene completely alters the depth and view of the same area of ground. Enclosure is usually associated with the vertical plane and the position, height and extent of enclosure can be manipulated, e.g. in Figure 3 the left hand scene allows a view to the end of the space, while the right hand scene does not.

Enclosure interacts with shape – enclosure of long narrow spaces creates a strongly directional space that encourages movement (in people anyway!) and therefore has a circulatory effect. (Add a focal element at the end of the axis and the effect is even stronger). Size and degree of enclosure also interact with topography – a small clearing in a valley has a different effect to the same space on a high point. The height of enclosure also interacts with the scale of the space – very tall enclosure of a small space overwhelms.

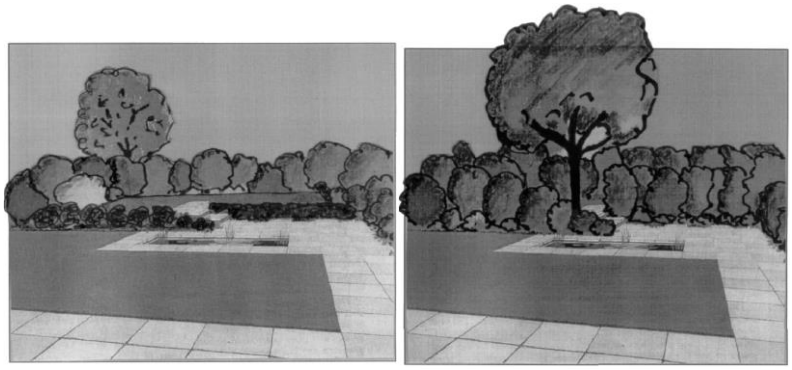


Figure 3. The effect of differing enclosure on spatial character

Partial enclosure, where something is partly hidden around the corner, has a strong circulatory effect as the promise of more information stimulates most people to find out what is hidden. (e.g. what will we find if we cross the bridge in Figure 7). Spatial character is also influenced by the ground plane – in park or garden design patterns are made on the ground with paving and planting, while on farms this technique could be applied with plantings in the grass that are safe for stock. When combined, manipulations of shape, size and enclosure of space, long with topography, provide many opportunities for the designer to create interest on a site. An obvious flow-on from the manipulation of space and enclosure is the development of views and viewing points. Careful control of which views are allowed, and from where they should be seen, is part of the interest of the journey. Enclosure is critical in view development and we manipulate the height, position and extent of openings. Using enclosure to allow glimpses of the view until the true viewing station is reached is another way of creating interest. Depending on the nature of your property, views may be narrow or extensive, on a long or short axis, and internal or external (don't forget to borrow from the neighbors!). Given your farming operations, manipulation of enclosure may be limited, but you could take advantage of topography again. Hills and valleys could be used to screen and reveal, with interesting views being discovered as one moves from one landform to the next. Using planting to support view development is an added bonus. Related to the issue of views is the question of focal points. These are deliberately sited elements to draw attention to a particular part of the landscape. Focal points

are often views, but are also created using strongly contrasting plants or objects.

Focal points are a key factor of landscape preference and are important for effective site layout as they influence the 'reading' of the scene. The focal point is used as a home-base from which the eye roams outward to read one part of the scene, comes back, and then roams again to read another part of the scene. It is therefore a reference point and a key ordering mechanism. In this respect the placement and number of focal points is critical. Points should be placed so that attention is drawn to the 'right' places – towards interesting parts of the site and away from places we do not want people to go. Within any one space there should only be one focal point, or if there are several then one must be dominant, as having too many makes the scene confusing as the eye does not know where to rest. A series of strategically placed focal points (along with views and enclosure) are used to lead the viewer around the site in a planned manner. In other forms of design artwork is commonly used to create focal points – you are unlikely to have sculptural pieces around the farm but interesting gates, quaint sheds, old implements, single specimen trees, and highly contrasting trees among the general mass all lend themselves to use as focal points.

Enclosure, views and focal points interact to control the path of travel through a space, so that areas are revealed when you want them. This control of travel is the principle of circulation where a deliberately organized progression around the site, through the series of spaces of different character, with strategically placed focal elements, makes that interesting 'journey' through the site. Circulation is triggered by the preference factors of locality (focal points), mystery (enclosure) and ground surface (ground plane) which are managed collectively to generate the required movement. On your farms the presence and location of traffic ways will be determined by your farming operations giving limited opportunity to manipulate those for visual effect, nevertheless focal points, views and enclosure could be managed around predetermined track locations to give added interest.

The layout and size of spaces, nature of enclosure, presence of focal points and views, and circulation is planned on a concept diagram. This is done before any detail of the design is developed. Using a site plan as a basis, we designate (i)

size and location of spaces, (ii) the type of enclosure between spaces, (iii) the presence of views and where they will be seen from, including any enclosure manipulations to control viewing, (iv) locations of focal points, and (v) the desired circulation route. Some of these factors are already set by farming operations, but others could be manipulated. For example, views, spaces and enclosure can be managed by varying the amount of vegetation you use and the places you put it.

EXERCISES

A) Complete the blanks with appropriate words.

geometry - focal – unity – design- topography

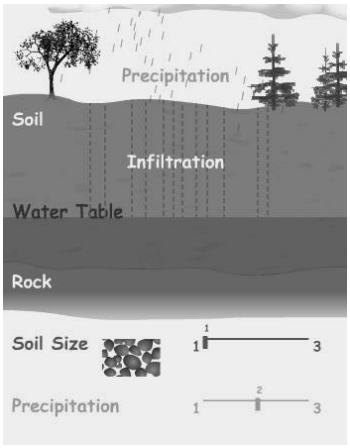
1) ……..principles can be applied at any scale and to a wide variety of sites.
2) ……..is achieved when the viewer feels (usually subconsciously) that a design 'holds together'.
3) ……..is an obvious form of ground patterning for urban areas and around houses.
4) Size and degree of enclosure also interact with……..
5) ……..points are a key factor of landscape preference and are important for effective site layout.

B) Answer the following questions.

1) How is landscape design connected to features of a site?
…….
…….
…….
2) How can the key elements of landscape design be applied to farm plantings?
…….
…….
…….
3) How can unity be generated in most designs?
…….
…….
…….

UNIT 22

Plant Color



Water infiltration

Plants perform many positive functions within the urban environment, such as controlling erosion, enhancing water infiltration into soils, and cooling our cities. Furthermore, research has shown that plants play an essential role in improving air quality. In addition to the physical benefits that plants provide within the built landscape, plants promote positive physiological, psychological, and economical responses in people. Viewing nature is associated with reductions in stress, improvements in mental alertness, greater productivity, and, in areas of commerce, increased spending. Additional improved health effects include shorter hospital stays, reduced pain, and fewer headaches. If we can better understand people's preferences and responses to individual elements of nature such as tree form or color, then plant producers, landscape designers, and public and private land managers could have a powerful set of tools to utilize when outlining specifications for our environments, both built and natural. Surprisingly, few studies have specifically examined the influence of plant color on people's emotional and physiological behavior. Sommer and Summit (1995) commented that, in the investigation of generic plant attributes such as tree size and shape, color has been neglected. In fact, early studies on plant preferences intentionally avoided colors other than green to remove distractions.

Some researchers have examined flowering plant color preferences. In their study of preference for geraniums, Behe and others (1999) found that flower color took precedence over leaf color and price. Red and lavender flowers were preferred over white and pink ones. A simulated blue flower color was the least preferred of all. Most customers preferred plant leaves with plain or zonal patterns to ones with white margins. While plant color has been largely unexamined, color has been studied since ancient times in many cultures. Color

research has typically involved looking at colored chips or sitting in different colored rooms. These methods showed that blue was preferred to red and that yellow was least preferred.

Hue was once thought to be the driving force in color preference. Preference is now known to be more linked to saturation (how strong a color is) than to hue. Studying color and emotion, Hemphill (1996) found that green, yellow, and red colored cards evoked more positive responses than other colors. Using change in skin resistance, Jacobs and Hustmyer (1974) found greater arousal for red, followed by green, then yellow. Heart rate and respiration did not change. Terwogt and Hoeksma (1995) noted that colors and emotions differed between age groups. The preference for yellow decreased with age and the preference for green increased with age. Researchers have specifically examined tree form and its influence on people. In a study on preferred tree form, Sommer and Summit (1995) studied tree canopy, trunk size, and shape. People expressed preferences for wider canopies and shorter trunks for street trees. Additionally, Lohr and Pearson-Mims (1996) examined people's responses to different tree forms and urban elements. Data suggested that more positive emotions were associated with tree forms than with the forms of inanimate objects. Furthermore, a spreading tree form elicited more positive and fewer negative emotions than a conical, globose, or columnar tree or an inanimate object. This reaction has been linked to survival cues in relation to the landscape.

Trunk

Trees with this preferred shape are associated with habitats that are good for human survival. As suggested in Kellart and Wilson (1993), there is an emotional connection between human beings and other living organisms; one that involves complex learning rules passed down through generations. Intuitively, it seems that responding to changing seasons would be important for survival. Plant colors could be a cue to these changes. For example, intense fall leaf colors would indicate a time to prepare for winter. Spring flowers would signal winter's end. Thus it would be reasonable to assume that some responses to plant color may be pre-programmed as responses to tree form appear to be, because they both provide useful survival information. This could help explain why certain plant colors would evoke different responses.

Vibrant green might indicate a healthy, nutrient-rich plant with high sugar and carbohydrate content, whereas yellow foliage might indicate an unhealthy nutrient deficient plant. In fact, this has been documented in other primates. Lucas and others (1998) reported that macaques monkeys relate leaf color to nutritious foods by selecting leaves with a particular hue of yellow-green and red that correspond with high nutrients levels. This is significant because macaque color vision is identical to that of humans, which may indicate that humans could have the same color cues for selecting plants that would sustain them.

Macaque

EXERCISES

A) Complete the blanks with appropriate words.

plants - inanimate objects – saturation – shape

1) Preference is now known to be more linked to ……. (how strong a color is) than to hue.
2) Trees with this preferred ……. are associated with habitats that are good for human survival.
3) More positive emotions were associated with tree forms than with the forms of…….
4) ……. promote positive physiological, psychological, and economical responses in people.

B) Answer the following questions.

1) What are plants positive functions within the urban environment?
…….
…….
2) What color rose stands in the lowest rank in preferences?
…….
…….
3) What does vibrant green might indicate?
…….
…….

UNIT 23

Children and play

When designing places for people, the first necessary thing is to know the users of these places. In this way, it would be possible to determine the user's needs and expectations. Places to meet these needs are preferred and used by users. Therefore, design for children requires to know the child, to understand the importance and necessity of play for child, and to know activities children do and want to do especially in public areas.

Play and importance of play for children

When you think of a child, the first thing that comes to mind is play. The play is a concept of universal that extremely important for the development of child's personality. There are many definitions of play in the literature. According to the Winnicott 'to play is to use imagination, the most important thing a person can do…Play is always an experience of creating, also of uniting time and space- so is fundamental to how we live'. Moore (1990) states that "play lies at the heart of childhood, limited in its boundaries only by the opportunities afforded by physical settings and by the attitudes and commitment of those whose business it is to manage them". According to Piaget, play is not a condition of mental, but is a behavior or action and it causes the child makes effort about what to do. According to him, the play is necessary for the development of intelligence. Play is a form of behavior which has many definition, description and developmental theories. As a result, if we need to briefly mention, the play refers to a unscheduled, spontaneous situation. It is possible to mention the four assumptions about the play.

These are listed as follows;

1. children learn during the play and play is necessary for the child's development and growth,
2. the play is not limited to younger children, it is an important concept in adults' lifecycle,

3. to play outside is an important need because it offers opportunities not found anywhere else,
4. play environments are educational areas.

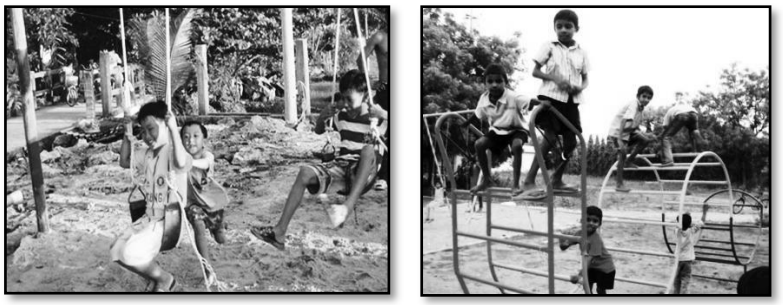


Figure 1. Children in playground

Children obtain feelings of achievement and self-security, of being together with others, respect for themselves and others as a result of playing the play. Play is an extremely important concept in terms of children's rights. The International Play Association (IPA) Declaration of the Child's Right to Play was introduced in November 1977 at the IPA Malta Consultation held in preparation for the International Year of Child (1979).

Play was emphasized that nutrition, health, housing and education, as well as of vital importance for the development potential of each child in this declaration. 294 Advances in Landscape Architecture Experts working on childhood states that the best learning is provided through play and exploration for children. A child learns and discovers himself and his environment during the play. During the play, children use objects to learn how to use them, perform activities with them and recognize them. Children should change the places of them, create compositions, bring together, separate, take a piece of them, and reinstall the missing part. In this way, children find the opportunity to learn by trying different things. Therefore play is the child's experiment tool. Benefits of play on the development of children can be classified under two headings. These are; the benefits of playing during the play, the benefits of playing over time. In 1978, Jones and Prescott stated that "through play, children (and bigger people, too) learn a great deal about the variety and complexity of the world, and about themselves as self-directed learners".

There are also benefits that bring to the play over time, summarized as follows:

- Children gain a sense of freedom and self-confidence
- When a child's respect for other individuals increases, sharing also increases
- Children become an healthy individual both physically and mentally, the learning ability of children develop
- Children's creativity increases

Recognizing the importance of play and playing game will provide to better understand the importance of play spaces as well. Because the nature of space and its components affects children's play. As we live in an environment that surrounds us, outdoor areas where children play are not possible to think independently from the environment. In this context, the relationship between the child and their environment is important.

EXERCISES

A) Complete the blanks with appropriate words.

experiment - learning – design – spontaneous

1) Play is the child's …….. tool.
2) …….. for children requires to know the child.
3) Architecture Experts working on childhood states that the best …….. is provided through play and exploration for children.
4) The play refers to a …….. situation.

B) Answer the following questions.

1) What are prerequisites of designing for children?
……..
……..
2) What are two assumptions about the play?
……..
……..
3) What are two benefits of play that were brought to the play over time ?
……..
……..

UNIT 24

Playgrounds

Playgrounds are important environments where many children play during their childhood. Playgrounds are designed for children, by adults, to be a place where they are able to perform many different activities[1]. Playgrounds are not solely for physical activities. They are also an important place for children to meet and interact with other children. In this respect, playgrounds should be just as important for children with disabilities.

Children with disabilities

Traditional playgrounds

Playgrounds used to reflect theories about how children learn and why they play. One early theory by Spencer from 1873 regarding play expressed that play was an activity that uses up surplus energy. Some of the first playgrounds and even some of those existing today, were built on this theory, designed only as a place to run around and "blow of steam" lacking in provisions for creative activity. Another theory by G.T. Patrick from 1916 stated that children's play was a behavior stemming from the need to relax, a way of rejuvenating after mentally stressful work and that it had no cognitive function. On this basis, children were sent out by their teachers to playgrounds by the school to rejuvenate resulting in playgrounds in school yards. In the early 1900s, play was seen as a way of practicing for adulthood, and props used in play were "adult" tools, like tools for cooking, cleaning or hunting. The result of this theory paved the way for playhouses on playgrounds. Another popular theory of the late nineteenth and early twentieth century was that childhood play was a way of acting out the Darwinian evolutionary development. This theory gave playgrounds, for example; swing sets, "jungle gyms" and "monkey bars" allowing the children to play like primates. In nineteenth century Germany, physical fitness became a tradition, influencing 1920s playground design to include indoor exercise apparatuses,

like different types of balancing beams and climbing structures, in the outdoors (Figure 1).

Figure 1. Traditional Playground

The beginning of the playground movement in America started in 1885 with an idea imported from Germany; a pile of sand that was provided for a "sandgarten" became a play area for children living near a mission in Boston. This play area was well supervised by adults with the purpose of "Americanizing" the children of immigrants, by enticing them to a site where they would be subject to instruction or propaganda, and keeping them off the Street. By the early 1900s most major cities in America had playgrounds were the main purpose was crime prevention, i.e., a way to keep children off the street, build character and promote exercise. The role of playgrounds in America at that time stemmed from John Dewey's theories that portrayed children as miniature adults and that a child's work was play. Children that did not engage in their profession (play) were believed to stray into delinquency. Another assumption was that physical activities, especially muscle control, were thought to have a moral dimension that would create better citizens. This is the background on how the so-called traditional playgrounds came about. Some of these types of playgrounds still exist in schools and public parks today.

Physical activities

Contemporary playgrounds

Towards the middle of the twentieth century, new theorists, mostly in the area of psychology, like Sigmund Freud, Jean Piaget, and M.J. Ellis, discussed play as a behavior in its own right and viewed play as important for children's social,

Galvanized steel

cognitive and affective development. For example, according to Ellis, traditional playgrounds were no more than a combination of large playthings placed together in one location to provide opportunities for gross motor activities by simulating, in galvanized steel, some primitive jungle setting. The outcome of the criticism of traditional playgrounds resulted in the design and construction of what is now called contemporary playgrounds.

These playgrounds are designed with novel forms, textures and different heights in aesthetically pleasing arrangements. In the contemporary playgrounds, color and texture, such as fiberglass and, later wood, became important features of playground design. During the 1950s and 1960s, these contemporary playgrounds became popular and had imaginative and artistic structures designed in different themes such as western or nautical, with playground equipment shaped to resemble animals or vehicles with the intention of pleasing stimulus-seeking children. One belief about play was that providing a stimulating environment could affect the amount of usage and type of play that took place in that environment. Children's interest in playing on the playground should be therefore increased if the playground had a creative design and complex materials that could be used in different ways. However, contemporary playgrounds still included much of the same kind of equipment, like jungle gyms and monkey bars, similar to traditional playgrounds but created with a different design and different materials. The new features of contemporary playgrounds was the inclusion of multifunctional equipment (i.e., one apparatus could have several play functions). An example is the slide that extends from a multileveled wooden structure shaped like a tower with a bridge to another structure with a ladder. Contemporary playgrounds are the most common playgrounds in the western world today (Figure 2).

Figure 2. Contemporary Playground

Adventure playgrounds

The first adventure playground was built in Copenhagen, Denmark during World War II. The idea came from C.Th. Sorensen, a landscape architect who had observed that children played everywhere except in the traditional playgrounds he had built. These playgrounds were also called "junk playgrounds" because they started out with used material like scraps of wood and fragments of metal, making these playgrounds perfect solutions for countries at war. At these playgrounds, the children were encouraged to build structures but also given the opportunity to choose freely what they wanted to do. These playgrounds were usually in an enclosed area and had a supervisor or play leader making different activities possible, such as gardening and cooking in addition to digging and building. Adventure playground became popular in Currently there are about 1,000 adventure playgrounds in Europe, most of them are in Germany, England, the Netherlands, France, and Denmark. Germany alone has over 400 adventure playgrounds. In Sweden today, there are four and in the United States, there are two adventure playgrounds.

Scraps of wood

Figure 3. Adventure Playground

EXERCISES

A) Complete the blanks with appropriate words.

adventure - junk – contemporary – multifunctional

1) The new features of contemporary playgrounds was the inclusion of …….equipment.
2) …….playground became popular in Great Britain during the 1950s embodying the more progressive theories of psychologist Erik Homburger Eriksson.
3) "…….playgrounds" because they started out with used material like scraps of wood and fragments of metal, making these playgrounds perfect solutions for countries at war.
4) …….playgrounds are the most common playgrounds in the western world today.

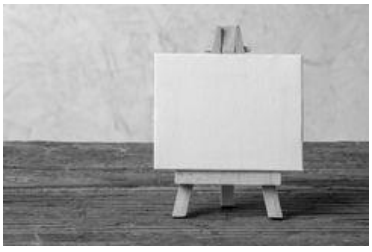
B) Answer the following questions.

1) What is theory of playgrounds proposed by G.T. Patrick?
…….
…….
…….
…….
2) What playgrounds were introduced after theory f Darvin?
…….
…….
…….
…….
3) What is the role of modern psychologists on traditional playgrounds?
…….
…….
…….
…….

UNIT 25

The Elements of Natural Design

The elements that make a landscape design "natural" are difficult to define. A landscape with curved bed lines, informal plant arrangements and no pyramidal yews does not always qualify as a natural landscape. And advocates of natural design are not necessarily eager to banish a host of beautiful exotics from the plant palettes of American landscape designers, replacing the plants with a motley crew of straggly natives. The basic concept behind natural design, however, is fairly simple—to incorporate native plant communities into the designed landscape. But their successful incorporation requires a basic understanding of how native plants operate in nature. Too often, random informality passes for "natural," when in reality nature is highly ordered and anything but random. Understanding this order and using it in our designs is the key to making natural design workable and successful. This does not mean, however, that we must design exclusively with native plants, attempt to copy nature exactly, or exclude the influences of other design styles. The goal is to create a framework for the overall designed landscape that has an aesthetic and ecological relationship to our indigenous landscape through the use of native plants in their natural associations.



Canvas

The basic considerations of natural design can be broken down into three categories: aesthetic, managerial and environmental. The aesthetic aspect of our designs is highly subjective, and individual style varies greatly. Some designers may object to uniformly patterning their work on the native landscape, feeling they are homogenizing their designs or stifling their artistic expression. But, as landscape designers, our medium is the land. Unlike a painter whose art occupies an isolated canvas, our work visually interacts with the surrounding landscape, both natural and constructed. We therefore have a responsibility to contribute continuity and a sense of place to

the larger landscape. To successfully accomplish a marriage of art and nature, we should sometimes put our egos aside and let nature be our guide. The managerial aspect of natural design is tied to the fact that reducing landscape maintenance is a strong priority for virtually all our clients. Natural design techniques can make a great contribution in this regard. This does not mean that natural landscapes are maintenance-free and can be completely left to natural processes with no human guidance, however. What natural design does mean is that landscapes that incorporate native plants and natural processes will require less time, money and energy for upkeep than designs in which plants are selected and combined for ornamental effect alone.

A purely ornamental garden is like a beautiful, sleek automobile with no engine. It may be nice to look at, but the only direction it will go without help is downhill. We will be perpetually required to tow these gardens up the hill with fertilizers, watering hoses and weeding forks. The environmental considerations of natural design are equally important. Many detrimental landscape practices can be minimized or eliminated. Such landscape practices include the excessive use of pesticides, herbicides, inorganic fertilizers, fossil fuels burned while mowing large areas of turf grass, and exotic species that have aggressively naturalized in the wild. Natural design aims not only to reduce these negative effects, but to make a positive contribution to the surrounding environment as well. Naturally designed landscapes can also become functioning ecosystems capable of providing food and shelter for animals and insects, while helping to perpetuate many native plants whose habitats are being reduced through development.

Watering hoses

Cultivate in your clients an appreciation of the beauty in nature.

Everyone admires the beauty in a majestic mountain range or a towering waterfall, but most of what we can create in our landscapes is more subtle. The contrasting patterns of straight and leaning tree trunks in a woodland grove, a single turk's cap lily (Lilium superbum) nodding above a bed of meadow grass,

Waterfall

or the layered branches of a pagoda dogwood (Cornus alternifolio) in a woodland edge may be an acquired taste. A native old field in winter is a prime example of how learning to see the landscape anew can open a whole new vista of aesthetic possibilities. The glistening orange of little bluestem (Schizachyrium scoparium) in the sun, punctuated with columnar green patches of eastern red cedar (Juniperus virginiana) is a spectacular American scene, and a much more warming sight on a frigid February morning than a curled up 'PJM' rhododendron (Rhododendron 'PJM') in a crispy bed of pachysandra (Pachysandra terminalis). Designers who cultivate in their clients an appreciation of the natural world around them will find their work to be more easily accepted.

Minimize disturbance of existing native growth.

Protecting existing native growth, particularly woodlands, is easier and less expensive than trying to restore it after it's destroyed. Even our best restoration efforts may never achieve the beauty and mystery of an undisturbed woodland. Developers, architects and clients need to be aware of the benefits of considering ecological systems before designing the structures for the site. Early decisions relating to the siting of buildings, topographic changes and excavation disturbance can help minimize destruction of natural growth during construction. Unfortunately, landscape designers and architects often are brought in after construction is complete and have no opportunity to influence the treatment of the existing landscape.

Residential site

Decide how closely your design will emulate the native landscape.
The design will be determined by numerous factors including the character of the surrounding landscape, client dictates, architectural style, site characteristics and the scale of the site. A large site may allow for the design of a functioning ecosystem using strictly native species. A smaller residential site can be designed with a perimeter of site-appropriate natives, becoming more cultivated as the landscape nears the house.

Allocate the location of woodlands, open spaces and transitional areas.
Natural landscape patterns found in many areas throughout the country are formed by the interplay of woodlands, open landscapes and the transitional areas where they meet (edges or ecotones). A graceful and functional mix of these features will define the design before any plants are selected. Even small properties can be approached in this manner, often resulting in the illusion of more space.

Base your design on native plant communities found in similar conditions in the surrounding areas.
Determine which plant communities would have existed on the site had it not been disturbed, and use these as a design model. Determining native plants is easiest on a site that still contains remnants of indigenous growth. If this is not the case, you can obtain information by observing nearby natural areas with similar ecological conditions, analyzing the soil and hydrology of the site, obtaining geological maps and studying the natural history of the area. If the post-disturbance soil and water conditions are no longer capable of supporting these plant communities, consider basing your design on a community with similar conditions.

Use and plan for natural processes of change to modify the landscape.
The indigenous landscape is a constantly changing system composed of plants, animals, insects, microorganisms and soils. Plants are not isolated entities, but participants in a system constantly in flux. Different types of systems change at different rates.

Hickory

The annual meadow immediately resulting from a disturbance may last for only one year, while the perennial meadow may last for 10 before yielding to pioneer forest species. By contrast, an old oak and hickory forest may last for hundreds of years if left undisturbed. Once these changing systems are understood, the designer can decide which aspects to encourage, discourage or manipulate to fit the requirements of the client and site. Designed landscapes need not be static photographs frozen in time forever, doing battle with the forces of nature.

Occupy all the spaces.

Grub hoes

A basic law of almost any native ecosystem is that if nothing is currently growing in a given space, something soon will. The more available space is filled, the less opportunity there is for a weed to enter. Plants grow against each other, above each other and below each other. Even a 3-foot-tall meadow has a multi-layered structure designed to seal off the area. This is also evident below ground, where fibrous rooted plants occupy the soil surface and coexist with deep tap rooted plants "holding down the fort" down below. There are obvious lessons here for the designer interested in creating landscapes that have the ability to fight off weed invasion without the aid of mulches, fabrics and grub hoes. Mulched beds around isolated groupings of shrubs are an open invitation to neighborhood bullies such as Canadian thistle (Cirsium arvense), knotweed (Polygonum) and nut grass (Cyperus esculentus). A mixed, densely planted herbaceous ground cover layer, composed of plants with complementary aboveground and belowground growth habits, will be far more successful at inhibiting weed invasion than any mulch. If this ground layer is also designed for succession of bloom and contrasting foliage texture, we can create a reduced-maintenance landscape that suggests the diverse tapestry of our native ground covers while achieving an artistic and colorful composition.

Figure 1. Wild nature

Increase ground water recharge by preserving rainwater on-site.

Current landscape practice often considers surface water as something to be eliminated. Meanwhile, water shortages are a frequent problem in our communities. Whenever we grade a property to direct surface runoff into the storm water system, we are sending a valuable commodity out to sea. Aquifer recharge, the replenishment of our underground water tables, depends upon the absorption of rainwater into the ground. We can assist this process by using ponds, irrigation catchments, porous paving surfaces and bog gardens. Low wet areas can be converted into colorful assets by designing them as wet basins containing a range of colorful water to lerant plants like turtlehead (Chelone lyonii), Joe-Pye weed (Eupatorium purpureum), New England aster (Aster novaeanglia) and blue flag iris (Iris versicolor).

Bog gardens

Employ alternatives to high-maintenance lawns.

The American lawn has become the focus of a great deal of controversy. Great quantities of water, fertilizers an fossil fuels are expended for lawn upkeep and the amount of pollution from herbicides, pesticides and small engine exhaust is well documented. Although there is nothing inherently evil in a blade of Kentucky blue grass or the person who likes it, replacing substantial portions

of mowed lawn with other, more ecologically friendly plantings would have a positive effect on our environment. A mowed lawn does serve a unique function in that you can walk, lay and play catch on it—activities that are difficult in a tall grass meadow or a cottage garden. It is possible, however, to offer alternatives that are affordable, easily sustainable, ecologically sound and aesthetically pleasing. The first alternative to lawn is lawn. Not the resource-intensive grass monoculture that we normally plant, but a diverse ground cover of creeping broadleaf plants combined with slow-growing drought and disease-resistant grass cultivars or native grass species. These plants could include buffalo grass (Buchloe dactyloides), Pennsylvania sedge (Carex pensylvanica), wild strawberry (Fragaria spp.) and violets (Viola spp.).

A lawn of this type would require little or no fertilizer or chemical application, and would need to be mowed less frequently than a traditional lawn. Wildlfower meadows are currently the most popular lawn alternative as they can provide visually stimulating, low-maintenance landscapes. However, in order for these plantings to succeed in the long run, the majority of wildflower seed producers must completely revamp their mixes. Annuals and short-lived perennials selected for immediate floral effect must give way to long-term native perennials and grasses selected for function and site-adaptability, as well as aesthetics. By patterning these landscapes after our native prairies and grasslands, their exciting potential can be fully realized. The most neglected lawn alternative is woodland. While open space is highly valued, it can be even more appreciated when contrasted with a shady tree grove. While this type of landscape would obviously take far longer to mature, a transitional period can be filled with a meadow or grassland landscape supplemented with trees. Woodland understory and ground layer plants can be added after a sufficient canopy is developed.

EXERCISES

A) Complete the blanks with appropriate words.

natural -woodland - ecotones – transitional – Mulched

1) A natural …… is composed of a multilayered tapestry of canopy and understory trees with a ground layer of shrubs and herbaceous plants.
2) Woodland edges are the …… areas between the woods and the open landscape.
3) …… are dynamic and diverse communities that hold a very prominent visual position in the landscape, and the design opportunities are exciting.
4) …… beds around isolated groupings of shrubs are an open invitation to neighborhood bullies
5) The managerial aspect of …… design is tied to the fact that reducing landscape maintenance is a strong priority for virtually all our clients.

B) Answer the following questions.

1) What are the basic considerations of natural design?
……..
……..
……..
2) What is a basic law of almost any native ecosystem?
……..
……..
……..
3) What should be done to preserve the open landscape ?
……..
……..
……..

UNIT 26

Park Design Guidelines

The following guidelines apply to the design of parks, open space areas and trails in Talent. These guidelines are based on the need for safe, easily maintained spaces, that area accessible to the community as a whole. Once adopted by the City, they will provide direction to the Park Commission, the City Council and Public Works Department in both the design of new parks and the review of proposed parks.

The following general areas are covered:

- Safety
- Plantings
- Mowing and Turf Maintenance
- Parking
- Restrooms
- Play Areas
- Site Furnishings Specific

Restrooms

Safety

Spaces need to be designed to deter transient, illegal, or potentially threatening uses in parklands. The following features will help create transparency in public spaces:

- Vegetation that is directly adjacent to pedestrian areas should be greater than 7 feet or less than 2 feet in height. Shrubs located in the formal areas of a park that are taller than 2 feet should be limbed up to provide visual access to users and authorities.
- Built structures should be situated for easy observation from areas of frequent use and convenient access by police.
- Promote the application of Crime Prevention Through Environmental Design (CPTED) principles to all park designs.
- Vehicle access to the park and amenities should allow authorities to patrol parks with some ease and proficiency. This access can also provide emergency services and maintenance.

- Sidewalks and paths intended for vehicle use should be at least 8 feet wide. Those that are concrete should be at least 7 inches thick.
- Rounded corners at park edges will provide protection from invisible intersections with adjacent areas.

Plantings

The use of native vegetation can enhance park design and support the ecological systems unique to the region. The following vegetation and irrigation guidelines assist in the creation of efficient, distinctive, and lush spaces.

- Vegetation along trail systems, waterways (creeks, rivers, bioswales and storm water) and within linear parks should consist of native plants and flora. The use of non-native species should be buffered by a broad band of native seed (i.e., tufted hair grass) between lawn and native vegetation.
- Non-irrigated areas should be designated and irrigation reserved for areas such as sports fields. The use of native vegetation will reduce the need for irrigation. To establish plants, consider using a temporary irrigation system or hand watering. Design the irrigation system so that irrigation heads spray underneath plants or into them, not above them.

Mowing

- Trees planted in groups increase the efficiency of mowing and maintenance. When designing tree groups, it is important to provide a flush border around groups to ease irrigation and mowing.
- Planting areas in parking lots should be designed to provide continuous coverage within 3 years. The plants should be hardy, with a track record that indicates their survival in extreme environments. At least 400 cubic feet of the appropriate soil per tree in a planting strip is recommended.
- Trees should not be planted next to restrooms because they may provide unwanted access to the roof as well as create hiding places near the structure. Shrubs surrounding restrooms should be less than 4 feet

in height and should be limbed up to allow visual access under them. Plantings should allow maintenance access to the roof.

Mowing and Turf Maintenance

Turf areas allow different experiences in parks. Groomed areas provide field sports, picnicking and free play while rough mowed areas provide an aesthetic to the park while buffering natural and riparian areas.

Riparian areas

To promote efficient mowing and turf maintenance the following guidelines should be followed:

- Rough mown areas are mowed once or twice a year. There should be 15 feet between vertical obstacles in these areas. Maximum mowing slopes for rough turf or natural areas should be less than 5:1. Use native grasses such as Spike Bentgrass (Agrostis exarta), California Oatgrass (Danthonia californica) or Tufted Hairgrass (Deschampsia cespitosa).
- Groomed turf slopes should be less than 4:1, with less being preferable. Irrigation systems should take into account solar aspect, wind and topography to minimize the overuse of water. The minimum distance between vertical objects is 7 feet for mower access. Design for continuous mowing, taking care to avoid the creation of dead ends, tight corners or areas where a mower cannot easily reach. Provide a concrete mowing strip around vertical objects such as fence posts, signs, drinking fountains, light poles and other site furniture with a 12" minimum offset between the object's vertical edge and turf. Also, plant trees in groups (see Planting).
- Herbicide use should be limited.
- is an important consideration. Curb cuts should be provided in logical areas such asturn-a-rounds. Curb edges should have large radial corners to protect adjacent planting or lawn areas.
- Herbicide use should be limited.

Parking

Parking lots should be representative of the experience the user will have at the park. The entrance to the parking area should be the entrance to the park itself,

with trees and planting included. The following will help to carefully situate parking in the landscape to provide both accessibility and views:

- A minimum of 3 to 5 spaces per acre of usable active park area should be provided if less than 300 lineal feet of on-street parking is available.
- Park design should encourage access by foot or bicycle.

Bicycle racks

- Provide bicycle racks at each primary access point and at restrooms.
- The size of planting areas within the parking lot should be as large as possible with adequate room for maintenance to be performed safely.
- Water runoff should be diverted into a bioswale before entering the storm water system to reduce the impact of pollution on stream and creek systems. To achieve water purification and cooling, bioswales should be planted with native vegetation (see Planting).

Restrooms

Restrooms are an important public amenity in high-use park facilities. The components, design, and placement of restrooms structures are important decisions to consider when specifying facilities. The following guidelines are intended to ensure that restroom facilities are safe, easy to maintain, and consistent with the park system vision:

- Interior surfaces of restrooms should be glazed tile and the exterior surfaces should be non-porous for easy cleaning (i.e., glazed block, glazed tile, painted block or painted concrete). The use of heavy concrete partitions between stalls is recommended. Specify only stainless steel restroom fixtures.
- The drain inside the structure should always operate correctly. If the facility is near an athletic field, such as volleyball courts or a spray park, there should be an area outside the restroom with a faucet/ shower and drain for users to rinse off sand and chlorine.

Spray park

- Including separate storage areas adjacent to the restroom structure can increase efficiency. Storage areas may house recreation equipment for fair weather activities and maintenance supplies for park crews.
- Skylights can maximize the use of natural light. Minimizing light fixtures helps prevent tampering, destruction and keep costs down. Facilities that are open in the evening should have lighting that is designed with vandalism in mind. A 5 to 6 foot apron around the structure should be provided to protect the building from debris and water. Trees should be avoided next to the restroom (see Plantings).

Skylights

Play Areas

Playgrounds in Talent should meet the needs of children of different ages and abilities. The following will help create facilities that ensure accessibility and safety for children of all ages.

- Parks that have playground equipment, sports fields and spray parks should be accessible to all children under sixteen. Play areas should be level to reduce the surface substance from slumping to low points. Consider using beach sand as a cost-effective, low-maintenance playground surface. Do not use engineered wood chip surfaces because decomposition will result in regular and expensive replacement.
- Play structures and equipment come in many different materials. Avoid specifying wood because: wood footings will rot, they are prone to termite infestation, the shrink/ swell defect of moisture loosens bolts and creates a safety hazard, and pressure treated wood contains chromate copper arsenate (CCA), a carcinogen.
- Wooden play structures that exist presently should be sealed every two years to prevent arsenic leaching.
- Natural play areas created from boulders,

Boulder

logs and land forms and playground equipment made from 100% recycled plastic or steel is recommended. Steel can become very hot in the summer months. If it is necessary to use steel, planting trees or other structures to shade the play area is recommended.

Site Furnishings

The selection of site furnishings (i.e., benches, trash receptacles, light poles, etc.) should be based on an established standard for Talent. The water fountains, benches, light fixtures and posts, signage and bike racks used in the parks should be consistent with those used in City civic spaces, along streets, and vice versa. Consistency in site furnishings will help establish an identifiable civic image, through the use of repeatable aesthetic elements, for Talent and the park system as a whole. These furnishings should offer comfort, aesthetic beauty and be of formidable stature to prevent vandalism.

light poles

- Seating should be made from a material that is comfortable both in winter and the heat of summer while being able to withstand vandalism. Benches should be provided to offer places of rest, opportunities to experience views, and congregate.
- Drinking fountains should be available at a ratio of 1 per acre with the exception of mini parks (typically smaller than 1-acre) which should have one. Drinking fountains should be complementary to other site furnishings, such as benches, and be operational in freezing conditions. Consider drinking fountains that are friendly not only to human users but to canines as well.
- Signage should be located in every park in areas visible to all users. For example, place a sign at the entrance of the park that is visible to vehicular traffic, also place signs

Drinking fountains

along greenways and trails to inform pedestrians and bicyclists. Signage should be easy to read and informative. Interpretive signs fall into this category as well. They can be useful in natural and historic areas. When used in natural areas these signs should be placed outside environmentally sensitive areas (i.e., wetlands and endangered habitat) and should be placed in areas that are accessible to all.

EXERCISES

A) Complete the blanks with appropriate words.

curb - signage – surface substance – arsenic

1) Wooden play structures that exist presently should be sealed every two years to prevent ……leaching.
2) …… should be located in every park in areas visible to all users.
3) Play areas should be level to reduce the ……from slumping to low points.
4) ……edges should have large radial corners to protect adjacent planting or lawn areas.

B) Answer the following questions.

1) What factors should be considered in designing parks?
…….
…….
…….
2) Name two factors helping create transparency in public spaces.
…….
…….
…….
3) Which guidelines should be followed to promote efficient mowing and turf maintenance?
…….
…….
…….

UNIT 27

Home Landscape Design Basics

Landscape design can be defined as organizing and enriching outdoor space by placing plants and structures in an agreeable and useful relationship with the natural environment.

Designing landscapes is an art. Merely planting trees and shrubs is not landscaping. Landscaping is creating a plan to make the best use of available space in the most attractive way. It means shaping the land to make the most of a site's natural features and advantages, and it includes building such necessary structures as fences, walls and patios. Finally, landscaping involves selecting and growing plants that best fit the design.

Fences

The smaller the house, grounds and budget, the greater the need for effective and complete planning because every square foot of space and every dollar must produce maximum results. Plan for the best use of the site and minimum upkeep as well as a pleasant appearance.

There is no need to develop all of the lot at once. However, there should be an overall plan so that when any work is done on the lot, it will be part of the general scheme. Carrying out the landscape plan generally takes several years, since plants need time to grow. Do not allow a spade of earth to be turned until a grading schedule has been prepared from a well-studied plan for house and lot. To do otherwise is to sacrifice other things, such as valuable trees and soil.

Analysis of Site and Family Needs

The fundamental principle of landscape design is that each development should be based upon a specific program. In turn, this program should be based upon the following criteria: the people who will use it, their cultural

needs, individual desires and economic abilities; the climate; the site, its immediate surroundings, its topographic and ecological conditions and all objects, natural or manmade, that now exist on the site or are planned for the future; and the available materials fabrication methods.

The landscape designer must study the habits of people and what they do and understand their desires and needs. The landscape designer also must determine what space and materials are available and how they may be used to accommodate these goals.

The first step in landscape design is to divide the available space into use areas, including the public area, the private area, and the service or work area. The public area is the section seen by passersby. It is generally in front of the house and should present an attractive public view. The living or private area is for the family and may consist of a patio, deck or porch for outdoor sitting, entertaining or dining. A play area may be incorporated into the living area, depending on the family's interest and the ages of any children. A service or storage and work area should provide a place for garbage, garden tools, supplies, etc. It should have convenient access and may be screened from other areas. A cut flower bed or vegetable garden may be conveniently located in or near the service area.

Factors Influencing Landscape Design

The Lot and Its Characteristics

In planning a design, preserve the best natural resources on the site, such as mature trees, ponds, brooks, rock outcroppings, good soil, turf, and interesting variations in the terrain. These natural elements affect the ease of construction and contribute to the overall landscape possibilities. Carefully survey the area to determine whether site conditions will be a deterrent or whether they can be incorporated into a design plan. Thin, overcrowded trees may be a problem and should be removed. Micro environmental problems may exist on a site, such as

Brooks

low places with cold air drainage or areas with poor soil and inadequate water drainage. Changes in elevation can add interest and variety to the home landscape. The character of land and its hills, slope, and trees should determine the basic landscape pattern. A hilly, wooded lot lends itself to an informal or natural design with large areas left in their natural state. In such a setting, large trees can be retained. Although natural slope variations are an asset, avoid creating too many artificial slopes. Excessive grading of terraces or retaining walls should be avoided. If these features are necessary to facilitate construction or control water drainage, they should be designed to detract as little as possible from the natural terrain.

Neighborhood Sights and Sounds

Keep attractive views visible and screen undesirable views. A shrub or two often will provide necessary screening. Plants also can act as noise barriers. Principal rooms of the house should look out on the lawn or the garden. Design special areas to be viewed from favorite windows.

Climate

Climate includes sunlight, wind, temperature, and all forms of precipitation. Climate affects the way a house should be placed on a lot, how the land is used and what is planted. In planning the grounds, do not fight the climate. Instead, capitalize on its advantages. In warm regions, enlarge the outdoor living area. In cold regions, plan the landscape so that winter scenes are enjoyed from indoors. Evergreens and hedges are picturesque when covered with snow. Since people respond differently to sun and shade, it also is important to study the amount and location of each on the lot. Sun and shade patterns change with the seasons and vary each minute of the day. The sun is higher, and shadows are shorter in summer than in winter. Northern exposures receive the least light and are therefore the coolest. Eastern and western areas receive more light; western exposures are warmer than eastern because they receive afternoon light. Southern orientations receive the most light and tend to be warmest.

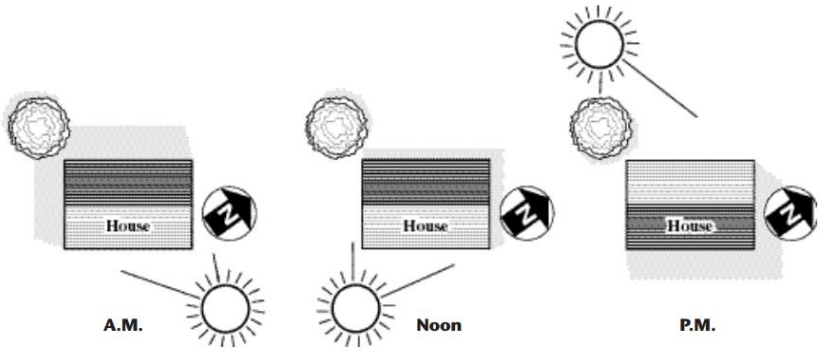


Figure 2. Shade patterns at different times of day.

The principal rooms of a house should benefit from winter sun and summer breeze. This means that the house must be correctly oriented. A plan suited to one lot will not be correct for another lot that faces a different direction. Sunlight and shade can be controlled by the location of buildings, fences, and trees. Also, consider possible shade from trees and houses on neighboring lots. Plan future shade from tree plantings with great care in order to keep sunny areas for the garden and summer shade for the house and terrace. Deciduous trees (those that shed their leaves) shade the house in summer and admit the sun in winter. Place trees off the corners rather than the sides of the house, where they will accent the house and not block views and air circulation from windows. Remember that too many trees tend to shut out sunlight and air.

Family Activities

How the land is going to be used should be a determining factor in landscape design. Analyze family activities. For example, small children need an open lawn for playing, and gardeners need space for growing vegetables and flowers. Make allowances for future changes. Consider outdoor living, playing, gardening, and household servicing. Family routines follow a general pattern, but they vary with each family's way of living.

Cost Effective Maintenance

Decide on maintenance standards. For the person who enjoys puttering about the yard, landscape design may be elaborate. In general, the simpler the site, the

less there is to maintain. A low maintenance plan is the goal of most homeowners. This may be achieved to a large extent in the planning stage by careful attention to the nature of the site. Existing trees, elevations, and projected use of the area should be prime considerations. Low maintenance may be achieved by adopting one or more of the following:

- Have small lawn areas
- Use ground covers or natural pine straw, bark chips and other mulches
- Pave heavily traveled areas
- Provide brick or concrete mowing strips for flower beds and shrub borders
- Use fences or walls instead of clipped formal hedges for screening
- Design raised flower beds for easy access and to help control weeds
- Install an underground irrigation system in areas of low rainfall
- Have small flower beds and use flowering trees and shrubs for color
- Be selective in the choice of plant materials; some plants require little pruning, spraying, and watering
- Use native plant materials
- Keep the design simple
- Use mulches for weed control when possible.
- If herbicides are necessary, use caution and follow directions

Pruning

- Install an underground irrigation system in areas of low rainfall
- Have small flower beds and use flowering trees and shrubs for color
- Be selective in the choice of plant materials; some plants require little pruning, spraying, and watering
- Use native plant materials
- Keep the design simple
- Use mulches for weed control when possible.
- If herbicides are necessary, use caution and follow directions

EXERCISES

A) Complete the blanks with appropriate words.

play area - low maintenance – landscape design –Southern orientations

1) The first step in ……is to divide the available space into use areas.
2) A ……may be incorporated into the living area, depending on the family's interest and the ages of any children.
3) A ……plan is the goal of most homeowners.
4……receive the most light and tend to be warmest.

B) Answer the following questions.

1) How is landscape design defined?
……..
……..
……..
2) What is the fundamental principle of landscape design?
……..
……..
……..
3) What is the duty of the landscape designer?
……..
……..
……..

UNIT 28

Specific Park Guidelines

Park Design Guidelines include:

- Mini Parks
- Neighborhood Parks
- Community Parks
- Regional Parks
- Open Space/Greenways
- Trails and Connections
- Dog Parks

Dog Parks

Mini Parks

Mini parks can be expensive to construct and maintain on a per unit basis but can be very valuable in neighborhoods that do not have parks or open space in close proximity. Following are design guidelines that will help to create spaces that have appropriate visual access and provide areas for community gathering.

- Mini Parks should be connected to a sidewalk and preferably a bike path. Housing should have direct access to the park through a path that is at a minimum of six feet wide.
- Fencing should offer privacy to residents abutting the park property line while still providing transparency. A four foot fence lined with trees that are limbed up 4 feet and shrubs that are generally 2 to 3 feet high will create a barrier for the park neighbors while still allowing the neighbors to enjoy the view of the park from their yard. Adjacent neighbors of the park should have a lockable gate to allow them direct access to the park from their yards.
- Appropriate facilities in mini-parks include children's playgrounds, open grass play areas, shelters, and picnic tables.
- Furnishings should include one drinking fountain, a street light, seating, and a sign that is recognizable to passers by.

- Restrooms are not required in these parks unless community events are proposed for the park (i.e., along a parade route).
- Dog parks and sports fields/courts should not be included.

Neighborhood Parks


Bike paths

A neighborhood park should accommodate the needs of a wide variety of age and user groups. These spaces are designed primarily for non-supervised, non-organized recreation activities. The guidelines will help ensure these parks are desirable to the surrounding neighborhood and offer activities that provide a daily pastime for all residents' neighborhood children.

- The pedestrian is more important than the car in this situation and should be thought of foremost in the overall plan. Connectivity to the surrounding neighborhood is vital to these parks. Sidewalks, bike paths, crosswalks and connections to larger trail systems should be established.
- Fencing should maintain privacy for residents but also provide some transparency to increase resident visibility into the park. Fencing should not be greater than 6 feet in height. Vegetation can be used as a screen to allow neighbors privacy while preserving views into the park. Housing developments adjacent to the park boundary should have direct access to the park through locked gates.


Picnic table

- Appropriate facilities in a neighborhood park include: children's play equipment, outdoor basketball courts, tennis courts, sand volleyball courts, un-programmed play space, and accessible pathways.
- Furnishings include, but are not limited to: drinking fountains, picnic tables and benches, trash receptacles, signage at entrances and all major trail intersections and utilities.


Portable toilet

- Restroom buildings should be discouraged unless community wide activities (i.e., festivals, parade routes) are located in the park. Another consideration is providing portable toilets when needed to support programs or special events. Seating and screening portable toilets is advised.

Community Parks

The size of these parks provides opportunities to offer active and structured recreation activities for young people and adults. There is also an opportunity to provide indoor facilities because the service area is much broader and therefore can meet a wider range of interests. These guidelines will help to create spaces that will be useful to people of all ages and create facilities that will be valuable to Talent's growth.

- Approximately two-thirds of a community park should be reserved for active recreation uses such as: ball fields, tennis, basketball and volleyball courts, open grass area for free play, children's playgrounds and space for outdoor events.

Volleyball court

- View sheds should be highlighted by the placement of picnic areas (some should be reserveable), benches, gardens and natural areas. Vegetation can be thinned or planted on the site to accentuate or hide scenes of the surrounding valley.
- Paved pathways should direct users to areas within the park as well as to adjacent trails, greenways, streets and sidewalks.
- Facilities that are appropriate in community parks include: children's play equipment, outdoor basketball court, sports fields, un programmed play space, off-leash dog play areas, utilities and accessible pathways. It is recommended that one community park in the Talent Park System provide a community center or natural learning center to hold community events.
- Housing developments need to create access to parks if they are located on the boundary of a park. To promote further connectivity, these developments should connect to other neighborhoods as well, especially if those other neighborhoods are connected to a park.

-
- Furnishing include, but should not be limited to, drinking fountains, picnic tables and benches, trash receptacles, bike racks, and signage at entrances and at all major trail intersections and utilities. Drinking fountains should be provided at intersections of larger trail systems. Drinking fountains should be designed for human and canine users.


Canine

Regional Parks

Regional Parks provide opportunities to preserve unique cultural and natural areas as well as provide features, facilities, and events that attract users from the entire Rogue Valley. Regional parks should be designed to connect with the community and the region via trails, sidewalks, bike lanes and roads.

- Signage should be located at the entrance and also at significant locations to provide direction and information for visitors and residents. Along trail systems, signage should be included to inform park users of trail connections that lead to other significant places of interest.
- If the site is proposed to attract large volumes of traffic, Access should be via a collector or arterial street.
- Wetland and riparian areas should be protected by a 50-foot native vegetation buffer allowing access for interpretive and educational viewing areas accompanied by signage.
- Passive recreation areas should be separate from active recreation area to create quiet, serene spaces. Passive recreation should be accessible to all users.
- Facilities may consist of: amphitheaters, children's play equipment, court sports, multiple sport fields, un-programmed play space, restrooms, off-leash dog play areas and accessible pathways.
- Furnishing may include, but should not be limited to: drinking fountains, picnic tables and benches, trash receptacles, bike racks, utilities, signage at entrances and at all major trail intersections.

- Pathways should be constructed properly to insure the success of its construction and the reduction of buckling and pot holes. Trails should have a 50 foot buffer to increase green space.

Pot hole

Open Space / Greenways

Open Space and Greenways consist of land typically left in its natural state, with passive recreation as a secondary objective. Open space and greenways may include passive recreation facilities such as trails and paths, and interpretive and educational features, in addition to environmental features such as sensitive wildlife habitat, stream and riparian corridors, and wetlands. The following guidelines are intended to preserve the integrity of open space and greenways:

- Sensitive areas such as wetlands, riparian zones and other ecologically sensitive areas should be protected.
- Wetland and riparian areas should be protected by a 50-foot native vegetation buffer allowing access occasionally for interpretive and educational viewing areas that are accompanied by a sign.
- Improvements should be limited to restorative actions and minimal construction of human made elements with the exception of thoughtfully placed paths. Paths should be natural if possible (i.e., bark mulch or stone).

Concrete

- The construction and design of paths needs to be carefully planned. Take into account the amount of users, the width of the path, the type of path, the placement in regards to the topography, soils and drainage conditions. All trails do not need to be paved but the system should offer diverse experiences to those who may be more challenged than others. Pathways that are paved with asphalt or concrete should be constructed correctly to achieve the longest lifetime possible.

Trails and Connections

Trails should be looped and interconnected to provide a variety of trail lengths and destinations. They should link to various parts of the community, as well as existing park sites. The following guidelines will help promote the effective design of trails and connections:

- Bike paths and sidewalks should connect to trails. Trailheads should include parking areas for at least 5 cars.
- Pathways and trails should not be constructed as part of a Street roadway. They should be interesting to the user and designed to offer diverse experiences (i.e., views, equestrian paths, mountain bike trails, quiet seating areas, bird watching, etc.).
- The design and construction of paths and trails needs to be carefully planned. Take into account the amount of users, the width of the path, the type of path, the placement in regards to the topography, soils and drainage conditions. All trails do not need to be paved but the system should offer diverse experiences to those who may be more challenged than others. Pathways that are paved with asphalt or concrete should be constructed correctly to achieve the longest lifetime possible.

Trailhead

- To ensure the success of an interconnected trail system, developers need to be encouraged to provide pathways through proposed developments adjoining or surrounding trail segments.

Dog Parks

Dog parks are fenced areas where dogs are allowed, under supervision, to run freely. Dog parks should not be located near incompatible uses such as child play areas, athletic fields, courts and community gardens. The following recommendations will help ensure the creation of dog parks that are safe for the user, respectful of non-dog park users, and respectful of adjoining neighbors:

- The site should have at least 1-acre of accessible land, avoiding flat lands that could otherwise be used for sports fields but also take into consideration the topography to reduce erosion and ensure drainage. A minimum buffer width of 300 feet should exist between the dog park and the nearest residence.

- The placement of a dog park within an existing neighborhood should be planned through community meetings aimed at resolving conflicting uses before implementation.
- Separated play areas for small dogs and large dogs are recommended.
- The dog play area should provide two entrances into a secure fenced area.
- Fencing height should be a minimum of four feet.
- The dog play area should include the following amenities: trash receptacles, shovels, water, trees for shade, picnic tables, and doggie bag stations.
- Retrieve licensed data to assist in the evaluation of dog park placement and how it fits into the overall park system.

EXERCISES

A) Complete the blanks with appropriate words.

community - buffer – trails – regional

1) ……parks should be designed to connect with the community and the region
2) ……should be looped and interconnected to provide a variety of trail lengths and destinations.
3) Wetland and riparian areas should be protected by a 50-foot native vegetation……
4) The size of ……parks provides opportunities to offer active and structured recreation activities for young people and adults.

B) Answer the following questions.

1) Explain two design guidelines to find visual access in mini parks.
……..
……..
2) What should be done to create parks suitable for all groups of people?
……..
……..
3) What do Open Space and Greenways include?
……..
……..

UNIT 29

Greenways for The Cities

Prof. Dr. Banu Çiçek KURDOĞLU

The physical environment is considered as all kinds of physical places and environments in which people live for a short or long time, have mutual relationships and participate in various actions. This environment should be suitable for human physiological and psycho-social needs. We come across different space scales such as physical environment, country, region, city, village, residential environment, residence, and room (1). The city is a living ecosystem and behaves just like the forest ecosystem. How can he not realize the tree, the forest, and the ecosystem that does not recognize nature and the cycle that exists in? To understand the city, it is necessary to look at its components. However, when this difference is perceived, the holistic urban ecosystem model can also be understood. Urban ecosystem is a whole of biological ecosystem and human ecosystem (2).

Green spaces offer different services to the people of the city. However, open green spaces that are independent of each other, fragmented, unrelated and discontinuous cannot form the green systems needed by the city ecosystem such as urban parks, urban forests, wooded areas, street trees, special green areas within the city as a whole, and it is necessary to ensure the interconnection of the city in a continuity including important and historical-culturally special areas (3).

Wooded area

Frederick Law Olmsted intended to emphasize the idea of correct communication and correct relationship with the greenway approach he developed in the 1860s. Olmsted's most important known greenway is the "Emerald Necklace" in Boston (4). Greenways are linear areas along a natural corridor, a canal, a scenic road, or a route. These areas are left or arranged in their natural character for pedestrian or bicycle crossing. Everything in life is linked to each other (5).

Borgese Garden (Roma)

This approach refers to the ways that connect parks to each other, but also link to unique and valuable areas in terms of landscape. The biotic, abiotic and cultural components that make up the landscape we live in are in relationship. All physical and social problems that arise in today's cities, rural areas and natural areas, are caused by incorrect relationships between the components listed above (6).

Frederik Law Olmsted's Emerald Park System (4)

Open green area systems in cities can be listed as green belt, green wedge, green heart (7). Green network system; It includes corridors that include and connect other listed systems. Green network is not only a concept that defines the distribution of green areas in the urban area but it is a concept that is more connected to the ecology culture network and green product market (8). Greenway corridors also offer recreational opportunities to the people of the city in line within this network system. Greenway is a sustainable green space utilization model that offers both recreation and conservation together. Since the greenways include not only urban centers and their surroundings, but also protected areas outside the cities, historical sites and natural areas that connect cities, have a broader meaning than the green belt and the park road.

Ahern (1995) consider 5 main criteria for greenways; sustainability, linkage, linearity, integrated into landscape planning and multi-functionality. The special form of greenways are first of all linear. Within this linearity with special characteristics and possibilities, it brings a number of advantages in mobility and transportation. Greenways connect with the landscape structure of all sizes, linking the city and the countryside, as well as connecting different wildlife habitats. Greenways are multifunctional. It has many ecological, social, cultural and aesthetic functions.

It is considered essential to evaluate it integratedly into landscape planning. Greenways are based on a basic principle that foresees nature conservation and economic development together. Sustainability is the main strategy (9).

Greenway nets; It can contribute to urban life and the city ecosystem in terms of legibility, accessibility, identity, socialization, quality of life, economy, aesthetics, climate control, urban-rural relations and education (10). If green network systems can be designed in line with multidisciplinary planning strategies and continuing parts of this system; while there are sometimes cycling and walking paths, sometimes they can undertake important tasks that protect the elements that make up the urban identity, reveal them and make them legible. They also provide habitats for animals and plants in the city, and connections for fragmented habitats. In addition, they create accessible recreation and socialization opportunities for disabled people, opportunities for integration with nature and awareness for children. The historical areas, theatres, art galleries, etc. are open to everyone, which are the focus of the greenways. If the connection between natural,

historical area

structural and vital focuses in cities is provided with green continuity, in these areas people will be able to appraoch nature and human (6).

Different types of greenway can be classified according to purpose (11,12): urban greenways, recreational greenways, scenic greenways, historical and cultural greenways, ecological greenways, educational greenways, riparian greenways, touristic greenways.

This classification was made in terms of the dominant goals of greenways. However, not every greenway type can serve one purpose. The greenway is a multifunctional system consisting of spatial or specific functional uses that are compatible with each other. A scenic greenway can also fulfil recreational, educational and ecological functions.

With regard to control of urban development; Greenways are of strategic importance for the definition and control of the transition from city to rural. Greenway plays a role in the conservation, restoration and management of water resources including river corridors, wetlands. In order to tackle many problems faced by citizens, it is necessary to ensure that they are in contact with the nature in their immediate vicinity. For cities, we need greenway systems that increase the chances of meeting with nature and then encountering it, extending from our own neighborhood to natural areas and integrating with them.

Borgese Garden (Roma)

Borgese Garden (Roma)

Kew Garden (London)

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EXERCISES

A) Complete the blanks with appropriate words.

Wetland – rural – green space – habitats – transportation

1) We will encourage more parks, gardens and …….
2) Today, hunting is no longer allowed and tourists visit these national parks to view and photograph the wildlife in their natural …….
3) There are some areas of ……. which are of ancient origin.
4) Every neighborhood had a main street for shopping and public …….
5) These plants have a tendency to grow in the more …….areas.

B) Answer the following questions.

1) What is the definition of the physical environment?
……....
……....
……....
……....
2) What are the main criteria for greenways according to Ahern?
……....
……....
……....
……....
3) What are different categories of greenways in terms of purpose?
……....
……....
……....
……....

UNIT 30

The Water Element As Aesthetic Factor In Landscape Design

Water is a multidimensional object of research which appears in various fields: environmentally it is a natural resource essential for living (drinkable water, river, lake etc.), socially it appears as a sensitive basis for developing human activities, financially it influences tourism, agriculture, fishery etc, culturally it is related to folklore, mythology, arts or religion, aesthetically it is represented as a beauty element of nature. Aim of this research is to present certain reflections of the water as it is represented in the fields mentioned above, through a historical back sight. From the past until now, the water was connected with the idea of the discovery and the conquest due to its agility, expansion, and its ecological stability Images form antiquity Thales considered the water as a basic source of genesis. When he traveled to Egypt, he saw how fertile the land was after the flood of Nile. According to Herodot, Persians were demanding "land and water" from the cities which were surrendered. This demand was meaning that the citizens abstained from any right on their land and its products. In ancient Greece, where the fountains were considered to be sacred, they were converted from a hole excavated close to the water point into impressively decorated buildings. Public fountains were existing in ancient Rome. Usually, they were a rectangular stone tank on a small pedestal and it had a sculptured human or animal head (e.g. lion) from which the water was flowing. The name of each traditional fountain is determined by the position, the shape or local tradition. The manufacture types were two: a) the "open" (which was the most usual one) and b) the "closed" where the water was flowing from a sculpture.

Cisterns

The water in Byzantium

The water as symbol of life, health and civilization was playing an eminent role in the everyday life of byzantine time. The people were regarding the water as an indispensable element of Paradise, which they were imagining as a blooming garden with four rivers. Fountains and cisterns could be found at many rural houses, while sculptured fountains (shaped as birds or crawlers) were to be found at many high class houses. Fountains were existing even at rural or forest roads for the needs of travelers. Areas with hot water fountains such Aghilaos or Pithia were therapeutic places which were supposed to cure pain. These fountains were a natural infrastructure for developing luxurious bath towns. The baths were a sociable place appropriate for meetings, discussions and demonstration of femaleness. The water was supposed to have supernatural power and was considered to be an element of multiple beliefs and functions (forecast, exorcism). The water had a great real or symbolic importance.

The role of water in music According to Yiannis Svolos the sweet water, in contrast to the sea water, is an absolutely necessary element for life existence. It is noticeable that in the chapter of Genesis in Old Testament the God differentiates the sea from the sweet water, while creating the human being of soil and water. In various mythologies the water (in form of rain, snow, lake etc) is a means of animism and is involved in human life. The presence of sweet water in western music plays a psychological, collective, drastic or idyllic role comparable with its historical importance for the life and progress of the culture. It appears in the Baroque time through mythological metaphors such as in Beethoven, Wagner, Handel, the Greek componist, Kalomiris etc.

The role of water in the landscape aesthetics

Water-related landscape values

Values ascribed to the landscape which are derived from the existence of water elements can be the following ones:

1. The sound of water or water birds
2. The movement of rivers, waterfalls, waves etc

Water birds

3. The colors of water and coasts
4. The reflections on the water surface
5. The possibility of expanding biotopes of certain species
6. The opportunities of emphasizing structural materials and lighting
7. The opportunities of environmental education

The water as landscape design element

The important design characteristics of the water consist in its movement, sound, and reflection. It is argued that the water activates all senses and provides numerous opportunities of recreation such as swimming, angling, rowing etc. Moreover, it has been empirically found that visitors remain in beach zone about four hours daily.

Stimulation of senses through image and sound

The water stimulates the senses

In order to strengthen this stimulation, the landscape designer can intervene e.g. on the bottom of a lake. The water cause memorial and emotional impacts with its tranquil and sensitive properties. The movement of water presents a dynamic and charming character which may cause thunderous sound or predominate the sound of city. The lotic water implies instability or movement against the balance.

Expert approach to the aesthetic function of water in the landscape

Litton et al. (1974) have made an extensive expert approach to the landscape perception. They emphasized aesthetic aspects of fresh water in the landscape. The contributions of water to the environments of recreation and everyday life are intensively explored by expert groups. Classification patterns have been proposed for native characteristics and these are considered together with man-made changes. These patterns are of visual character and consist of landscape

Waterscape units

units, setting units, and waterscape units. This scope includes comparative analyses and suggests settings through which water can contribute to environmental quality. Policy recommendations are usually made in expert approaches.

Selecting water feature materials

When choosing and planning a water feature, make sure that it fits in with the composition of your garden, perhaps using materials that feature elsewhere in the design. The following examples are characteristic.

A. Fountain in the garden

The running water in the garden makes a dynamic impression which breaks any visual monotony which may cause by extensive green material (Figure 1).

Figure 1. DK - Garden Design, 2009 Dorling Kindersley Limited

B. Containing water

Waterproof masonry, such as concrete, will seal in the water in your feature, whether it is a raised or sunken pool (Figure 2). Any material with joints, such as bricks, will leak, so add a specialized render to the inside of your pond, which can then be coloured or glad with tiles.

Figure2. DK - Garden Design, 2009 Dorling Kindersley Limited

C. Edging and lining streams

Natural-looking water features, such as artificial streams or wildlife ponds, are usually irregularly shaped, and lined with flexible waterproof materials (Figure3).

Figure 3. DK - Garden Design, 2009 Dorling Kindersley Limited

EXERCISES

A) Complete the blanks with appropriate words.

wildlife ponds - visual monotony – animism – movement

1) The running water in the garden makes a dynamic impression which breaks any…….
2) Natural-looking water features, such as artificial streams or ……., are usually irregularly shaped.
3) The ……. of water presents a dynamic and charming character.
4) In various mythologies the water is a means of …….and is involved in human life.

B) Answer the following questions.

1) What is the role of water in the landscape aesthetics?
……....
……....
……....
……....
2) What are the important design characteristics of the water?
……....
……....
……....
……....
3) Which factors are significant to be involved in planning a water feature?
……....
……....
……....
……....

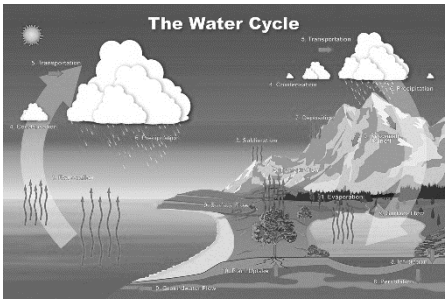
UNIT 31

Water Conservation And Management In Cities

Assoc. Prof. Elif BAYRAMOĞLU

Cities are areas where people have historically used to protect and sustain their lives. The reason which is called historical process is that cities have different uses and settlement structures for centuries (Oktay et al., 2015). With its ever-changing dynamic structure, in fact, the only reason for this change has been human exposure to environmental changes because people continued to change the city they lived in according to life style, changes in nature and their changing needs. When addressing urban environments, it is vitally important to question the conservation and change of the elements it contains. Protecting, evaluating and maintaining existing natural and cultural values while shaping the environment is the primary condition (Erdoğan, 2006).

However, the natural structures in the cities deteriorate and become damaged every day during this evolving and changing process. In particular, Water Resources, which are non-renewable and which are the reason for humanity's survival, are adversely affected by environmental change (Büyükkurt, 2019). Sudden and short-term heavy rainfall due to climate change both creates environmental pollution and negatively affects people's quality of life (Bayramoğlu, 2016).



Water cycle

Ecological cycles must not be disrupted in order to maintain the continuity of natural life and to be managed in a healthy way (Westmacott, 1991) because the relationship between urban texture and urban infrastructure facilities is inevitable. In parallel with this situation, the structure and components of the landscape are used in the creation of sustainable infrastructure systems. This relationship between urban tissue organizations and infrastructure systems can be fulfilled by managing natural water (Sert, 2013). In order to restore balance in the natural water cycle, water movement must be regulated by accumulating and using clean water again. Rainwater is the easiest way for nature to renew

itself and continue its cycle in providing water and nutrients by reaching the Earth. Providing water conservation in cities improves water quality and provides healthier living environments and improves ecosystems.
Especially in recent years, water harvesting and water harvesting techniques have been discussed in the name of water retention and re-evaluation in cities and making it possible to consume water more effectively. Rainwater harvesting methods aim to be developed with a strategy that will provide maximum benefit from the waters (Oweis and Hachum, 2000; Lancaster, 2008). Protecting water in cities is an important step that needs to be taken in order to protect water sources within the natural cycle to manage and allow repeated use.

Why should we protect water in cities? In fact, the answer is very easy and straightforward; water is in the most basic needs of humans and living things. The water, which is considered a non-renewable resource, is constantly depleted and polluted and lost. Life does not exist if we think of water as having disappeared (Kılıç, 2008). Water moves through a hydrological cycle in nature. As a result of this hydrological cycle, it integrates with the environment in nature as a non-renewable natural resource. According to the United Nations Committee on economic, Social and Cultural Committee on Rights, it is stated that the necessary measures must be taken to meet the water needs of nature and living things (Özbilen, 2005). The surface distribution of water on earth is thought to cover almost the surface of the earth. However, this is not actually the case.

The amount of water in the world is constant and is unlikely to change. Only freshwater and sea water rates are changing (Ulusoy, 2007). Earth is described as the only planet that hosts life in terms of Water Resources and where the water cycle is carried out. While the hydrosphere contains approximately 1.4 billion m3 of water, 97% of the amount is salty and is not available to humans (Scheckel, 2002).

Scenarios for the future have been created due to climate change. The ice and snow layers, which account for the bulk of the water used in agriculture in Asia, will decrease by 30% in 2030. The water consumption per capita of the world population is determined as 800 m^3 per year and 800 million people in the world have food shortages (Atalık 2008). When the amount of the world's fresh water resources is examined, it is determined that although the Asian continent takes advantage of 60% of the land assets, its water resources are

36% (Yilmaz and Peker, 2013). Amount of water per capita according to Falkenmark indicator as stated by Tuğaç (2018) includes

- Countries below 500 m^3 " experiencing intense water shortages"
- Those between 500 m^3 and 1000 m^3 " experiencing water scarcity"
- Those between 1000 m^3 and 1700 m^3 " with water stress"
- Countries with more than 1700 m^3 are designated as countries with "no water stress" (Brown and Matlock, 2013).

By taking the values into account, Turkey is a "country experiencing water stress" with water presence around 1500 m^3. It is projected that the annual usable per capita amount will be 1000 m^3. In this respect, it is estimated that the annual per capita amount available will be 1000 m^3. Thus, measures should be taken against climate change to keep the amount of water resources low at a significant level (Yilmaz and Peker, 2013).

Climate change and water

UNFCCC's definition of climate change is as follows: "changes that occur directly or indirectly as a result of disruption of global atmospheric activities in addition to natural climate change observed in a given time period" (Arikan, 2012). The World Meteorological Organization (WMO) first organized in 1979 to take measures on climate 1. Climate conference held. Later, after the 1980s, governments ' awareness of climate-related issues increased. In 1988, Intergovernmental Panel on Climate Change (UN-IPCC) was established in cooperation with WMO, UNEP and UNESCO. All of the world's climate-related studies have been studied by scientists from 85 countries. As of 2018, 5 separate reports were published by the IPCC in 1990, 1995, 2001, 2007, 2013 and the last report in 2013, AR5, revealed that 95% of global climate change is human-induced (REC Turkey, 2015).

According to Türkeş (2012), he listed the possible effects of global warming and climate change in Turkey as follows:

There appear to be regional or seasonal differences in production in agricultural areas.

- Depending on hot and dry periods, the effect and duration of forest fires may increase.
- Renewable energy sources such as wind and solar can vary by region, wind speed, intensity and strength.

•The number of seasonal snowy days and the amount of water that the snow melts may decrease and the duration of the snow-covered circuit may decrease. As a consequence, sudden snowmelt and snow avalanches may increase.

Water conservation methods in cities

Maintaining the continuity of the water cycle, which is a part of nature, has been obliged to address new solutions and as a result of the changing climate conditions in recent years, the effects such as decreasing rainfall, increasing temperature, developing technology and the intensive use of water have occurred due to urbanization.

Drought landscape applications: arrangement has been described as alternative plant design. The planning approach was widely used in the arid Southern states, Colorado and Florida in the 1980s. However, it was first developed in 1981 by the Denver Water Department (Peace 2007; Gary L. Wade et al. 2009; Bayramoğlu and Demirel, 2015). The droughts landscape regulation approach is aimed at protecting water resources by reducing water use to a minimum. There is no need to rearrange the entire landscape to make the arrangement and it can be rearranged according to planning principles over existing design. There are 7 basic principles of a suitable droughts landscape arrangement (Bayramoğlu, 2016; Bayramoğlu and Demirel, 2015).

irrigation

Grey water management: In order to reduce water consumption, actions should be taken to prevent drinking water from being used in toilet reservoirs, garden irrigation, laundry and other cleaning activities. Grey water contains all the waste water except toilet water and is the lowest level of pollution and the least polluting current in the waste water types which is called the black water-free part of domestic wastewater, i.e. wastewater from the shower, sink, bathtub and even kitchen (Karahan, 2011; Üstün and Scythe, 2015).

Storm water management: Storm water management traditionally; channels, pipes, loopholes etc. structural rain water collection systems are used (Çakıroğlu, 2011). It is possible to define urban storm water management as a set of measures that allow the amount of rain left behind after the useful part

to be removed without damaging the urban infrastructure and superstructure (Davis and McCuen, 2005; Demir, 2012).

Preference of natural plants in landscape areas: The application stage of plantings in urban open areas are organized with a "naturalistic" approach based on the re-creation of nature rather than artificial arrangements. This planning approach meets the elements used in open spaces which are composed of natural, renewable and environmentally non-destructive elements (Ertop, 2009). Natural plant species generally do not require additional fertilization, but are more resistant to disease and pests (Barış, 2007). In maintenance and repair works, the need for natural plant groups is minimal. Natural plant groups cause the creation of a healthy ecosystem to restore the landscape character of the area in plantation studies. It adapts best to local environmental conditions in plantation studies with natural plants (Yazgan et al., 2005).

Rainwater harvesting: The method of water harvesting has been developed so as to provide maximum benefit from rainfall waters in urban areas. The collection and accumulation of rain water and surface runoff water can be defined as the supply of water necessary for plant and animal production and the provision of water necessary for domestic consumption (Mengü and Akkuzu, 2008). Rainwater can be collected and stored from roofs of buildings, greenhouses, courtyards, impermeable floors such as roads (Oweis et al., 2004). With the advent of new technologies, the quality of life is increasing and therefore, with the desire to live in a more modern environment, it has changed the natural environment by hand and created the cultural environment. With the formation of the cultural environment, the natural and ecological balance has been broken. As a result of this, nature and the need for open green area has grown in importance.

Although the amount of green area per capita is determined as 10 m^2, this value is lower in Turkey. For new sources, energy and water resources need to be protected and passed on to future generations, so they need to be used effectively and turned to alternative sources. Water, one of the sources of water that has no alternative, is available in limited quantities all over the world and the existing water resources are decreasing on a daily basis. So every drop of water is vitally important. Water resources are limited in many parts of our country. Therefore, despite a potential thirst problem, it is considered necessary to develop efficient use methods, especially in open green areas.

As the most important stage in landscape design and application is the planting stage, the arrangements made with plants with minimum water consumption and need should come to the fore.

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EXERCISES

A) Complete the blanks with appropriate words.

Freshwater – urban – consumption – climate change - infrastructure

1) The government is urging people to reduce their water ……
2) Only 1 percent of the world is covered by ……
3) These developments often failed because of the limited scale of the local social and economic ……
4) The recent floods are said to be caused by ……in the northern hemisphere.
5) The problem of air pollution is especially serious in …… areas.

B) Answer the following questions.

1) What is the definition of climate change according to UNFCCC?
…….
…….
…….

2) What are the possible effects of global warming and climate change in Turkey?
…….
…….
…….

3) What does " Grey water management " mean?
…….
…….
…….

UNIT 32

Landscape Irrigation System Design

"To irrigate or not to irrigate," may be your first question. Humid regions like Tennessee receive significant rainfall and a decision to irrigate your landscape requires careful consideration. Historic records show that summer precipitation (June thru August) over the last 20 years has not been sufficient to meet an estimated water use (17 inches) for landscape plants in Tennessee.
Small rainfall deficits are not much of a problem because stored soil moisture will supply water to plants and plants will adjust to use less water during dry periods. However, not all rainfall deficits are small. Records also show that in 10 of the last 20 years, rainfall deficits were greater than 6 inches of water which can adversely affect the appearance of landscape plants and, in some cases, plant survival.
If you decide to irrigate, you will not be alone. Landscape irrigation is increasing in humid regions such as Tennessee. Irrigation will help you maintain optimum landscape appearance during the entire growing season and will help insure survival of expensive plant material during dry periods. Landscape irrigation is expensive (approximately $2,000 per acre for equipment designed and installed by yourself), but this investment can increase the value of your home.
Automated irrigation systems reduce the labor involved in moving garden hoses with sprinklers or in carrying buckets of water. Also, fruit and vegetable gardeners will benefit from an increase in the yield and quality of their produce from irrigating crops.


Sprinklers

In addition to the capital cost of landscape irrigation, operating costs are high when municipal water supplies are used. In order to apply one inch of water to a one half acre landscape, 13,500 gallons are required. At water costs of $0.25/100 gallons for delivering treated water to your home and $0.36/100 gallons for

removing water from your home for sewage treatment, the combined cost for applying 13,500 gallons is $85.00. If six inches of water are required in a growing season, the yearly cost of irrigation is more than $500.00 for one half acre. In an effort to decrease operating cost, some homeowners pay to install a separate tap and meter for irrigation water and thus avoid the sewer charge. The operating cost from ground and surface water sources is much lower because the water is free and only the energy cost of pumping water is incurred.

Pipelines

However, surface and ground water supplies will incur additional capital cost for items such as: a pump, new electrical meter or gas engine, construction of a pond or well, longer delivery pipelines, and filtration & chemical injection for drip irrigation.

Cost is one factor that should motivate you to pay attention to how much water is applied. Every inch of water wasted is dollars wasted. You should also recognize that wasted water also costs the environment. Over irrigation unnecessarily uses fossil fuels for energy, depletes water resources for wildlife and human beings, and causes pollution when nutrients and plant protection products are transported into surface and ground water via surface run-off and deep percolation of excess irrigation water, respectively. Over irrigation can also harm some plants by reducing oxygen in the root zone and creating an environment that favors disease. Therefore, one goal of this publication is to teach you when to apply water and how much to apply. However, applying the right amount of water at the right time can not be accomplished with an irrigation system that is poorly designed. If an irrigation system applies 0.25 inches in one area and 0.75 inches in another area, the tendencies is to make sure that the dry spots are sufficiently watered leading to an excessive waste of water in the wet areas.

Fossil fuels

Therefore, the primary goal of this publication is to teach you how to design an efficient and uniform landscape irrigation system.

Water Requirements and Supply

One of the first steps in designing a landscape irrigation system is to make sure that your water source can meet the water use rate of landscape plants. While plants can use over 1.5 inches per week during short periods of peak water use, you should not need to apply this much water because soil moisture can supply a portion of the plants' water consumption during an extreme dry period and rainfall can then replenish soil moisture at a later date. If you apply 1.0 inches of water per week, temporary soil moisture deficits will occur but plant water stress and deterioration of the landscape appearance will be very unlikely. If you apply 0.7 inch per week, some short periods of water stress may detract from landscape appearance in the worst drought years but plant survival should not be a problem. Remember, you do not have to apply this amount of water each week. Your irrigation system can be turned off during periods of adequate rainfall and/or low water use.

Knowing the water use requirements for plants allows you to compare their need with your supply. A requirement of 1.5, 1.0, or 0.7 inch per week can be supplied by a flow rate of 4.5, 3.0, and 2.0 gallons per minute per acre (gpm/ac), respectively if the system is operated 24 hours per day (figure 1). These minimal rates of supply will require that sprinklers are separated into zones that operate independently. For instance, 1.5 gpm would be required to apply one inch of water per week on a half acre (a 3 gpm per acre rate), but only 2 or 3 sprinklers may be operated at one time at this rate, and the large number of zones could make this design very expensive or impractical. In contrast, all the sprinklers could be operated at one time with 40 gpm on a half acre (an 80 gpm/ac rate).

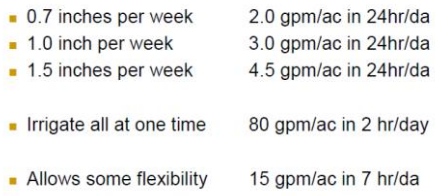


Figure 1. How Much Water is Required?

A system supplied at this maximum rate would only have to be operated 1 hr per day to apply 1 inch of water per week, but it will require larger and more expensive components from the meter sizes to the delivery pipe, and the system may still need to be zoned if different types of sprinklers are used. A more reasonable flow rate would be 15 gpm/ac or 3.5 gpm/10,000ft2. At this supply rate, 1.0 inch could be applied per week by operating less than six hours per day. This intermediate flow rate would: 1) reduce competition for water between landscape irrigation and inside the home water use, 2) reduce conflict between irrigation and outdoor activities, and 3) keep the irrigation equipment cost in a more affordable range.

Some homeowners have access to lake and river water and there will not be a limit to the supply rate (figure 2). If a small stream is used, it will be important to verify the flow rate during drought conditions.

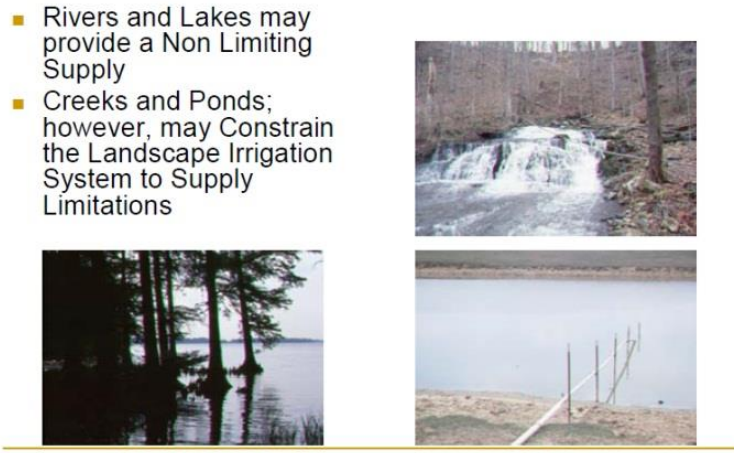
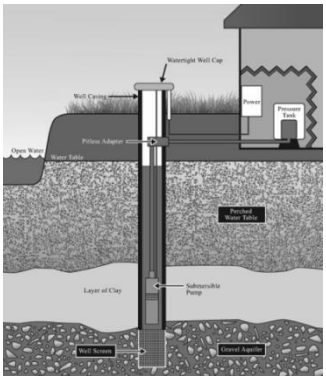


Figure 2: Surface and Ground Water Sources

As a riparian water user on a small stream, you have the right to use water but not the right to harm the right of other riparians to use water. Therefore, don't assume you can have access to the entire stream of water. If you use a pond that is fed by surface run-off, care must be taken to provide sufficient storage for your irrigation needs. The storage required to apply one inch of water on an acre is 3,630 ft3, such that 6 inches of water for a half acre lot would require 11,000 ft3 or 83,000 gallons of storage. However, for the majority of homeowners, your irrigation source will be a domestic water supply that can limit the design flow rate of an irrigation system. Municipal utilities are connected to most homes with a ¾-inch meter that can often provide a maximum flow of 15 gpm. If an increase in flow rate is needed, a 1 inch meter and connection can be added at extra cost to produce a maximum flow rate of 25 gpm. If you are on a residential well, a normal flow range will be from 5 to 20 gpm. In addition to flow rate, a domestic water supply must provide enough pressure to operate the sprinklers, as well as overcome friction loss in the irrigation equipment and elevation gain. At a minimum, sprinklers that shoot water more than 25 feet will require 35 pounds per square inch (psi) of pressure at the nozzle and the pressure losses in the system will be at least 10 psi, requiring a minimum pressure of 45 psi at the source.



Residential well

Flow rate and pressure can be measured by connecting a pressure gauge and a manual valve to a hose bib or hydrant that is located near the point of connection for the proposed irrigation system (figure 4). As the valve is incrementally opened to one position at a time, the pressure gauge is read and flow is measured by: 1) recording the time required to fill a 5 gallon bucket and then dividing the 5 gallon volume by the number of minutes to calculate gpm, or 2) recording the number of revolutions made by the flow meter needle in one minute and equating this value to gpm. You should discover that pressure drops as flow increases


Nozzle

(figure 5). The pressure versus flow rate relationship is different for every irrigation system so make sure that you pick a design flow rate that maintains enough pressure to operate your irrigation equipment.

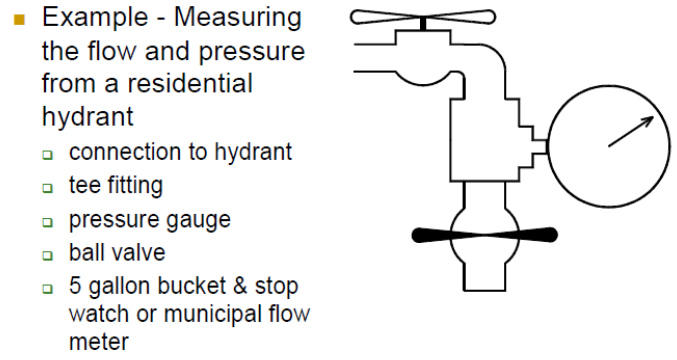


Figure 4: Measuring Flow and Pressure

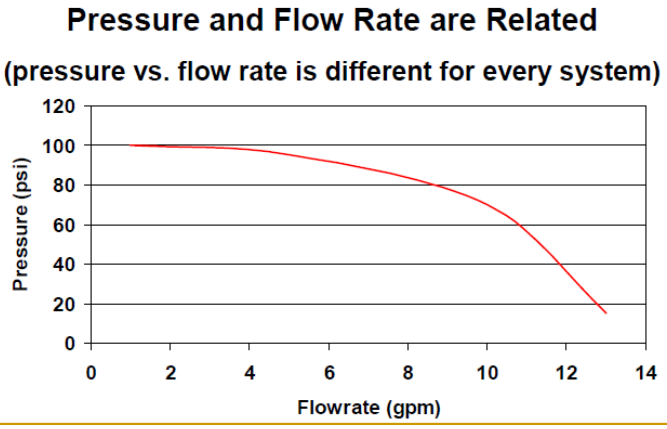


Figure 5: Pressure and Flow Rate

EXERCISES

A) Complete the blanks with appropriate words.

supply - irrigation – flow rate – cost- pressure

1) Automated ……systems reduce the labor involved in moving garden hoses.
2) ……is one factor that should motivate you to pay attention to how much water is applied.
3) Knowing the water use requirements for plants allows you to compare their need with your……
4) ……and ……can be measured by connecting a pressure gauge and a manual valve.

B) Answer the following questions.

1) How does irrigation help landscape?
……..
……..
……..
……..
2) What are harms of over irrigation?
……..
……..
……..
……..
3) As a riparian, what should be in mind regarding water usage?
……..
……..
……..
……..

UNIT 33

Ecotourism

Prof. Atila GÜL

Tourism

It is active and passive activities by visiting countries or places outside of abnormal environments for personal or commercial/professional purposes such as people's traveling, seeing, having fun, business, trade, education. These people are called tourist if it does include an overnight stay. If the tourism activity does not include an overnight stay and is done on the same day, it is called a visitor.

The purpose of their trip can be for business, leisure or personal reasons, other than to be employed by a resident entity in the country or place visited.

Types of Tourism

There are three basic forms of tourism: domestic tourism, inbound tourism, and outbound tourism.

- Domestic tourism refers to activities of a visitor within their country of residence and outside of their home (e.g. a Turk visiting other parts of Turkey).
- Inbound tourism refers to the activities of a visitor from outside of country of residence (e.g. a Spaniard visiting Turkey).
- Outbound tourism refers to the activities of a resident visitor outside of their country of residence (e.g. a Turk visiting an other country).

Ecology

Ecology includes the study of plant and animal populations, plant and animal communities and ecosystems

Ecotourism (ecology + tourism)

Ecotourism

It is a form of tourism involving visiting fragile, pristine, and relatively undisturbed natural areas, intended as a low-impact and often small scale alternative to standard commercial mass tourism. Ecotourism focuses on socially responsible travel, personal growth, and environmental sustainability. According to The International Ecotourism Society, the ecotourism definition is: "responsible travel to natural areas that conserves the environment and improves the well-being of local people." İt minimizes impact on the environment and builds environmental and cultural awareness and respect.

Ecotourism that is designed to contribute to the protection of the environment or at least minimize damage to it, often involves travel to areas of natural interest in developing countries or participation in environmental projects.

Principles of Ecotourism

- It contributes to the conservation of biological diversity. It does not harm the character of the natural or cultural environments visited.
- It gives ecotourists insight into nature and environmental protection and respect.
- Ecotourism Generated income leads to the protection of natural areas and management of protected areas.
- It does not exceed social and ecological capacity.
- Provides economic benefits to local communities and increases revenue.
- The use of local and traditional facilities and services has priority.

Basic Components of Ecotourism

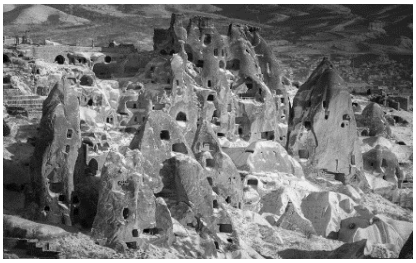
- Being nature-based is an effort to understand natural and cultural values, and it tends to convert this effort into conservation,
- Protection of biological diversity,
- Ensuring the active participation of local people,
- Providing socio-economic benefits to the region and increasing life expectancy,
- Minimizing negative environmental and socio-cultural impacts
- Ecotourism and local people should be responsible and sensitive in ecotourism activities
- Ecotourism activities are carried out with small groups or individually,
- Increasing awareness and awareness of current natural and cultural values,
- To keep artificial elements and physical facilities to a minimum and to build these facilities in a simple type, in harmony with the natural environment and local architecture,
- It is a responsible, acceptable and rational natural tourism activity that respects nature and the environment.

Ecotourism activities

It is possible to form group ecotourism activities in terms of their conceptual and basic features as follows.

Canyon

- Wildlife observation and investigation and ecological contribution
- Plant observation, investigation and ecological contribution
- Observation, investigation and ecological contribution of Geomorphological Formations such as cave, canyon, fairy chimneys, waterfall
- Observation, investigation and ecological



Fairy chimneys

contribution of historical, archaeological, religious and traditional cultural objects and sites

- Ecotourism based nature sports and ecological contribution

Ecotourist

The concept of ecotourist is defined as the person who visits areas that retain their relatively natural

The reasons and purposes of ecotourists traveling;

- Protection and survival of nature and the environment,
- Interaction with nature and rural life,
- Being in touch with nature,
- Enjoying and appreciating nature
- Understanding and appreciating nature,
- Observing and examining nature,
- Scientific curiosity and information
- Social interaction,
- Self-discovery and awareness
- Learning and seeing local culture and history

EXERCISES

A) Complete the blanks with appropriate words.

Wildlife – environmental awareness – ecology – biological diversity – ecotourism

1) ……is the relationships between the air, land, water, animals, plants, etc., usually of a particular area, or the scientific study of this.
2) North Carolina is an area of astonishing ……
3) …… is animals and plants that grow independently of people, usually in natural conditions.
4) ……has increased dramatically over the past decade.

B) Answer the following questions.

1) What are the basic forms of tourism?
……..
……..
……..
……..
2) What are the principles of ecotourism?
……..
……..
……..
……..
3) What are reasons and purposes of ecotourists traveling?
……..
……..
……..
……..

UNIT 34

The restoration of agricultural lands and drylands

The world's agricultural lands and drylands are deteriorating as a result of mismanagement. Fertility of agricultural lands is declining, erosion is widespread, and production increases are not matching population gains is many areas. The drylands are in the worst condition, as a result of inappropriate agricultural practices, overgrazing, and tree cutting for fuel. Recent estimates place the worldwide area of land affected by moderate- to- severe desertifcation at 22.5 million km^2, an area two an done half times the size of the United States. More than a fourth of the drylands of the United States are more than moderately desertified.

Dryland

The deterioration of these lands can be measured by the reduced productivity of desirable plants, alterations in biomass and diversity of the micro- and macrofauna, accelerated soil erosion, and increased risk for human occupants. The causes for his decline in drylands productivity include overgrazing, inapproprite dryland cultivation, overpumping of groundwater, deforestation, and poor drainage of irrigated lands.

The problems of farmland deterioration in the United States first received national attention during the Dust Bowl years of the 1930s. After the Second World War new forces emerged that encouraged further land degradation. Foremost among these were the massive irrigation schemes of the West; the development of farm chemicals which offered the illusion of fertility maintenance; and the shorts- term control of pests and diseases needed to grow extensive monocultures of the same crop year after year. These problems were compounded by government research and regulatory programs which

subsidized chemicals, energy, water, and commodities without concern for environmental or social impact.

The area of agricultural land that has been abandoned in the United States is not known, but Pimentel et al. (1976) suggested that an estimated 80 million ha have been either totally ruined for crop production or so heavily damaged as to be only margainally productive.

Rabge deterioration in the United States was most catastrophic in the late 1800s as a result of serious overstocking. Within this period the carrying capacity of the California range was reduced by half. Land deterioration results from comples interactions of cultural and ecological factors. Finding solutions that will both prevent further decline and restore degarded lands will require an approach that combines ecological, technical, and cultural underestanding of these problems. Developing restoration programs that work in the United States wilşl provide a sound base for addressing similar problems elsewhere in the World.

Restoring Agricultureal Lands

Plowing

Most of the land sutied for continued agricultural prodution is already in production but much is in very poor condition. The elements of a restoration program for farmland will depend on the soil, climate, cropping system, market, and the farmer's experience and skill. In general, a restoration program will include a decreased emphasis on chemical inputs, an increased diversity of natural ecosystems. In many cases, trees and animals are include: subsoiling or deep chiseling to break up compacted soil and facilitate root growth, use of manure, mulch, compost, or green manures to restore soil organic matter and biological activity, and improve soil structure and tilth, primary reliance on biological nitrogen fixation rather than commerical fertilizers, conversion from moldboard plowing to conservation village, stablishment of a rotation program; in tercropping and/or multipıe cropping; development of integrated pest management programs that maximize use of biological controls and minimize use of chemical controls;

and establishment of windbreaks, hedgerows, and drain channel vegetation to control erosion. In addition the farm program should include a monitoring program to track conditions in each field and to ensure that both macro- and micronutrients removed in harvested crops are replaced.

Many excellent farm restorations have been achieved by improved management. Agricultural land restoration will be aided by the development of perennial grains and tree crops which can be grown with limited inputs and beneficial environmental impacts in areas where production of conventional annual crops can be very destructive.

Restoring abandoned agricultural land can be relatively easy and economical because conventioınal farm equipment can be used for cultivation and seeding. Thousands of hectares of abandoned agricultural land have been restored to productive use as rangeland in the western United States. In South- eastored to productive use as rangeland in the western United Statesç In South-eastern Oregon, for example, range managers estimate that the livestock carrying capacity was doubled by restoration efforts.

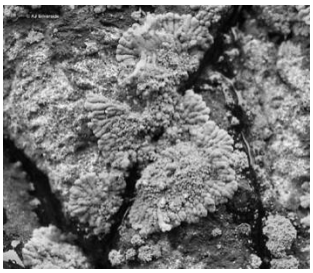
The low valuse and limited economic potential of much of this abandoned land makes low-cost restoration essential. Although long-term fallow periods will lead to revegetation in some cases, the native seed stock is commonly exhausted, and the soil structure and fertility have deteriorated sufficiently to limit or prevent revegetation. Where funding is limited, treatment may have to be limited to pitting or imprinting to increase surfacce roughness and infiltation. If more mony is available, direct seeding with mixes of forbs, grasses, shurbs, and trees can be added.

Restoration of agricultural land in subhumid and humid areas is much easier than in arid areas; extensive areas of the United States that were in poor condition have been reforested by naturan processes. In New England, for example, where the boom years for farming in the mis- 1800s led to extensive conversion of forest to agricultural use, most of the marginal land has now reverted to forest. In the southeastern United States, direct seeding of oaks had proved effective for reforesting abandoned farmland and trees should be an integral element in most restoration schemes.

Every year more than a million hectares of agricultural land is developed for housing, highways, and other uses. Much of this land could be kept in

production if development were more wisely managed. Village Homes, a 200 unit residential development in Davis, California, kept more than 17% of the land area in agricultural use.

Restoring Drylands



Lichens

Some of the little known yet important factors that are involved in restoration of drylands are the living soil crust, soil structure, chemistry, microbiology, microsite differences, and fire.

Soil crusts include lichens, ferns, algae, and other cryptogams. Cryptogamic crusts have been ignored by range managers until recently, despite early suggestions thah they might be important for plant establishment. More recent studies have shown that grazing can degrade the cryptogamic crust and reduce infiltration. Other recent work on the effects of grazing on soil properties and plant succession has demonstrated the importance of microsite changes and the role these play in determining which species increase and which decrease. They found that moderate tramling encouraged the establishment of desirable plants on range im excellent condititon, but led to further deterioration of land in poor condition.

Ferns

Fire was used extensively by indigenous peaple to mange vegetation. Fires of natural origin also strongly influence the course of plant succession.

Fire supperssion may have many unintended and unwanted effects and should be more carefully considered in lanf manageement and restoration. Dryland restoration is made difficult by the limited potential for immediate return on investment.

Principles of Successful Restoration

The foundation of an economical and successful restoration program is a clear understanding of the environment and the plants, animals, and people involved. A restoration program should begin with a study of the history of the land, its native vegetation (and human influences), the soil characteriestics of

comparable undisturbed native soils, and as much information as possible on the intractions between plants, animals, and humans. When this information is avalable, a draft plan for restoration can be developed.

The second step should be a series of test plots to evaluate the strategies for restoration that appear promising. This is particulary important in areas where little information is available. While the test plots are underway, a seed-collection program should be initiated, and seed nurseries should be established if needed to increase seed stocks.

The essential elementrs of a minimum- cost restoration effort are the introduction of appropiate seede and related symbionts to microsites that provide suitable soil and moisture conditions for rapid root growth and plant establishment. This may include preparation of the soil by deep ripping, chiseling, and/or discing; application of soil crust inoculum; seeding with a complex mix of species inoculated with appropriate symbionts; and imprinting. Weed control can help slow-growing native plants to compete. Controlled burning at the time weed species are most vulnerable or soil solarization can provide weed control without chemicals. Solarization involves moistening the soil and covering it with transparent plastic, letting the sun heat the soil, thereby killing weed seeds and many pathogens.

Other low-cost techniques that have been successful include the use of discs that have been modified to creat pits which provide a variety of microsites and collect water. Large pits were found to be generally more effective than small pits in arid areas. Pita are most effective on slopes of less than 8% where natural infiltration is limited.

When very little Money is available, the best option is simply to roughen up the soil surface. A rough surface increases infiltration and traps blowing soil and seeds. On some soils an imprinter would be most appropriate for roughening; others would benefit from use of a plow or disc pitter.

Mulch

More expensive treatments will provide more rapid revegetation. These treatments might include ridging, catchment basins, mulch, and pest control. Ridging provides many benefits, including water

collection and evelopment of a microside gradient that should provide favorable conditions for seeds over a wide range of precipitation. Ridging is also very effective in areas that may experience waterlogging or standing water. Micro- and macrocatchment basins may also be used to aid in establishing vegetation.

Mulching and composting can also provide many benefits. Native grasses with seed are excellent for mulching if they are available, but straw is also of value. High application rates, from 5-10 tons/ha, with crimping to retain the straw, are desirable, particularly on erosive slopes.

Other restoration program elements that may be of value include pest control (vages of fencing to protect plants), rodent control, limited irrigation, and fertilizer. Fertilizer should be used with care because it may increase shoot rather that root growth, increase weed compotition, depress microsymbiont development, and make plants more palatable for pests. Adams et al. (1987) found that even a slow release fertilizer decreased transplant survival in all case and by as much as 90% in the worst case. Similar problems might be expected with direct seeding, and few experienced revegetation groups in the California deserts used fertilizer of any kind except pn cut slopes and exposed subsoil.

Transplants are expensive but make it possible to establish plants that are not easily started from seed in the field. Containers and nursery management should enable plants to develop a root system (with symbionts) suited for survival in a difficult environment. Deep containers may provide substantial benefits in this regard. Transplants will usually require cages or screens to reduce grazing pressure from insects, rodents, livestook, and deer.

Timing of transplanting can be critical for establishment. Transplanting in the desert may be feasible only after a flood event. Lovenstein (1988) has achieved 95% establishment in the Negev Desert at such times. Even transplants that die may provide some cover and increase establishment of seedlings. It mey be desirable to combine expebsive treatment, i.e., transplants, on a very limited area (1-2 %), with contour strip treatments, i.e., pitting and direct seeding, on a larger area (perhaps 10-20 %). This approach can establish seed sources for subsequent natural revegetation of the remaining land. Heady and Bartolome (1976) found that revegetating 10% of the land in their study area had a very positive effect on the remaining 90% by reducing grazing pressure.

EXERCISES

A)Complete the blanks with appropriate words.

vegetation - Ridging - nursery management - arid

1) Restoration of agricultural land in subhumid and humid areas is much easier than in …… areas.
2) …… is also very effective in areas that may experience waterlogging or standing water.
3) Containers and …… should enable plants to develop a root system (with symbionts) suited for survival in a difficult environment.
4) Micro- and macrocatchment basins may also be used to aid in establishing ……

B)Answer the following questions.

1)What is the role of Fertility of agricultural lands in deterioration of these lands?
……
……
……
2)On what elements a restoration program will depend ?
……
……
……
3)What does soil crust include?
……
……
……
4)When very little Money is available, what is the best option is simply to improve the surface.
……
……
……

UNIT 35

Forest definition and extent


An ornithologist

Defining what constitutes a forest is not easy. Forest types differ widely, determined by factors including latitude, temperature, rainfall patterns, soil composition and human activity. How a forest is defined also depends on who is doing the defining. People living in the British Isles or Scandinavia might identify forests differently from people in Africa or Asia. Similarly, a business person or economist might define and value a forest in a very different way from a forester, farmer or an ornithologist.

A recent study of the various definitions of forests found that more than 800 different definitions for forests and wooded areas were in use round the world – with some countries adopting several such definitions at the same time! It should be kept in mind that different definitions are required for different purposes and at different scales. An assessment focusing on the availability of timber for commercial or industrial purposes may exclude small wooded areas and types of forest not considered to be of commercial value. A definition based on physical characteristics, such as the canopy cover, will most likely be used for an assessment of the forest extent, whilst a definition based on botanical characteristics, i.e. variety of tree species, will be used for asses sing various classes or types of forest.

An overall assessment carried out on a regional or global level is unlikely to satisfy more detailed national level requirements. Conversely, a definition developed to suit the needs of any given country is unlikely to be applicable at a global level. In an attempt to calculate how much forest there is both at regional and global levels some common definitions have been developed. These definitions are generally very broad, in order to encompass all types of

forests – from dense, tall forests found in the humid tropics, to temperate and boreal forests and forests in semi-arid and arid regions (Figure 1).

Figure 1. Countries with the most forest

Common Definitions

The Food and Agriculture Organization of the United Nations (FAO) has been assessing the world's forest resources at regular intervals. Its Global Forest Resources Assessments (FRA) are based on data provided by individual countries, using an agreed global definition of forest which includes a minimum threshold for the height of trees (5 m), at least 10 per cent crown cover (canopy density determined by estimating the area of ground shaded by the crown of the trees) and a minimum forest area size (0.5 hectares).

Urban parks, orchards and other agricultural tree crops are excluded from this definition – as are agroforestry systems used for agriculture. According to this definition there are at present just under 4 billion hectares of forest in the world, covering in all about 30 per cent of the world's land area (FAO 2006a).

The United Nations Framework Convention on Climate Change (UNFCCC) uses a slightly different approach. It requests industrialized countries to esti mate the forest area according to their own national definitions which should be documented in the greenhouse gas inventory report.

For supplementary reporting to the Kyoto Protocol, however, these countries have to apply a forest definition with threshold values within certain parameters; 0.01-1.0 hectares for minimum area, 2-5 meters for minimum tree height and 10-30 per cent for minimum crown cover. The threshold values chosen must be used for all subsequent assessments made during the reporting period and if the definition is different from the definition used by FAO, the country should explain why a different definition was chosen. The crown cover

threshold and the land use criterion are, in most cases, the most critical factors defining forests.

The 10 per cent threshold of crown cover encompasses both open and closed forests. The term closed forest refers to areas where tree cover exceeds 40 per cent while the term open forest refers to areas where tree cover is between 10 and 40 per cent. In order to assess the state of the world's closed forests, the United Nations Environment Program (UNEP) has recently employed other definition criteria, including a minimum crown cover of 40 per cent. It has also used remote sensing to ensure compatibility across countries. According to the UNEP assessment, there were an estimated 2.87 billion hectares of closed forest worldwide in 1995, equivalent to 21.4 per cent of the total land area. Half of this area was located in Russia, Canada and Brazil.

Several other regional and global maps and assessments of forests have been produced – often with differing results, reflecting the various definitions and methodologies used and also the differing interpretations made. Problems which arise in trying to assess the extent of forests worldwide are compounded by the fact that even when using a commonly held definition, data from one country is not necessarily comparable with data from another due to the different methodologies used. For example, the use of satellite imagery might produce very different results to a ground based survey (Figure 2).

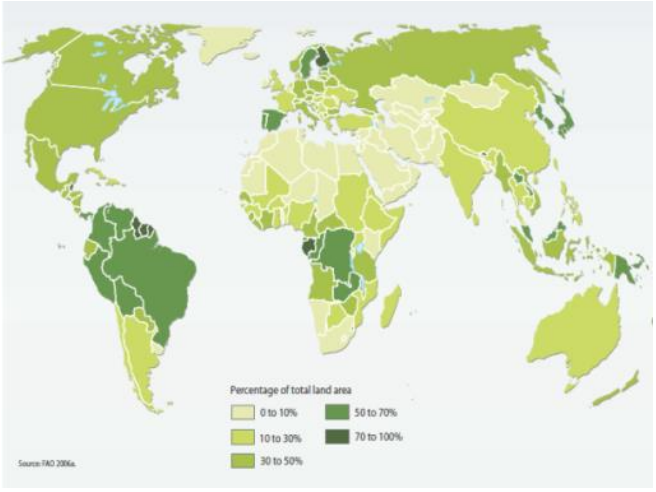


Figure 2. Forest cover in percentage of total land area

Forest fire

In addition, remote sensing techniques for assessing forest areas can result in areas used for agricultural purposes or urban development being included rather than excluded in overall calculations of forest area. In order to help address some of these problems, a new global remote sensing survey of forests carried out by group of agencies led by the FAO is at present being used to assess trends in forest areas over the last 30 years. The survey, which is due to announce its results in 2011, involves all countries and aims to carry out this work in as consistent a way as possible. A factor not included in the abovementioned definitions concerns just what a particular forest is made up of. Is it largely composed of indigenous (native) or introduced species? If planted, is it a monoculture – consisting of only one species? The definitions outlined above also exclude the condition of the forest. Is it an undisturbed primary forest, severely degraded forest or something in between? Is the forest healthy or has it been subject to attacks by pests, disease or forest fire, or damaged by wind or air pollution? Area is only one factor in assessing the world's forests: it is also vital to present comparable data on various specific forest types, examine forest health and look at usage and resource values.

EXERCISES

A) Complete the blanks with appropriate words.

threshold - satellite – area – global

1) A definition developed to suit the needs of any given country is unlikely to be applicable at a ……..level.
2) Kyoto Protocol, however, these countries have to apply a forest definition with ……..values within certain parameters
3) The use of ……..imagery might produce very different results to a ground based survey.
4) ……..is only one factor in assessing the world's forests: it is also vital to present comparable data on various specific forest types, examine forest health and look at usage and resource values.

B) Answer the following questions.

1) What is the result of remote sensing techniques?
……
……
……
2) There are lots of various definitions of forest. Why?
……
……
……
3) How is an industrial view to forests?
……
……
……

UNIT 36

Organic Gardening Basics

Organic gardening is not just about replacing harmful fertilizers and pesticides with natural alternatives. The art of organic gardening involves both theory and practice. The organic approach acknowledges the complexity of the natural world and aims to work within these systems.

Organic Gardening

What is Organic Gardening - The Basics for gardening organically?

The short answer is that organic gardening means not using synthetic products, including pesticides and fertilizers. Ideally, organic gardening replenishes the resources as it makes use of them. Like feeding depleted soil with composted plants, or planting legumes to add nitrogen to an area that had been planted with heavy feeder. The bigger picture involves working in cooperation with nature, viewing your garden as a small part of all the natural system.

What is meant by Organic Matter?

Organic matter is decaying plant and animal waste. It includes everything from compost, grass clipping, dried leaves and kitchen scraps to manures and fish heads. Organic matter is used as a soil amendment or conditioner. It can be worked into the soil of a new garden or used as a top dressing or mulch in an existing garden.

Grass clipping

What's so important about the Soil?

One of the basic tenants of organic gardening is to "Feed the soil and the soil will feed the plants". It's really common sense. Plants get water, air and nutrients from the soil. Clay soil is higher in nutrients than sand and hold water better. Sometimes it holds water too well and the plants can't get enough air. Sandy soil is well drained, but can use some amending to make it great garden soil. This is where organic matter comes into play. Adding organic matter improves any soil's texture as well as attracting soil organisms that create nutrients in the soil.

Soil

Conventional fertilizers are generally soluble, making their ingredients readily available. Organic gardening relies on soil-living creatures to make food available to plants.

Sandy soil

Natural Pest Control

Organic gardening aims to attract natural pest controllers to your garden. Ladybeetles, birds and lizards all help to keep pests such as aphids, snails and insects in check in your garden.

Other methods such as barriers and traps, disease and pest resistant plant varieties, and crop rotation also provide natural alternatives to pest control.

Lizards

Managing Weeds

Weeds are a valuable composting resource but can also compete with other plants in your garden for food and water. Options such as hoeing (Godi), mulching or the use of solar heat are natural alternatives commonly used in an organic garden.

Environment

By minimizing the impact on the environment organic gardening can help make a positive contribution to environmental sustainability. This means

recycling and reusing, providing habitats for natural wildlife and the use of sustainable practices.

Diseases and Pests

Organic Gardening methods are great for protecting and nurturing your plants without having to resort to environmentally harmful practices. Organic gardening emphasizes the balance between healthy soil, healthy plants and the health of your family and the wider community.

Organic gardeners work with natural systems to promote healthy gardens, with the ultimate goal of sustainability without the need for artificial chemicals or additives. Listed below are the main causes of disease and ill health in your garden.

General Growth Problems

Environmental factors can have profound effects on the overall health of your garden:

Water

Water shortages leave plants susceptible to disease and pest attack. Prolonged drought stunts plant growth and can alter the natural cycles of flowering etc.

Mineral Deficiencies

Minerals such as nitrogen, phosphorus, potassium and magnesium become unavailable to plants in extremely acidic soil and can lead to damaged leaf systems. Iron deficiency leaves plant leaves yellow in color, however seemingly healthy. Well managed, biologically active, gardens utilizing compost and mulch tend to have only slightly acidic soils which promote healthy plant growth.

General good gardening

Many methods of organic control in the garden are simply examples of sound gardening practice.

Tip: Pests that are attracted to their host plant via smell can be confused by strong smelling companion plants e.g. inter-planting carrots with onions.

Garden Cleanliness

Carryover of pests and diseases from season to season can be prevented by good garden maintenance. A good compost heap can help kill of disease in older dead plants and methods such as winter digging can expose hibernating pests to predatory birds and ground insects.

Pests

Companion Planting

It is described as the growing of two or more different species of plant together for the benefit of one or both. For example many adult insects visit flowers for pollen and nectar and can be effective natural controllers of other unwanted pests.

Garden Cleanliness

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Companion Planting

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Using Natural Predators

A fundamental part of maintaining an organic garden is allowing the natural predators that exist in the wider environment to thrive. Many animals in the garden feed on pests. Ladybirds and their larvae are amongst the hardest workers, helping to control green fly as well as aphids. Mixing flowering plants with fruit and vegetables encourages predators such as parasitic wasps and hoverflies. It is important to recognize these natural predators and encourage their existence.

Hoverflies

Barriers and Deterrents

Barriers around gardens certainly aren't new and have been in use for centuries. However the use of barriers etc. to control insects and smaller pests are relatively new. Simple methods such as hanging shiny silver objects in the sunlight can confuse insects such as aphid which orient their flight patterns by sunlight. Medium mesh netting can also be effective in keeping out smaller birds etc. from fruit growing areas of the garden.

Where prophylactics do not work, and pest populations reach proportions where economic loss is a surety, there are a number of non-chemical methods of pest control. These include, among others:

- Picking off the pest by hand (where the pest is a large caterpillar for example)
- Use of pheromone traps
- Use of light traps (for moths and other insects)
- Use of predator species (a point of debate)
- Growing trap crops (e.g. Mustard with cabbage; Maize around cotton)
- Use of microbial pesticides and biological agents like Heliothis, Spodoptera, Trichogramma, Trichoderma etc.
- Using easily-prepared natural pesticides

For preparing natural bio-pesticides, a number of plants can be used. Neem, ginger, chili, vitex negundo (Indian pivet tree), custard apple (the seeds), pongamia pinnata (pongam/ karanj), asafoetida, turmeric, garlic, tobacco, sweet flag, nux vomica, tulsi and Persian lilac are among the many plants that are commonly used in pest control. Each pest requires a specific preparation.

Mulching is the use of organic materials (plastic mulch is expensive and non-biodegradable) to cover the soil, especially around plants to keep down evaporation and water loss, besides adding valuable nutrients to the soil as they decompose. Mulching is a regular process and does require some labor and plenty of organic material, but has excellent effects, including encouraging the growth of soil fauna such as earthworms, preventing soil erosion to some extent and weed control.

Green manuring is an age-old practice prevalent since ancient times. Green manuring is beneficial in two ways - firstly it fixes nitrogen, and secondly the addition of biomass greatly helps in improving the soil texture and water

holding capacity. Green leaf manuring can also be carried out if sufficient leguminous tree leaves are available.

How Do You Control Pests and Diseases without Chemicals?

Organic gardening doesn't mean you have to share your apples with the worms, but you will probably have less than pristine looking plants and produce. Since you are trying to garden in cooperation with nature, sometimes you have to accept the occasional pest in the garden.

Your first line of defense should be vigilance. Inspect your plants regularly for signs of a problem and take action quickly. Keep in mind that not every insect is a foe and that action doesn't necessarily mean pesticide.

- There are many organic pesticides available, but first make certain that there is a problem and that you know what it is. You can live with a little damage. Some insects, like the 4 lined plant bug, do their damage and then move on for the season.
- Consider if you are having a pest problem because your plants are stressed and don't
- have the resources to defend themselves.

Swaths

- Inter-planting and diversity will protect you from losing an entire crop to an infestation. Large swaths of a single plant are pretty, but are also a landing strip for interested insects.
- Many insects and larger animals are considered beneficial, preying on the insect pests.
- Reaching for the spray can every time you see a pest; you will be killing of the beneficial too. Lady bugs and parasitic wasps enjoy an aphid banquet. Birds will munch on grubs. Frogs, lizards and even snakes all contribute to the balance in your garden and prevent a pest population from becoming a problem.
- Barriers prevent problems. Floating row covers prevent moths from landing and laying eggs. Yellow sticky traps can easily catch dozens of flying pests. Foil collars around the base of plants will foil cut worms and many borers.

- There will probably come a time when you will need to apply a pesticide or lose your plants. Organic or natural pesticides can be very effective and are usually less toxic to wildlife, pets and humans than synthetic pesticides. Many organic controls can target specific problems, such as using Bacillus thuringiensis (Bt), a type of bacteria, that kills caterpillars, but not much else. Just be sure that you know what the problem is before you treat it and that you always follow the label instructions.

EXERCISES

A) Complete the blanks with appropriate words.

tree leaves - sand – maintenance – Organic

1) ……matter is decaying plant and animal waste.
2) Clay soil is higher in nutrients than……
3) Carryover of pests and diseases from season to season can be prevented by good garden……
4) Green leaf manuring can also be carried out if sufficient leguminous …… are available.

B) Answer the following questions.

1) What is Organic Gardening?
……..
……..
……..
2) What does Organic matter include?
……..
……..
……..
3) What is the aim of Organic gardening?
……..
……..
……..

UNIT 37

Sustainable Landscape Design

Assoc. Prof. Sara DEMİR

Sustainability

The concept of sustainability first emerged with the report "Our Common Future", also known as the Brundtland Report, published in 1987 by the World Commission on Environment and Development by the United Nations. According to the result of this report, sustainability is "the physical development and institutional operating practices that meet the needs of present users without compromising the ability of future generations to meet their own needs, particularly with regard to use and waste of natural resources". The aim of sustainability can be called fulfilling responsibilities towards nature by protecting the environment and nature for the coming generation with sustainable development. Therefore, the concept of sustainability tend to prefer renewable fuel sources, reducing carbon emissions in order to decrease climate change and protect environments and ecosystems in balance. Sustainability is a broad discipline with the aspect of human world from business to technology to environment and the social sciences. It is a kind of ecological, economic, industrial, health, social and cultural bridge with the technology of the future. This has led to the development of innovative approaches especially in architecture, city and regional planning, landscape planning and landscape design.

The Historical Process

The historical development of sustainability is listed below;

-1987: The concept of sustainable development was discussed for the first time as Our Common Future known as the Brundtland report in the international scale. It was emphasized that **the sustainability of the vital bridge between environmental development and economic development s**hould be realized in the social, economic and political strategies of the whole countries.

-1992: According to Conference on Environment and Development held in Rio, informally known as the Earth Summit, it has been emphasized that countries should be able to **sustain their development policies on a global scale**. The sustainable architecture discourse has been developed within the framework of an **energy efficient design** approach. Along with the economic activities, it was emphasized that environmental values should be taken into consideration in the five basic documents in this conference;

- *Rio Decleration*
- *Agenda 21(policy request about sustainable urban-rural development strategies)*
- *United Nations Framework Convention on Climate Change*
- *The Convention on Biological Diversity*
- *The Rio Conventions Action on FORESTS*

-1997: The Kyoto Protocol is an international treaty to **decrease the level of greenhouse gas emissions**, based on the scientific consensus that **global warming** is occurring and it is most probably likely that **human-induced CO2 emissions** have predominantly caused it. In addition to reducing greenhouse gas emissions, it was decided to increase using of renewable energy sources, to make environmentally sensitive planning and designs, and to impose more taxes on those who consume more fuel and carbon.

-2002: The World Summit on Sustainable Development was convened to discuss the result of sustainable development decisions topic among the organizations that commits state, 10 years after the first Earth Summit in Rio de Janeiro.

Landscape

According to European Landscape Convention (ELC), the first international treaty to use landscape legally in the international scale,LANDSCAPE is "an area perceived by people whose character is the result of the action and interaction of natural and/or human factors."

Sustainable Landscape Design

Landscape design is based on an **ecological, social, economical and cultural awereness** of natural and cultural landscape providing a holistic, dynamic, responsive and intuitive focus. As for these approaches, the basic principles of sustainable landscape design;

1. Use of Regional Facilities

- Climate Condition
- Sun-Shade (aspect) Condition (protection from summer sun, benefiting from winter sun)
- Wind Condition (protection from cold winds, benefiting from hot winds)
- Precipitation Rate
- Regional-Local and /or Recycled Material

2. Minimal Destruction of the Existing Landscape

- Use of Current Topography
- Least Excavation-filling
- Use of Existing Vegetation
- Use of Surface Waters

3. Repair of Degraded Landscape

- Soil Repair
- Reduction of Harmful Substances
- Use of Suitable Plants

Sustainable Landscape Design Approaches

With the increase of technological developments,human needs, urban growth and climate change, the following sustainable innovative approaches have emerged in sustainable landscape design based on hydrology, soil, vegetation, local material, human health and welfare;

- Design with climate (temperature, sunbathing, wind)
- Water-efficient landscape design
- Xeriscape landscape design
- Natural landscape design
- Efficient energy landscape design (temperature and sunbathing, humidity and precipitation, wind, plants, water surface, shape surface, properties of the materials)
- Permaculture
- Green infrastructure (green roofs / roof gardens, rain gardens, permeable and porous flooring solution, planted water arcs ,structured wetlands, rain tanks, rain ditch, rain water plant strip)
- Alternative green spaces.

Sustainable landscape design approaches in urban scale;

Urban growth should be planned and designed in harmony with the natural and cultural landscape. In this context, landscape should be preserved for the environment, economic, social and cultural development. As a result, the "New Urbanism" movement emerged especially in the early 1990s;

- Sustainable Cities
- Ecological Cities
- Smart Growth
- Slow Cities
- Low Carbon Cities
- Liveable Cities
- Digital Cities
- Smart Cities
- Compact Cities
- Sustainability Certification Programs

'The Sustainable Sites Initiative' developed by the American Landscape Architects Society (ASLA) was used In the field of Landscape Architecture.

EXERCISES

A) Complete the blanks with appropriate words.

Energy efficient – carbon emission – renewable – global warming – precipitation

1) The problem with fossil fuels is that they are not ……
2) The government predicts that on current trends ……will rise from 160 million tons to 170 million tons in the 1990s.
3) Modern houses are much more …….
4) In the last four days, we've had three inches of …….
5) Scientists estimate that ……could cause a six degree rise in temperatures by 2100.

B) Answer the following questions.

1) What is the definition of sustainability?
……..
……..
……..
……..
2) What are the basic principles of sustainable landscape design?
……..
……..
……..
……..
3) What are the subcategories of " new urbanism " in the early 1990s?
……..
……..
……..
……..

UNIT 38

Sustainable Watershed Management and Planning

Sahar POUYA (Ph.D)

1.Water Scarcity of Cities

Over the last few decades, water reduction has threatened the sustainable development of the human community due to a regularly increasing freshwater demand. The major reasons behind the increasing global water demand are enhancing living standards, changing life patterns, increasing global population, and the spread of irrigated agriculture. İn addition, climate change will exacerbate the degree of water scarcity in the following decades. Large water consumption has resulted in reducing river flows and decreasing basin water and groundwater levels. The excessive water consumption affects human life during droughts periods, leads to harvests shortage and income loss for farmers, and makes pressure on whole societies. Furthermore, some businesses that heavily depend on water in their operations or supply chain also experience risks of water scarcity. Other adverse effects include biodiversity losses, land subsidence, low water navigation, soil salinization, and groundwater pollution.

Cities are facing spreading vulnerability to water stress, due to several reasons including rapid development, climate change, population growth, water pollution, increasing water use, declining revenues, aging infrastructure, and a range of other challenges. Main water-related challenges and water shortage such as access to water supply and sanitation; pollution and wastewater management; institutional capacity, water governance; water-related disasters, and climate change have mainly emerged in the cities. Here some main reasons for water scarcity in the cities are explained.

- Population growth: The population of the world has increased to 7 billion people, most of whom live in megacities than in rural regions. It is estimated that 70 percent of the global population will be living in urban areas by 2050, which means that the cities will be places for attracting the world population increase.

- Climate Change: It is assumed that climate will become drier, hotter, with more extreme and frequent weather events which will change to the water quality, quantity, and seasonal water availability in urban regions.
- Urban Rapid Development: Metropolitan areas with a population of more than 10 million are becoming more large and common. While the expanded urbanization has brought about greater socioeconomic chances and enhanced social welfare, it is exerting additional pressure on the ecosystems of water resources.
- Increasing per capita water use: Water use is the volume and amount of water that is consumed by an individual, several people, a country, or the water used in the industrial sector, in agriculture for crop production, or any other particular goals. A large amount of water is consumed and contaminated through humans in the cities as urbanization and population growth expands. Furthermore, economic development and new technologies such as washing machines, showers, and dishwashers increase per-capita water use as well.
- Aging infrastructure: old water infrastructure, water pipes replacement, and need to water equipment over time have been issues in many cities. A lot of water infrastructure has caused problems due to surpassing their expected lifetime.

2. Water in Sustainable Development

In the late 20th century, it was discovered by people that the only way for sustainable economic progress is to understand the relationship between environmental preservation, development of the economy, and social inclusion. In this way, the concept of sustainable development has come into being. Foundation of the sustainable development was laid in 'Our Common Future', known as the Brundtland Report from the United Nations World Commission on Environment and Development. It was defined as a "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Sustainable development not only considers economic growth, but it also prioritizes environmental issues, improves the equitable distribution of wealth, and empowers the community rather than marginalizing them. Water is central to the sustainability concept and many of the Millennium Development Goals at

the Millennium Summit as the biggest meeting of world leaders in history were directly or indirectly associated with issues of water. Sustainable development in urban areas requires easily accessible, equitable, and reliable water. Urban water system sustainability is mainly dealing with challenges posed by water supply, water infrastructure, sanitation, socio-economic conditions, and water resources. As a consequence, the planning and management of the water resources (such as watersheds and water basins) as the main water sources of the cities have grown in importance in terms of planning approaches and management strategies.

3. Concepts of Water Basin and Watershed

River basin and watershed have been recognized as appropriate units for management and planning approaches. In hydrology, a river basin is a place that receives and collects the precipitation and surface water (snowmelt, and rain runoff) and drains them off into a water body like sea or lake. However, small watersheds aggregated together to form bigger watersheds and the bigger watersheds together create a river basis. A small watershed inside of a bigger watershed is known as sub-watershed. Each watershed area has specific living and nonliving components that have interaction with each other and the environment.

Watersheds include regions ranging from several hundred to thousands of square miles and cover various land uses, such as agriculture, forest, suburban, and urban areas. The water basin is not solely the hydrological unit but also there is a social, political, and ecological entity which plays a fundamental role in providing food, social, and economic security and supporting life services for rural people. Watersheds are associated with social-ecological systems which means that the prosperity and well-being of human communities are contingent upon the health of the watersheds and vice versa. People and livestock are an indispensable part of a watershed, and their activities affect the productive status of watersheds and vice versa. There are also a large number of economic benefits to watersheds including

- Creation of water-related recreation opportunities like fishing, swimming, boating, and ecotourism opportunities;

- Minimization of the vulnerability to floods, fires, and other natural disasters;
- Contribution to water supply for human needs, agricultural and industrial uses;
- Reduction of water treatment expenses by protecting surface water sources and aquifer recharge zones;
- Mitigating the effect of climate change by holding huge amounts of carbon and regulating flows during droughts and large storm events;

3.1Watershed Natural Characteristics

Watersheds have six main natural factors which contribute to understanding and assessment of any water bodies:

- Hydrology: Hydrological factors of the streams, climate, and meteorological process play a significant role in the generation of river discharge. The hydrological processes are affected by various structures such as stream networks and human intervention, such as land and water use including road constructions ad sewage systems.
- Geomorphology: Catchment topography and shape determine how fast runoff will reach a river, while catchment size, soil type determine the amount of water to reach the river.
- Landscape Condition: Land cover, vegetation (type, quantity, and structure) covering watersheds exert important influences on aquatic habitats, soil, and watershed hydrology.
- Water Quality: Water Quality can be defined as chemical and physical characteristics of the water including concentrations of nutrient constituents, pH and dissolved oxygen; water temperature and turbidity
- Biological Condition: The biological condition of the watershed includes factors of the biological community, the diversity, composition, abundance, and condition of species.
- Habitat: The number, type, and distribution of diverse habitats, or patches, and their connectivity influence species population health.

4. Sustainable Watershed Management

Given the importance of water, Sustainable Water Resource Management has become one of the most significant Sustainable Development Goals. In the past, water-related sectors, including wastewater treatment, water supply, solid waste management, stormwater drainage, and sanitation have been planned separately and as isolated sectors under a central administration. Fragmented water resources management has led to the degradation of water resources in many of the watersheds as it has failed to distinguish between different water qualities for various purposes. All domestic water is treated to drinking water standards, and water was used only once and disposed of with a large amount of energy and materials. Lack of appropriate infrastructure and high transaction costs in the centralized management of water basins worsen the problems. With population growth, it became prohibitively expensive to aggregate water services over vast areas and transport water over a long distance by pumping energy. Besides, the whole system was susceptible to hazards, such as draughts and salt loads. Therefore, due to these problems, the conventional water management became old-fashioned andoutdated, and instead a new paradigm of "integrated water management" has emerged at both levels of urban and basin water management.

4.1 Integrated Water Basin Management

With regard to the Integrated Water Resources Management (IWRM), social, economic, environmental and technical dimensions should be taken into consideration in the management and development of water resources. IWRM provides a broad set of tools and strategies that must be planned for a watershed to improve the status of both the surface water and groundwater. It deals with multiple sectors that emphasize stakeholder participation, cross-agency coordination, and the protection of the ecosystems. Main Integrated management goals in Watershed planning include:

- Soil protection and control of erosion, landslide, flood, overflowing
- Water production at the desired quantity and quality
- Improvement of the socio-economic situation of the basin and rural development

- Forestry objectives achievement
- Conservation and development of wildlife and biodiversity production
- Land use objectives and organizing the use of land
- Preserving cultural resources
- Land and water management integration
- Sustainable irrigation for agriculture
- Recreational goals achievement
- Reclamation of the degraded land natural resources in a conservative approach
- Development of methods in the use and control of natural resources with the advancement of civilization and technological developments
- Water ecosystem conservation, their enhancement, and sustainable water use

Integration Aspects: Seven main categories are recognized on integration aspects of IWRM which are

- Integration across water sectors such as water supply, water quality, water control, irrigation, flood control, wastewater treatment, navigation, hydropower, and recreation.
- Integration across geographic units and the surrounding environment that involves basin management and management between basins.
- Integration across policy sectors such as public health, natural resources, environment, energy, transportation, agriculture, and emergency management.
- Integration across government sectors that includes the national, regional, and local levels and government units.
- Integration across managerial functions that needs alignment among experts, planners, engineers, finance staff, and other members of the organizations.
- Integration across phases of management such as designing, planning, construction, implementation, recycling, and so on.
- Integration across disciplines and human sectors including both cross-sectoral integration between spatial planning and water management; and also

inter-agency integration with public, private and voluntary sectors in water management.

EXERCISES

A) Complete the blanks with appropriate words.

Sustainable - scarcity – drainage – recreation – conservation

1) The committee soon offered a comprehensive plan for redevelopment and …… in all areas of the city.
2) About 80 percent of the …… goes to a treatment plant and about 20 percent flows to these waterways.
3) The flowers are produced to high environmental standards using ……farming methods.
4) Increasingly, the use of land for …… is a feature of the Pentland Hills.
5) Both factors helped to overcome ecological constraints imposed by a growing …… of land and timber.

B) Answer the following questions.

1) What are the main reasons for shortage of water?
……..
……..
……..
2) What are the economic benefits of watershed?
……..
……..
……..
3) What are main integrated management goals in watershed planning?
……..
……..
……..

UNIT 39

Green Infrastructure Applications in Urban Planning

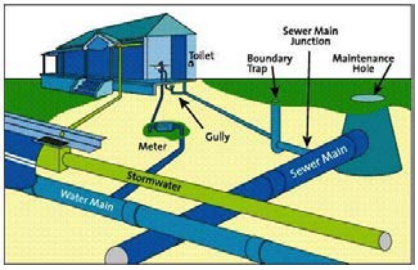
Assoc. Prof. Sevgi Görmüş

The sustainability of the cities, which are considered as the continuation of the society and which take on increasingly complex and intensive structure, depends on the well integration of the gray infrastructure with the green infrastructure. All of the ecological systems that provide important services such as clean air, drinking water and food are the systems that constitute the "green infrastructure" network of the cities in order to ensure that the city residents can maintain their physical and mental existence in a healthy way. However, green infrastructure is not limited to these systems, it has been used to express many systems from green roofs to more environmentally friendly rainwater management systems and large natural areas, the city's valley system (Wise 2008; Schwartz 2009). The basic element required to ensure the correct integration of these different layers is that the built environment and the natural environment (ecological environment) are interconnected and the integration between them is ensured.

Green infrastructure applications, which are an important tool for ensuring harmony between the built environment and the natural environment, are integrated into urban planning studies. Berlin (Germany) has been reflecting an active green movement to national policies such as the National Environmental Protection Law since the 1980s, and it has been successfully employed the innovative example of the green infrastructure implemented on the parcel or building scale. The increasing and decentralized green infrastructure has an important impact on improving the urban ecology, which is the main reason for the development of the plan. The main purpose of the plan is to prevent "impermeability" by considering the buildings to be built or renewed as green infrastructure systems with certain criteria. These criteria have variety of purposes, their targets have been developed to prevent evaporation of water, retain and leak rainwater, remove particles in the air, support natural soil functions and result in plant and animal habitats. The plan

was implemented primarily at the neighborhood level where performance data was collected and evaluated to measure progress towards selected strategies and goals. Firstly, the distribution of land uses in the urban area was determined and it was recognized that the density of land use should be different. Accordingly, the sale or modification of property on the land is carried out according to the principles of the plan: The new owner of the land should build / renovate the building to achieve the green building target by applying the selected green building techniques. Each technique is assigned a weight based on its contribution to its goals and the ratio of the green area is calculated to determine the green factor. The techniques applied are: green roof, linear channels to concentrate rainwater and permeable sidewalks. these techniques use a comprehensive strategy targeting multiple objectives and target adaptive components of green infrastructure techniques (urban climate, urban diversity, water quality and total water flow) that are implemented through monitoring the clustered activity (Ahern 2007).

In the 1980s, planning studies were initiated in New York that address the problems of flood and water quality, which were the result of a large sewage overflow. Primarily, the plan focused on the integration of existing wetlands in the 4,000 hectares of southwestern Staten Island, which includes 16 small city basins into water management plans. The plan includes two basic components: To build a separate sanitary sewerage system and a separate rainwater system between existing wetlands. It is considered as a continuation of the urban green infrastructure by fully integrating the rainwater system and wetland systems into the urban fabric. This corridor has been successful in reducing the amount and speed of water flow and getting rid of pollutants from the water flow by bringing water plants for bioremediation. A successful model in water management has been applied, focusing on water basins and isolated wetlands, within the spatial concept of the region based on hydrological models, created and interpreted by ecological designer Ian McHarg (McHarg, 1969). Although it started with a focus on



sewerage system

solving water quality problems, it has managed to perform many functions simultaneously, including wildlife habitat, amusement parks and the protection of wetlands in the city. The protective strategy for existing wetlands has been integrated with the rainwater management infrastructure (Ahern 2007).

Two examples of urban plans made in recent years for the integration of green infrastructure and urban planning are given below.

El Paso (Texas) Green Infrastructure Plan: The city of El Paso, Texas, has Franklin Mountain State Park, one of the largest city parks with an area of 24 248 hectares. Outside this park, there is a limited area with preserved natural quality and are few corridors that provide the connection between the city and Mount Franklin. El Paso has adopted a green infrastructure approach to develop open green space planning through parks and corridors. Instead of focusing on individual plots, it aimed to protect the dry valley ecosystem (rivers and streams) between Franklin Mountain and the city. It aimed to establish a link between drainage channels, river flood plain and service corridors by its gray infrastructure to create a green infrastructure network. The plan has developed targets to ensure changes in the management practices of gray infrastructure for restoring natural vegetation and benefiting from the benefits of green infrastructure (Amundsen et al., 2009).

Taizhou (China) Green Infrastructure Plan: Taizhou is a metropolitan city with an area of 1000 km^2 located on the southeast coast of China and has a population of 5.5 million people. 115% population growth is expected in the city in 25 years. A comprehensive water network has been developed that combines historical and natural water surfaces, wetlands and ditches to control flooding. The water system is one of the main components of the cultural landscape character of the region, but the desire to meet the needs of the rapidly developing economy and the destructions caused by large infrastructure constructions affect this system negatively. The ecological infrastructure plan made by Turenscape and Peking University includes the concept of ecological security patterns to ensure the sustainability of ecosystem services. The plan targeted the issues of supporting abiotic, biotic and cultural resources, structuring future urban development and preventing urban sprawl. Taizhou

green infrastructure plan includes a multi-scale approach with plan alternatives developed at regional scales. In the plan, it is aimed to apply a landscape ecology perspective, which includes the establishment of patterns between ecological security patterns and emphasis on the versatile connection with water. The Taizhou ecological infrastructure plan has developed an innovative and proactive solution proposal for a metropolitan area that is under high pressure for urbanization (Ahern 2007).

Resources

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EXERCISES

A) Complete the blanks with appropriate words.

Flooding – drainage – pollutants – green infrastructure – metropolitan areas

1) ……refers to ecological systems, both natural and engineered, that act as living infrastructure.
2) The heavy rain has led to serious …… in some areas.
3) Some workers can only afford homes outside ……
4) The …… system over some sections of route has also had to be refurbished or renewed.
5) …… are substances that pollute the environment, especially gases from vehicles and poisonous chemicals produced as waste by industrial processes.

B) Answer the following questions.
1) What does "green infrastructure" constitute?
……..
……..
……..
……..
2) What are the green building techniques?

……..
……..
……..
……..

UNIT 40

Sustainable Tourism: Culture Tourism and Cultural Heritage

Prof. Öner DEMİREL

Tourism, which contributes to the economy of the country at national and international level, is an important sector which also facilitates the progress of social and cultural development processes. Apart from providing opportunities for using the unique values of countries, tourism activities make great contribution to providing employment, equal distribution of income and the development of rural areas. In this process of development, especially the concept of sustainability gains importance.

Sustainability, is the sum of all activities carried out in order to leave the future generations a good environment and protect the natural resources while meeting the needs of today. Hence, Tourism as well as Sustainability are in a reciprocal relationship and they are inextricably linked.

With its most common use; the first official use of SUSTAİNABİLİTY in history, which is to meet the needs of today's generations without jeopardizing the opportunities for future generations to meet their own needs, was seen in the 1713 thesis of German tax treasurer Hans Carl von Carlowitz on Sustainable Forestry Titled, Sustainable Forestry, Sylvicultura Oeconomica (Thatcher, 2013). The concept used in different sources and subjects has gained popularity with the concept of "Sustainable Development", which is an economic definition.

Along with the natural resources which create the source of tourism, the factors causing the creation and distribution of various wonders of civilization and art produced by societies from the past to present, unite tourism, geography and culture.

The diversity of the places chosen by people as living areas, are reflected directly to the life style and culture.

Culture is everything human beings create in order to sustain their life against nature and together with nature. The natural environment in which people live is affected by many factors ranging from the building materials they use, the way they make a living and to the style of clothing. The diversity of the natural environment is reflected into the culture; the culture affects both the natural environment and the society.

Today, apart from seeing the traces of the old civilizations and cultures, people have also developed interests in local cultures other than their own culture. The development of cultural tourism provides an important advantage to distribute tourism all through the year without being tied to the natural conditions, to bring dynamism to tourism, to introduce the culture of the country to locals and foreigners, to protect, to look out for the past and the future.

The natural and ***cultural heritage*** is defined as all moveable or immoveable properties related to science, culture, religion and fine arts above ground, underground or underwater belonging to prehistoric or historic periods.

Culture tourism, which developed as a result of the interest of tourists in cultural heritage, has started with visits to historical sites, museums, ruins, fairs and festivals.

The products of cultural tourism diversify in relation to the past and the present. With the remains of the old civilizations, life styles, traditions, customs, festivals, music and entertainment styles, handcrafts, cuisine and habits gain an increasing importance as the most important products of culture tourism in the globalizing world.

It is a tourism concept that offers natural and historical cultural assets, cultural activities and contemporary art works, socio-economic phenomena to users in the form of a tourist product.

- It is a term that covers not only the historical one, but also the current.
- All natural and cultural heritage, (tangible and intangible) archaeological, historical cultural assets, museums, ruins, monumental

structures, religious structures, rural and urban civil architecture examples, palaces, castles, gardens, theme parks, tombs, tombs and all kinds of contemporary art works and activities, crafts, ethnography, botany, flora and fauna, folklore, traditional and current life forms, cuisine, some kind of socio-economic phenomenon are all kinds of culture.

Travelers participating in cultural trips are more educated, more curious, more interested, more sensitive to cultural and artistic activities, who are eager to recognize the daily life of the country they go to, who are more respectful to nature, the environment, the culture and traditions of the region, who are willing to know the local people, who are willing to travel within groups.

Travelers participating in cultural trips are more educated, more curious, more interested, cultural and artistic cultural tourism in all their work;

- The "Ethical Rules for Tourism" of the United Nations World Tourism Organization (UNWTO);
- The International Council of Monuments and Sites shall be able to access the ICOMOS' "International Cultural Tourism Charter";
- Europa Nostra must comply with the "Maltese Information" regarding "Promoting and Supervision of Cultural Tourism".

The fundamental idea producing the need for ***sustainable tourism*** is providing the use of environmental and cultural values creating the source of tourism in a way that does not deteriorate and reduces the negative effects that could emerge in the long term.

In this respect, the relationship between the sources of cultural heritage or values and tourism is dynamic and should be sustainable.

One of the tools which defines ***sustainable cultural tourism*** is "architecture". The sustainability of architecture which is an important culture resource is possible through carrying out protection and restoration activities. In our country which possesses an important part of the world cultural heritage, various studies have been started in order to provide sustainability of cultural heritage in accordance with protection-use-sustain principles.

Sustainability, sustainable tourism and cultural tourism as its COMPONENT AND CULTURAL HERITAGE is going to be put under discussion conceptually.

Cultural tourism and the sustainable development of the CULTURAL HERITAGE is going to be scrutinized countrywide.

EXERCISES

A) Complete the blanks with appropriate words.

Sustainability – cuisine – flora and fauna – natural resources – cultural heritage

1) Considering cost is vital to achieving long-term …….
2) These monuments are a vital part of the …… of Turkey.
3) Tourism is damaging the …… of the islands.
4) The state owns the land, the ……, the factories, the machines, and so on.
5) Turkey has an excellent and internationally recognized ……

B) Answer the following questions.

1) What are the benefits of tourism for economy?
……..
……..
……..
2) What are the definitions of " culture" and " culture tourism" ?
……..
……..
……..
3) What can travelers learn by travelling?
……..
……..
……..

UNIT 41

Zoo Design Principles

Assoc. Prof. Serap YILMAZ

Definition of Zoo

Zoos are places where animals belonging to different geographical origins are displayed in the conditions closest to their natural habitat. In addition, zoos are places where visitors can see animals easily and observe their behaviour. Zoos fulfil four purposes; research, conservation, education and recreation.

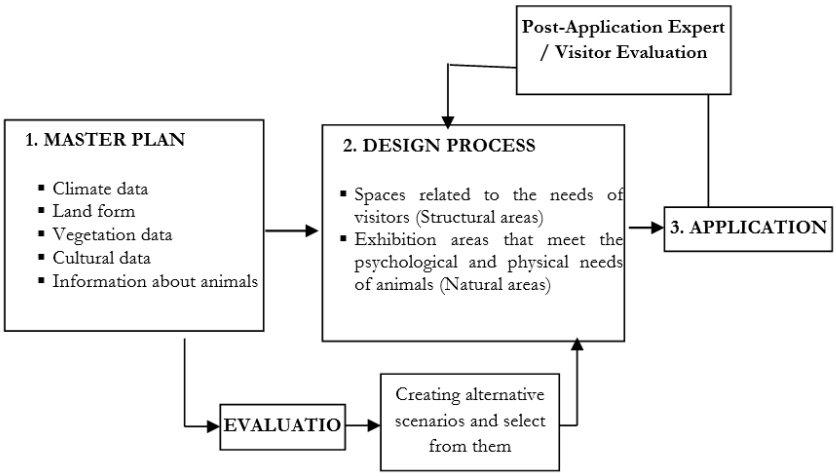
Zoos primarily focus on research, conservation, and educational purposes, but the reason why visitors usually visit the zoo is recreation. Therefore, visitors should be welcomed with impressive and inviting places in the zoo, which encourage them to visit other zoos. This positive experience provided by the zoo enables the zoo visitor to gain insight into animals. When visitors learn about the species in zoos, they develop more positive emotions towards animals and protect animals. In this context, how should zoos similar to natural habitats be designed?

Design of Zoo

- A modern zoo must provide the necessary conditions for each animal species to live and should reflect the animal's natural habitat.
- In a modern zoo, visitors should be able to learn about the habitat of animals.
- A modern zoo should provide the visitor with the opportunity to watch the animal's natural behaviour.

The first stage of the zoo design is the master plan. The master plan is prepared by landscape architect, architect, engineers, zoologists and ecologists. The master plan should be prepared by calculating the future growth rate of the zoo. In addition, the master plan should take the economy and

management plan and physical planning (structuring, circulation, outdoor exhibition areas, vegetative texture) into consideration. The zoo design process is shaped as follows:



A well-designed zoo consists of three different sections. These include visitor areas, exhibit areas and border elements. The organization of these sections in the zoo is different from each other although they must be in harmony.

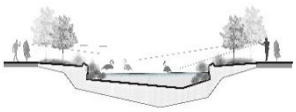
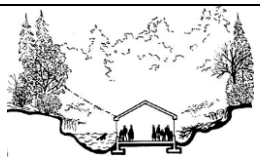
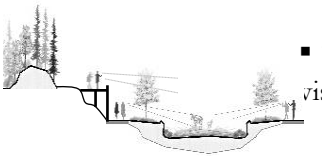
1- Visitor Areas

Zoo visitors are considering the maximum use of animals' exhibit areas, aesthetic values, comfort and entertainment. Viewing areas, entrance areas and circulation are designed in order to meet these requests of the visitors.

a- Viewing areas: Viewing areas include the range of views where animals can be best seen, and the viewing areas are the places that allow the visitors to watch the exhibition from a wide perspective. Viewing areas should not be placed on secondary roads mutually. In this case, the visitors prefer one of the two exhibitions without passing the other. For this reason, the viewing areas should be designed so that they do not come across.

Viewing areas are classified as follows:

VIEWING AREAS

	Physical Properties	Design Purposes
Open-Edge Viewing Areas		▪ To ensure that visitors are closer to animals. ▪ To enable visitors to see small animals better. ▪ To offer children the opportunity to observe without obstacles.
Planted Edged Viewing Areas		▪ The plants located between the exhibition area and the visitors intermittently cut the view and make the viewing natural. ▪ It provides a sense of curiosity for the visitor.
Covered Viewing Areas		▪ To provide comfort in observing the animals that are interesting and visitors are able to watch them for a long time. ▪ To give visitors the feeling of being displayed in the natural areas of predators.
Viewing Bridges		▪ To provide wide viewing angle for visitors.

b- Entrance: Each environment has distinguishing features that defines it. Zoo entrances should also have a qualification to identify them. The entrance of the zoo must be designed to be an inviting place that attracts people. The entrance is designed as an impressive area with water games, animal sculptures that symbolize the zoo and seasonal flowers as a focal point that welcomes the visitor. The entrance should include information boards that dominate the

entire zoo and direct the visitor to the desired side. It should also include equipment and building to meet people's daily needs. Topography and vegetative elements are used in order not to spoil the naturalness of the parking area at the entrance.

c- Circulation: The most ideal mode of circulation in the zoo is pedestrian paths that move people slowly. However, the designer also designs an alternative road circulation (rail system, cable car) for patients, children and disabled people. All exhibition areas should be easily accessible from the road route and the station should be in a strategic place that the visitor can easily reach. These roads should carry people to the most interesting points of the exhibition areas and should be in a hierarchical order. The hierarchical structure and physical properties of the circulation system are as follows:

CIRCULATION **Physical characteristics**	
Main Roads	▪ The main roads start from the entrance of the zoo, connecting the main activity areas and the exhibition areas. ▪ The width of main roads is 4.5-5.5 m. It should be wide and contain activity areas that provide sitting-shading and eating-drinking on these roads.
Secondary roads	▪ The secondary roads provide access to the areas where the animals and the transition between them are exhibited. ▪ The width of secondary roads is 2.5-3.5m. These roads reach the viewpoints and convert into viewing terraces.
Third roads	▪ Third roads are designed to keep visitors closest to animals and their habitats. ▪ These roads are designed to generate the excitement and interest of natural life in the visitors. Therefore, they are designed as a part of the exhibition area. ▪ The width of third roads is 1.5-2 m. These roads are formed by curved, upright and natural materials.

2- Exhibition Areas

Exhibits are considered one of the best ways to convey the message of the zoo to the public.

Therefore, the design of zoo exhibit areas has been improved for many years in order to meet recreational needs of the visitors as well as providing education. This improvement focuses on the way that people perceive animals and the natural behaviours that animals are exhibited. Exhibit areas are classified as three generations: In the first-generation exhibits, animals are displayed in cages or in deep holes surrounded by walls. This design approach has been incapable of meeting behavioural, psychological and physical needs of animals. In the second-generation exhibits, animals are exhibited in wide spaces and visitors are provided with panoramic views. In these exhibition areas, developed by Carl Hagenbeck, the visibility of boundary elements has been minimized. In the third-generation exhibits (naturalistic exhibits), animals are exhibited through forming natural groups with their own species. Exhibition areas are designed to contain the topography and plant diversity in natural habitats of animals without any boundary elements which destroy visual harmony between animal and human. The stress that animals suffer from because of the crowd is reduced by keeping the watching areas out of the exhibition areas, and thus animals behave more naturally. Consequently, animals are exhibited in a way that does not pose a threat to their original habitats and destroy their social structure. The third-generation exhibits are defined with the term ***'immersive'*** as they are the exhibits that do not include visitors in exhibition areas only visually, but they also cause people to feel the atmosphere of the area psychologically. While these kinds of exhibition areas increase both the aesthetic satisfaction and interest and attention of people for the natural world, and while they take them into natural world, they focus on the benefits of animals. Thus, they offer effective opportunities for education of protection and enable the visitors to transfer feelings of discovery and mystery in nature to the zoos. With these kinds of features, naturalistic exhibits support the educational functions and the philosophical structure of zoos because the type of exhibit area is extremely effective on visitors' perceptions of animals. This change in the design of exhibition areas enables visitors to get right messages from the environment by giving them the right perceptive data. Thus, the visitors are given the chance to gain insight into the animals in exhibits that are similar to their own habitats and to discover the behaviours of animals.

	**Foreground**	This section includes border elements and visitors. Boundary elements in this area are hidden by plants and rocks. Thus, the continuity of naturalness in the exhibition area is ensured.
	Mid plan	This section is the exhibition space of animals. This area is designed to reflect the animal's natural habitat. Thus, the immersive exhibit attempts to recreate the appearance and sense of the animal's natural environment.
	Background	This section is meant to add depth and mystery to the exhibition area. It is the section designed to add depth and mystery to the exhibition area. The perceptual effect provided by plants and topography is used to provide mystery in the exhibition area.

The design of the immersive exhibit is discussed in three separate sections: foreground, mid plan and background.

Typological Features of immersive exhibit:

- Exhibit areas are designed including the topography and the types of plants in animals' natural environments and without including any boundary elements that distort the visual integrity between animals and visitors.
- Viewing areas are outside the exhibit areas, which decrease the negative effect of crowds on animals and enable animals to exhibit more natural behaviours. Therefore, animals are exhibited in a way that is suitable for their original habitats without destroying their social structure.
- Visitors walk along narrow and rugged pathways through in the 'immersive' exhibit, so visitors feel the spirit of nature.

2- Border Elements

Border elements in the zoo separate animals and humans, but they do not disrupt visual integrity. The type, depth, width and material of the border element are decided by considering the animal's physical strength, behavioural, biological features and the safety of the visitors to be included in the zoo. Boundary elements are classified as follows:

1- ***Abstract barriers*** (They are effective barriers thanks to the training of the animal by using fear and discomfort).

2- Concrete barriers

- Physical barriers (Walls, fences, glass dividers, dry moats and water-filled moats)
- Thermal barriers (Cold and hot water lines)

Physical barriers are often used as the boundary element, as they contribute to the aesthetic appearance of zoos and prevent animals from being hurt. The advantages of physical barriers are:

- No contact with animals
- Less chance of transmission of infectious disease from visitors
- More natural looking than others
- Provide visitors with an unobstructed view

EXERCISES

A) Complete the blanks with appropriate words.

Zoo – visitors – vegetation – exhibition – entertainment

1) We could hear the lions roaring at the other end of the …….
2) Much of the region's native …….has been damaged by developers who are building hotels along the coast.
3) So what do you do for ……. in this town?
4) There has been a steady decrease in the number of ……. to the museum.
5) The photographs will be on ……. until the end of the month.

B) Answer the following questions.
1) What points should be taken into account while designing a zoo?
……..
……..
……..
……..
2) What does a well-designed zoo consist of?

……..
……..
……..
……..
3) What are the typological features of immersive exhibit?
……..
……..
……..
……..

UNIT 42

Botanic Garden

Prof. Öner DEMİREL

Concept

A botanical park can be defined as a plant center which accommodates as many plant end/or tree species as possible, where scientific examinations are conducted on these plants and which is generally open to public for recreation and sightseeing. Basically, botanical gardens have important scientific (research and conservation), educational (teaching and culture) and recreational (active and passive activities) functions.

However, in our country the concepts of Botanical Park and Botanical Garden are confused and used with the same meaning. While Botanical Gardens are places where research, conservation and educational activities come forward, (URL 2) Botanical Parks are places which are defined mostly with recreational activities and functions such as relaxation, entertainment, trips or hikes, etc.)

Botanical Gardens in the World were first established in order to introduce primarily medicinal and economic plants to the public and carry out research on them; however, in the course of time their functions developed and today their functions have evolved more and more to include world nature and plant conservation as the main subjects of study for these gardens. Other botanical gardens were mostly considered as "City Park" or "Public Park".

The Botanical Garden concept which is a planning element which has to be considered in detail is a phenomenon which requires common action of different disciplines which are directly or indirectly related to the subject, and the importance of reaching "SHARED BENEFIT" as a result of "SHARED WISDOM" has been highlighted.

Historical Background

The first botanical garden known in the world in today's sense is the botanical garden founded by Luca Gihini in Pisa city in 1543. Subsequently, botanical gardens began to appear in other cities of Italy and Europe (Sarkowicz, 2003).

The first established botanical gardens are more research-based and known as research institutes where research-oriented studies are carried out for example, Botanical Gardens in Zürich (Switzerland), Meise (Brussels-Belgium), Cambridge (London-England).

Other botanical gardens are mostly handled as "urban park" and "public park". Maybe the concept of "garden of the nation", which is frequently mentioned these days, coincides with this scope! Time will show it to us. To give an example from abroad; Prospect Park conructed in Brooklyn by Frederick Law Olmstedt, who was also the planner of Central Park in New York in 1863, was more than many botanical gardens in America and it has gained botanical garden feature due to its plant transportation (URL 1).

Another group of botanical gardens are gardens that have more education and research characteristics including the Kew Royal Botanical Garden in London and the Paris botanical gardens. Passive recreational activities can also be included in these gardens, albeit limited.

Another group is botanical gardens created by institutions and individuals (public institutions and organizations, municipalities, universities, associations and foundations, and private individuals), as well as botanical gardens where they are established (protection, natural vegetation protection, gene banks, medical- aromatic botanical gardens, cactus or succulent plants, etc.).

National and International Organizations and Studies

The botanical gardens, which are close to 2000 counted in the world, have more than 200 million visitors every year, and this situation is imperative to sustain and even increase this area.

The definition of the Botanic Gardens Conservation International (BCGI) botanical garden; They have been identified as organizations containing documented collections of living plants for scientific research, conservation, display and educational purposes. BCGI is a transnational international organization that includes 460 botanical gardens on Earth (URL 3). This organization is dedicated to enhancing the roles of the botanical garden in biodiversity programs and conservation. BCGI continues its activities with congresses they publish regularly and on different dates.

In our country, the first non-institutional botanic garden is the garden where four physician heads were created with the special efforts of their own mansions and opened to medical students on their own initiative. 1-Botanical Garden of Hekimbaşı Abdulhak Molla, 2-Botanical Garden of Hekimbaşı Salih. Our first botanical garden in the modern sense is Galatasaray Botanical Garden, which was established in 1839 in the service of medicine and disappeared with the medical building with the fire in Beyoğlu in 1848. Süleymaniye Alfred Heilbronn Botanical Garden, on the other hand, is the most developed botanical garden that has survived for the longest time in our country with its establishment in 1935.

In our country, the concept of botanic park and botanic garden can be sometimes used interchangeably in the same sense. For example, in Botanic Park, located between Çankaya Avenue and Cinnah Avenue in Ankara, with a total area of 56,400 m2, there is a 15,000 m2 lawn area and a 1,000 m2 pool area, as well as a 100 m2 children's playground and a 200 m2 sports area. It is at the forefront with its very recreational dimension.

However, within the scope of the green belt in Bursa, "Soğanlı Botanical Park" was opened in 1998 in order to provide the city with plenty of oxygen, new recreation and healthy sports areas. It protects the Bursa Plain with 8,000 trees of 150 species, 100.000 bushes of 76 species, 50.000 groundcovers of 20 species and 6000 roses of 27 species, in an area of 400.000 m2, but it is a park open to vegetative research and scientific studies. Soğanlı Botanical Park offers its visitors the opportunity to relax and observe the leaves and blooming plants at different times, as well as to play sports for healthy life.

In the light of all these evaluations, the botanic gardens established in our country (Çukurova University Botanical Garden, Ankara University Botanical Garden, Ege University Botanical Garden, Gaziantep Botanical Garden, Süleyman Demirel University Botanical Garden, Istanbul University Alfred Heilbronn Botanical Garden, Nezahat Gökyiğit Botanical Garden, Ata Botanical Garden.) has performed a lot of functions and has gained a wider acceptance and its numerical excess has enabled more Botanical gardens to be located and constructed.

Functions

While Botanical gardens enjoy important functions such as research, protection and education, it can be said that Botanical parks are defined with more prominent functions in terms of recreational activities (recreation, entertainment, excursions and walks, etc.). However, the general definition focuses on the Botanical gardens, considering the examples in our country.

In addition to the plants grown in different parts of the world to its visitors, the botanic gardens, having the mission of promoting the natural vegetation of their own regions, also contribute to the formation of environmental awareness and conservation scientists by introducing information about plants to people of all ages, by introducing the richness of plant life. At the same time, they serve different fields of activity, such as organizing various training meetings, creating corporate publications and documents. It is worth mentioning that many of the botanical gardens include uses and organizations that will respond to the active recreational needs of the society as well as the passive recreation opportunities they have in recent years.

The botanic gardens and parks that aim to gain insight into nature are also covering active and passive activities such as watching, watching, resting, walking, getting rid of stress and meditation, sharing, learning mutual dialogue, and being in vegetative environments, and also active recreational activities such as high rope activities, can also be included.

A number of activities that will not meet the primary purpose of the botanical gardens and surpass the botanical garden in terms of land use and uses can be limited to a limited number of activities that will meet the needs of the visitors when they visit the garden and renew themselves. With the increasing number of activities such as eating, drinking tea and coffee, the size of the area that it will cover may pose a risk and threat to Botanical gardens. This situation is against the concept of Botanical Gardens.

Botanic gardens can be planned as a unit of the city's green space system, as well as zoos or part of the city parks. In 1989, the International Union for Conservation of Nature and Natural Resources (IUCN) and the Secretariat for

Botanical Gardens Conservation created a draft for ex-situ conservation studies for botanical gardens, and each country benefited from this draft and created plant protection programs for their country (URL 4): According to this draft study, for example in Canada:

Natural species;
• rare or endangered species
• economically important species
• species necessary for the restoration of the ecosystem
• Species of special importance in maintaining the ecosystem
• with taxonomically classified plants
Cultural species;
• the first cultivars
• They are classified under subheadings, including semi-domestic plant species.

Planning

When focusing on the studies to be referenced in the planning of botanic gardens, it is witnessed that botanic parks are functional on the basis of "production, conservation, science and research" and are accepted as the main duties of botanical gardens. The use of space is also designed with these basic roles in mind.

Today, the key roles of botanical gardens are shaped in the following five concepts.

1. Horticulture, 2. Protection, 3. Science and research, 4. Education, 5. Recreation

The use of space in the botanical gardens

It is useful to gather in three main sections:

1. Management, education and research zone, 2. Production zone, 3. Recreation zone.

Considering the tasks that botanical gardens carry out or need to carry out, three main zones used for functioning in botanical gardens draw attention, and the planning approach is made by considering this thematically differentiated

space setup. These are management - research, production and recreation zones.

EXERCISES

A) Complete the blanks with appropriate words.

Horticultural – restoration – excursion – botanical garden – endangered species

1) The lizard are classed as an ……..
2) A ……. usually open to the public, where a wide range of plants are grown for scientific and educational purposes.
3) ……. is the study or activity of growing garden plants.
4) Many museums shut down in the afternoon or are closed for …….
5) The resort also offers daily ……. to nearby towns.

B) Answer the following questions.

1) What is a botanical park?
……..
……..
……..
……..
2) What are various functions of a botanical park?

……..
……..
……..
……..
3) What does the use of space in the botanical gardens consist of?
……..
……..
……..
……..

UNIT 43

Roof and Terrace Gardens

Prof. Bülent YILMAZ

Definition of Roof and Terrace Gardens

The roof and terrace gardens are gardens on the roof and terrace. This means that each roof cover with plant, such as, trees, shrubs, bushes and grass as well as another definition of roof and terrace garden is environment or nature in the sky. A roof is the exterior part of a building's ceiling and serves to protect it. Terrace roofs are the flat, slightly inclined, tileless roofs of a building, or part of a building, which can be comfortably walked on and used for carrying out various activities, such as hanging out washing, sunbathing, enjoying some fresh air, reading, and so on (Contreras and Castillo, 20

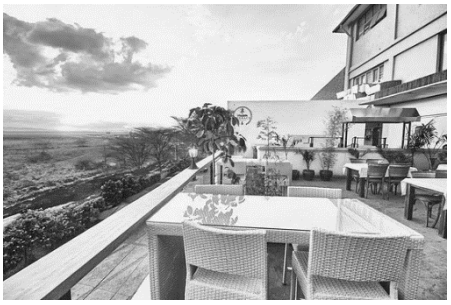
Bushes

Roof types

The first step in creating a roof terrace will be to determine what type of roof the existing structure has.

• ***Pitched roofs*** - For obvious reasons, sloped roofs are not ideal candidates for roof terraces. However, flat spaces can be created either by building up an external wall or cutting into the roof. Getting planning permission for this type of project can often be difficult.

• ***Flat roofs*** - In most cases, an existing flat roof will be used to create a roof terrace. In concrete or steel frame buildings, the existing flat roof is likely to



Terrace

have enough structural strength for a terrace, because the roof is constructed like the floor structures below. Timber-framed residential constructions are much more likely to require upgrading. This will usually entail placing a steel joist underneath the roof structure, and this work is done from the bottom up, meaning there will probably be a significant amount of disruption to anyone currently living in the property.

Roof and terrace gardens is a good way to enhance buildings in urban areas through landscape design, which can transform the obsolete areas into valuable area that provides environmental and economic benefits.

Environmental benefits

- Insulates the building against heat and cold
- Reduces indoor temperature by 6 – 8 degree
- Reduces in the urban heat island effect
- Reduces sound pollution
- Increases the amount of oxygen in air
- Filters air borne particles from air
- Controlling storm water runoff, erosion and pollution
- Increased habitat for birds, butterflies and insects

Economical benefits:

- Doubles the life of the conventional roof
- Reduces air conditioning cost by 25% to 50%
- Boosting urban agriculture
- Increase in the building's price

As aesthetics and recreation are the priority, they may not provide the environmental and energy benefits of a green roof. Planting on roof tops can make urban living more self-sufficient and make fresh vegetables more accessible to urban people.

Key Considerations for Establishing Roof and Terrace Gardens

Before establishing a roof and terrace garden, we must consider following aspects:

1. Condition of the roof: The most effective time to construct a roof garden is when the roof is newly constructed or being repaired. When working with an existing roof, we must take into account the existing leak ages, damage, inability to resist roots and standing water etc.

2. Structural capacity of the roof: Prior to designing and constructing a roof garden, we must determine if the roof can support the additional weight of soil and plants. The structural capacity of the roof mainly determines the type of roof garden that can be built.

3. Access to the roof: Access to the roof is an important consideration. Typical access includes stairs or fire escapes. However, there should be enough space for transporting materials for construction and maintenance.

4. Weight of garden: Consideration of weight is the heart of planning for any type of roof and terrace garden. Weight of the garden should be determined by licensed architect or structural engineer. It must be assured that the weight of garden does not exceed the structural capacity of the roof

5. Cost: Before starting a roof garden, all necessary cost analysis should be done. Usually, a green roof costs 50% higher than conventional roofs. Moreover, an extensive garden is less costly than intensive garden.

6. Design of a roof garden: The design of a roof garden may vary with the structural capacity of building, owner's personal choice, purpose of gardening, surrounding scenery etc.

7. Irrigation: Roof garden plants largely depend on rain water for irrigation. But, during certain period of year, rainfall may be insufficient to fulfill the water requirements. So, harvesting of rain water can be done. Moreover, drip irrigation system, hose-pipemanual watering etc. should be arranged to supplement rainfall.

8. Drainage: The drainage system is an essential consideration of any roof garden. Typical drainage systems include gutters, downspouts, drains and barriers to prevent growing media erosion and drainage system clogging. Poor

drainage may result in rootrot and diseases of plants as well as significant weight beyond the roof capacity.

9. Selection of plants and growing media: Rooftops can be hostile environments for plants due to the effects of wind, heat, rain and shadows. So, drought tolerant plants of native varieties are suitable and attractive option for roof and terrace gardening. Usually, lightweight growing media consisting of high-quality compost and recycled materials are used.

10. Maintenance: Roof gardens must be maintained just like any garden such as watering, weeding etc. the amount of maintenance will depend on the types of plants used and the garden design. Larger plants, shrubs, and trees must be pruned to ensure safety during windy conditions. Drains and gutters must be inspected and cleared more frequently in comparison to the conventional naked rooftop

Types of Roof and Terrace Gardens

The basic principle of a roof and terrace garden system is that it consists of a roof waterproofing membrane which prevents moisture from entering a habitable building or space. Garden roof systems can be divided into three categories: extensive, semi-intensive and intensive, which are defined as follows:

1.Extensive (shallow) roof and terrace garden system: Roof system with garden that has medium plants with approximately 6 cm to 20 cm deep roots. It is the most basic type. It uses a shallow layer of inexpensive ordinary soil and supports drought resistant and low growth plants like herbs, mosses grass, and simple foliage.

2.Semi-intensive (moderate) roof and terrace garden system: Roof system with garden that has medium plants with approximately 12 cm to 25 cm deep roots. This type of roof garden typically has a deeper layer of nutrient rich soil and contain shrubs, herbaceous plants and bushes and a thicker layer of grass.

3.Intensive (deep) roof and terrace garden system: Roof system with a garden that has plants with roots that are from than 15 cm to 1 m deep. It has a very deep soil layer and supports a wide variety of plants, bushes, and small trees.

The following criteria can be used to characterize 3 types of roof and terrace gardens:

Criteria	Extensive	Semi-Intensive	Intensive
Maintenance	Low	Periodically	High
Irrigation	No	Periodically	Regularly
Plant communities	Moss-Sedum-Herbs and Grasses	Grass-Herbs and Shrubs	Lawn or Perennials, Shrubs and Trees
Height	6-20 cm	12-25 cm	15 cm > 1 m
Weight	60-150 kg/m²	120-200 kg/m²	180-500 kg/m²
Costs	Low	Middle	High
Use	Ecological protection layer	Designed Green Roof	Park like garden

The waterproofing membrane component is the same in all three types. However, the other system components vary based on the plants and landscapes placed above the waterproofing system.

Components of a Roof and Terrace Garden System

The various components of a roof garden system are as follows:

Waterproofing Membrane: A roof and terrace garden system incorporates a waterproofing system that is directly adhered to the substrate. The membrane should be able to provide hydrostatic resistance based on the expected amount of water drainage and retention.

Protection Course: Protection course is a separate layer of material which is installed over the waterproofing membrane to protect it from damage after installation. The material of the protection course depends on the type of membrane and its thickness depends on the type of overburden.

Root Barrier: Roots can penetrate the waterproofing membrane and potentially create leak locations. A root barrier is typically a separate layer of material installed on top of the protection course, but it may be combined with a protection course or drainage course. It prevents the migration of plant roots from damaging the membrane. Its material type depends on the type of membrane and plants used for a roof and terrace garden system.

Drainage Layer: Drainage layer provides a way or path for moisture to move laterally through the roof and terrace garden system. This layer enhances the performance of the waterproofing material by relieving hydrostatic pressure from the material's surface and its associated weight.

Moisture-Resistant Insulation: Moisture-resistant insulation may be installed above the membrane. This provides thermal protection to the membrane, reducing the overall temperature gradient that a membrane experiences. Additional insulation may be considered because of the expected loss of R-value when insulation is located in a moist environment.

Aeration Layer: The composition of an aeration layer is similar to that of a drainage mat. An aeration layer allows air to move across the top surface of the insulation layer. Additionally, the aeration layer allows moisture to drain from the top side of the insulation. Aeration layers are needed when insulation is used above the garden roof waterproofing membrane, so that the insulation will retain its R-value.

Where insulation is used above the membrane without an aeration layer, the in-place R-value of the insulation will most likely be less than the design R-value of the insulation, because of the moisture retained within the insulation.

Moisture Retention Layer: A moisture-retention layer is typically an absorptive mat consisting of recycled polypropylene fibers. A moisture retention layer retains or stores moisture for plant growth. This layer is typically located above the drainage layer (or it can be combined with the drainage layer) in uninsulated systems or above the aeration layer in insulated

systems. The materials for a moisture-retention layer depend on the overburden type.

Reservoir Layer: The reservoir layer is typically located above the moisture retention layer. A reservoir layer retains or stores moisture for overburden growth. The materials for a reservoir layer

depend on the overburden type, but typically consist of polyethylene-based panels, formed into a three-dimensional array of water reservoir cups and drainage channels. The panels are designed to hold a specific amount of moisture by using overflow holes which limit the capacity of the cups. The reservoir cups are graduated in size for differing amounts of water storage, as required for the growth medium and plantings. Reservoir layers typically include aggregate when used under intensive roof and terrace garden systems, because of the large water storage requirement.

Filter Fabric or Geotextile: This is a tightly woven fabric, typically polyester or polyethylene/polypropylene, used to restrict the flow of fine growth medium particles and other contaminants

while allowing water to pass freely through, thereby protecting drainage systems from clogging. Filter fabric is often laid directly over the top surface of the drainage layer and is generally installed just prior to the placement of the growth medium.

Garden Growth Medium: Growth medium is typically a lightweight aggregate-based medium and is specially formulated to provide a proper growing environment for specific plants to be included in a roof and terrace garden system. Growth media are mixtures of mineral, organic and synthetic components. The components are blended in appropriate ratios to provide the needed characteristics of the medium. Growth medium considerations include vegetation requirements, moisture and nutrient retention, drainage, pH level, porosity and compaction, erosion resistance, weight restrictions based on structure, resistance to fire propagation and structure for plant anchorage.

EXERCISES

A) Complete the blanks with appropriate words.

roof garden- well insulated- air conditioning- waterproofed- reservoir
1) Are your hot and cold water pipes .....?
2) A ..... is a lake that is used for storing water before it is supplied to people.
3) The cargo area was ..... and fitted with a drainage system, allowing it to be easily hosed down for cleaning.
4).....is a method of providing buildings and vehicles with cool dry air.
5) A .....is a garden on the flat roof of a building.

B) Answer the following questions.
1) What are the benefits of roof and terrace gardens?
……..
……..
……..
……..
2) What are the key consideration while establishing roof and terrace gardens?

……..
……..
……..
……..
3) What are various types of roof and terrace gardens?
……..
……..
……..
……..

UNIT 44

Persian Garden

From the earlier times the idea of an earthly paradise spread through Persian literature and to other cultures, both the Hellenistic gardens of the Seleucids and the Ptolemies in Alexandria.

"The god has actually defined paradise as Garden, and it is up to individual not only to aspire to it in the after-life, but also to try to create its image hare on earth"

Persian garden

It is with this theme in mind that the Persian gardens have been created as a model of orderly paradise, devised in the flat deserts of Persia. As greater part of Persia is arid, lacking water and vegetation. It is largely composed of elevated and level land with area of barren plain stretches as far as an eye can see, and for the most part of the year it is extremely hot.

The Persian gardens are enclosed, fertile and rich with fruits and flowers in contrast to the draught, heat and sun outside it has water, coolness and shade. It has order and tranquility, and it is place where one may sit shade and relax, enjoy the sound of birds, water flow and fragrance of flowers.

The tradition and style in the design of Persian gardens, has influenced the design of gardens from Andalusia to India and beyond. The Persian garden is an enclosed space (preferable a square) in its center is a water source from which channels carrying water divide it into quarters. Each quarter is further divided into quarters and if the garden is large it is divided in further smaller quarters.

Pavilion

Taj Mahal is one of the largest Persian Garden interpretations in the world, from the era of the Mughal Empire in India. It has the elements of a Persian garden- the enclosure, the quadrangles, water channels, groves of trees and plants, pavilions, boarders of pathways and lawns (Figure 1).

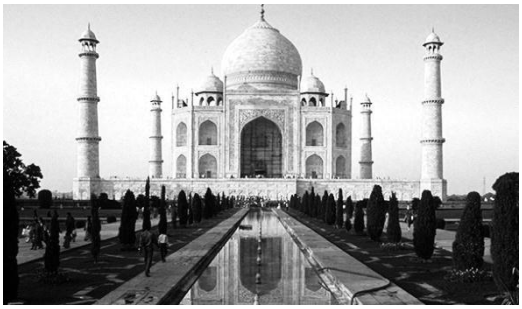


Figure 1. Taj Mahal garden.

As the word expresses, such gardens would have been enclosed. The garden's purpose was, and is, to provide a place for protected relaxation in a variety of manners: spiritual, and leisurely (such as meetings with friends), essentially a paradise on earth. The Common Iranian word for "enclosed space" was *paridaiza- (Avestan pairi-daçza-), a term that was adopted by Christian mythology to describe the garden of Eden or Paradise on earth. The garden's construction may be formal (with an emphasis on structure) or casual (with an emphasis on nature), following several simple design rules.During the Arab occupation, the aesthetic aspect of the garden increased in importance, overtaking utility. During this time, aesthetic rules that govern the garden grew in importance.

An example of this is the Chahâr Bâgh, a form of garden that attempts to emulate Eden, with four rivers and four quadrants that represent the world. The design sometimes extends one axis longer than the cross-axis, and may feature water channels that run through each of the four gardens and connect to a central pool. The invasion of Persia by the Mongols in the thirteenth century led to a new emphasis on highly ornate structure in the garden. The Mongol empire then carried a Persian garden tradition to other parts of their empire (notably India).

Use of Vegetation

Planting of trees and selection of species was carefully done in order to improve micro climate inside the gardens. Elements of the Persian garden, such as the shade, the Jub, and the courtyard style Hayât in a public garden in Shiraz.

Sunlight and its effects were an important factor of structural design in Persian gardens. Textures and shapes were specifically chosen by architects to harness the light. Iran's dry heat makes shade important in gardens, which would be nearly unusable without it. Trees and trellises largely feature as biotic shade; pavilions and walls are also structurally prominent in blocking the sun.

The heat also makes water important, both in the design and maintenance of the garden. Irrigation may be required, and may be provided via a form of underground tunnel called a Ganat, that transports water from a local aquifer. Well-like structures then connect to the Ganat, enabling the drawing of water. Alternatively, an animal-driven Persian well would draw water to the surface. Such wheel systems also moved water around surface water systems, such as those in the Chahar Bâgh style. Trees were often planted in a ditch called a Jub, which prevented water evaporation and allowed the water quick access to the tree roots (Figure 2).

Vaulted arches

The Persian style often attempts to integrate indoors with outdoors through the connection of a surrounding garden with an inner courtyard. Designers often place architectural elements such as vaulted arches between the outer and interior areas to open up the divide between them.

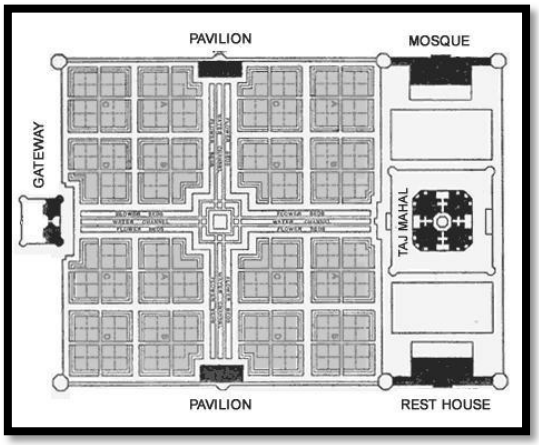


Figure 2. Chahar bâgh style in the Persian garden

Historical Descriptions

The oldest representational descriptions and illustrations of Persian gardens come from travelers who reached Iran from the west. These accounts include Ibn Battuta in the fourteenth century, Ruy Gonzáles de Clavijo in the fifteenth century and Engelbert Kaempfer in the seventeenth century. Battuta and Clavijo made only passing references to gardens and did not describe their design, but Kaempfer made careful drawings and converted them into detailed engravings after his return to Europe. They show chahar bâgh type gardens that featured an enclosing wall, rectangular pools, an internal network of canals, garden pavilions and lush planting. There are surviving examples of this garden type at Yazd (Dowlatabad) and at Kashan (Bâgh-e Fin). The location of the gardens Kaempfer illustrated in Isfahan can be identified.

Rectangular pools

Styles of Persian Gardens

Styles of Persian Gardens

The six primary styles of the Persian garden may be seen in the following table, which puts them in the context of their function and style. Gardens are not limited to a particular style, but often integrate different styles, or have areas with different functions and styles.

Hayât

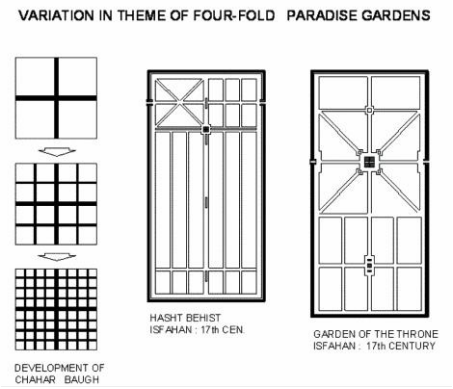
Publicly, it is a classical Persian layout with heavy emphasis on aesthetics over function. Manmade structures in the garden are particularly important, with arches and pools (which may be used to bathe). The ground is often covered in gravel flagged with stone. Plantings are typically very simple - such as a line of trees, which also provide shade. Privately, these gardens are often pool-centred and, again, structural. The pool serves as a focus and source of humidity for the surrounding atmosphere. There are few plants, often due to the limited water available in urban areas.

Meidân

This is a public, formal garden that puts more emphasis on the biotic element than the hayât and that minimizes structure. Plants range from trees, to shrubs, to bedding plants, to grasses. Again, there are elements such as a pool and gravel pathways which divide the lawn. When structures are used, they are often built, as in the case of pavilions, to provide shade.

Chahar Bâgh

These gardens are private and formal. The basic structure consists of four quadrants divided by waterways or pathways. Traditionally, the rich used such gardens in work-related functions (such as entertaining ambassadors). These gardens balance structure with greenery, with the plants often around the periphery of a pool and path based structure.



Park

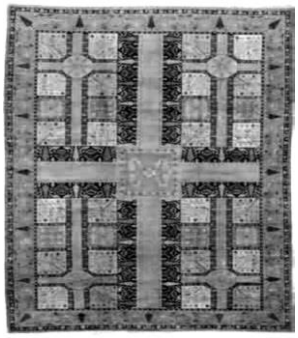
Much like many other parks, the Persian park serves a casual public function with emphasis on plant life. They provide pathways and seating, but are otherwise usually limited in terms of structural elements. The purpose of such places is relaxation and socialization.

Bâgh

Like the other casual garden, the park, bâgh emphasizes the natural and green aspect of the garden. Unlike the park it is a private area often affixed to houses and often consisting of lawns, trees, and ground plants. The waterways and pathways stand out less than in the more formal counterparts and are largely functional. The primary function of such areas is familial relaxation.

Concept of Persian Garden Carpet

A Persian carpet of 17th or 18th century is a rectangle. Has a regular border of flowers and leaves and is followed by a wider one of trees- thin and pointed cypress- and shrubs. Each of these borders is enclosed by a thin band with an abstract pattern, suggestion boundary walls and paths. Within these boarders is the garden proper, divided into sections by four "river".



Persian carpet

The four quarters are equal in size, each being divided into six squares. They contain alternately

flower with flowers and Chenar trees, of which four, the most prominent, grow outwards from the central floral design. Both cypress on boundary and Chenar have been planted to serve as the symbol of eternity and aesthetic importance. Cypress - eternity and earthly equivalent of LOTE tree. Chenar- is an earthly equivalent of TUBA tree, the great giver of shade as per KORAN. The central square and circle design is symbolic of perfection.

EXERCISES

A) Complete the blanks with appropriate words.

micro climate - Persian – Chahar Bâgh – structures

1) Planting of trees and selection of species was carefully done in order to improve …… inside the gardens.
2) Sunlight and its effects were an important factor of structural design in …… gardens.
3) Manmade …… in the garden are particularly important, with arches and pools
4) …… gardens are private and formal. The basic structure consists of four quadrants divided by waterways or pathways.

B) Answer the following questions.

1) How is Persian Garden Carpet defined?
……..
……..
……..
……..
2) What is Meidân's features in Iranian structure?
……..
……..
……..
……..
3) What is the use of Use of Vegetation?
……..
……..
……..
……..

UNIT 45

Healing Garden

The idea of Healing Gardens is both ancient and modern. Following the beginning of human settlements and erect of communities, local healing places were nearly always found in nature. The earliest hospitals and infirmaries in the Western world were dependent on plants, herbs and a cloistered garden as essential parts of the healing process. For a long time the importance of health and well-being has been noticed in the presence of urban green space, green ways, parks, green areas, schoolyards, and house private gardens. All these factors are viewed as the health creating elements of the city. The great gardens of Egypt were built to offer an escape from the external environment offering a healing relief (Figure 1).

By the late twentieth century the idea of nature and healing was totally lost; nature 'landscaping' came to be merely portrayed as a green sort of decoration. Starting from the 1990's the idea of healing gardens, once again, gained interest and began to appear in the research field of sustainable landscape. the aspect of Healing Gardens is gaining its popularity due to the harsh living and environmental conditions that people are suffering from all over the World.

Figure 1. Examples of healing gardens

The health outcomes of the healing garden

Patient

Why is nature restorative? There are many theories regarding the effects nature has on human beings. In Clare Cooper Marcus' book Healing Gardens, Rodger Ulrich writes in an article "Effects of Gardens on Health Outcome: Theory and Research", that people learn to associate restoration with nature settings and associate stress with urban settings. As an example, people may find vacations in rural settings relaxing because as a society we were "taught" these landscapes were calming and restorative. Another theory is that the urban or built environment is over stimulating, causing increased stress in the body. Nature is less complex making it more restorative. Evolutionary theories contend that many cultures have the same positive responses to nature. Humans may be genetically inclined to respond to certain landscapes more positively because these environments were favorable for their survival. Nancy Gerlach-Spriggs contends that our "response to nature is not Gardens have the ability to heal in many ways. The simple exposure to nature causes heart rate to decrease. Muscle tension and blood pressure also decrease. Rodger Ulrich explains, "it is justifiable to propose that gardens in healthcare situations are important stress-mitigating resources for patients and staff to the extent that they foster: a sense of control and access to privacy, social support, physical movement and exercise, and access to nature and other positive distractions". Ulrich explains in another article entitled "View through a Window May Influence Recovery from Surgery," that patients who were able to view nature had a shorter hospital stay, lower analgesic use and fewer complaints during recovery.

Benefits for employees (reduced workplace stress, improved satisfaction, possibility of reduced turnover, improved capability of workplace to attract and retain qualified employees). Additionally, there are several other advantages found in healing gardens:

- Social support: Users are encouraged to meet other people, sharing stories or experience and receiving spiritual support or physical aid that can help to re-build their self-confidence and enhance healing.
- Sense of control: A sense of control is an important factor affecting a person‘s ability to cope with stressful events or situations, including stress associated with illness and hospitalization. Assisting patients to retrieve their capacities will improve the rate of recovery.
- Exercise: Exercise can decrease stress, blood pressure and depression and strengthen body and mind, especially the functions of heart, lung and nervous system.
- Positive distractions: Positive distractions are environmental criteria that can attract people‘s attention, thus disturbing negative thoughts or emotions and improving the issues of blood pressure and stress for instance, music, art, flowers and animals.
- Reduction of mental fatigue: Experiencing a natural environment has the efficacy of decreasing mental fatigue. People feel relax and recover from attentional fatigue by engaging in natural surroundings and being away from stressors.

Role of landscape architecture

In “Landscapes: A Typology of Approaches to Landscape Architecture,” the authors describe therapeutic settings as places of “healing and transcendence” and argue that landscape architects play a critical role in creating these environments.

Here the connection between humans and the natural world is emphasized in ways that go beyond the common professional concerns to re-establish spiritual emotional connections between humans and nature.

The Healing Garden: Essential design elements and environmental Qualities

An emerging area of research and design focus within landscape architecture has sought to address the relationship of designed natural environments to health and healing. As landscape architecture increasingly addresses the interface between designed natural environments and health, confusion has

developed regarding various terms applied to this concept. "Healing gardens" is a term frequently applied to gardens designed to promote recovery from illness. "Healing," within the context of healthcare, is a broad term, not necessarily referring to the cure from a given illness. Rather, healing is seen as an improvement in overall well-being that incorporates the spiritual as well as the physical. Numerous healthcare institutions within and outside the United States have begun to incorporate therapeutic landscape design. As Clare Cooper-Marcus and Marni Barnes have noted in their book Healing gardens focus on providing stress relief, alleviation of physical symptoms, and improvement in the overall sense of wellness for both patients and healthcare staff. Successful gardens include the following design principles:

- Variety of Spaces: Spaces for both group and solitary occupancy. By providing a variety of spaces, the patient is given choices, thus providing an increased sense of control-leading to lower stress levels. An area for solitary occupancy allows one to "get away" from the sterilized environments of the hospital. Areas for small groups (e.g., family members or support staff) to congregate provide social support to the patient.
- A Prevalence of Green Material: Hardscaping is minimized and plant materials dominate the garden. The goal would be to minimize hardscaping to only one-third of the space being occupied. It is through the softening of the landscape patients can feel an improvement in their overall sense of wellness.
- Encourage Exercise: Gardens that encourage walking as a form of exercise have been correlated with lower levels of depression.
- Provide Positive Distractions: Natural distractions such as plants, flowers, and water features decrease stress levels. Other activities such as working with plants and gardening can also provide positive distractions in the garden setting.
- Minimize Intrusions: Negative factors such as urban noise, smoke, and artificial lighting are minimized in the garden. Natural lighting and sounds are additive to the positive effects of the garden.
- Minimize Ambiguity: Abstract environments (i.e., those with a high sense of mystery or complexity) can be interesting and challenging to

the healthy, but to the ill they may have counter-indicated effects. Numerous studies show that abstraction in design is not well tolerated by persons who are ill or stressed.

EXERCISES

A) Complete the blanks with appropriate words.

Healing gardens - mental fatigue – landscape – control

1) ……. architecture increasingly addresses the interface between designed natural environments and health.
2) "……." is a term frequently applied to gardens designed to promote recovery from illness.
3) Experiencing a natural environment has the efficacy of decreasing…….
4) A sense of ……. is an important factor affecting a person's ability to cope with stressful events or situations, including stress associated with illness and hospitalization.

B) Answer the following questions.

1) Explain the importance of social support in healing gardens.
……...
……...
……...
……...
2) What is the contribution of the connection between humans and the natural world?
……...
……...
……...
……...
3) How can a garden perform as a healing garden?
……...
……...
……...
……...

ANSWER KEY TO EXERCISES

Unit	Key Answers
1	**A)** 1) the built 2) the project type 3) contractors 4) master plan **B)** 1) It requires a multidisciplinary approach involving environmental science, art, ecology, and much more. 2) The designers routinely visit the site, meet with the client, and work with the construction team to ensure all goes smoothly 3) Landscape architects use initial drawings or 3-D models to propose the big ideas.
2	**A)** 1) region 2) outdoor- the natural environment 3) aesthetics 4) straight lines 5) visual weight **B)** 1) Design is the creative process of responding to conditions and concentrating meaning; and landscape design is the creation of responsive, evocative, meaningful, sustainable, and regenerative landscapes. 2) Circles are a strong design form because the eye is always drawn to the center, which can be used to emphasize a focal point or connect other forms. 3) Meandering lines work well for pathways, plant bed lines, and dry stream beds. Meandering lines can add interest and mystery to a garden by leading viewers around corners to discover new views and spaces. 4) Color is an important element for creating interest and variety in the landscape. Colors have properties that can affect emotions, spatial perception, light quality, balance, and emphasis. One property of color is described relative to temperature—colors appear to be cool or warm and can affect emotions or feelings.
3	**A)** 1) asymmetrical balance 2) Mass collection 3) Gradation 4) adjacent objects 5) fitting **B)** 1) A harmonious composition can be achieved through the principles of proportion, order, repetition, and unity. All of the principles are related, and applying one principle helps achieve the others 2) Ordinary plants can also be used for emphasis by isolating the plant in a container or an open space. 3) Spatially dividing a yard into separate uses is often referred to as creating outdoor rooms and is a fundamental concept of outdoor design.
4	**A)** 1) Hills 2) ranges 3) valleys 4) surveyor **B)** 1) Four common landforms are mountains, hills, valleys, and plains. 2) Landforms are made as rocks and soil are added or removed from a place over millions of years. For instance, mountains form when pieces of Earth are pushed upward. 3) Earth can push a landform upward to create hills.
5	**A)** 1) Geomorphology 2) Deposition 3) Glacial 4) humid **B)** 1)Erosion and Deposition 2) Arid landscapes, Coastal landscapes, Glacial landscapes 3) An environment in which molten rock acts as a geomorphic agent. The process is called 'volcanism' and results in the molten rock being forced into the earth's crust or out onto the surface of that crust (the earth's surface). 4) Intrusive features, found underneath the earth's surface and Extrusive features, found above the earth's surface.
6	**A)** 1) Urban landscape 2) physical and socioeconomic 3) runoff 4) parks **B)** 1) Urbanization is a complex and multidimensional concept with its spatial, ecological,

	economic, social and cultural aspects. It has also caused environmental and socioeconomic challenges. Today more than half of the world population lives in urban environments. Urbanization is a complex and multidimensional concept with its spatial, ecological, economic, social and cultural aspects. 2) The discipline of urban design is concerned with notions of the "good city." It is concerned with how urban environments work for people and support human needs, how physical designs may facilitate or hinder human behavior, how cities look, and what cities mean. It is concerned foremost with environmental quality, measured in many ways but particularly in terms of access, connectivity, comfort, legibility, and sense of place. 3) It uses both nonliving and living materials for design and planning, therefore the outcome is always dynamic and changing. 4) Design is a creative process influenced by designer's experiences, values, beliefs and vision.
7	**A)** 1) pollution 2) GIS 3) increased scattering- absorption 4) local wind **B)** 1) Location, Altitude, Latitude, settings with respect to land profile, location of water bodies, lakes, rivers or ocean in the surroundings, rate of rainfall or precipitation, sun shine, wind direction, and speed of winds, type, size, location and intensity of vegetation and buildings or structures. 2) The conditions for transfer of energy through the building fabric and for determining the thermal response of people are local and site-specific. 3)Landform, Vegetation ,Water bodies ,Street width and orientation, Open spaces and built-form
8	**A)** 1) Urbanized 2) Public spaces 3) Archaeology **B)** 1) It is a detailed regulation method in the urban space, consisting of the multidimensional, urban detail in the physical, socio-cultural and socio-economic contexts. 2) Urban public spaces are places where urban people meet each other. There are some objects that people use in these places. They form site street furniture. 3) • building the basic to investment or land marketing decisions in urban areas • to produce ideas for urban development, to develop subprojects and to build their ability, • to ensure the integration of planned big projects with the city and its inner circle, • to strengthen the existing urban identity profile or create a new spatial identity profile, • to bring the proposal to local policy decision-making, • to prepare construction projects for implementation
9	**A)** 1) urbanization 2) natural- cultural 3) urban 4) ecosystems **B)** 1) (i) accessibility, (ii) urbanization, (iii) globalization, and finally (iv) calamities 2) Vegetation cover also filters out other particles and dust in the air; Green spaces absorb and reduce the noise generated by human activities, especially trees act like noise barriers; Vegetation cover and soil in urban landscape controls water regime and reduces runoff, hence helps to prevent water floods by absorbing excess water; Trees can also act like wind breaker. 3) Their aesthetic contribution to cityscape, employment opportunities during their design, construction and maintenance, health benefits, environments for walking, sports and other recreational activities for no cost at all, etc.
10	**A)** 1) Landscape 2) Ecosystem 3) Environmental 4)Tourism 5)Nature **B)** 1) Landscape is a field which consists of the interaction of human and nature factors, and it is shaped by the way people perceive it. 2) 1. Assessments according to landscape characters in landscape planning and management

	are necessary in ELC. However, every landscape assessment may not be based on characters. (exp: some environmental assessments) (figure 2) 2. It is of great importance to include the relevant groups in the process of landscape protection and development. 3. Approaches towards analysis and assessments based on characters can vary given the purpose and the content. Reasons for the approaches that will be adopted should be clearly specified with the help of scientific sources. 4. Landscape functions should be based on assessments. Beside this, potential functions should be taken into consideration. 5. If an area has a high value in terms of landscape functions that have been evaluated, the value of this area increases. If an area has a high value for one or more landscape functions, the value of this area is still high in terms of functions. 6. Information produced with landscape analysis is the basis for the maps of strategic landscape assessment and with the combination of these assessments, synthesis maps are formed. 3) Yeşilırmak Basin Landscape Atlas can be a guide to managers of the public and an institution (governor, district governor, city manager, village headman and field services of ministries etc.) and the members of civil society organization. It is straightforward to use the atlas since it is created in a language and a mapping system that enables everyone to understand.
11	**A)** 1)hardscape 2) Softscape 3) walls- wallpaper 4) animated **B)** 1) The stone, flagstone and rock are referred to as hardscape; hardscape is all about brick and mortar; hardscape takes care of the spaces, proportion, patios, driveways, arbors and gates. Hardscape includes all those installations that prevent the absorption of water, even from natural rains or artificial sprinklers. 2) Walkways, Driveways, Patios, Swimming pools, Fountains, Stone benches and Arbors 3) No landscape is complete without elements from both categories, but there are pros and cons to think about as you find harmony in your space. First, hardscaping elements are typically much higher in cost. And, if you need a change of scenery in a few years, you'll need to go through the redesign and replacing of hardscape features. Softscaping, on the other hand, is more affordable and can be easily changed. At the same time, softscape elements require more care and maintenance.
12	**A)** 1) high cost – time commitment 2) Google SketchUp 3) 2D drawings 4) building **B)** 1) Development of 3D digital graphics was first led by architecture and industrial design, and then rapidly adopted in landscape architecture. Pervasive arguments for using 3D technologies are that they constantly innovate and may fundamentally change the way that design is perceived and communicated. As a result, an increasing number of landscape architects are applying 3D technologies in order to supplement the traditional 2D methods of design representation. 2) In landscape architecture, the most commonly used 3D software packages include Google SketchUp, ArcGIS, AutoCAD, 3D Studio Max, Maya, and VuE. 3) Communication plays an important role during the design process and landscape architecture is no exception. Communication becomes particularly critical between designers and clients. Majority of the respondents agreed that 3D programs are overall effective in communication. 4) The most compelling benefit is a better communication between designers and clients (reported by 89% of the participants), and as a result increasing clients' satisfaction. Another major benefit of 3D visualizations is that they allow the proposed design to be put in the real context. , respondents also requested future 3D programs to provide fast, yet photorealistic rendering, increase the compatibility with ArcGIS and other geoprocessing tools, provide

	more and higher quality symbols, and improve modeling accuracy.
13	**A)** 1) GIS 2) sustainable development 3) process-oriented 4) software systems **B)** 1) Its contribution is essentially a classification system that identifies and orders the main purposes of models according to the type of questions they address. 2) The technical evolution of hard- and software enable planners and designers to improve participation processes and decision-making using visualization and WebGIS-technologies. 3) Existing Geographic Information Systems (GIS) offer the needed capabilities concerning the whole planning cycle. Data capturing for inventory purpose, scientific-based analysis, defining objectives, scenarios and alternative futures and planning measures can be carried out by using GIS.
14	**A)** 1) costly, slow, and old 2) visible light 3) re-emit 4) speed and direction 5) light Detection and Ranging 6) natural disasters 7) hydrocarbon **B)** 1) Remote sensing makes it possible to access risky and inaccessible zones as it is an unlimited approach that allows its users to collect and analyze their intended information without encountering any serious hurdle. It also has useful characteristics, such as complete and quick coverage of the Earth and also the capability of repeating data collection procedure in a very wide area. 2) The extent of the reflection of the sun light depends on the roughness of the surface and its albedo. As an example, the surface of oceans have little albedo and can reflect only 6% of the sun energy. But snow, because of its high albedo, can reflect almost 90% of the sun energy and only 10% of it is absorbed. 3) In agriculture, remote sensing might be used in irrigation management and also soil moisture monitoring.
15	**A)** 1) landscapes 2) plants 3) colors- textures 4) visual **B)** 1) The principle of "the right plant in the right place" can prevent many common problems associated with landscapes and potentially reduce maintenance requirements. 2) It also is useful to remember that a successful planting design often is a compromise between the science of growing plants and the desire for artistic expression with plants. 3) Plants serve many functions in the landscape, including human comfort, screens and barriers, and soil protection. 4) Plants can effectively modify the microclimate for human comfort by affecting humidity, air temperature, and air movement. Trees and other vegetation cool air temperature through the reflection of solar radiation, which creates shade, and through transpiration (water evaporation) from the leaves. Trees also can provide windbreaks to block cold air or funnel air to increase cooling breezes. 5) Plants prevent erosion in several ways: leaves break the impact of raindrops, rough bark and twigs slow water flow, and fibrous roots near the surface trap and retain soil.
16	**A)** 1) native origins 2) branching pattern 3) short trees 4) span **B)** 1) Our goal should be to have a tree well-matched to its planting site so it survives and thrives. The tree must also achieve our goals for size, shape, function, and appearance and must be affordable. 2) Soil provides trees with physical support, water, mineral elements (sometimes called nutrients), and oxygen for the roots. 3) Ornamental factors include flower and fruit presence and appearance, foliage color and texture, bark characteristics, shade density, fall color, and winter appearance. Some trees have thorns or spines, objectionable odors, a tendency to have basal or root sprouts, or maintenance-related needs that should also be considered.
17	**A)** 1) wind 2) volume- compaction 3) lighter 4) substrate

	B) 1) Containers differ from raised planters in that they are usually smaller in volume and moveable, whereas planters are generally larger, and often built as part of the permanent hardscape (paving, etc.). 2) The greatest challenge in selecting trees for containers and planters is in choosing trees that can survive temperature extremes, and that can establish roots in a limited volume of substrate (potting soil). Consider several factors when selecting containers and trees including environmental influences, container and planter design, substrate type, and tree characteristics. 3) A variety of organic and inorganic components can be used to blend a substrate including pine bark, compost, sand and expanded clay products.
18	**A)** 1) tracheids 2) white cedar 3) larch 4) Hemlock **B)** 1) Leaves called needles. Most conifer leaves are narrow. They have a wax coating that helps keep water inside the plant in winter and other dry times. Conifer seeds grow in cones. 2) Because white cedar wood resists rotting, people like to use it to build decks and other things that will be exposed to weather. 3) Like black spruce, white spruce also can reproduce by layering.
19	**A)** 1) Ornamental 2) Aesthetic 3) Resistant 4) Maintenance **B)** 1) Annual or perennial herbaceous, semiwoody or sometimes woody plants, evergreen to decidious plants, whose above ground parts grow closely to soil surface and cover soil surface densely with approximately 30 cm in height. 2) a-Aesthetic properties; It creates order and integrity in landscape spaces, It provides a natural and aesthetic image with homogeneous color and texture, It provides an organic transition between high-tall plants such as trees and shrubs and the ground, It creates a flexible flooring etc b-Functional Properties; Its functions include expanding the landscape and creating perspective, Iit creates its own microclimate in the landscape, It cools the environment (air condition effect), It holds dust and other particles in the air and acts as a filter, It prevents water and wind erosion. It prevents the top soil from being worn and moved, It is resistant to frequent and short cutting, It resistants to food traffic, It has refresh yourself and close the gaps, It creates the most ideal, healthy and flexible ground for sports games and other recreational activities, It has positive effects on human psychology with green leaves. 3) Its covers not only have leaf properties, but also visual and decorative effects with a wide variety of flowers and berries (Thymus, Hypericum, Veronica and others). It proves to be effective when confined and shaped of grass areas, other plant compositions or structural elements. It covers the soil surface frequently and intensively, providing a homogenous view to the landscape and bringing order. It can be contrast in other plant compositions in the landscape. It contributes to plant diversity and offers higher wildlife value than a monoculture of turf grass. It creates different visual effects in different seasons. Apart from green color, leaves, flowers and even fruit colors create various visual effects and

	contrasts at different times. It balances and establishes an organic link between the grass area and other trees and plants. It does not obstruct the angle of view in the places in which it is used and offers a wide perspective to the landscape. It provides a limited passage at the places of use. It provides an informal contribution to landscape spaces and helps to identify the space.
20	**A)** 1) Bush 2) Miniature 3) Heritage 4) watering 5) fertilizing **B)** 1) They can be placed as accent plants or used to form hedges or ground covers. They offer a rainbow of colors and a variety of forms and fragrances, and their sizes range from miniatures to tall climbing plants. 2) Morning sun is especially important because it dries the leaves, which helps prevent disease. 3) How roses are used depends on their growth habits (as bushes, hedges, shrubs, climbers) and flowering characteristics (number of flowers per stem, single versus double flowers, fragrance). The following classifications are based on the functional uses of outdoor roses.
21	**A)** 1) design 2) unity 3) geometry 4) topography 5) focal **B)** 1) Landscape design is concerned with the functional, spatial and visual layout of a site so that the site is functionally efficient but also develops maximum aesthetic effect. 2) First, by developing a coherent spatial and visual organization ;second, by organizing planting. 3) In most designs techniques such as pattern, proportion, materials, and planting are used to generate unity.
22	**A)** 1) saturation 2) shape 3) inanimate objects 4) plants **B)** 1) Plants perform many positive functions within the urban environment, such as controlling erosion, enhancing water infiltration into soils, and cooling our cities. 2) A simulated blue flower color was the least preferred of all. 3) Vibrant green might indicate a healthy, nutrient-rich plant with high sugar and carbohydrate content.
23	**A)** 1) experiment 2) design 3) learning 4) spontaneous **B)** 1) Design for children requires to know the child, to understand the importance and necessity of play for child, and to know activities children do and want to do especially in public areas. 2) Children learn during the play and play is necessary for the child's development and growth, the play is not limited to younger children, it is an important concept in adults' lifecycle, 3) Children gain a sense of freedom and self-confidence and WHEN a child's respect for other individuals increases, sharing also increases.
24	**A)** 1) multifunctional 2) adventure 3) junk 4) contemporary **B)** 1) Theory by G.T. Patrick from 1916 stated that children's play was a behavior stemming from the need to relax, a way of rejuvenating after mentally stressful work and that it had no cognitive function. 2) This theory gave playgrounds, for example; swing sets, "jungle gyms" and "monkey bars" allowing the children to play like primates. 3) They believed play as a behavior in its own right and viewed play as important for children's social, cognitive and affective development. For example, according to Ellis, traditional playgrounds were no more than a combination of large playthings placed together in one location to provide opportunities for gross motor activities by simulating, in galvanized steel, some primitive jungle setting.
25	**A)** 1) woodland 2) transitional 3) ecotones 4) Mulched 5) natural

	B) 1) The basic considerations of natural design can be broken down into three categories: aesthetic, managerial and environmental. 2) A basic law of almost any native ecosystem is that if nothing is currently growing in a given space, something soon will. The more available space is filled, the less opportunity there is for a weed to enter. 3) To preserve the open landscape then be it lawn, meadow or perennial border we must continuously arrest the successional process by artificially disturbing the landscape in various ways, such as by mowing lawns and weeding perennial gardens.
26	**A)** 1) arsenic 2) Signage 3) surface substance 4) curb **B)** 1) The need for safe, easily maintained spaces, that area accessible to the community as a whole should be considered in designing parks. 2) Sidewalks and paths intended for vehicle use should be at least 8 feet wide. Those that are concrete should be at least 7 inches thick.Rounded corners at park edges will provide protection from invisible intersections with adjacent areas. 3) Herbicide use should be limited. Herbicide use should be limited. Groomed turf slopes should be less than 4:1, with less being preferable. Irrigation systems should take into account solar aspect, wind and topography to minimize the overuse of water.
27	**A)** 1) play area 2) landscape design 3) low maintenance 4) Southern orientations **B)** 1) Landscape design can be defined as organizing and enriching outdoor space by placing plants and structures in an agreeable and useful relationship with the natural environment. 2) The fundamental principle of landscape design is that each development should be based upon a specific program. 3) The landscape designer must study the habits of people and what they do and understand their desires and needs. The landscape designer also must determine what space and materials are available and how they may be used to accommodate these goals.
28	**A)** 1) Regional 2) Trails 3) buffer 4) community **B)** 1)Furnishings should include one drinking fountain, a street light, seating, and a sign that is recognizable to passers by./Restrooms are not required in these parks unless community events are proposed for the park (i.e., along a parade route). 2) View sheds should be highlighted by the placements, housing developments should be provided, Furnishing should be provided, etc. 3) Open Space and Greenways consist of land typically left in its natural state, with passive recreation as a secondary objective. Open space and greenways may include passive recreation facilities such as trails and paths, and interpretive and educational features, in addition to environmental features such as sensitive wildlife habitat, stream and riparian corridors, and wetlands.
29	**A)** 1) Green spaces 2)Habitats 3) Wetland 4) Transportation 5) Rural **B)** 1) The physical environment is considered as all kinds of physical places and environments in which people live for a short or long time, have mutual relationships and participate in various actions. This environment should be suitable for human physiological and psycho-social needs. 2) sustainability, linkage, linearity, integrated into landscape planning and multi-functionality 3) Urban Greenways Recreational Greenways Scenic Greenways Historical and Cultural Greenways Ecological Greenways

	Educational Greenways Riparian Greenways Touristic Greenways
30	**A)** 1) visual monotony 2) wildlife ponds 3) movement 4) animism **B)** 1)The sound of water or water birds/The movement of rivers, waterfalls, waves etc./ The colors of water and coasts /The reflections on the water surface. 2) The important design characteristics of the water consist in its movement, sound, and reflection. It is argued that the water activates all senses and provides numerous opportunities of recreation. 3) When choosing and planning a water feature, make sure that it fits in with the composition of your garden, perhaps using materials that feature elsewhere in the design.
31	**A)** 1)Consumption 2) Freshwater 3) Infrastructure 4) Climate change 5)Urban **B)** 1) Changes that occur directly or indirectly as a result of disruption of global atmospheric activities in addition to natural climate change observed in a given time period. 2) Depending on hot and dry periods, the effect and duration of forest fires may increase. Renewable energy sources such as wind and solar can vary by region, wind speed, Esme intensity and strength. The number of seasonal snowy days and the amount of water that the snow melts may decrease and the duration of the snow-covered circuit may decrease. As a consequence, sudden snowmelt and snow avalanches may increase.
32	**A)** 1) irrigation 2) cost 3) supply 4) flow rate- pressure **B)** 1) Irrigation will help you maintain optimum landscape appearance during the entire growing season and will help insure survival of expensive plant material during dry periods. 2) Over irrigation unnecessarily uses fossil fuels for energy, depletes water resources for wildlife and human beings, and causes pollution when nutrients and plant protection products are transported into surface and ground water via surface run-off and deep percolation of excess irrigation water, respectively. 3) As a riparian water user on a small stream, you have the right to use water but not the right to harm the right of other riparians to use water. Therefore, don't assume you can have access to the entire stream of water.
33	**A)** 1) Ecology 2) Biological diversity 3) Wildlife 4) Environmental awareness **B)** 1) Domestic tourism refers to activities of a visitor within their country of residence and outside of their home (e.g. a Turk visiting other parts of Turkey). Inbound tourism refers to the activities of a visitor from outside of country of residence (e.g. a Spaniard visiting Turkey). Outbound tourism refers to the activities of a resident visitor outside of their country of residence (e.g. a Turk visiting an other country). 2) It contributes to the conservation of biological diversity.It does not harm the character of the natural or cultural environments visited. It gives ecotourists insight into nature and environmental protection and respect. Ecotourism Generated income leads to the protection of natural areas and management of protected areas. It does not exceed social and ecological capacity. Provides economic benefits to local communities and increases revenue. The use of local and traditional facilities and services has priority. 3) Protection and survival of nature and the environment, Interaction with nature and rural life, Being in touch with nature,

	Enjoying and appreciating nature Understanding and appreciating nature, Observing and examining nature, Scientific curiosity and information Social interaction, Self-discovery and awareness Learning and seeing local culture and history
34	**A)** 1) exchange earnings 2) diversity 3) tourism 4) individual **B)** 1)Specialized marketing to attract travelers who are primarily interested in visiting natural areas. And Management skills that are particular to handling visitors in protected natural areas. 2)The efficiency and social fairness of current to ecotourism) for long-term conservation of biological and cultural diversity. And, the risk that unregulated tourists contribute to lowering genetic capital and traditional knowledge belonging to traditional communities; i.e. bio piracy. 3) Certifying ecotourism industries involves gathering data from companies on their environmental and social performance, and then verifying these data.
35	**A)** 1) global 2) threshold 3) satellite 4) area **B)** 1) Remote sensing techniques for assessing forest areas can result in areas used for agricultural purposes or urban development being included rather than excluded in overall calculations of forest area. 2) Defining what constitutes a forest is not easy. Forest types differ widely, determined by factors including latitude, temperature, rainfall patterns, soil composition and human activity. How a forest is defined also depends on who is doing the defining. 3) An assessment focusing on the availability of timber for commercial or industrial purposes may exclude small wooded areas and types of forest not considered to be of commercial value.
36	**A)** 1) organic 2) sand 3) maintenance 4) tree leaves **B)** 1) The short answer is that organic gardening means not using synthetic products, including pesticides and fertilizers. Ideally, organic gardening replenishes the resources as it makes use of them. 2) It includes everything from compost, grass clipping, dried leaves and kitchen scraps to manures and fish heads. Organic matter is used as a soil amendment or conditioner. 3) Organic gardening aims to attract natural pest controllers to your garden.
37	A) 1) Renewable 2)Carbon emissions 3)Energy efficient 4)Precipitation 5)Global warming B) 1) The physical development and institutional operating practices that meet the needs of present users without compromising the ability of future generations to meet their own needs, particularly with regard to use and waste of natural resources. 2) 1. Use of Regional Facilities, Climate Condition, Sun-Shade (aspect) Condition (protection from summer sun, benefiting from winter sun), Wind Condition (protection from cold winds, benefiting from hot winds), Precipitation Rate, Regional-Local and /or Recycled Material 2. Minimal Destruction of the Existing Landscape,Use of Current Topography, Least Excavation-filling, Use of Existing Vegetation, Use of Surface Waters 3. Repair of Degraded Landscape, Soil Repair, Reduction of Harmful Substances, Use of Suitable Plants 3) Sustainable Cities, Ecological Cities, Smart Growth, Slow Cities, Low Carbon Cities, Liveable Cities Digital Cities, Smart Cities,Compact Cities, Sustainability Certification Programs, 'The Sustainable Sites Initiative' developed by the American Landscape Architects Society (ASLA) was used In the field of Landscape Architecture.
38	**A)** 1) Conservation 2)Drainage 3) Sustainable 4) Recreation 5)Scarcity

	B) 1) Population growth / Climate Change / Urban Rapid Development Increasing per capita water use / Aging infrastructure 2) Creation of water-related recreation opportunities like fishing, swimming, boating, and ecotourism opportunities; Minimization of the vulnerability to floods, fires, and other natural disasters; Contribution to water supply for human needs, agricultural and industrial uses; Reduction of water treatment expenses by protecting surface water sources and aquifer recharge zones; Mitigating the effect of climate change by holding huge amounts of carbon and regulating flows during droughts and large storm events; 3) Soil protection and control of erosion, landslide, flood, overflowing, Water production at the desired quantity and quality, Improvement of the socio-economic situation of the basin and rural development, Forestry objectives achievement, Conservation and development of wildlife and biodiversity production, Land use objectives and organizing the use of land, Preserving cultural resources, Land and water management integration, Sustainable irrigation for agriculture, Recreational goals achievement, Reclamation of the degraded land natural resources in a conservative approach, Development of methods in the use and control of natural resources with the advancement of civilization and technological developments, Water ecosystem conservation, their enhancement, and sustainable water use
39	**A)** 1) Green Infrastructure 2)Flooding 3)Metropolitan areas 4) Drainage 5)Pollutants **B)** 1) All of the ecological systems that provide important services such as clean air, drinking water and food are the systems that constitute the "green infrastructure" network of the cities in order to ensure that the city residents can maintain their physical and mental existence in a healthy way. 2)The techniques applied are: green roof, linear channels to concentrate rainwater and permeable sidewalks.
40	**A)** 1) Sustainability 2) Cultural heritage 3) Flora and fauna 4) Natural resources 5) Cuisine 1)Tourism, which contributes to the economy of the country at national and international level, is an important sector which also facilitates the progress of social and cultural development processes. Apart from providing opportunities for using the unique values of countries, tourism activities make great contribution to providing employment, equal distribution of income and the development of rural areas. In this process of development, especially the concept of sustainability gains importance. 2) Culture is everything human beings create in order to sustain their life against nature and together with nature. Culture tourism, which developed as a result of the interest of tourists in cultural heritage, has started with visits to historical sites, museums, ruins, fairs and festivals. 3)Travelers participating in cultural trips are more educated, more curious, more interested, more sensitive to cultural and artistic activities, who are eager to recognize the daily life of the country they go to, who are more respectful to nature, the environment, the culture and traditions of the region, who are willing to know the local people, who are willing to travel within groups.
41	**A)** 1) Zoo 2)Vegetation 3)Entertainment 4)Visitors 5)Exhibition **B)** 1) • A modern zoo must provide the necessary conditions for each animal species to live and should reflect the animal's natural habitat. • In a modern zoo, visitors should be able to learn about the habitat of animals. • A modern zoo should provide the visitor with the opportunity to watch the animal's natural behaviour.

	2)A well-designed zoo consists of three different sections. These include visitor areas, exhibit areas and border elements. 3)Exhibit areas are designed including the topography and the types of plants in animals' natural environments and without including any boundary elements that distort the visual integrity between animals and visitors. Viewing areas are outside the exhibit areas, which decrease the negative effect of crowds on animals and enable animals to exhibit more natural behaviours. Therefore, animals are exhibited in a way that is suitable for their original habitats without destroying their social structure. Visitors walk along narrow and rugged pathways through in the 'immersive' exhibit, so visitors feel the spirit of nature.
42	**A)** 1)Botanical garden 2) Horticulture 3)Restoration 4)Excursions **B)** 1) A botanical park can be defined as a plant center which accommodates as many plant end/or tree species as possible, where scientific examinations are conducted on these plants and which is generally open to public for recreation and sightseeing. 2) While Botanical gardens enjoy important functions such as research, protection and education, it can be said that Botanical parks are defined with more prominent functions in terms of recreational activities (recreation, entertainment, excursions and walks, etc.). 3) 1. Management, education and research zone, 2. Production zone, 3. Recreation zone.
43	**A)** well insulated / reservoir / waterproofed / air conditioning / roof garden **B)** 1) Environmental benefits • Insulates the building against heat and cold • Reduces indoor temperature by 6 – 8 degree • Reduces in the urban heat island effect • Reduces sound pollution • Increases the amount of oxygen in air • Filters air borne particles from air • Controlling storm water runoff, erosion and pollution • Increased habitat for birds, butterflies and insects Economical benefits: • Doubles the life of the conventional roof • Reduces air conditioning cost by 25% to 50% • Boosting urban agriculture • Increase in the building's price 2) Condition of the roof, Structural capacity of the roof, Access to the roof Weight of garden, Cost Design of a roof garden, Irrigation, Drainage Selection of plants and growing media, Maintenance 3) Extensive (shallow) roof and terrace garden system, Semi-intensive (moderate) roof and terrace garden system, Intensive (deep) roof and terrace garden system
44	**A)** 1) micro climate 2) Persian 3) structures 4) Chahar Bâgh **B)** 1) Has a regular border of flowers and leaves and is followed by a wider one of trees- thin and pointed cypress- and shrubs. Each of these borders is enclosed by a thin band with an abstract pattern, suggestion boundary walls and paths. Within these boarders is the garden proper,

	divided into sections by four "river". 2) This is a public, formal garden that puts more emphasis on the biotic element than the hayât and that minimizes structure. Plants range from trees, to shrubs, to bedding plants, to grasses. Again, there are elements such as a pool and gravel pathways which divide the lawn. When structures are used, they are often built, as in the case of pavilions, to provide shade. 3) Planting of trees and selection of species was carefully done in order to improve micro climate inside the gardens. Elements of the Persian garden, such as the shade, the jub, and the courtyard style hayât in a public garden in Shiraz. Sunlight and its effects were an important factor of structural design in Persian gardens. Textures and shapes were specifically chosen by architects to harness the light.
45	**A)** 1) landscape 2) Healing gardens 3) mental fatigue 4) control **B)** 1) Users are encouraged to meet other people, sharing stories or experience and receiving spiritual support or physical aid that can help to re-build their self-confidence and enhance healing. 2) The connection between humans and the natural world is emphasized in ways that go beyond the common professional concerns to re-establish spiritual emotional connections between humans and nature. 3) As Clare Cooper-Marcus and Marni Barnes have noted in their book Healing gardens focus on providing stress relief, alleviation of physical symptoms, and improvement in the overall sense of wellness for both patients and healthcare staff.

GLOSSARY

words	**Meaning**
A	
aerobic (adj)	Serbest oksijenin varlığında yaşayan veya aktif olabilen organizma.
aerosol (n)	Havada asılı parçacık biçiminde (madde).
acid soil (n)	Ph değeri 6,5'ten az olan asit reaksiyonu gösteren toprak.
alkaline soil (n)	Ph değeri 8,5'dan daha fazla olan toprak.
annual plant (n)	Yaşam süresi tek yıl olan bitkiler.
abiotic component (n)	Ekosistemin cansız b*ileşenleri.*
abrasian resistance (n)	*Sürtünme* kuvveti, temas hâlinde olan iki nesnenin arasında oluşan ve harekete karşı koyan kuvvet.
absolute humidity	Bir metre küp havada bulunan su buharı miktarı.
absorption (n)	emilim
access (n)	giriş, ulaşma
access road (n)	giriş yolu, ulaşım yolu
acclimatize (v)	iklime alıştırmak, alışmak
accretion (land) (n)	yer kabuğun büyümesi
acculturation (n)	kültürleşme
acid precipitation (n)	Ph değeri 6,5'ten az olan yağış.
acid rain (n)	Ph değeri 6,5'ten az olan yağmur.
acoustic (adj)	akustik
acoustical glass	Akustik cam, ses kontrolü için çok katlı cam.
active green space	Aktif yeşil alan, iklime uygun tasarlanan ve sürdürülebilirliğini devam eden yeşil alan.
adaptation (n)	adaptasyon
adobe	kerpiç, ince taneli kil
advertising (n)	reklam, ilan
aerial perspective	Atmosferik perspektif olarak da adlandırılan hava perspektifi, uzaktan görülen şeylerin renkleri üzerinde atmosferden etkilenen değişiklikleri simüle etmek için renk modüle ederek bir resim veya çizimde derinlik veya durgunluk yanılsama yaratma yöntemi.
aesthetics (n)	estetik
afforest *(v)*	ağaçlandırmak
agency (n)	ajans

agent (n)	etken
aggregate (v)	kum ve çakıl
agora (n)	kamusal meydan
agreement (n)	anlaşma, uyma
agroforestry (n)	tarımsal ormancılık
agroturism (n)	ziraat turizmi, kırsal bölge turizmi
airstream (n)	hava akışı
airtight (adj)	hava geçirmez
alignment (n)	Düz bir çizgide veya doğru veya uygun göreceli konumlarda düzenleme.
alkaline (n)	alkalik
allee (n)	İki yanı ağaçlı yol veya sokak.s
alley (n)	geçit, dar yol
alluvial (adj)	alüvyonlu
alpine plant (n)	Alp bitkisi
alternative (n / adj)	alternatif
altimeter (n)	yükseklik ölçer
altitude (n)	yükseklik
aluifer	Kifer-ekonomik olarak önemli miktarda suyu depolayabilen ve yeterince hızlı taşıyabilen geçirimli jeolojik birim.
ambiance (n)	ortam koşulu
ambient (adj)	ortam, ambians
ambiguity (n)	belirsizlik
amorphous	amorf
amphitheater (n)	amfıtiyatro
amusement park (n)	luna park
anaerobic	Oksijene ihtiyaç duymayan organizma.
analogy (n)	benzerlik, analoji
analysis (n)	analiz
analytical drawing	analitik çizim
ancient monument	antik anıt
angle of refose	Eğimli düzeyin ufukla oluşturduğu açı.
annual ring	ağacın yaşını gösteren halka
annual plant	bir yıllık bitki
anomaly (n)	anormallik
anthropocentrism (n)	insanmerkezcilik
anthropology (n)	insan tarihi ilmi
anthropomorphize (v)	insan niteliklerini başka bir varlığa vermek
apartment (n)	daire
applied force	uygulanan kuvvet

appropriateness (n)	uygunluk
aquatic habitat	sucul habitat
aquatic plant	su bitkisi
aquifer (n)	yeraltı su tabakası
arabesque (n)	arabesk tarzında yapı/eser
arable land	tarıma elverişli arazi
arbor (n)	çardak, pergole
arboretum (n)	botanik bahçesi
arc (n)	yay, kavis
arch (n)	kemer
archetype (n)	prototip, ilk örnek
architect (n)	mimar
architection (n)	teknik mimari
area (n)	alan
area culture	kültürel alan
area drain	alan drenajı
area plan	alan planı
arid zone	kurak bölge
aromatic (adj)	kokulu
arrangement (n)	düzenleme
art (n)	sanat
art nouveau	Avrupa ve Amerika'da 1890-1910 Yılları Arasında Gelişen Dekoratif ve Mimari Stil
arterial (n)	anayol
aspect (n)	görünüş, bakı, yüz
asphalt (n)	asfalt
asymmetrical balance	asimetrik denge
atrium (n)	Otel vb. bir yapıda ortası açık merkezi alan.
attitude (n)	bakış, fikir, tutum
avenue (n)	bulvar
awning (n)	güneş şemsiyesi
axis (n)	eksen
axis of symmetry	simetri ekseni
axonometric	üçboyutlu ancak perspektifsiz resim
B	
back fill	kazılmış kısımların yeniden imlası, geri doldurma
bare root	yalın kök
background (n)	arka plan
balcony (n)	balkon
bar (n)	demir çubuk

bark (n)	ağaç kabuğu
baroque architecture	Barok mimari, 16. ve 18. yüzyıllarda gelişen ve müzik, resim ve edebiyat alanından sonra mimaride de kendine önemli ölçüde yer edinen akım.
barrier (n)	engel (çit/duvar/korkuluk gibi)
barrier free (adj)	engelsiz
basin (n)	havza
battlement (n)	mazgal
b.b.q (barbeque) (n)	barbekü
beach (n)	sahil, kumsal
beauty(n)	güzel
behavioral science	Davranışsal bilimler doğal dünyadaki organizmalar arasındaki etkileşimleri ve aktiviteleri keşfetmeyi amaçlayan tüm disiplinleri kapsar.
beltway (n)	çevre yolu
belvedere	tepe köşkü, seyirlik
bench (n)	bank, oturma yeri
bench terrace	Bank terasları, suyu tutmak ve erozyonu kontrol etmek için nispeten derin topraklara sahip eğimli arazilerde kullanılan bir toprak ve su koruma önlemi.
biennial plant	Bienal bir bitki biyolojik yaşam döngüsünü tamamlamak için iki yıl süren çiçekli bir bitki.
bike rack	bisiklet park yeri
bikeway (n)	bisiklet yolu
biome	Elli bir doğal ortam ve iklimdeki bütün canlı organizmalardan oluşan karmaşık topluluk.
bioremediation	Biyoremidasyon, bir çevre kirleticisinin mikroorganizmalar yardımıyla uzaklaştırılması işlemidir.
biotic component	Biyotik bileşenler veya biyotik faktörler, başka bir organizmayı etkileyen veya ekosistemi şekillendiren herhangi bir canlı bileşen.
biotope (n)	Biyotop, belirli bir bitki ve hayvan topluluğu için yaşam alanı sağlayan tek biçimli çevresel koşulların alanı.
biotype (n)	biyotip
bonsai (n)	Özel tekniklerle ağaçların saksılar içinde budanarak ve bodurlaştırarak büyütülmesi sanatı.

botanical name	Algler, mantarlar ve bitkiler için Uluslararası İsimlendirme Koduna uyan resmi bir bilimsel isimlendirme.
block (v)	parsel, blok
boarding (n)	Çatı veya kaplama için tahta yapıları.
bollard (n)	İki yeri birbirinden ayıran, tehlikeyi gösteren ve trafiği önleyen yapı.
border (n)	hudut, sınır
borrow pit	ariyet çukuru
botanical name	bilimsel isim
boulder	dere ve sel taşı
boulvard (n)	Ortasında çiçekçiler ve büfeler olan büyük bir bulvar.
branch (n)	dal
branching structure	Ağaçlardan dalların dağılımı ve ayrılma düzeni.
break line	çizgi kesme
breeze (n)	hafif rüzgar
breezeway (n)	örtülü geçit
bridge (n)	köprü
board leaf	geniş yapraklı ağaçlar
bronze age	erken tunç çağı
brownstone (n)	kırmızımsı kahverengi kumtaşı
bud (n)	filizlenmek
budding (n)	göz aşı tekniği
buffer zone	tampon bölge
build (v)	inşa etmek
building (n)	yapı
building stone	inşaat taşı
built environment	yapılı çevre
business park	Kentin etrafında ve kırsal bölgede yer alan bölge, ulaşımı kolay ve ticari ve şirketlerin kurumlamasına müsait olan alan.
by-pass (n)	çevre yolu
bypass (v)	kestirme yol
byzantine architecture	Bizans mimarisi, Bizans İmparatorluğu mimarisi
C	
calciphyte (n)	Kireç bakımından zengin topraklarda gelişen bir bitki.
cambium (n)	Bitkilerin iletim demetlerinde, bir veya birkaç sıra meristematik hücre tabakasından oluşan, ikincil kalınlaşmayı ve enine büyümeyi sağlayan

	doku.
camouflage (n) / (v)	kamuflaj
campus (n)	kampüs
capacity (n)	kapasite
capital (adi)	başkent
caravan (n)	karavan
caravansaray (n)	Kentler arası uzak anayollarda kervanların konaklaması için yapılmış büyük han.
cardinal point	Coğrafi yönler, dünya üzerindeki yer ve varlıkların konumunu tanımlamakta kullanılan, dünyanın kutupları.
carrefour (n)	Birçok yolun kesiştiği noktadaki meydan.
carring capacity	taşıma kapasitesi
carved work	Binalarda ve yapılardan yapılan oyma işleri.
cascade (n)	küçük şelale
case study	vaka çalışması
catalyst (n)	katalizör
catch basin	tutma havzası
caves (n)	mağaralar
ceiling *(n)*	tavan
cemeteries (n)	mezarlıklar
center (n)	merkez
center line	orta çizgi, eksen çizgi
center of gravity	ağırlık merkezi
center of vision	görme merkezi
central axis of vision	görüntünün merkez ekseni
central reservation	yolda yer alan orta şerit
centralized organization	merkezi organizasyon
century (n)	yüzyıl, asır
ceramic (n)	seramik
ceramic tile	seramik kaplama plakası
channel (n)	kanal
chaos (n)	karışıklık
chasmophyte	Kayaların ve taşların boşluklarında yetişen bitkiler.
check (n)/(v)	çatlak
chemical weathering	kimyasal çözülme
church (n)	kilise
cylindrical form	silindirik form
circulation (n)	dolanım, akım
cistern (n)	su deposu, mahzen

citizen (n)	vatandaş
city (n)	kent, şehir
city planning	kent planlaması
city region	şehir bölgesi
city state	Şehir devleti, sadece tek bir şehirle ona bağlı bölgelerden oluşan bağımsız devlet.
civilization (n)	medeniyet
classical (adj)	klasik
classical architecture	Klasik mimari genellikle klasik antik çağın Yunan ve Roma mimarisi ilkelerinden veya bazen daha da spesifik olarak Roma mimarı Vitruvius'un eserlerinden az çok bilinçli olarak türetilmiş mimari.
classicism (n)	Klasisizm, sanatta Antik Yunan ve Roma sanatını temel alan tarihselci yaklaşım ve estetik tutum.
clearance areas	Bir bölgenin infilakla veya başka usullerle mayınlardan temizlenmesi.
climate (n)	iklim
climatology (n)	iklim bilim
clustered organization	kümelenmiş organizasyon
coexist *(v)*	yan yana yaşamak
coherent (adj)	tutarlı, koherent
colony (n)	Birlik durumda yaşayan ayni türden organizmaların oluşturduğu topluluk.
color (n)	renk
color wheel	renk tekeri
column (n)	sütun
comfort (n)	konfor
commodity (n)	ürün
common rooms	ortak alanlar
common (n)	halka açık alan
communication (n)	iletişim
community (n)	topluluk
community garden	hobi bahçesi, ortak bahçe
competition (n)	rekabet
composition (n)	kompozisyon
compost (n)	Bitki artıklarının çürümesiyle oluşan gübre.
comprehensive plan	kapsamlı afet önleme planı
compression (n)	basınç
compressive force	basınç kuvveti

concave (adj)	içbükey
conceive (v)	tasarlamak
concept (n)	konsept
conception (n)	düşünce, fikir
concrete (n)	beton
cone of vision	görüş konisi
conformist (n)	konformist
conical form	konik form
conifer (n)	kozalaklı ağaç
coniferous forest	iğne yapraklı orman
connection (n)	ilişki
conopy cover	gölgelik alan
conservation (n)	doğal kaynakları koruma
consolidation (n)	oturma, sıkışma
constancy (n)	sebat
construction (n)	inşaat, yapı
construction document	uygulama projesi
construction drawing	uygulama çizimi
construction manager	inşaat işletmecisi, yöneticisi
consultant (n)	danışman
container (n)	konteyner
content (n)	içerik
context (n)	şartlar, bağlam
continuity (n)	akıcılık, devamlılık
continuity of outline	çizgi veya tasarımın devamlılığı
contour drawing	çevre çizgisinin çizimi
contour interval	eş yükselti eğrisi aralığı
contract document	sözleşme belgeleri
contraction (n)	büzülme
contractor (n)	müteahhit
contradiction (n)	tezat
contrast (n)	zıtlık
contrive (v)	icat etmek, kurmak
controlled tipping	Kontrollü çöpün açık alanlara dökülmesi.
conurbation (n)	Genellikle bir şehir ve kasabayla kenar semtlerinin birleştiği geniş yayılımlı alan.
convergence (n)	bir noktada birleşme
corinthian order	Korint düzeni, sütun başlarının akantus yapraklarıyla süslendiği ve sütunların bir kaide üzerine oturtulduğu, klasik mimarideki üç düzenden biri.

cork tile	mantar, tıpa fayans
corm (n)	Bazı bitki saplarının altındaki soğanımsı kısım.
corridor (n)	koridor
corridor space	koridor alanı
corrosion (n)	aşınma, çürüme
cortile (n)	Rumların saraylarından yapılan avlu.
cosmopolitan plant	Dünyanın yer yerinden büyüyen bitki.
course (n)	tabaka, yol, rota
court (n)	avlu, oyun alanı
courtyard (n)	Dört yönden çevrelenen avlu.
cover material	kaplama malzemesi
coverage (n)	kapsama
covert (n)	gizli
creative imagination	yaratıcı hayal gücü
creativity (n)	yaratıcılık
criterion (n)	kriter, miyar
cross section	enine kesit
crossing (n)	yol kesişmesi
crosswalk line	yaya geçidi çizgileri
crown (n)	ağacın taçı veya tepesi
crown (n)	sırt bölgesi
cryophyte (n)	Soğuk hava şartlarında yetişen bitki grubu.
cubism (n)	Yirminci yüzyıl başındaki temsile dayalı sanat anlayışından saparak devrim yapan Fransız sanat akımı. kübizm
climate (n)	iklim
cultivar (n)	Kültivar veya kültürvaryete, istenilen bazı özellikleri nedeniyle seçilmiş ve bu özelliklerini çoğaltıldığında koruyan bitki.
culture (n)	kültür
culvert (n)	su yolu, ark
curb cut	kaldırım rampası
curve (n)	kavis, eğri, kıvrım
cut and fill	kazı ve dolgu
cut section	kazı bölümü
D	
daylight (n)	gün ışığı
decay (n)	çürümek, çürük
deciduous (adj)	yaprak döken
deciduous forest	yaprak döken orman
decontamination (n)	arıtma, temizleme

decorative (adj)	dekoratif
deep (adj)	derin
deforestation (n)	ormansızlaşma
deformation (n)	biçim bozulması
delicate flowers	narin çiçekler
delight (n)	sevinç, tat
dense (adj)	yoğun
density (n)	yoğunluk
demonstration garden	gösteri amaçlı bahçe
depending on	bağlı olarak
deposition (n)	çökeltme, çöküntü
decentralization (n)	dağıtılmış kılma
desert (n)	çöl
desertification (n)	çölleşme
design (n) / (v)	tasarım
design concept	tasarım konsepti
design drawing	tasarım çizimi
design goal	tasarım amacı
design process	tasarım süreci
design principle	tasarım prensibi
design guideline	tasarım rehberi
detail (n)	detay
detailed plan	detay planı
detention basin	bekletme havzası
detention structure	tutma, saklama yapısı
develop (v)	geliştirmek
development plan	kalkınma planı
develop spaces	kalkınma alanı
devise (v)	planlamak
diagonal lines	köşegen
diagonal walls	köşegen duvar
diagram (n)	grafik
diffraction (n)	dağılma, kırılma
digital formats	elektronik format
dimensions (n)	boyutlar
direction (n)	yön
discharge (adj)	tahliye etmek
discrimination (n)	ayırım
display (n)/ (v)	gösterme, sergilemek
distance (n)	mesafe
distinct professions	farklı meslekler

distinguishable (adj)	fark edilebilir
diversity (n)	çeşitlilik
dog runs	köpekten kaçmak
dome (n)	kubbe
dominant (adj)	egemen
dominant color	baskın renk
door (n)	kapı, giriş yeri
downtown park	merkezi park
draft (n)	taslak, tasarı
drain (n) / (v)	drene etmek
drainage (n)	drenaj, çekilme
drainage area	drenaj alanı
draw (v)	çizmek
drawdown(n)	su seviyesinin inmesi
drawings (n)	çizimler
draw attention	dikkati çekmek
drinking fountain	su çeşmesi
driveways (n)	ağaçlı otomobil yolu
drought (n)	kuraklık
drought, tolerant (adj)	kuraklığa dayanıklı
dry forest	Tropikal ve subtropikal kuru geniş yapraklı orman, Dünya Çapında Doğa Fonu tarafından tanımlanan bir habitat türü ve tropikal ve subtropikal enlemlerde yer almak.
dump (n) / (v)	çöplük
dune (n)	kum tepesi
dwarf (n)	gölgede bırakmak
dwelling (n)	konut, ikametgah
duplication (n)	çoğaltma
E	
earth (n)	zemin. kara. toprak
earthquake (n)	deprem
earth's surface	yeryüzü
ecologically (adv)	ekolojik olarak
ecological system	ekolojik sistem
ecology (n)	ekoloji
ecosystem design	ekosistem tasarımı
economically (adv)	ekonomik olarak
ecotone (n)	Ekoton. ekoton, belirli popülasyona ait yaşama alanlarının sınır bölgeleri.
ecotourism (n)	Ekoturizm çevreyi koruyan ve yerel halkın

	refahını gözeten, doğal alanlara karşı duyarlı bir seyahat.
edge (n)	kıyı, sınır, köşe
education (n)	eğitim
educational park	eğitim parkı
education courses	eğitim kursları
electric (adj)	elektirik
elements of design	tasarım elemanları
elevation (n)	yükseklik, yükselti
elevator (n)	asansör
embankment (n)	dolgu, toprak set
emboss (adj)	kabartma desenle süslemek
emotions (n)	duygu
emphasis (n)	vurgu
encloses a space	Bir alanı örtmek, kapatmak.
enclosure (n)	kuşatma, kapatma
endemic (adj)	endemik. yöresel
energy (n)	enerji
engineer (n)	mühendis
engineering (n)	mühendislik, teknik
engrave (v)	kazmak, işlemek
endangered wetlands	tehlikedeki sulak alanlar.
enriching (adj)	süsleme gübreleme
entrances (n)	erişmek, giriş
entertaining (adj)	eğlendirici, ilginç
environment (n)	çevre, mühit
environmental design	çevre tasarımı, çevre peyzaji
environmental perception	çevresel algı
environmental planning	çevre planlaması, peyzaj planlaması
environmental pollution	çevre kirliliği
environmental science	çevre bilimi, peyzaj bilimi
environmental conditions	çevre koşulları, peyzaj koşulları
esthetical features	estetik faktörler
erosion (n)	erozyon, toprak aşınımı
evaluate (v)	değerlendirme
evapotranspiration (n)	terleme yoluyla buharlaşma
evergreen (n) / (adj)	daima yeşil
excavation (n)	kazı, hafriyat
evocative landscapes	çağrıştıran çevre, hatıra peyzaj
exposure (n)	sergileme

expression (n)	ifade etmek, anlatım, izah
extensive (adj)	ekstansif, derin, yoğun
exurb (n)	şehirden uzak lüks site
exurbanite (n)	şehir dışındaki lüks sitede yaşayan kimse
eye (n)	göz, görüş
F	
fabric (n)	kumaş
facade (n)	cephe görünüş
fall (v)	güz, sonbahar
family house	aile evi
familiarity (n)	aşinalık, bilinirlik
farming (n)	çiftçilik, tarım
fancy (n)	sevgi, beğeni
fault (n)	çatlak, arıza
fauna (n)	Bir bölgenin özgün kendine has hayvan yaşamı.
feature (n)	özellik, olgu
fence lines	çit çizgisi
fiber (n)	yapı, lif, tel
field (n)	tarla, saha, mera
field stone	işlenmemiş taş, kaba taş
figure (n)	şekil, resim
fill (v)	doldurmak, yapmak
fill section	kesit veya bir bölümü doldurmak
final design	final tasarım, son plan
final master plan	final imar planı, son temel planı
fine needles	ince iğneli
finish hardware	son donanım
fire hose	itfaiye hortumu
flagstone pavers	yassı taş döşemesi
flat (n)	ova, düz, düzlük
flash flood	su baskını, ani sel
flood (n)	sel
flood fringe	Taşkın saçak, taşkın yatağının dışında, genellikle yüzyıllık taşkın veya fırtına olayından kaynaklanan suyla kaplı kısım.
floor (n)	kat, yer, zemin, taban
flora (n)	bitki örtüsü
flower spike	dikenli çiçek
flowers (n)	çiçekler
focus (n) / (v)	odaklama, odak noktası
foliage (n)	yeşilik, ağaç yaprakları

focal point	merkez noktası, odak noktası
foot path	yaya kaldırımı
footprint (n)	ayak izi, iz bölgesi
footway (n)	yaya geçidi, patika
force (n) / (v)	güç, bası, kuvvet
forecourt (n)	avlu, ön avlu, giriş avlu
foreground (n)	ön plan
forest (n)	orman
form (n) / (v)	form, şekil, biçim
forms and patterns	biçimler ve desenler
formal or informal garden	formal ve informal bahçe
fragmented edges	parçalanmış köşe veya kenar
freestone (n)	yonu taşı
front (n)	ön, ön taraf, sima
forum (n)	forum, toplantı
foundation (n)	inşaat temeli, esas altyapı
fountain (n)	süs havuzu fıskiyesi, çeşme, pınar
functional (adj)	fonksiyonel, işlevsel
functional manner	fonksiyonel biçim veya yöntem
fundamental concepts	ana konsept
furniture (n)	mobilya
G	
garden ornaments	bahçe aksesuarları ve mobilyaları
garden walls	bahçe duvarları veya sınırları
gazebos (n)	balkon, çardak, teras
geometric forms	geometrik formlar
geomorphology (n)	jeomorfoloji
germanic languages	Batı Avrupa'daki ülkelerde konuşulan, Hint-Avrupa dil ailesinin bir alt birimi olan Cermen dilleri.
geographic information system (GIS)	Coğrafi Bilgi Sistemleri (CBS)
glaciers (n)	buzullar
glass ornaments	Cam ile yapılan süs veya aksesuarlar
gradation (n)	sınıflandırma, derecelendirme
grade (n) / (v)	derece, sınıf, ton
grading and drainage	ayırma ve drenaj
gradient (n)	eğim, yokuş, rampa
grain (n)	tohum, damar, tane
gradual change	aşamalı değişim
granite (n)	granit, taş gibi

graphic (adj)	grafik
grass (n)	çim, çimen, otlak
grassland (n)	çayır, otlak
gravel (n)	çakıl, iri kum
gravel drain	çakıl diren
gravel path	çakıl patika
green belt	yeşil kuşak
green field	yeşil alan
green turf	yeşil çim saha
green roofs	yeşil çatılar
green house	sera
green surface	yeşil yüzeyler
greenway	yeşilyol
greenhouse effect (n)	Sera gaz etkisi, Dünya, üzerine düşen güneş ışınlarından çok, dünyadan yansıyan güneş ışınlarıyla ısınır. Bu yansıyan ışınlar başta karbondioksit, metan ve su buharı olmak üzere atmosferde bulunan gazlar tarafından tutulur, böylece dünya ısınır. Işınların bu gazlar tarafından tutulmasına sera etkisi denir.
greenhouse gas (n)	Sera gazları, Sera gazları, Sera etkisini destekleyen, atmosferde bulunan ve en çok ısı tutma özelliğine sahip olan bileşikler. Dünya atmosferi çeşitli gazlardan oluşur. Ayrıca küçük miktarlarda bazı asal gazlar bulunmaktadır. Güneşten gelen ışınlar, atmosferi geçerek yeryüzünü ısıtır.
greenness (n)	yeşillik
grid pattern	grid deseni
ground cover plant	yer örtücü bitki
ground water	yeraltı suyu
ground plane	yer düzlemi
groundcover	yer örtücü bitkiler/küçük bitkiler
groundcover forms	yer örtücü bitkilerin formu
ground-hugging plants	yer sargı bitkileri
growing plants	sıcak iklim bitkileri
guard (n) / (v)	korkuluk
guidelines (n)	kılavuz, ana esaslar
gully (n)	kanal, çukur
gutter (n)	dere, çukur
gymnasium (n)	kapalı spor salonu

H	
habitat (n)	habitat, yaşam ortamı
hachure (n)	tarama çizgiler, gölge hatları
hailstorm (n)	dolu fırtınası
handle (v)	tutamak, Işlemek, ele almak
hard water	Yüksek mineral içeriğine sahip su. sert su
hardness (n)	sertlik, zorluk
hardscape (n)	Bir manzaraya dahil edilen yapılı çevre yapılarındaki sert peyzaj malzemeleri.
hardscape areas	sert peyzaj alanı
hardscape materials	sert peyzaj materyali
hardware (n)	malzeme, donanım
hardwood (n)	sert ağaç, ahşap
harmonious (adj)	ahenkli, düzenli, düzgün
health (n)	sağlık
head wall	başını taştan taşa vurmak
healthy design	Sağlık tasarımı, sağlık için yapılan tasarım
height (n)	yükseklik, yükselti
hearing (n)	duyma, duyuş, işitme
heat island	Kentsel ısı adası insan faaliyetleri nedeniyle çevresindeki kırsal alanlardan önemli ölçüde daha sıcak olan metropol alanlar. ısı adası
hedge (n)	çit, önlem
hexagon shapes	altıgen biçim
hierarchy (n)	hiyerarşi, sıradüzen
high-arching tree	gövdesi yüksek olan ağaç
high-rise (adj)	yüksek, çok katlı
hill (n)	tepe oluşturmak küme
historic gardens	tarihi bahçeler
historic preservation	Tarihi koruma, mirasın korunması veya mirasın korunması, binaları, nesneleri, manzaraları veya tarihi öneme sahip diğer eserleri korumayı, korumayı ve korumayı amaçlayan bir çabadır.
holistic (adj)	bütünsel, bütüncül
homogeneous (adj)	homojen, düzgün
horizontal lines	yatay çizgi, çevre çizgisi
horticulture (n)	bahçecilik
horticulture therapy	Amerikan Bahçecilik Terapisi Derneği tarafından, bir kişinin belirli terapötik tedavi hedeflerine ulaşmak için eğitimli bir terapist tarafından kolaylaştırılan bahçe ve bitki temelli

	faaliyetlere katılımı.
hospital stays	hastanede kalış süresi
house (n)	ev, konut, barınmak
human scale	insan ölçeği
humid (adj)	rutubet, nemli
hydrant (fire hydrant) (n)	yangın musluğu
hydration (n)	hidrasyon
hydrology (n)	hidroloji, su bilimi
hypothesis (n)	hipotez, varsayım
İ	
idea (n)	fikir, tasarım
identity (n)	kişilik, kimlik
image (n)	görüntü, resim
imagination (n)	imgelem, hayal, tasarım
impact noise	parçacık darbe gürültüsünün algılanması
imperviousness (n)	su geçirmezlik
implement (v)	uygulamak, yerine getirmek
implied enclosure	anlaşılan çit veya çerçeve
initial drawings	ön çizim, ilk çizim
individual plant	özel bitki
indoor (adj)	içeri, iç mekanlara uygun
inference (n)	anlam, sonuç
infiltration (n)	filtreleme, sızma
infection (n)	enfeksiyon, bulaşma
influence (n) (v)	etkilemek, etki
informal (adj)	informal, düzensiz
innovation (n)	yenilik, yenilenme
insolation (n)	güneşlendirme, güneşe maruz bırakma
integrity (n)	bütünlük, tamamlık
interior decorator	iç dekoratör
interior design	İç tasarım
intentional direction	uluslararası talimat
international park	uluslararası park
interconnection (n)	arabağlantı, birbirine bağlı olma
inversion (n)	evirme, değişme, ters çevirme
irregular polygons	düzensiz polygon
islands. (n)	adalar
isometric (adj)	izometrik
italian gardens	Stilistik olarak simetriye, eksenel geometriye ve doğaya düzen emri prensibine dayanan İtalyan bahçesi.

J	
joinery (n)	marangozluk
junction (n)	yol ayrımı, yol ağzı
K	
key (n)	ses perdesi, kilit nokta
knot (n)	düğüm, budalamak
knot garden	Bir düğüm bahçesi, çeşitli aromatik bitkiler ve germander, mercanköşk, kekik, güney ağacı, limon balsamı, çördük, *costmary*, *acanthus*, ebegümeci, papatya, biberiye, *calendula* dahil olmak üzere mutfak bitkilerinden oluşan çok kare bir tasarıma sahip bir bahçe.
L	
ladder (n)	merdiven
lake (n)	göl
land (n)	yer, arazi, emlak
land art	1960'ların sonunda ABD'de ortaya çıkmış, 1970'lerde tüm batı ülkelerini etkilemiş avant-garde sanat türüdür. Çağdaş sanatın non–art veya anti-form hareketleri içinde yer alan Land art akımı hiçbir sanatsal -izm ile açıklanamaz. Bu akım, doğanın geniş alanlarına insan müdahalesi olarak düşünülebilir.
land fill (n)	doldurma
landform (n)	volkanik arazi şekli
landscape (n)	peyzaj, manzara, tabiat, çevre
landscaping (n)	çevre düzeni
landscape architecture	peyzaj mimarlığı
landscape architect	peyzaj mimarı
landscape design	peyzaj tasarımı
landscape designer	peyzaj tasarımcısı
landscape engineering	peyzaj mühendisliği
landscape planning	peyzaj planlaması
land survey	arazı kullanım araştırması, alan analizi
land use	arazi kullanımı
landing (n)	üretim, sahanlık, boşaltma
landscape ecology	Manzara ekolojisi coğrafyanın ve ekolojinin alt disiplini.
landslide (n)	heyelan
larger-scale projects.	büyük ölçekli projeler
lawn area	çim alanı

lawn panels	çim panelleri
leader line	kılavuz çizgisi
leaf (n)	yaprak
leisure time	boş vakit, uygun zaman, serbest zaman
level (n)	seviye, düzey
lighting (n)	aydınlatma
lightning (n)	şimşek, yıldırım
life quality	yaşam kalitesi
line (n)	Çizgi, satır, şekil, sıra
linear organization	sıralı organizasyon
lithosphere (n)	Yerkürenin kabuğu veya yüzeyi. litosfer
liveable (adj)	yaşanılır
living organism	canlı organizma
load (n)/ (v)	yüklemek, doldurmak
local (adj)	yerli, yerel
local park	yerel parkı, mahalle parkı
location (n)	konum, lokasyon
logical arrangement	mantıklı düzenleme
logical location	mantıklı konum
lona park	Pek çok elektrikli oyuncak ve makinanın bir araya gelmesiyle oluşan eğlence merkezi.
lot (n)	arsa, alan
lumber (n)	kereste
lux (n)	lüks
M	
maintenance (n)	koruma, bakım, muhafaza
man-made materials	insan üretimi materyal
manage (v)	yönetmek, idare etmek
manufacturer (n)	üretici, yapımcı
manure (n)	gürbe
map (n)	harita, planma
marble (n)	mermer, damarlı
market gardening	bostancılık, bostan bölgesi
master's degree	yüksek lisans derecesi
masonry (n)	taş, taşçılık, yığma
mass (n) / (adj)	küme, yığın
massing (n)	kitle, küme
material (n)	materyal
matrix (n)	düzey, matris
matter (n)	konu, mesele, önem

matting (n)	hasır, hasır örgüsü, hasır örme
meadow (n)	çayır
meaningful landscapes	anlamlı peyzaj
mechanics (n)	teknik, mekanik
medieval period	Avrupa tarihinin geleneksel ve şematik olarak üç bölüme ayrılmasında ortada kalan çağ. Orta Çağ
megapolis (n)	metropoller topluluğu, kümekent
memorial (n)	bildiri, anıt
merge (v)	kaynaşmak, birleştirme
meridian (n)	Dünya üzerindeki aynı boylama sahip noktaların birleşmesiyle oluşan yarım daire şeklindeki varsayımsal yaylar. meridyen
mesic environment	puslu çevre
metaphor (n)	metafor, mecaz
metes-and-bounds survey	arazi sınırları analizi
metropolitan (adj)	başkent, metropoliten
microclimate (n)	mikroklima
middle ages	Avrupa tarihinin geleneksel ve şematik olarak üç bölüme ayrılmasında ortada kalan çağ. Orta Çağ
migration (n)	göç, migrasyon
minor change	ufak değişim
model (n)	model
modeling (n)	modelleme
Modern Architecture	19. yüzyıl'ın Eklektisist mimarlığına karşı çıkan özgün yaratma yanlısı tüm mimari akımları. modern mimarlık
monochromatic (adj)	tek renkli, monokrom
monochromatic scheme	Tek renkli renkler, tek bir renk tonunun tüm renkleri. Tek renkli renk şemaları tek bir temel renk tonundan türetilir ve tonları, tonları ve renk tonları kullanılarak genişletilir.
mood (n)	duygu durumu
moorland (n)	bozkır, kıraç arazi
mosque (n)	cami, mescit
movement (n)	hareket, yürütüş
mulch (n)	malç, saman örtüsü
multidisciplinary (adj)	çokdisiplinli, multidisipliner
mural (n)	fresk, duvar resmi
N	

national forest	ulusal orman
national memorial	milli miras, milli hatıra
national monuments	milli anıtlar
national park	milli park
national parkway	milli gezi yolu, milli park yolu
natural environments	doğal çevre, doğal ortam
natural course	doğal süreç, doğal akış
natural grade	derecede doğal sit alanı
natural resources	doğal kaynaklar
natural vegetation	doğal bitki örtüsü
Naturalism (N)	Romantizmi reddetmesinde edebi gerçekçiliğe benzer fakat determinizmi, kopuşu, bilimsel nesnelliği ve sosyal yorumu benimsemede farklı olan edebi bir hareket. Natüralizm
naturalistic (adj)	tabiata uygun, tabiata uygun
naturalistic forms	doğal formlar
nature (n)	doğa, tabiat
nature park	doğal park
nature reserves	doğa rezervatı, doğal koruma alanı
naval (city) (adj)	deniz
needle (n)	iğne
neighborhood (n)	komşuluk, mahalle
Neoclassicism (N)	Antik Yunan ve Antik Roma dönemine ait tarzların yeniden canlandırılmasıyla ortaya çıkan bir akım. neoklasizm
negative space	mahalle, komşuluk
nest (n)	yuva, ev
network	ağ, şebeke
newspaper stand	gazete büfesi
node (n)	düğüm, merkez noktası
noise (n)	gürültü
normative method	Toplumun genel ihtiyaç ve beklentilerine en uygun değer ve normları değerlendirmek veya belirlemek amacıyla sosyolojik çalışmalara teorik, kuralcı bir yaklaşım.
nonessentials (n)	hayati önemi olmayan şeyler
noticeable (adj)	bariz, göze çarpan
nursery (n)	üretme çiftliği, çocuk odası
O	
ocean (n)	okyanus
odd numbers	tek sayılar

official residence	resmi konut
open areas	açık alanlar
open space	açık alan
opportunity (n)	fırsat
orchard (n)	meyve bahçesi
orchestra (n)	orkestra
order (n)	düzen, emir
original elements	orijinal elemanlar
organic edges	doğal olan kenarlar
organic forms	doğal formlar
organize (v)	düzenlemek, organize etmek
organization (n)	düzenleme, organizasyon
orientation (n)	oryantasyon, yöneltme
originality (n)	orijinallik
ornament (n)	donatmak, süs
ornamental plant	süs bitkileri
outdoor recreation	açık hava etkinlikleri
outdoor recreation resources	açık hava rekreasyon kaynakları
outdoor design	dış mekan tasarımı
outdoor space	açık alan
outfit (n)	donatmak
outline (n)	taslak
outlook (n)	görünüm
overdoor (n)	kapı üstü
ovals (n)	oval
oval form	oval form
over-trimmed forms	aşırı kesilmiş formlar
oversee (v)	nezaret
ozone (n)	ozon
ozone-friendly (adj)	ozon dostu
ozone hole	ozon deliği
ozone layer (n)	ozon tabakası
P	
pace (foot pace) (n)	tempo (ayak temposu)
pagoda (n)	Pagoda, Budistlerin dinî yapılarına verilen addır. Pagodalar çoğunlukla taştan, bazen tuğladan ve çok nadir olarak da tahtadan yapılır.
post-modernism (n)	Modernizmin sonrası ve ötesi anlamında bir tanımlama olarak kullanılmaktadır ve modern düşünceye ve kültüre ait temel kavram ve

	perspektiflerin sorunsallaştırılmasıyla ve hatta bunların yadsınmasıyla birlikte yürütülmektedir.
potable water	içme suyu
power (n)	güç, enerji
precipitation (n)	yağış, yağış miktarı
perennial plant	Çok yıllık veya çokyıllık veya çok yıllık bitki, yaşam süresi en az üç yıl olan bitkiler.
preparation (n)	hazırlık, tedarik
presentation drawing	sunum çizimi
perambulate (v)	ölçmek
percentage method	yüzde yöntemi
perception (n)	algı
percolation (n)	sızma, süzülme
pergola (n)	çardak
period (n)	dönem
peristyle (n)	Peristil antik mimarlıkta üstü açık sütunlu koridorlar ile çevrelenmiş dikdörtgen biçimli açık bir avlu.
Persian Architecture	İran ile Batı Asya'nın geri kalan bölümlerinin, Kafkaslar ve Orta Asya'ya özgü bir mimari. İran mimarisi, Fars mimarisi
pervious (adj)	geçirgen
pest (n)	bitki mazarratlısı-zararlı böcek
pesticide(n)	böcek ilacı
pH	Bir maddenin pH değeri hidrojen iyonu [H+] ile hidroksit iyonunun [OH-] derişimlerinin oranına direkt bağlıdır.
phase (n)	aşama
photosynthesis (n)	Bitkiler ve diğer organizmalar tarafından, ışık enerjisini organizmaların faaliyetlerine enerji sağlamak için daha sonra serbest bırakılabilecek kimyasal enerjiye dönüştürmek için kullanılan bir işlem.
phototropism (n)	ışığa yönelim
pizza (n)	pizza
picnic area	piknik alanı
pictograph (n)	resimli grafik
picture plane	resim düzlemi
picture window	resim penceresi
picturesque (adj)	resmedilmeye değer, Ilginç
pillar (n)	sütun

plumbing (n)	su tesisatı
plywood (n)	kontrplak
point (n)	nokta
pollution ecology	kirlilik ekolojisi
polymerization (n)	polimerizasyon
pond (n)	gölet
probe (n) / (v)	incelemek, bulmak
profile (n)	profil
program (n)	program
projection (n)	projeksiyon
promenade (n)	mesire
propagation (n)	yayılma
pale (adj)	soluk
palmette (n)	palmet
panorama view	panorama görünümü
pantheon (n)	panteon
paradise (n)	cennet
parallax (n)	paralaks
parallel (n) / (adj)	paralel
pargeting (n)	sıvamak
park (n)	park
park land	park alanı
parking meter	parkmetre
parkway (n)	ağaçlı yol
parquet (n)	parke
parterre (n)	parter
passage (n)	geçit
path (n)	yol, patika
patio pavers	veranda döşeme
path lines	yol çizgileri
park services	park hizmetleri
pavement (n)	kaldırım
paver (n)	harç karma makinesi
pavilion (n)	köşk
pedstrain (n)	yaya
pedstrain crossing	pedstrain geçişi
pedestrian mall	yaya alışveriş merkez
pedestrian precinct	yaya bölgesi
pedology (n)	pedoloji
pedosphere (n)	pedosfer
perspective (adj)	perspektif, görünüm

pictorial genre	resimsel tür
phenomenon (n)	fenomen
physical linkage	fiziksel bağlantı
placement (n)	yerleştirme
plain (adj)	sade
planning (n)	planlama
plant (n)	bitki
plant bed	bitki yatağı
plant forms	bitki formları
plant selection	bitki seçimi
planted space	bitkilendirilmiş alan
pleasing landscape	hoş manzara
playing (n)	oyun, oynama
pollution (n)	kirlilik
polygons (n)	çokgenler
playgrounds (n)	oyun alanı
popularity (n)	popülerlik
population (n)	nüfus, popülasyon
potted plants	saksı bitkileri
practice (n) / (v)	uygulamak, pratik
primary colors	ana renkler
principles (n)	ilkeler
principles of design	tasarım ilkeleri
private (adj)	özel, kişiye özel
project type	proje çeşidi
proportion (n)	oran
proposed site	önerilen site
psychology (n)	psikoloji
psychological enclosure	psikolojik sınırlama
public (n) / (adj)	halka açık
public gardens	halka açık bahçeler
public feedback.	kamu geri bildirimi
public land	kamu alanı
pyramidal (n)	piramit şeklinde
pyramidal plants	piramidal bitkiler
Q	
quality design	kaliteli tasarım
R	
radiation (n)	radyasyon
railway (n)	demiryolu
rainwater (n)	yağmur suyu

reefs (n)	resifleri
recognizable (adj)	tanınabilir
rectangular (adj)	dikdörtgen biçiminde
region (n)	bölge
regional context	bölgesel bağlam
regenerative landscapes	yenileyici manzaralar
relationship (n)	ilişki
relaxation (n)	rahatlama
repetition (n)	tekrarlama
requirements (n)	gereksinimler
research (n)	araştırma
responsive (adj)	duyarlı
river (n)	nehir
rhythm (n)	ritim
rock (n)	kaya
rock gardens	kayalı bahçeler
rough-finished brick	kaba işlenmiş tuğla
rural (adj)	kırsal
radial organization	radyal organizasyon
radiation (n)	radyasyon
rainfall intensity	yağış yoğunluğu
ramp (n)	rampa
raw water	İşlenmemiş ortamda bulunan ve mineralleri, iyonları, partikülleri, bakterileri veya parazitlerinin hiçbirini çıkarmayan sudur. ham su
reception (n)	resepsiyon
recharge (v)	yeniden şarj etmek
reclamation of land	arazi ıslahı, toprak ıslahı
recycle (v)	geri dönüştürmek
recycling (n)	geri dönüşümlü
reductionism (n)	Olayların veya olguların, onları oluşturan daha basit olguları çözümleyerek anlaşılabileceğini savunan felsefi akım.
reevaluation (n)	yeniden değerlendirme
refine (v)	rafine, arıtmak
reforestation (n)	Genellikle ormanların yok edilmesi yoluyla tükenmiş ormanların ve ormanlık alanların doğal veya kasıtlı olarak yeniden stoklanmasıdır. ağaçlandırma
refuge (n)	refüj

regional landscape	bölgesel manzara
regular (adj)	düzenli
regulating line	düzenleme hattı
rehabilitation (n)	rehabilitasyon
relatedness (n)	ilişki
relief (n)	rahatlama
renaissance (n)	rönesans
render (v)	resmetmek, ifade etmek
renewable energy	yenilenebilir enerji
rangeland (n)	mera
repose (n) / (v)	dinlenmek, güvenmek
resilient flooring	elastik yer döşemeleri
retaining wall	istinat duvarı
retention structure	tutma yapısı
reticulate (v)	ağ şeklinde
revetment (n)	kaplama
rhizomes (n)	rizom, toprakaltı gövde
road (n)	yol, demiryolu
rock (n)	kaya, taş
rock garden	kayalık bahçe
Roman Architecture	MÖ 1. ve MS 4. yüzyıllar arasında merkezi italya olmak üzere Roma imparatorluğunun egemen olduğu Akdeniz havzası ve çevresini etkileyen bir mimâri.
root (n)	kök, kök tutmak
rotation (n)	dsevir, dönüşüm
rough grading	kaba düzleme
rough hardware	kaba donanım
rubber (n)	silgi
rubber tile	lastik yer karosu
rubrics (n)	bölüm, yön
rugged (adj)	kayalık
run (v)	koşu-koşmak
runoff (n)	akarsu, akış
rural (adj)	kırsal, bölgesel
S	
sacred (adj)	kutsal
salient (adj)	göze çarpan, çarpıcı
sand filter	kum filtre
sandstone (n)	kum taşı
sanitary landfill	düzenli çöp depolama sahası

sap (n)	bitki özü
Sassanian Architecture	Sasani döneminde gelişiminde zirveye ulaşan Fars mimarisi tarzı. Sasani mimarisi
satellite city	uydu şehir, uydu kent
scattered groupings	dağınık gruplamalar
scale (n)	ölçek, orantılı olmak
scenery (n)	manzara, doğal manzara
schematic plan	şematik plan
science (n)	bilim
scientific methods	bilimsel metotlar
screen (n)	ekran
sea (n)	deniz
seafront (n)	sahil
season (n)	mevsim
seasonal rhythm	mevsimsel ritim
second order change	ikinci dereceden değişiklik
secondary color	ikincil renk
section (n)	bölüm, kesit
section line	kesit çizgisi
sediment (n)	tortu, çökelti
sediment basin	tortu havzası
seed (n)	tohum
seed pod	tohum kabuğu
seedling (n)	fide, dikme
seismic (adj)	depremsel, deprem ile ilgili
semi-arid zone	yarı kurak bölge
sense of place	mekan ruhu
sensitive (adj)	hassas
separate uses	ayrı kullanımlar
sequence (n)	sıra
service (n)	hizmet
serenity (n)	huzur
setting	ayar, düzenleme
settlement (n)	yerleşme
sewage (n)	kanalizasyon
silhouette (n)	siluet
similarities (n)	benzerlikler
site conditions	site koşulları
site design	site tasarımı
site opportunities	site potansiyeli, site fırsatları
site post-construction	inşaat sonrası site

shade (n)	gölge
shading (n)	gölgeleme
shadow (n)	gölge
shady area	gölgeli alan
shape(n)	şekil
short hedges	kısa çit
shear (n) / (v)	biçilmek
shear diagram	kesme diyagramı
sheathing (n)	kaplama
sheet flow	sayfa akışı
shelter (n)	barınak
shoulder (n)	omuz
shrink (v)	küçültmek
shrub (n)	çalı
sidewalk (n)	kaldırım
sight (n)	görüş, manzara
sight distance	görüş mesafesi
sign (n) / (v)	işaret
signage (n)	tabela
similarity (n)	benzerlik
similarly (adv)	benzer şekilde
simulate (v)	benzetmek
site (n)	yer-site
site analyse	site analizi
site furniture	site mobilyaları
site plan (plot plan)	site planı
site work	site çalışması
skew lines	eğri çizgiler
sky line	ufuk çizgisi
sky way	gökyüzü yolu, asma yol
shrub forms	çalı formları
sketch pad	eskis altığı
sky (n)	gökyüzü
skyscraper (n)	gökdelen
slate (n)	yazı tahtası
slide (n)	kaymak
sliding (n)	kayma
slog (cinder) (n)	zorlanmak, çok çalışmak
slope (n)	eğim
sloping (n)	eğimli
snow (n)	kar

socialization (n)	sosyalleştirme
society (n)	toplum
sociology (n)	sosyoloji
sod (n)	çim, çimen
solar access	güneş erişimi
soil analysis	toprak analizi
soil class	toprak sınıfı
sounding (n)	sondaj
sound intensity	ses şiddeti
sound intensity level	ses şiddeti seviyesi
sound isolation	ses yalıtımı
sound proof	ses geçirmez
stalk (n)	sap
steep (adj)	dik
steepness (n)	sarplık
step (n)	adım, basamak
Stalk (n)	yaprak sapı
stewardship tradition	yönetim geleneği
smooth edges	pürüzsüz kenarlar
smooth lines	düzgün çizgiler
socioeconomic	sosyoekonomik
sod lines	çim hatları
soil (n)	toprak
software (n)	yazılım
solar panels	güneş panelleri
solid edge	katı kenarlar
sources (n)	kaynaklar
spaces (n)	alan
spatial (adj)	uzaysal
spatial perception	mekansal algı
specimen plants	numune bitkileri
spectrum (n)	spektrum
spiky (adj)	dikenli
spines (n)	dikenler
sprawling (adj)	yayılıcı
spreading (n) / (adj)	yayma
square (n)	meydan
square form	kare biçimi
staff (n)	personel
statuary (n)	heykel
stepping stones (n)	basamak taşları

stones (n)	taşlar
stone patio	taş veranda
straight lines	düz çizgiler
straightforward (adj)	basit, açık
strappy leaves	bantlı yapraklar
streams (n)	akarsu, akım
structures (n)	yapılar
style (n)	stil
subgrade (n)	alt temel
subjective experience	öznel deneyim
subsoil (n)	toprakaltı
suburban (adj)	şehrin çevresindeki yerleşim alanları
substituted (adj)	değiştirilen
successional rhythms	ardışık ritimler
succulent plant	etli bitki
sumerian architecture	Sümer mimarisi
Summer Solstice	Yaz gündönümü veya yaz gün dönümü, güneş ışıklarının Yengeç Dönencesi'ne yılda bir kez dik geldiği an. Kuzey yarıkürede en uzun gündüz yaşanır ve günler kısalmaya, güney yarıkürede en kısa gündüz yaşanır ve günler uzamaya başlar.
summer wood (late wood)	ahşap (bahar ağacı) ve geç ahşap (yaz ağacı); erken odun daha az yoğundur çünkü hücreler daha büyüktür ve duvarları daha incedir.
sun (n)	güneş, güneş ışığı
sun deck	güneşlenme güvertesi
sun shine	güneş işigi
sunlight (n)	güneş ışığı
sunshade (n)	güneşlik
surface material	yüzey kaplama malzemesi
survey (n)	araştırma
sustainable (adj)	sürdürülebilir
sustainable landscapes	sürdürülebilir peyzaj
swale (n)	hendeği
sweating (n)	terlemek
symbol (n)	sembol
symmetrical balance	simetrik denge
symmetrical design	simetrik tasarım
synonym (n)	sinonim, eş anlam
synthesis (n)	sentez

system (n)	sistem
systematically (adv)	sistematik olarak
system level of design	sistem tasarım seviyesi
system planning	sistem planlaması
T	
table (n)	tablo, çizelge
tangent (n)	teğet
task lighting	görev aydınlatma
taste (n)	damak zevki
taxonomy (n)	taksonomisi
technic (n)	teknik, yöntem
technology (n)	teknoloji
temple (n)	tapınak, mabet
temperatures (n)	hafifçe yükselen sıcaklıklar
tender (adj)	hassas
thermal comfort	termal rahatlık
thermal insulation	ısı yalıtımı
three-point perspective	üç kaçışlı perspektifi
three-dimensional	üç boyutlu
terrace (n)	teras, balkon
territory (n)	arazi, tarla
tertiary colors	karışım rengi
texture (n)	doku, yapı
tiles (n)	döşeme, çiniler
timber (n)	kalas, kereste
topiary (n)	budama sanatı
tower (n)	kule
town (n)	kasaba, şehir
town space	kasaba alanı, şehir alanı
toxins (n)	toksin
transportation (n)	taşıma, nakliye
trace (n)	İz, işaret
traffic cop (n)	trafik polisi
traffic jam (n)	trafik sıkışıklığı
traffic light (n)	trafik ışığı
traffic volume	trafik yoğunluğu
trail (n)	iz, yol
triangle (n)	üçgen- gönye
transformation (n)	dönüşüm
trans planting	trans dikim, başka yere dikmek

transportion (n)	taşımacılık
transition (n)	geçiş
trash (n)	çöp
trash can (n)	çöp kutusu
travel time	seyahat süresi
travertine (n)	traverten
tread (n) / (v)	basamak
tree (n)	ağaç
tree gate	Ağaç kapısı, ağaçın içinde oluşan bir geçiş kapısı.
trench drain	kanal boşaltma
triumphal arch	Tak, özel günlerde, bayramlarda ve festivallerde, geçit yapılacak caddelere geçici veya sürekli olarak kurulan, günün anlam ve önemine göre yazı, çiçek vb. ile süslenen kemer.
truss (n)	demet
turf (n)	çim, çimen
two-point perspective	çift kaçışlı perspektif
type (n)	tip
typology (n)	tipoloji
U	
unique (adj)	eşsiz, benzersiz
unique patterns	eşsiz modeller
unity (n)	birlik, beraberlik, ünite
urban (adj)	kentsel, şehir
university degree	üniversite derecesi
upward line	yukarıya doğru çizgi
urban design	kentsel tasarım
urban farms	kent çiftliği
urban landscape	kentsel peyzaj
urban matrix	kentsel matris
urban transportation	şehir içi ulaşım
urbanization (n)	kentleşme
user (n)	kullanıcı
utility box	yardımcı kutu
V	
vacant land	boş arazi
valley (n)	vadi
vandalism (n)	vandalizm
vanishing point	ufuk noktası
variety (n)	çeşitlilik

variety of features	çeşitli özellikler
vault (n)	tonoz, kubbe
vegetation (n)	bitki örtüsü
vehicle (n)	araç
ventilation (n)	havalandırma
ventilator (n)	vantilatör
vertical forms	dikey formlar
vertical lines	dikey çizgiler
view (n)	görünüm
vine (n)	asma
vining form	asma formu
visible (adj)	gözle görülür
vision (n)	vizyon
vision light	görüş ışığı
visual appeal	görsel cazibe
visual quality	görsel kalite
visual weight	görsel ağırlık
visualization (n)	görüntüleme
visually pleasing	hoş görüntü
voids (n)	boşluklar
volcanic eruptions	volkanik patlamalar
void (n)	geçersiz, boş
volume (n)	ses, hacim
W	
walkways (n)	yürüme yolları
wall (n)	duvar
wallpaper (n)	duvar kağıdı
warp (n)	eğrilik
waste (n) /(v)	atık
wasteland (n)	çorak, boş arazi
water bodies	su kütleleri
waste water	atık su
waterfront (n)	Denize yakın arsa, su kenarında arsa, liman bölgesi
water floods	su taşkınları
water holding capacity	su tutma kapasitesi
water plant	su bitkisi
water proofing	su geçirmezlik
watering (n)	sulama
watershed (n)	dönüm noktası, sınır
waterway (n)	su yolu

wave (n)	dalga
wavelength (n)	dalga boyu
way in	giriş yolu
way side	yol tarafı
weathering *(n)*	ufalanma, bozunma
weatherize (v)	(binayı) soğuğa karşı korumak
wheel chair	tekerlekli sandalye
weep hole	dren deliği
weeping (adj)	dökülen
width (n)	genişlik
wind (n)	rüzgar
warm colors	sıcak renkler
wispy (n)	bir tutam
water system	su sistemi
wood or ceramic pots	ahşap veya seramik kaplar
work experience	iş deneyimi
X	
xeric (adj)	kuru ve nemsiz (bölge)
xeromorphic adaptation	kuraklığa adaptasyon
xerophyte (n)	çöl bitkisi
Y	
yard (n)	avlu, bahçe, saha
Z	
Ziggurat (zikkurat) (n)	Antik Mezopotamya vadisinde ve İran'da terası bulunan piramitlere benzeyen tapınak kulesidir. Zigguratlar eski Mezopotamya'da Sümerlerde, Babillerde ve Asurlarda bir çeşit tapınaktır. Ziggurat
zoo (n)	hayvanat bahçesi

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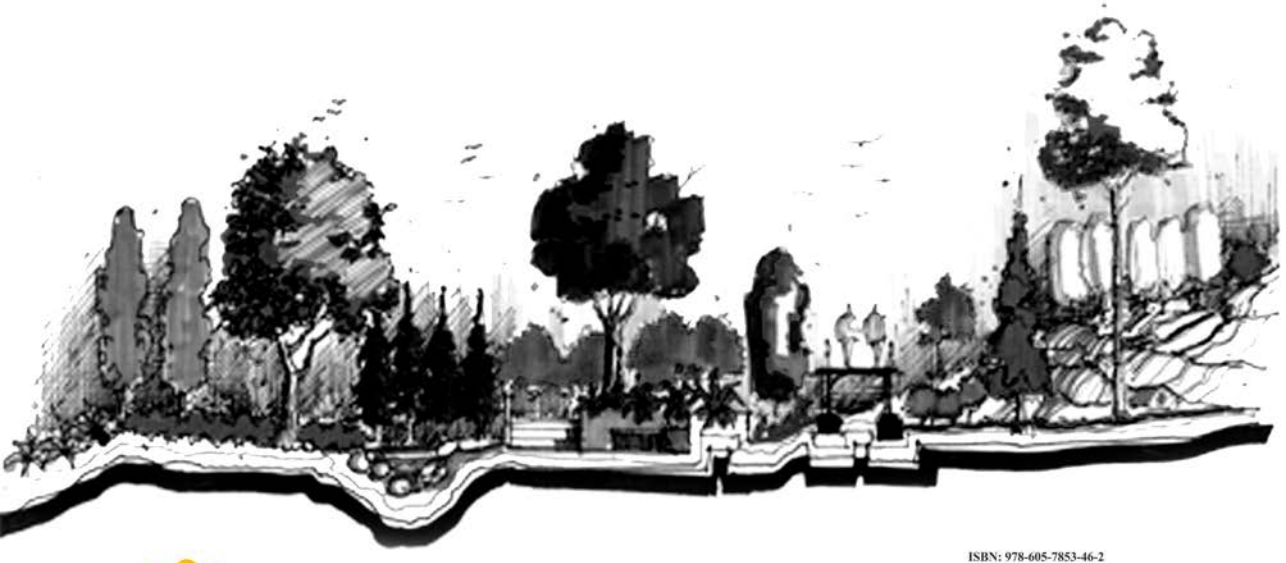
PEYZAJ MİMARLIĞI ÖĞRENCİLERİ İÇİN

MESLEKİ İNGİLİZCE

Doç. Dr. Sima POUYA

Kitap, peyzaj mimarların bilmeleri gereken en önemli mesleki konuları kapsayan 45 üniteden oluşmaktadır. Üniteler, İnönü Üniversitesi başta olmak üzere farklı üniversitelerdeki peyzaj mimarlığı ve yakın meslek gruplarında eğitim veren değerli öğretim üyeleri tarafından hazırlanmıştır. Her ünitede belli bir konuyu ele alınırken metin içinde bulunan önemli kelime ve terimler, ilgili resimlerle açıklanmıştır. Ayrıca her ünite sonunda alıştırmalara yer verilmiştir. Bu kitabın diğer bir özelliği de İngilizce-Türkçe peyzaj mimarlığı sözlüğünün olmasıdır. Sözlükte daha çok kitap içinde bulunan mesleki terimlerin Türkçe karşılığına yer verilmiştir.



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