



# Landscape Architecture in India

A R E A D E R

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*Plants maintain the earth's ecological balance. In landscape architecture, their prime function is to restore this equilibrium when it is threatened, and additionally to provide environmental comfort, to define and embellish spaces, and to add visual interest; in short, to impart character and life to urban and rural settings.*

# Plants in Design

Compiled and edited with inputs from **K C Singal**

MATCHING PLANTS TO PLACES | PLANTS

## Matching Plants to Places

Plant selection and planting design begins with knowledge of **plants**, an understanding of the **place** (the site) where landscape design is proposed, and creative ideas about the **use** of space and plant material within the site. It involves making thoughtful decisions about the selection and arrangement of plant material to perform specific **functions** in the proposed landscape.

The effective use of plant material as a medium of design requires familiarity with :

- Plant physiology, metabolism and growth, nomenclature and scientific classification (Botany),
- Plant communities (Ecology and Forestry),
- Plant growth, maintenance and production (Horticulture),
- Plant form and visual appearance (Art and Design).

Conditions as they exist on the site play a major role in guiding choices, because for long-term success the growth requirements of the plants chosen need to broadly match the growing conditions that will prevail for the foreseeable future. Second, plant material has to be organized to meet functional or aesthetic requirements arising out of site planning, the architectural layout and the landscape design brief. Its form, physical characteristics and visual appearance should be appropriate to those needs.

### Sites

Approaches to planting design vary depending on site location and use, In large-scale infrastructure or industrial development in rural areas, environmental laws mandate vegetation cover over a substantial percentage of land within the boundaries of the site. Planting schemes in these projects are broadly based on afforestation with species selected from the native forest type of the region.

On very large rural sites it's important to recognize that the particularities of location must guide the planting strategy for each site. For example, planting design for a site located in a semi-arid, ravinous and degraded landscape would be quite different from that planned in a project being developed on formerly well-irrigated agricultural fields, or that proposed for the environmental restoration of areas subject to open-cast mining. Similar variations would exist between sites situated in hilly terrain and those on flat or low-lying land, or again, sites that are enclosed in valleys and those lying in more open tracts, on the banks of rivers, or skirting large forests.

In urban situations, as elsewhere, planting design is of course determined by the local soil and climatic condition, but apart from that, the great variety of uses found in urban sites are the main determinants of design. Each kind of site, be it campus, urban extension or township, health facility, office and commercial plaza, heritage precinct or any of the numerous other kinds of developments demands that plants be used to suit its specific requirements.

### Functions

In landscape design as in nature, plants are as vital to the well-being of land as they are inseparable from the human perception of landscape - as scenery and also as experience.

Vegetation shelters sites from extremes of temperature and wind-velocity, affording protection to human settlements, and to livestock and crops in the countryside. Plants are critical to soil conservation –

improving soil structure and fertility - and to the maintenance of bio-diversity and wildlife habitats, to the rehabilitation of degraded landscape and the restoration of forest cover. Rows of trees and shrubs planted as windbreaks and shelterbelts act as a sink for suspended particulate matter and polluting gases.

The articulation of space in landscape architecture is largely an outcome of how plant material is used to enclose, define and distinguish each part of the scheme. Planting concepts often seek to realize a variety of visual or design objectives: for example, plants, or planting as a counterpoint to architectural built form; or, to



*The form, physical characteristics and visual appearance of the plant material should be appropriate to the needs of the site.*



bring a sense of scale to the outdoor environment, tree clusters and belts as the main structuring elements of the scheme, especially in large-scale projects whose extent and dimensions may not otherwise be easily appreciated.

Sensitively evolved planting schemes exploit seasonal changes and variations in foliage and flowering characteristics of plant material to provide an almost unlimited range of memorable experiences whilst performing such quite ordinary design tasks as the creation of enclosure, the extension or termination of views, or the careful punctuation of space with visual incident.

## Plants

The range of plant material extends from the smallest plants, growing to perhaps only a few centimetres above the ground, or creepers and climbers, to massive trees towering to heights exceeding 30 metres. Plant material when it is used as a medium of design, as in gardening or landscape architecture, is conventionally classified on the basis of size:

- Ground-covers: low-growing plants that can carpet large areas of ground and unify a designed landscape; easier to maintain than grass; useful in soil conservation and slope stabilization,
- Small medium and large shrubs: woody plants usually with multiple stems arising from or near their bases,
- Small medium and large trees: woody plants, usually single-stemmed from the ground, with a bare trunk and a well defined canopy,
- Creepers and climbers,
- Herbaceous and seasonal plants.

Apart from its ecological objectives, designing with plants has an emphatically aesthetic purpose. Plants are chosen on the basis of their appearance that is their branching pattern and the shape of the canopy, foliage colour and density, and their flowering characteristics. Additionally, their ability to thrive in specific growing conditions, their rate of growth and their life-span are very significant factors.



In gardening, plants can be classified on the basis of size as ground cover, shrubs, small medium and large trees and creepers and climbers.



Growth habit determines plant shape, and trees are recognized by their typical branching patterns and canopy profile.

## Appearance

### Form

The botanical term generally used to describe the growth form of a plant species is "habit". A plant may be of fastigiated or columnar habit as say tall narrow trees like Silver Oak or Poplar; or it may be multi-stemmed and spreading like most shrubs. Branches and foliage drooping downwards is a habit distinctive to Weeping Willow and Bottlebrush trees. Growth habit determines plant shape, and trees are recognized by their typical branching patterns and canopy profile.

Visual effects of accent, contrast or harmonious blending can be variously achieved by combining plants on the basis of their differences or similarities of form. Plants which exhibit a consistent habit of growth (e.g. *Alstonia*, *Ashok*) are valued for use in places where a formal or sym-

metrical effect is desired, for example in avenue planting. Plants whose growth may vary appreciably from specimen to specimen (e.g. *Dhak*) are useful in groves or places where asymmetry adds to their visual charm.

### Foliage texture

Seen from a distance, plants are often recognized by the characteristic texture of their foliage, a result of the play of light and shade on their leaf canopy. The foliage of smaller leaved plants such as *Neem* or *Gulmohar* appears to be of a finer visual texture than that of large-leaved species, like *Plumeria* or *Banyan*. The areas of light and shade are larger in the latter case and their appearance is therefore bolder.

The shape of individual leaves or leaflets has a significant bearing on the appearance of the foliage. Long narrow leaves, such as those of bottle brush (*Callistemon*

*viminalis*), willow or *Acacia auriculiformis* impart a light, feathery appearance, whereas the foliage of trees like *Gular* (*Ficus glomerata*) or *Maulsari* (*Mimusops elengi*) seems heavier and darker.

The physical texture of their leaves affects the appearance of plants. Rough-textured leaves (*Har-singar*, for example) collect dust and look dull most of the year, while the much smoother leaves of plants like *Kaner* (*Thevetia peruviana*) appear fresher and greener, because dust is easily blown away or washed off by rain.

Tree masses are usually seen from a greater distance than shrubs and clear contrasts in texture highlight the distinctive foliage of individual species. Shrubs and ground cover plants on the other hand, are best seen close-up, hence more subtle combinations of contrasting or blending foliage texture can be appreciated.



Plants are often recognized by the characteristic texture of their foliage, a result of the play of light and shade on their leaf surface. From left or right: Fine texture foliage of *Azadirachta indica* (*Neem*), smooth leaves of *Nerium oleander* (*Kaner*) and bold texture of *Plumeria rubra* (*Champa*).





### Foliage colour

Changes in the foliage colour of trees occur most dramatically in spring and autumn, when new leaves sprout and the old ones die and fall, respectively. Autumn colour is more pronounced in the temperate climate of hilly regions, for example the fiery red and gold of the *Chenar* in the Kashmir valley. But even in the plains trees such as *Kosum* (*Schechleichera oleosa*) are valued for the remarkably bright red colour of their leaves when they are new.

There is a much greater range of foliage colour in shrubs and ground-cover plants. Species like *Acalypha* and *Codiaeum* (Crotons) and *Dracaena* species are known for the brilliant variegation of their leaves, and are often used to add colour to planting schemes otherwise dominated by shades of green. Colour variation in the foliage of shade-loving ground-cover plants is particularly striking, Light or golden coloured leaves of plants such as *Syngonium* and *Scindapsus* (money-plant) brighten up areas under the shadow of trees and shrubs, or in courtyards receiving little sunlight.

### Flowering

Landscapes dominated by a particular kind of tree - often a fruit tree such as apple or cherry - look spectacular during the flow-

ering season; they are part of the culture of a region and are marked by festivals and folklore – as say the spring flowering of almond trees in the historic Badamwari at Srinagar, or indeed the renowned Japanese Sakura festival of cherry tree blossoms. Plants are distinguished by the colour and profusion of their bloom, but the significance of flowers extends beyond that of just prettiness or ornament - they have a place in myth and ritual; the flowers of many species define geographic and cultural identity. And of course the phenomenon of flowering itself symbolically affirms the process of change, decay and renewal central to life and nature.

Considerations that enable a planting concept to creatively utilize the extra dimension represented by flower colour and fragrance include:

- When and for how long the plant is in flower: shrubs are a very consistent source of colour because they remain in flower for a much longer period of time, e.g. *Chandni* (*Tabernaemontana coronaria*), Hibiscus or Oleander. Many trees have a relatively short flowering season as for example Jacaranda (less than a month in Delhi), whereas trees such as *Gulmohar* and *Amaltas* are

Plants with various colours of foliage are used to add colour to the planting schemes otherwise dominated by shades of green.

LEFT TO RIGHT: Plants with coloured foliage – Crotons, *Syngonium* and fresh red coloured leaves of *Schleichera oleosa* (*Kosum*).



*Ficus virens* (*Pilkhan*) at Teen Murti Bhawan, New Delhi.

fully covered with flowers for more than two months.

- Are the flowers sparsely distributed or in profusion over the whole plant canopy, and are they single or in clusters? Plants on which flowers appear in profusion have a very strong visual impact, for example, trees such as *Laegerstoemia flos-reginae* or *Chorisia speciosa* and shrubs like *Calliandra brevipes* or *Jasmine* (*Chameli*). Ground-cover plants such as *Wedelia* and *Lantana sellowiana* are valued for their profuse flowers (yellow and blue



Plants on which flowers appear in profusion have a very strong visual impact



Plants with profuse flowering. CLOCKWISE FROM TOP LEFT: *Quisqualis indica* (*Madhumalti*), *Jasminum sambac* (*Motia*), *Lantana species* and *Hamelia patens*.

respectively). Climbers known for their flower colour include Rangoon creeper or *Madhumalti* (*Quisqualis indica*) and Golden Shower (*Bignonia venusta*).

- The presence or absence of foliage during the flowering period has a marked effect on the appearance of the plant. Deciduous trees such as *Dhak* (*Butea monosperma*) or the Coral tree (*Erythrina indica*) on which flowers occur in great profusion on the bare branches look brilliantly colourful against the sky.

- Fragrance imparts a special atmosphere, especially when plants whose flowers have a very strong perfume – such as *Harsingar* (*Nyctanthes arbor-tristis*) and, *Raat ki rani* (*Cestrum nocturnum*) are used. *Champa* (*Plumeria rubra*) blossoms have a more subtle effect; the inconspicuous flowers of *Saptparini* (*Alstonia scholaris*) make their presence known by their distinctive sweet smell in late October.





## Growth

### Growing conditions and growth requirements

Conditions available at site are the outcome of regional geography and climate, and building or infrastructure development. Since these can be modified only to a limited degree to suit the growth requirements of plants included in the design concept, it is wise to aim at achieving a close match between the two.

Plants show considerable differences in their growth and appearance because of regional variations. For example, *Gulmohar* and *Jacaranda* have a much stronger shape and longer flowering period in Bengaluru or Mumbai than in the much drier climate of Delhi. It is common to see the Silver Oak blooming with its characteristic golden yellow flowers in the South, whereas in Delhi that happens rarely. Certain trees, like the magnificent Rain Tree (*Samanea saman*) thrive in the South and in coastal areas, but hardly grow at all in northern India.

### Evergreen or deciduous?

All plants shed and renew their leaves, but while this is a continuous process in evergreen plants - so the tree or shrub appears in leaf throughout the year - deciduous plants shed all their leaves in a

particular season and therefore appear bare-branched at that time of the year.

Evergreen trees are most useful in places where protection from adverse climatic conditions and erosive winds is required throughout the year - in windbreaks, shelterbelts or buffers especially in arid or coastal areas. In other cases they suit situations where shade is required throughout the year. In towns and cities they meet the requirements of parking areas, plazas and commercial complexes where shading is a necessity and leaf-litter is to be discouraged.. Sometimes an evergreen theme is preferred where a uniform effect is desired throughout the year.

In cool temperate climates, most evergreen trees are coniferous, because few broad leaf plants can tolerate severe cold; in these regions, broadleaf deciduous trees shed their leaves usually as an adaptation to cold or dry seasons. In India many trees best known for their flowers are deciduous, e.g. *Amaltas*, *Bombax*, *Chorisia* and *Erythrina* (Coral Tree). Landscapes can be designed to use deciduous trees to create visual variety, partial visual barriers and to add seasonal colour. They permit sunlight to penetrate to the ground below their canopies and allow a greater variety of ground-cover underneath.

The litter generated by deciduous plants enriches soil and is useful for compost and producing organic manures such as leaf-mould. Carefully planned planting of evergreen and deciduous trees in the vicinity of buildings can reduce seasonal energy needs, by giving shade in summers and letting sunlight into built spaces in winters.

### Fast or slow?

The growth rate and life span of plant species are closely related. Fast growing plants are generally seen to have a significantly shorter life than slow-growing plants, especially trees, which can survive for centuries. A banyan tree can grow to a height and spread of about 10 or more metres in two decades or so; *Gulmohar* in the same climate grows that much in eight or nine years, while trees like *Su-babul* or *Eucalyptus* attain that kind of height in less than five years. Needless to say long-lived trees have lasting environmental value and represent cultural and natural heritage.

However, in certain special situations only fast-growing species will do. For example, where immediate protection - of soil, crops or habitation - by wind breaks and shelter-planting is required. Selecting only slow-growing species is not practical, as by the time they grew big enough to afford any protection, the environmental damage would already have occurred. In

these cases, fast and slow-growing species are used in combination, so that the former can act as “nurse” plants, until the latter have grown large enough to provide protection on a long-term basis.

A plant’s growth rate also has an effect on its appearance, generally on the branching pattern and the density of foliage. The quickest growing trees such as *Eucalyptus*, *Su-babul* and some varieties of *Poplar* show much sparser foliage than *Gulmohar* or *Erythrina* which are somewhat less fast; the slowest and longest lived trees like *Maulsari* (*Mimusops elengi*) and *Imli* (*Tamarindus*) are characterized by a very dense foliage canopy.

### Sun or shade?

Plant species adapt to conditions as they exist in the natural environment of their origin. Plants found growing in the understory or on the floor of dense tropical forests are adapted to thrive in places which receive little sunlight. Species of this kind include *Alpinia*, *Dieffenbachia*, *Dracaena* or *Syngonium*, and many types of palm; these and many others of this kind are widely used to deal with the more shaded areas of landscape projects.

Other plants - these of course are a wider range - grow best in full sun. A lawn needs to be fully exposed to sunlight. Most flowering shrubs (*Hamelia*, *Jatropha*, and others) prefer this, though certain others such as *Chandni* and *Daedelocanthus nervosus* can tolerate partial shade. Invariably, trees need sunny conditions to establish well. Some plants need both sun and shade; generally they are tolerant of the morning sunlight but would prefer to be shaded during the hot afternoons. *Crotons*, as well as *Zebrina* and *Pilea* species fall into this category.



Plants that can tolerate partial shade. CLOCKWISE FROM TOP LEFT: *Tabernaemontana coronaria* (Chandni), *Wadelia trilobata*, *Dracaena* and *Scindapsus aureus* (money plant)

In any landscape project it is important to know how the shadows move across the site during the course of the day and in different seasons, so as to identify at least approximately which areas are mostly in shade and which are relatively sunny. Without this it is not possible to make effective decisions about which areas are suitable for grass, which for shade-loving ground cover, where trees need to be planted to provide shade, or where trees should not be planted because those areas are already shaded, and so on.

### Format

In nature, plants are usually found in open or closed canopy forests, open scrub or grassland, or in the close vicinity of water sources such as the alignments of natural drainage channels, rivers, streams and ponds.

In cultivated landscape they are seen as fields, groves and orchards of distinct shape, or in linear fashion along the alignment of field boundaries, tracks or irrigation systems. Additionally, in both natural and cultivated landscapes individual specimens or small tree groves may be prominent visual landmarks.



Planting concepts are often inspired by these formats and seek to emulate or interpret them in designed landscapes, to create in various ways enclosure, shelter, direction, emphasis, focus and accent. Designed planting formats include the vertical structuring of plant material – ground cover, shrubs and trees – as well as the arrangement of planting beds for shrubs and seasonals, and the judicious use of hedges or other forms of pruned and clipped vegetation.

### Design

#### Planting concept

The planting concept explains design intentions with reference to issues and possibilities specific to the particular site:

- A policy for existing vegetation - its value, how much of it is worth retaining and how it can be integrated into the proposed landscape design,
- A statement of functions proposed to be met by the planting proposals,
- The proposed distribution of major vegetation masses to create an overall landscape structure,
- Differentiation between areas of grass, ground cover, shrubs and trees,
- Boundary or other kinds of protective buffer planting,
- Important lines or shapes in the site plan which might be reinforced or emphasized by planting.

#### Planting plan

The final planting plan is a working drawing containing information sufficient for execution of the scheme. It includes detailed information about the plant species, their location, quantity and planting distances. It is accompanied by a schedule of plants, bills of quantities, specifications and other details as might be necessary.

In terms of graphic presentation, the size of plants shown in the planting plan is the canopy diameter for trees, extent of spread for shrubs and total area to be planted for ground cover. Generally, 10 years growth is considered as a mature size for trees and two years growth for shrubs.

All existing vegetation must be recorded on the planting plan. Trees that are to be retained or cut or transplanted need to be differentiated from each other.

Where it is necessary to remove trees, the procedure for necessary permissions would need to be ascertained and followed.

#### Maintenance

The success of a designed landscape depends upon the consistent growth of vegetation over an extended period of time; how much or how little a landscape has to be looked after depends a great deal upon decisions about plant material made at the initial stages of design and execution. Schemes in which most plants are of native or naturalized species that are acclimatized to local conditions will require far less maintenance than those in which species which may be delicate or not hardy in the given conditions have been used. This is because the latter will have to be nurtured and nursed to a much greater extent. It is true to say that the maintenance requirements of a proposed landscape have to be articulated as part of the design concept.

In small areas such as gardens or small parks, the natural environmental conditions can be changed and maintained in the changed state by management practices. The choice of plant species is there-

fore not very strictly limited by the existing environmental conditions. On larger scale schemes, such as large parks, campuses and townships, this kind of intensive maintenance is not possible, and any planting scheme which does not take this into account is likely to fail.



*Salvia splendens* seasonals along the pathway add colour and variety to the landscape. Lodi Garden, New Delhi. Photo: Jitendra Pawgi