Landscape and Ecology

Lecture 4

Plant Material

They are valuable natural Resources because the capture solar energy and make it available to food chains. It also produce oxygen and purify water. They influence micro climate. The foliage mass of the trees they provide shading and did also divert the flow into our away from the use areas. And because of the evaporate transportation process, evaporate cooling occurs. And plant materials are products of biological processes operating in a specific place and time. We also learned about the process of succession in the first unit. So in this process the pioneer species died and decay and a create favorable environment for other higher level species. So this indicates that plants and habitat change together interdependently and they are always in a state of dynamic equilibrium. Plant provide many environmental benefits as we discussed earlier it modifies micro climate it provides shades and and it diverts the winds. It can act as shelter belts. And it can also prevent soil erosion .plants can also be used as buffer zones against sound and air pollution. Especially in industrial areas planting can be used to reduce air pollution and they can also be effective in controlling sound pollution. For example A Hundred feet wide planting can reduce the sound level as much as 7 decibels. Plants can play important functions in design. Designer can use plants for defining a space in a landscape. Large areas can be divided into smaller spaces. It can also be used for screening and blocking undesirable views. It can also be used to in frame a view or focus on any other Focal Point. It can be used to emphasize an entrance or a direction. It can act as a background or foreground to a composition or an element. In order to achieve this functions we need to understand the characteristics of plants and how it can be used in designs. So we will discuss about this aspect now. That is use of plants as landscape design elements. This process is known as planting design. So what is planting design?

It is the selection and placing of suitable plants within the overall design of the landscape so that the plants chosen perform specific functions and create the desired visual effect. In order to achieve this we need to have an understanding of the characteristics of individual plants and the knowledge of how plants can be used to fulfill various design requirements. So in this lecture we will first discuss about the characteristics of individual plants. Many of us are fortunate enough to see the different kinds of plants around us. Most of us tend to notice plants when they have bright and colorful flowers something like this. Sometimes we notice or differentiate between small shrubs or large trees. Maybe on a hot summer afternoon we might notice that some trees have huge canopy and they provide shade where as some trees don't. Some of us might have noticed trees have different kinds of leaves some leaves are really small where is some trees have big leaves. These are some of the important characteristics that the designer need to understand so that they can be exploited in the design to achieve the intended design requirement. First we will discuss about the classification of plant required materials based on different characteristics. We will start with size, habits of growth, form, flowering characteristics, foliage characteristics, growth rate and lifespan. First we will start with. Size size

is the broadest level at which plants can be classified. As shown in the figure plants can be classified into trees, shrubs and ground cover.

Trees are defined as plants having a single stem growing to a height greater than 5 meter. Trees can be further classified into large trees, medium trees and small trees based on their height. Shrubs are defined as Woody plants and are often multi stems and low branching. Again can be classified into large, medium and small shrubs based on its size. Ground cover are low growing, prostrate, and surface covering plants. They grow up to a height of .3. Again the dimension mentioned here are conventional numbers. Different Classification systems give slightly varying numbers. Another thing is it is very difficult to put plants in definitely into certain categories. For example sometime a small tree Negro as a large Shrub due to environmental conditions that is growing conditions. For example here this is a plumeria species where we can see the characteristics of a tree. It has single trunk and a large canopy. Whereas here the similar species has grown into Ashram where we can see low branching multi stems. The next Characteristics that we are going to discuss is habits of growth. When we discuss about the appearance of plants two terms are often used. One is habit and the other is form. Habit can be described as the growth style, or the direction of growth or natural growth tendency of a specific plant type. Where the form is is defined as the mass contained within boundaries of the extremities of growth. So for example we can see the different types of habits of plants and habits are mainly identified by how their branches originate, how they divide and their growth pattern. So based on this plants can be broadly classified into 5 types. One is vertical this is the most common type. We might see lot of trees around us, trees and shrubs with this characteristics where the branches grow vertically. A common example for this is Neem tree the botanical name is azadirachta Indica. The second type is horizontal. Here the branches grow horizontally as we can see here. So this kind of plants they are distinct and standalone. They can be used as focal points. An example for this is Indianalmond tree or the Indian badam tree. Botanical name is terminalia catappa. Third type is weeping type. In this case the branches drop down from the main branches. So these are very good focal points. And these kinds of plants are generally used near water bodies and the flowing characteristics of the branches lead the eye of the observer to the water body. An example for this is bottle brush tree, callistemon species. The next type is pendulous type. You are the branches grow upward and then the branches dropdown the end. This again can be good focal points. They can also be used for softening effects against buildings. The final type is tortuous or twisted. Here the branches are twisted. Due to its branching pattern these kinds of plants tend to visually quarrel with other plants. You should be very careful when we use these kinds of plants in landscape they can be very effective with Rock and water and they can also be used for focal points if it has an interesting form. An example for this is Indian Coral tree or erythrina indicia species. We discussed about the different habits of growth of plants such as vertical horizontal, weeping, pendulous and tortuous. Some plants consist a habit of growth but sometimes because of external environmental conditions such as wind, availability of Sunlight the habit of growth is slightly modified. Next we will discuss about form of the plants. Based on the form plants can be classified into many types. Well look at some examples for form.

Globular- these are some spherical plants where the foliage forms a ball of equal height and width with the base curving in. These kinds of plants are non-directional. They form a formal

shape. And they can become good Avenue trees and shrubs. They can also be minor focal points. An example for this is Neem tree. Next form is oval. In this kind of farm height is greater than the width and the base turns inwards. This can be used in formal planting they are good Avenue plants. An example for this is fountain tree or African Tulip tree. The botanical name is spathodea campanulata. Domical plants have rounded top with the width of the foliage greater than the height. The associate well with other shapes so they can be used in combination with other kinds of plants. An example for this is Rain Tree. The botanical name is albizia Saman or samanea Saman. Conical plants they act as an accent among other plans so they can be used in formal planting and they can also be used for focal points. An example for this is Thuja orientalis. In column null plants the height is much more than the width. Height is more than 5 times the width. We should be very careful when we use plants with this characteristics. If it is wrongly placed it can become an iso. Example for this is mast tree or false ashoka tree. Botanical name is polyalthia longifolia . The next form we are going to discuss is fan of vase shape. These kinds of plants are narrow at the base and spreads at the two such plants can make an attractive arch as we see here. An example for this is Travellers palm. Most of you might have seen shop plants in public parks. The botanical name is ravenala madagascariensis. The last form that we are going to discuss is irregular. These kinds of plants have no definite shape. They are irregular and they can be used against buildings they can also be used as focal points. Example is Indian Coral tree- erythrina Indica. In some plants the Habit aspect of the plant is dominant, whereas in some plants their leaves hide the branching patterns so the form becomes more prominent. Generally in shrubs the form aspect is more prominent. And we need to remember this when we are selecting plants.

Flowering Characteristics

The next characteristics we are going to look at is flowering characteristics. In some plants the flowers appear in profusion like this. What we are seeing here is a tree species lagerstroemia Indica. And these kinds of plants have bold visual impact. where as in some plants flowers are less profuse or last for a shorter period. So as we can see here there are plants but they are not very prominent. This is a thespesia populnea tree. These plants have subtle visual impact these are the basic two types based on flowering characteristics. But when we are selecting a plant for its flowers we need to consider the flowering season, the color of the flower, density and distribution of the flower, botanical characteristics of flowers such as single and cluster. The images you show the plants with two contrasting flowering characteristics single and cluster. The density is really high and here the cluster is very low. Another characteristics that we need to consider is the presence or absence poly foliage during the flowering period. The next characteristics that we are going to discuss is foliage characteristics. All of you might be knowing about evergreen tree or deciduous trees. Evergreen tree do not lose their leaves fully. They lose their leaves a little bit but not all at once. But the deciduous trees close all the leaves once or twice a year and they become completely leafless. There is other category in between which is Semi deciduous have a brief deciduous period they do not lose all their leaves. They just lose some of their leaves. Show the density of the leaf is reduced. Discussing the foliage

characteristics the texture becomes very important. What is texture? Texture is a visual grain or coarseness of the perceived surface. This is determined by the leaf size, and branch size, dark articulation, growth habit, viewing distance. Based on these plants can be classified into coarse textured, medium texture and fine texture. What we see here is a course texture plant. Generally course texture plants have large sleeves and massive branching. Whereas fine textured trees have small leaves and they have thin branches and fine twigs. Example for coarse texture tree is plumeria species whereas fine textured tree plants are neem or Rain Tree has full foliage. The final characteristics that we are going to discuss is the growth rate and lifespan. Generally there is a relationship between growth rate and lifespan. Fast growing species have shorter life and they have sparser foliage. They are appropriate in situations where the quick results are desired for example as windbreaks shelterbelts. They can be used nurse plants where they grow very fast and protect the other plants. Sample for fast growing species eucalyptus and Subabul. In contrast to the fast growing species slow growing species have longer life. So it is used for its sustained environmental benefits. They are used along roadside, used in campuses, townships and public landscapes. Example for a slow growing species is banyan tree. A Banyan Tree takes more than two decades to grow to a height of 10 metres, where growing species such as subabul fast is takes just less than 5 years. Those fast growing species have very less lifespan, whereas treed such as banyan tree can grow for 100 years. We discussed about the classification of plant material based on different characteristics. So all this classification gives us an idea about different characteristics of plants.

Space Structure

Next we will discuss about how plants can contribute to the space structure of landscape. When we are designing the spaces for people the size of the plant a relative to the dimension of human figure becomes important. Height is an important factor here. Because height of the plant determines the spatial framework, vision control movement and physical experience. So based on the human dimensions five size categories of plants are identified. They are ground level planting, below knee level plants, knee to waist level plants, wait to eye level plants and above eye level plants. So based on this we are going to discuss about different categories of plants and how they can be used to define or structure that spaces. We will start with ground level planting. This is also known as carpeting plants. Its primary spatial role is it act as a Floor. As a floor it neither abstracts vision nor movement. And they provide visual link to the related areas. It can be used occasionally for circulation purposes. For example as we see here the carpet planting here in this case it is a lawn and it can be used for circulation purpose. And using carpet planting we can create patterns on the ground. This is an example. For carpet planting on ground level planting we can use grasses and other turf plans we can also use herbaceous plants and other ground level plans. Examples are Ipomoea batatas and wedelia trilobeta. It is much easier to remember things botanical names if you understand the characteristics. For example in this case this particular plant if you look at the leaves there are 3 loaves. Hence the name trilobeta. We discussed about ground level planting. Next we will discuss about below knee height planting. This is also known as low planting. It allows uninterrupted vision as it doesn't encourage movements. As we see here it doesn't abstract the view this kind of planting again can be used to create patterns which can be viewed from above and appreciated. Low planting can be used to

form a carpet of foliage below taller plants. If we see here this low planting forms carpet of foliage. This can also be used to edge larger shrubs as well. As we see here these are low planting .example for low planting or shrubs are vinca rosea, vinca alba and many varieties of coleus species. Next we will discuss about knee to eye level planting. We have categorized them into 5 but we are going to combine these two. Knee to eye level planting. Planting between knee and eye level. This kind of planting abstracts movement and it allows the vision. This is also known as medium Shrub planting .as we can see here it obstructs moment but we can see what is there beyond. As a result this can be used to separate hazardous areas or sensitive areas from the pedestrian path. It can also be used to emphasize direction or the direction of circulation as we see here. Here is another example that emphasizes the direction and circulation of path. Medium shrub planting can also be used to find the territory .in this case it almost acts as a fence a small wall. It can be used to improve privacy within the building. Here are some of the examples .so here these kind of plans near the building it provides privacy within the building but at the same time it allows sunlight inside. It can also be used for as focal points. They can make minor focal points as we see here. And in this case the scrubs are focal points. These low planting connects all these plants and forms a carpet. Examples for medium shrubs are lantana and eranthemum species. Next we will discuss about above eye level planting. For above eye level planting. Tall shrubs and trees are used, though we will discuss this into 2 different categories. We will start with tall Shrub planting. Tall Shrub planting actually above high so it forms both physical and visual barrier. As a result it can give privacy and provide shelter as well as we see here it completely closes the space. So it provides privacy and encloses the space. Tall Shrub planting can act as a backdrop against which we can display artifacts and elements. Here this dark green backdrop is very effective in displaying a white marble statue. Tall shrubs on its own can act as a Focal Point or it can also be used to frame vista or Landmark at a distance. Examples are nerium oleander and the vetiya peruviana. The final category is above eye level planting and under this tree planting. Tree planting can have different effects. For example in case of a large tree, the canopy when it is about the eye level we can see only that trunks and such trunks can only imply a space. Where the foliage is in case of a small tree can be at high level in that case they enclose the space. As we see here, in this case we can see the trunk enclose the space and some more examples the trunk of the tree they just imply the space. Whereas the canopy when it spreads about the head that also implies an overhead plane. In addition to these functions a tree planting can be very effective as buffers and as screens. They can be used as a buffer to protect sensitive areas from the incompatible activities or it can also be used to screen and separate different activities. Tree planting can also be used to integrate large structures into their landscapes as we see here this industrial structure is soft an integrated into the landscape with tree planting and other low level Shrub planting. Trees can be used to frame or emphasize landmarks as we see here. A single or a large tree can become a landmark or a meeting place. Example here is a banyan tree. So this huge Banyan trees can act as a landmark and they can also be effective meeting place. With this we have come to the conclusion of this lecture. Best lecture help you understand one of the important materials in landscape Architects design palette that is the plant material and the last lecture we discussed about water and landforms. In this to lectures we primarily focused on spatial and visual aspects of the plants. But it is important to remember their use in design has environmental implications and potential. Because designed landscapes

depend on multiple resources such as energy, water and mineral nutrients. As environmentally responsible designer we need to minimize these inputs in designed landscape. Because decision on land selection, use of water features and modification of landforms in a design needs to be made with resource conception in mind. For example when there is a mismatch between growth requirement of a plant and the site condition landscape can consume a lot of energy. In this case we are designing landscapes that are resource hungry. One Way to approach this problem is to consider the entire site as a functioning system with inputs and outputs and within that there is an internal cycling. In case of an open and sustainable system there are a lot of resources that goes as input into the internal system. There is minimal recycling or reuse of materials within the system and as a result there is a lot of output as a waste or as run off pollution. To avoid this we need to create closed systems. In closed systems we have minimum input they are mostly renewable material and then within the system all these elements or resources are recycled and as a result there is very little output. The output will also be a clean water and also very minimum toxic materials. So it is best to create closed systems. Closed systems can be created at various scales starting from site scales at global level. But as a designer it is best to consider a site level and create a closed system at lowest hierarchy levels that is low site plant level.