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Monstera deliciosa oozing through the fence of the Old Brisbane Botanic Gardens along George Street (J.Sim 2012).
Introduction

This Planting Design Sourcebook is the essential guide to developing phytophilic design sensibilities, as well as constructing design processes suitable for various situations, and deciding how best to manipulate plants for effective uses for humankind.

Phytophilic is a word Jean invented that means 'plant loving'. We hope you agree it is essential to appreciate the natural world, natural systems and plants in particular to be able to really engage with effective planting design.

To be able to make good use of plants, a designer must learn the character and capabilities of plants; not ALL plants, but a selection which we could call our 'plant palette'. These are the well-known favourites which are easy to play with. However, different clients and different sites may call for different sets of plants. Therefore, a good designer knows where to look to amass a new set of plants that will be just right for this new situation.

A good designer should be aware also of unfounded biases and swings of fashion. If we use checklists or someone else's plant palette, we rarely meet the requirements of the current client and their particular requirements of site and brief. Understanding plants allows us more freedom of expression and speculation, and helps us achieve better design results.

This book was compiled to teach landscape architecture students at our university in Brisbane, so we have a few biases especially in favour of sub/tropical climates. Horticulture and park management students will also find this book useful. However, anyone who likes gardening and designing would benefit from this book.

Certain design principles are common across all climates because we humans have many common needs. We humans also have some recurring wants that plants can fulfill. So we have both overt and hidden goals, often multiple layers of these influential factors that can make plant selection a daunting task. Leaving the selection to someone else is not a wise strategy: you miss out on a lot of fun and satisfaction in the hunt and the refinement of a design idea.

Knowledge is power! We never stop learning about plants and experimenting with ways of intervening in their growth. And underpinning it all are these amazing living things that provide oxygen we need to breathe, food we need to eat and give us all sorts of sensual pleasures. Plants are just awesome!

Design is fun!
And planting design is even more fun! Good design outcomes can really help other people to find health, comfort, safety and sustenance! What a wonderful contribution to the world.

Other Planting Design books

There are many books published every year about plants, gardening and garden design, and some of these focus on planting and landscape architecture. Most of these works are personal statements often highlighting the author's own design practice. Many of these also contain a personal selection of favourite plants. They are useful to students up to a point, but be careful of thinking that their way is the only way. Only a very few books attempt to describe planting design or designing with plants as a process, let alone a set of possible options.

Our book is focussed on design process and will reveal as many as possible of the current and historical planting design approaches. To be both specific and broadly encompassing is a challenge, but we hope that the result will help you develop more design flexibility plus better creative and critical thinking skills. The thing we will not do is provide you with a "how to do it" checklist. That is a recipe for unresponsive, malfunctioning, repetitive and banal design. We want you to be much better than that.

Who designs with plants?

Here is a two-part proposition that may or may not be accurate. (1) Landscape architects are professional designers who mostly have larger scaled projects that are mostly in the public domain and cover a wide range of uses (including residential, commercial, industrial and recreational purposes). (2) Garden designers are mostly amateurs (though some are professional), who mostly design smaller scale gardens (rather than landscapes or landscape systems), their projects are mostly in the private domain and most are domestic or residential properties. This proposition is a generalisation, but even so there are some interesting truths here.
Most contemporary planting design books are aimed at the home (amateur) gardener with simplified concepts to help the most unskilled and inexperienced reader. Without the benefit of contextual knowledge (that is, what all the other authors and experts advise) means that readers are seduced into following one path that may or may not be relevant to their situation.

We examined many published sources to consider many sorts of design options and share this with you. This is a reflective practice that marks a legitimate professional with better adaptive capabilities. It also encourages deeper thinking about processes and outcomes to help advance our group understanding and improve practice overall. We want you all to be aware of what you are doing and why you are doing it. If not, you will be a cog in a machine, stuck in a repetitive cycle. You will not be able to think for yourselves or be able to react to future changing circumstances.

We can find evidence in history of this adaptive and innovative practice. Someone was aware enough to start making vertical gardens, where previously there were concrete and masonry walls. Someone adapted horticultural procedures to create glass houses (so called winter gardens in cold climates). Someone else was curious enough to find out why planting in warm climate cities reduces temperatures. The key to being an effective professional landscape designer is this willingness to experiment and to criticise the status quo, and so create better outcomes.

We hope this book will help you develop sound skills while you indulge in fun design activities along the way. We certainly find mucking about with plants (experimenting and pushing boundaries of capabilities) is thoroughly absorbing and rewarding. Good luck.

Jeannie Sim, who conspired with Thom Lenigas in the earlier stages of this publication preparation. December 2014.

Ficus benghalensis Banyan fig.

30 years ago I produced this Plant Profile for my horticulture subject at QIT! Note the power of the black ball point pen for subtle hatching effects and that some glues discolour with age! Oops! But tropical figs are just so awesome!

Go see this site! For an inspirational visual and intellectual feast. Thom Lenigas set up a great Tumblr site attached to this unit that just keeps growing, since August 2009! Thanks Thom!

http://landscapehorticulture.tumblr.com
Finally, rethinking teaching landscape horticulture... a challenge for engagement.

**Jeannie's MANIFESTO CHALLENGE:**

Landscape architects who are ignorant and dismissive of plants are really roll-playing urban designers or planners or wannabe architects.

Here are 5 observations that you may agree with or you may be annoyed to the point of disgust! Any reaction is a form of engagement! If you have no reaction we are in deep trouble. Maybe you should go away and come back when you are ready to learn.

**Observation 1**

"I don’t care about plants and stuff"

Some designers, such as industrial designers, can have such distaste for plants that it borders on an allergy. When this lack of connection to plants and their living processes is manifest in baby landscape architects, it borders on catastrophic for the future of humankind. Why? Because landscape architects should be the profession that helps the other design professions deal with the realities of the physical living world of which they are woefully ignorant. LAs should be the ones to provide ecological context to human-centred design. Sustainable design is our bread and butter basics. Plants matter!

**Observation 2**

"Most of today’s landscape architects do not know enough about plants"

"But it’s too hard", folk cry out! So is playing a musical instrument; so musicians practice every day and never stop filling their lives with music, listening to music and talking about music. Plants demand that level of commitment to begin to understand how they work, why they work and what ones are useful to designers. Plants are amazing! If an individual LA or a practice has a reasonably fixed set of plants (so called plant palette) that hardly varies, then they are not really living up to the history of LA professionals who are directly evolved from master Head Gardeners who really knew stuff about plants. At this point, such practitioners are really urban designers of infrastructure most of which is hard constructions and do more damage than good to the complex systems of ecology and living things.

**Observation 3**

"Without plants, humans are just animals"

This is a philosophical point about the benefits of observing and collaborating with plants. The more you learn about plants, the more you realise there is to learn. We can start with the scientific side if things by learning basic ecology and horticulture. Then traditionally designers look to art theory and start to rummage in the attic for visual elements and principles and other aesthetic matters. Somehow we have to blend the science and the art to make design usefulness the key goal. But there is another way, the philosophical and emotional way.

Plants and gardens can be good for your soul, if you let them, if you participate and keep your mind open. Awareness is not a shroud that someone else lays over your head. Awareness is based on active participation. You need to go out and get into looking with intent, gardening with patience and persistence and never stop experimenting and growing. As soon as you stop learning you become jaded and useless, because ultimately a good designer is one who can adapt to changing circumstances and make the best of what is available. Adaptation is the key measure of intelligence. Banality and repetition is good for cows and sheep but not wild thinkers and dreamers. And we need that wild biodiversity potential to survive and thrive in the future.

**Observation 4**

"Designing gardens is not the role of landscape architects"

That was me screaming, perhaps you didn’t hear it, but it was loud and gut-wrenchingly sad. Gardens are places of such joy and healing, of such delight and bounty, why the heck would you not want to be part of that? Excuse me, but that was why I joined this club so don’t give me that ‘it’s not relevant’ balderdash (insert swear word of choice, please be as creative and colourful as possible). If LAs are about big picture infrastructure planning only, then how will they be able to design for human-sized, ordinary people with human-sized needs and wants? Gardens are the vital core of creating spaces for humans and should not be left to scientists who may well understand the needs of plants but are hopeless at understanding the practical needs of people nor the spiritual needs of creative outcomes to make our minds and spirits healthy.
Professional horticulturists are not trained to take on that huge area of learning we introduce to our LA students. They have a smattering, but not the tools to be truly inventive and adaptive. Thus we get excruciatingly painful fashions like Bali gardens or miniature boring bushlands that are limited in use and repetitive in scope and form. Dumping a Buddha sculpture into a lush border of gingers does not make sense nor is it respectful to a noble religion. Buddha sculptures should not be seen as decorative; one does not use images of Jesus Christ on a cross as appropriate decoration for a garden even if one does practice Christianity. Such icons are for active spiritual use not bubblegum confetti wasteful displays.

The disparity and even disrespect between some LAs and Horticulturalists who are garden designers is shocking and not right. Both camps are fearful of their own areas of ignorance about either plants or about people. These attitudes have to stop. Learning from each other is the key. Until the profession of LA includes specialist garden designers who have horticultural training, we will be the disrespected poor cousins to the other spatial designers out there.

Observation 5
"I can find it on my smartphone with an Internet search"

And I can find it by observing plants in my backyard and my neighbour’s and the botanic garden down the road and the library next door. Nothing is as good as first-hand experience in understanding plants and their processes. Nothing. Horticulturists train by hands-on experience of gardening. Why don’t LAs do the same? Because we don’t have the time and space in our courses to fit such practices, that’s the reasoning usually given. Until that attitude changes, and it must, it is up to individual students to get out of the studio and into the bush and into the garden and start really learning.

The best LAs are the ones with hands-on experience. Lucky ones come with a horticulture degree or diploma and learn the stuff about people and systems laid over their previous studies. Fanatics like me, came with self-taught gardening obsessions that have been further honed and practiced for decades. And I’m almost getting it! However, the adaptive creativity that marks a great designer is more than this formula. It is an attitude of mind and strength of will that begins the process of building creativity. It takes time and engagement and you can’t find that on your smartphone.

Conclusion
So what? This manifesto is written to directly jolt your over-worked and distracted student minds with a challenge. Are you up to that challenge or will “just passing” with dispassionate abandon be your lifelong credo?

The first step in this process of engagement is to reflect on your surroundings. Writing about plants and gardening is an old tradition to help achieve an increased understanding. It doesn’t matter if you believe you can’t write to save yourself! Be that musician and practice, practice, practice. We need garden writers, landscape architectural theorists and critics as much as we need designers. You have the potential to be any and all these things, but only if you participate. Widen your horizons before you focus on your speciality!

Of course, the second step is to get gardening, but that may take a longer time to get going. To start off, I’m thinking of starting a terrarium for the class and you shall watch and be amazed at this extraordinary invention: the world in exquisite microcosm. Dr Ward invented the idea in the 19th century and without it, Australian settlement would have suffered (maybe even failed)!

Jeannie wrote this Manifesto over 2 hours on an overcast Friday morning in Spring 2014. And then she decided to include it in this Sourcebook to continue to shake things up and prod students for reactions!

Strelitzia regia (bird of paradise)
(JS 1984)

Plants are awesome!
(Thom Lenigas, 2014)
1. PLANTING DESIGN as PROCESS

Have you done any planting design or plant selection? Maybe you too have been seduced by a beautiful plant at the nursery and just had to grab it for your garden? At first, you might be thinking selecting plants is all about finding the prettiest bits of greenery or the most fragrant, or the cheapest!

All these factors could apply, and there are many more possible influences, but essentially we select plants for purposes that suit humans first, while acknowledging the capabilities and tolerances of the plants themselves for the site where they will grow.

This Sourcebook is founded on the premise that we can be logical and comprehensive when we design with plants. We can also be whimsical and irrational if needs be. With the huge range of plants available for use and the many possible ways we can treat plants, without an effective design process, we are at the mercy of impulse buying, making expensive mistakes and wasting money and resources along the way.

What is the right Design Process?

The first point to realise is that THERE IS NO ONE WAY TO DESIGN WITH PLANTS! Each site is different, each client and brief is different and each designer is different. This Sourcebook can be used to help you find your own voice as a designer with your own methods and priorities.

We reviewed many current publications that offer advice about planting design and have drawn together insights we want to share as well as the faulty methods we believe you should avoid. When you look at the huge wealth of literature about gardening and plants, you can see that most emphasise information about the plants: identifying their place of origin (habitat and climate); describing their physical character; and hopefully, including data about their preferences and tolerances for growing situations. A few publications avoid the detail plant descriptions and concentrate of design procedures and how one selects plants. We reckon you have to know a certain amount about the science of plants (botany and ecology) and about growing plants (horticulture) to be able to use effectively these concepts about planting design.

Therefore, to help you find your personal design vision and approach, we have included some basic botany, ecology and horticulture in this Sourcebook, but the overriding principle guiding what information is included has been 'design usefulness'. Indeed, much of the Sourcebook covers what plants can do for humans: the many purposes or uses we have for them. The other matter that helps you achieve a good design result each time you design, is knowing where to look for more information about plants. Keeping up-to-date and managing huge amounts of data are vital goals in developing your personal design process. We explore these ideas in the next section.

So what can we find in the planting design books already published? Many don't really describe the whole process but emphasise selected components. These approaches can still be useful. First let's look at the broad context of planting design process.

One of the most well-known and loved landscape architecture design textbooks was written by American landscape architect John O. Simonds and
is still available in its 4th edition. The following guidelines show their origin in the 1960s Modernist design approaches that emphasised 'functional' ideals and often resulted in checklists that can seriously limit creative design thinking. Be wary of checklists! Read Simonds for further explanation and illustration of these ideas. Here is his list of planting ideas, called "The Guidelines (2006,147-153):

- Preserve the existing vegetation
- Select each plant to serve intended function
- Trees are the basics
- Group trees to simulate natural stands
- Use canopy trees to unify the site
- Install intermediate trees for understory screening, windbreak, and visual interest
- Utilize shrubs for supplementary low-level baffles and screens
- Treat vines as nets and draperies
- Install ground cover on the base plane to retain soils and soil moisture, define paths and use area, and provide turf where required.
- In all extensive tree plantings, select a theme tree, from three to five supporting trees, and a limited palette of supplementary species for special conditions and effects.
- Choose as the dominant theme tree a type that is indigenous, moderately fast-growing, and able to thrive with little care.
- Use secondary species to complement the primary planting installation and to define the site spaces of lesser magnitude.
- Supplementary tree species are used as appropriate to demarcate or differentiate areas of unique landscape quality.
- Exotic species are to be limited to areas of high refinement.
  - Use trees to sheathe the trafficways.
  - Give emphasis to trafficway nodes.
  - Keep the sightlines clear at roadway intersections.
  - Create an attractive roadway portal to each neighbourhood and activity centre.
  - Arrange the tree groupings to provide views and expansive open space.
  - Close or compress the plantings where the ground forms or structures impinge.
  - Expand the roadside plantings.
  - Use plantings to reinforce the alignment of paths and roadways.
  - Provide shade and interest along the paths and bikeways.
  - Conceal parking, storage, & other service areas.
  - Consider climate control in all landscape planting
- Complement the topographical forms.
- Use plants as space definers."

We highlighted some of what we thought of as biases in green to point out there are other options and choices. Arranging plants in regular or irregular (naturalistic) ways depends on the design context. However, the use of indigenous species as a priority (or exclusively) is hard to resist when sustainable horticulture especially in the public sphere, is a primary goal. And maybe we are being too particular when we flinch at the thought of EVERY scheme with a theme tree? Use the list as suggestions, many points are very worthwhile and most have good solid logic behind them. This list still does not really describe the various stages in the design process despite being so prescriptive. We want and need more.

We found a thorough and succinct description of planting design process from James Hitchmough (1994,114) who listed the various stages from beginning to end (we augmented, shown in green):

**INITIAL DESIGN PHASE**
1. Initial aim & objectives
2. Base plan & site analysis (+ vegetation survey)
3. Amended Aim & objectives
4. Big idea & rationale
5. Final aim & objectives
6. Potential functional spaces
7. Planting design concept
8. Detailed planting design
9. Initial plant selection

**INSTALLATION & ESTABLISHMENT PHASE**
10. Site modification
11. Amended plant selection
12. Planting/seedling
13. Plant establishment
14. Vegetation management

Did you get lost in this list? Long lists will do that, but it does reveal the back and forth in any design process (the "iterative process" in design jargon) and it also shows the many variables that can arise along the journey. It is never a simple: "I like red flowers, so I will only use them, full stop."

You can see that effective planting design should include the implementation and continued management of that design. It is such a waste to find your best intentions are ruined because that particular plant is not available for sale, or was improperly planted, or perhaps planted in the wrong place or subsequently pruned incorrectly. Imagine a wistful naturalistic scheme that gets
sliced and diced into topiary building blocks. Or vice versa!

What is hidden in this simple list includes the client briefing and consultations, research, problem solving, and idea generation, to name a few major activities. Even simple design projects have these collections of stages each needing resolution.

Of course, in a typical home garden situation, where you are designing for yourself, you can easily slip into an indulgent and lazy approach. Sometimes we can even justify this approach as being whimsical and experimental. We have all been seduced by the exquisite new plant or new planting container at the nursery or some new artwork that just has to be squeezed in somewhere. And then sometimes you just have to revision a whole garden compartment because you can’t get enough of pinkish-oranges this season! This is the reality of gardens and people: they are dynamic and change, even without our permission!

What works in the private sphere is not as welcome in the public sphere. Change due to mere whims or unforeseen disasters all need to be funded, so change had better be worthwhile and justifiable if the taxpayer or the big corporation is paying. Unreasonable change is unwelcome in two other special situations: historic places and nature reserves. Historic parks and gardens have distinctive and valued authentic plants and arrangements which need to be protected and maintained. Nature reserves need protection from weeds, pests and diseases and even from human misuse or overuse. These situations require special management regimes to be sure to manage normal loss of plants while protecting the special components and essential spirit of place. All these examples show that planting design process varies according to the situation. So how can we judge what is appropriate or successful?

### What is Successful Planting Design?

We could sprout an easy answer to this question, such as "the right plant for the right spot or fitting the purpose"! However, that doesn’t help us understand how we determine what is the right spot or best plant. Judging what is successful, needs clear objectives to measure against. Let’s review some of those possible objectives.

Landscape architectural academic from Britain (and NZ), Nick Robinson describes three key requirements for successful planting design:

- functional performance
- ecological balance
- aesthetic delight

This is a start but understanding what these points mean and recognising what is missing is necessary. Functional performance means the physical uses of the plants, such as for screening or shading or to define space or avoiding potential dangerous plants for certain users. For instance, it is probably best to avoid planting poisonous or thorny plants near a children’s playground! Ecological balance is how your plants interact with the local vegetation systems: do they pose a weed threat or will they make successful associations? It should include aspects of biological tolerances which relate to limits your plants will withstand in climatic and growing conditions generally: are they frost or drought tolerant or gross feeders or tough as old boots?

Lastly, we believe aesthetic delight should mean more than just 'looking good'! Humans have other perceptive senses (taste, touch, smell, hearing) and we humans also think and feel. Psychological, sociological and cultural needs and wants can also impact on our design decisions and plants selections.

Another landscape architect and teacher from the USA, Nancy Leszczynski (199,84) delved into defining what the purposes behind plant selection might be and arrived at this list:

- Plants create an 'architectural' framework
- Plants produce aesthetic effects
- Plants modify the microclimate
- Plants provide solutions to engineering problems.

We found this list uses awkward language and is fraught with missed opportunities. Architectural framework can be easily misunderstood as a building by novices to design practice (and its jargon). A more appropriate descriptor is spatial framework. Plants can be manipulated to help define spaces (or rooms) in the landscape. We liked the clarity of 'modify the microclimate' because it reminds the designer that shade is not the only beneficial factor that can be provided by plants. We also liked the ideas behind 'engineering problems' but we need to make the extent of engineering clearer, maybe even swap the word for 'technical'. In this case, we generally don’t mean plants make dams or span creeks, but we have found a few examples of where humans have made living plants do such extraordinary things! Typically
these technical problems include managing storm or rainwater, erosion control, reducing toxic chemicals in the soil and the air, and so on.

Thus an improved version of the basic requirements for measuring planting design success is:

- functional performance
- biological tolerances
- ecological balance
- aesthetic, emotional & mental aptness

We will explore these ideas in a practical ways during design exercises (Esquisses) later in semester.

Finding the right plant for the right use is part of the planting design process. We have only have scratched the surface of exploring the known and potential uses of plants. We need to get more information about plants and how they grow then we can move on to exploring purposes in greater detail, generously illustrated of course!

One last thing to recognise about planting design is that the designer’s decisions are only part of the equation and other factors will be involved that influence the final outcomes in the landscape. We have called these ‘variables’.

**Plant Selection/Design VARIABLES**

The more you look for variables the more you can find, but let’s start with these:

1. Each SITE is unique
2. Each CLIENT is unique
3. Each PLANT has a distinct CHARACTER (preferred habitat, tolerances, cultivation needs, visual characteristics, etc.)
4. Each landscape design project will have its own set of PROPOSED USES and INTENTIONS
5. Each project has a choice of possible plant ARRANGEMENT RATIONALES
6. Each project can be maintained differently (i.e. MANAGEMENT REGIMES can differ).

Any variation in any one of the above means a change in overall outcome. All these things impact on plant selection. And when you check on nursery availability and/or cost, you might have to start over again! But don’t be discouraged. This chaos is normal and designers do develop coping strategies eventually!
2. APPROACHES to PLANTING DESIGN

Back in the introduction, we presented a proposition that planting design has two major directions as used by garden designers or landscape architects. These are both valid approaches which we believe can be used by both groups according to the relevant circumstance. We have examined the design works of both groups and offer new descriptors for the differing design approaches: compositional approach and problem-based approach. More often than not, both approaches are used in a project, but we need to clarify what we mean and why we believe it is important to make this distinction. This section introduces some new ideas under these two themes as well as some very traditional design terms, such as garden styles and types.

Compositional Design

Most of the garden design and planting design books available at the moment use terms that describe different ways of designing with plants such as styles (Formal Style, Natural Style) or garden types (Cottage Gardens or Tropical Gardens). Naturalistic planting maybe concerned with establishing self-managing systems but at its heart is a visual character that is distinctive. Supporting these approaches are plant information databases that focus on plant form, visual qualities of colour and texture and so on. While mention is made (at times) of potential functional aspects, the primary driver for these sorts of design approach is visual character.

It can be argued that compositional design is a major focus for garden designers while landscape designers concentrate on problem-based design including whole systems that are typically big in scale.

Problem-Based Design

This kind of design approach is primarily driven by the need to solve a problem or develop a solution system. Landscape architects undertake this kind of planting design as part of their normal practice.

When the landscape architectural design books start to list purposes and functions of plants they are using aspects of problem-based approaches to design to explain their intentions.

GARDEN and LANDSCAPE TYPES

The preceding pages were focussed on design styles, which may be applied to garden and landscape types. Some places that provide specific purposes have acquired names. We compiled an explanatory list of these type terms:

- **Bog Garden** soggy water logged soil for plants that thrive in those conditions (sedges, reeds) often beside ponds or lakes.

- **Cottage Garden** mixture of ornamental and productive plants seemingly haphazardly arranged often with cluttered effect, typically as surrounds to small houses.

- **Courtyard Garden** may have no or limited planting material; often has spatial function that extends the inside to the outside or can be inaccessible and provide visual display or as lightwell.

- **Flower Garden** (Cut-flower garden) has primary purpose that is ornamental but may also be a productive source of cut flowers/foliage for use inside houses.

- **GARDEN:** enclosure (usually bounded with fences or walls) for cultivation of plants and providing spaces for various useful functions, events and activities.

- **Indoor Garden** similar to courtyards (which are open to sky) but indoors means under the roof, albeit glass or plastic; includes internal green walls.

- **Kitchen Garden; Walled Garden** productive gardens for food (fruit, vegetables, salad greens, herbs, etc.)

- **Knot Garden** intricate hedging that create knot patterns as a version of a parterre; Renaissance idea that is highly labour intensive to maintain.
LANDSCAPE: broader scale, not necessarily bounded, often in the public realm, with plants (cultivated and remnant natural vegetation) also providing spaces for various useful functions, events and activities.

Market Garden commercial productive garden for food crops that greengrocers would sell, especially salad greens, herbs and vegetables.

Orchard; Fruit Garden productive plantations of fruiting crops, mostly trees arranged in regular layout.

Public Park accessible open space, government owned for all to enjoy, mostly recreational uses, also aesthetic values, can range from remnant natural vegetation to formal gardens.

Podium planting a version of container planting on big scale (on top of underground carparks around buildings) with no access to ground soil or water. Plant growing media needs to be lightweight with good drainage that invariably needs more attention to keep fertile over time than is usually provided.

Rain Garden slows and filters overland stormwater so it can seep into ground not down a drain; bog garden plants used often here.

Roof Garden akin to podium planting as a large scale version of container planting; may be for looking out onto or walking through, with medium height canopies or very low to the ground. Grassed roofs are usually for the benefits insulating heat/cold inside not for walking about or other activities.

Stumpery 19th century invention of upturned trees (the more bizarre shaped roots the better) displayed as borders or spatial definers; colonized by ferns / moss if located under tree shade. Difficult to maintain in Australia with our hungry termites.

Sunken Garden usually a space within/adjacent a larger space that is lower in level that can be overseen from the upper space.

Terrace Garden as distinct from podium planting, terrace gardens can have access to real soil and ground water while much of the space is paved over for other functions than growing plants.

Wall Gardening rough stonework or rockwork that allows small herbaceous plants to grow in the gaps between rocks or spill over the face of the wall from beds located on top of retaining walls.

Wild Gardening 19th century idea about naturalizing bulbs under deciduous (fruit) trees or mixed, randomly arranged plantings like Hill's Fern Island (OBBG) or Guilfoyle’s Fern Gully (RBG Melbourne).

Woodland Garden 19th century idea that simulates woodlands with upper and understorey plantings and sinuous paths running through the plantations; often used acid loving plants from New World e.g. Sequoias with Rhododendron understorey or bluebells under deciduous trees.

YARD: so little plant cultivation going on that it really isn't a garden! It may be grassed and mown, but often there are many out-buildings and pavement.

Zoological Garden = ZOO (Menagerie) old zoos started as gardens with animal enclosures.

We also found a group of building types that house plants, also called plant houses.

GREENHOUSE:
generic term for a building that houses plants; includes glasshouse and shadehouse types.

GLASSHOUSE types
Conservatory
Orangery, Orangerie, Lemonaria
Heated Glasshouse or Stovehouse or Stove
Winter Garden (building)
Vinery (House for grape vines)
Orchid House, Palm House, Fig House, etc.

SHADEHOUSE types
Bush-house
(traditional Australian term since 1870s)
Fernery or Fern House
Orchid House
One way of entering the planting design arena is to consider latching yourself to a pre-existing design style or garden type. Initially this can be a useful in gaining confidence in your design skills, but relying on it rigorously will actually stunt your judgement and your creativity! However, knowing about what other designers have done in the past and in recent times is very useful however in developing your own design approach, or adapting as needed for new sorts of circumstances. There is an important distinction to be made: knowing about is not the same as copying.

Sorting design into distinct classifications of style (and type) has been attempted by many historians and other writers. Let’s start with this broad approach. Architect Barbara Stauffacher Solomon (1988,8) considered architectural and landscape design and devised a three part classification:

The formal garden is the reasoned ordering of landscape with buildings. The picturesque garden is a landscape of fictional scenery that consumes and trivializes the architecture. The agrarian garden is a cultivated holding of fields, orchards, and buildings.

She postulated that when all three are combined, a fourth classification is created: "green architecture". This is one way of sorting design, but it is not commonly regarded as the best or most accurate. What we like about it, is the recognition of ordinary agricultural landscapes as part of the designed world.

The classical traditions (formal regularity) and the romantic traditions (informal irregularity) are widely recognised general terms among landscape and garden historians. Geoffrey and Susan Jellicoe (1995,371) use the terms 'classical inheritance' and 'romantic inheritance'. Many historians consider utilitarian approaches as part of a vernacular tradition and not considered relevant within the context of studying 'designed' landscapes. This disregard for utilitarian approaches is undesirable – all three approaches reflect human goals and cultural beliefs. Furthermore, ignoring productive landscapes as a landscape designer is cutting off a huge potential market of clients and jobs!

Interestingly, the use of the terms formal / informal design often incites much rancour and argument among landscape architects, for example from Laurie Olin (1988,155): "Everything that exists has form. The words 'formal' and 'informal' as used in everyday speech are meaningless and an obstacle to a discussion about design which by definition always contains formal properties of some sort." This is an old argument, but the use of the terms persists.

The Oxford Companion to Gardens revealed a possible solution to the overuse or misuse of these words. The French description of the English Landscape Garden School and other English garden design approaches includes the terms jardin anglais and jardin régulière, defined thus: "Jardin anglais (or à l'anglaise) is a French expression commonly used to signify the opposite of a jardin régulier or à la français, i.e. in the style of Le Nôtre." Thus, the polarity 'formal and informal' might be better described by the terms 'regular and irregular.' The use of pan-stylistic terms such as formal (regular) and informal (irregular), are part of the typical lexicons used by amateur and professional alike. Whatever the ideological and semantic discourses, their use cannot be disputed. Their misuse or overuse can be debated.

Like a weed, which can be any plant deemed to be 'in the wrong place', the use of simplistic polar opposites to describe design, have their place, if used carefully. They offer a bridge between common observation and deeper analysis and offer a starting point for discussion, rather than a final judgement.


Here is one approach to explaining (classifying) patterns of design forms and their changes over time:

- Utilitarian Traditions
- Classical Traditions
- Romantic Traditions
- Contemporary Movements

Let’s look at these classifications a little more closely.
An often forgotten reality, e.g.

- commercial nurseries, orchards, farms
- market gardens
- vernacular gardens
- popular domestic productive gardens
- permaculture gardens
- community gardens, farms etc.
- scientific collections
- plant enthusiasts’ collections

**SYSTEMATIC**

*Adjective* 1. having, showing, or involving a system, method, or plan: a systematic course of reading; systematic efforts.
2. characterised by system or method; methodical: a systematic person; systematic habits.
3. arranged in or comprising an ordered system: systematic theology.
4. concerned with classification: systematic botany.
5. relating to, based on, or in accordance with a system of classification: the systematic names of plants.

The prosaic mentality behind the design quality of the 'utilitarian' should not be confused with the Modernist dictum of 'functionalism'. A utilitarian garden may or may not be the most functional of designs; it may be evidence more of making-do with what is available to get the job done, rather than finding a perfect solution or way of working as espoused by functional Modernists. Such utilitarian gardens often contain rudimentary geometric layouts such as straight, often narrow, linear garden beds; and, rows of trees and planting beds along the boundaries and edges of space (especially around the foundations of buildings). 'Utilitarian' suburban gardens of non-gardening residents can take on a prosaic/banal character as can public parkland when only the basic landscape development is undertaken. Thus, utilitarian does not necessarily involve productivity.

**PRODUCTIVE GARDENS** (orchards, herb and vegetable gardens, and cut-flower gardens) were (and are) usually arranged in a utilitarian manner. Among orchardists, the use of the equilateral triangle in laying out trees maximises the number grown within a given area; it is thus more efficient than a square grid pattern – maximising productivity of the land area being the priority here. A similar pattern is used in ornamental gardening when bedding out masses of groundcover plants or shrubs – to ensure maximum coverage of the ground plane. Solomon's observations (1988: 41 & 132) about productive landscapes were:

> Agrarian gardens, rural and urban, are eternal (if ignored as ignoble), constant and seasonal, utilitarian and splendid... Agrarian gardens were precursors of formal gardens and urban settlements. They are our earliest and most consistent ways of shaping the inhabited landscape...


Aligned to utilitarian arrangements are **SYSTEMATIC GARDENS**, which contain collections of plants arranged according to a variety of scientific, geographic or other concerns (e.g. taxonomical systems). Systematic layouts in gardens include those of plant enthusiasts who collect and grow plants (usually breeding the varieties with a predominant concern for horticultural or botanical matters rather than artistic aspirations or aesthetic purposes. Such collections acquire special names:

- **Botanic Garden**: scientific collection of living plants with several purposes e.g. scientific, educational, recreational and aesthetic values.
- **Arboretum**: trees, woody shrubs, any sorts.
- **Bambooserie** for bamboos (a French term)
- **Fernery**: different ferns and their allies
- **Herbarium**: botanists’ dried, pressed plants used for benchmark reference purposes
- **Mossery**: different mosses and allies
- **Nuttery**: plantation of nut-trees
- **Palmetum**: palms or palm-like
- **Pinetum**: conifers (pines, cypress; gymnosperms)
- **Rosarium, Rosary**: formal rose garden
- **Succulentarium**: for cacti and succulents
- **Vineyard**: growing grapevines, prefer sloping land

The living plant collections of BOTANIC GARDENS and ARBORETA are prime examples of this systematic form and ideology of garden-making. The 'system gardens,' based on taxonomical classifications of family or genus or other systems, traditionally used by scientific botanical establishments are the most methodical of all within the boundaries of this classification.

CLASSICAL TRADITIONS

Regular / Formal Arrangements

For example in history,

☼ Ancient Land Art
☼ Ancient Egypt / Greek / Roman Gardens and Urban Design
☼ Medieval Gardens
☼ Traditional Persian and Islamic Gardens
☼ Italian Renaissance Gardens
☼ French Formal Gardens or Grand Style
☼ Beaux Arts / Classicism of 19th century
☼ Classicism of 20th and 21st centuries

FORMALITY

noun
1. the condition or quality of being formal; accordance with prescribed, customary, or due forms; conventionality.
2. rigorously methodical character.
3. excessive regularity, or stiffness.
4. observance of form or ceremony.

All gardens have form, but only some are formal. 'Formal regularity' or 'formality' are perhaps more exact terms to describe this sort of design approach. The design quality of 'formality' incorporates many traditional stylistic categories from classical to modern. The key characteristic is refined geometry, either linear or curvilinear or combinations of these attributes. Symmetry usually accompanies these arrangements, with the opportunity to create a vista along an axis or alley.

Various ideologies can be attached to these forms: including the desire to dominate and control natural processes and those related to expressing artistic and aesthetic concepts. Such ideas center on the notion of achieving and maintaining perfection or purity of form and expressed via the media of hard landscape and planted landscape components. Common planting features in regular landscape designs are avenues or rows of trees, clipped hedges, clipped edgings (short hedges), and topiary.

At times throughout history, this perfection of form has not been reached, with only a stiff and awkward regularity achieved. This is typical of...
amateurish design, where the full understanding of the classical allusions and high-minded intentions are missing. In this sort of attempt at formality, the borders and edges of spaces are often the location of planting – using narrow, straight beds and rows of trees or shrubs – and featuring ‘foundation planting’ near the junction of buildings and the ground.

There has been a resurgence of regularity and symmetry in some contemporary landscape designs, particularly those designers offering a ‘traditional’ approach, e.g. Paul Bangay in Australia (his book titles are revealing: Defined Garden / Balanced Garden / Boxed Garden); Luciano Giubbilei (UK) and Jacques Wirtz (Belgian/Europe).

SOURCES:

![Figure 4: Macmillan’s Plan of House and Garden; note overall symmetry & plant house (=shade house) to right.](image)


ROMANTIC TRADITIONS

Irregular / Informal Arrangements

For example from history,

- Traditional Chinese & Japanese Gardens
- English Landscape Garden
- Picturesque (several iterations)
- Gardenesque (2 or 3 versions)
- Wild Gardens
- Arts & Crafts / Surrey School
- Native Plant Gardens: Prairie School (USA); Bush Gardens (Australia) etc.
- Ecological regeneration works
- Australian Aboriginal practices (function following form)

INFORMAL

adjective 1. not according to prescribed or customary forms; irregular: informal proceedings.
2. without formality; unceremonious: an informal visit.

The Macquarie Dictionary Online © Macquarie Dictionary Publishers Pty Ltd. (downloaded August 2013)

The essential attribute of informal arrangements is an irregular layout. The design quality of ‘informality’ can be used in different rates of irregularity. All the design approaches which attempt to re-create or imitate natural forms and lines are included in this classification, however controlled, artificial, and ‘unnatural’ they might be in reality. There is often some degree of chance involved in the ideas and manner of keeping such gardens.

At one end of the scale of chance and irregularity is the place which is approaching a self-monitoring and self-sustaining state of being, otherwise known as establishing its own stable ecological balance. At the other end of the scale are places with disguised or subtle geometrical layouts and sham-randomness in planting arrangements that require enormous amounts of human intervention to maintain their character. Styles such as ‘Wild Gardening’ (19th-20th centuries) or the traditional ‘Cottage Gardens’ are included in this end of the informal spectrum.

One aspect of the ideology behind most of these irregular forms is working with natural processes, and directing but not necessarily curtailing change.

DESIGN APPROACHES
Traditional Chinese and Japanese garden design contain many components of informality – albeit usually highly controlled to a 'perfected' natural state. However, regularity also existed in these gardens in certain compartments, e.g. potted collections of peonies or chrysanthemums. The English Landscape Garden and notions of the 'picturesque' in the 18th and early 19th centuries are early western examples of informal landscape arrangements.

**Contemporary terms and garden types:**
- Wildflower meadows
- Woodlands
- Herbaceous Borders
- Shrubberies
- Cottage Gardens
- Tropical Gardens (Tropicalia)
- Exotica (tropical plants in temperate climates)
- Australian (bush) Gardens
- Natural Style Gardens / Natural Gardens
- Naturalistic Planting Design
- Ecological planting, etc.

**SOURCES:**

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**CONTEMPORARY MOVEMENTS**

**Modernists, Purists, Pluralists, Eccentrics, Critics, etc.**

For example,
- ☦ *Art Deco* 1920s-1930s
- ☦ 'Abstractions' as one part of MODERNISM (esp. since 1940s)
- ☦ Functionalism (form following function)
- ☦ Minimalism (various forms)
- ☦ POSTMODERNISM (various forms)
- ☦ Eccentrics: Burle Marx to Derek Jarmon

"Less is More"
— attrib. Mies van der Rohe, German/US Modernist architect

"Less is a Bore"
— Robert Venturi, US Post-modernist architect

There is a huge diversity of approaches being explored at present in all the arts, although arguably landscape design is drawing from the widest range of sources. The creativity of the non-professional people (including indigenous, multi-cultural and female) are being taken seriously as never before – influencing mainstream professional artists and clients. Conservation (natural and cultural), environmentalism and sustainability generally have become important underpinnings of our lives and work, and of course our design practice.

This rich, cacophonous mixture of design outcomes can be explored by students in a number of ways: by visiting the newly created sites in person (the best approach) or by reading descriptions/reviews and by viewing still/moving images of these places.

It is still early days for historians and theorists analysing the late 20th and early 21st centuries. Meanwhile, these publications (and professional periodicals) are useful for becoming familiar with the masterpieces of today.

All these recent design expressions have more going on than just design with plants. They can't be easily or happily reduced to just this one aspect of design. However, the big philosophical ideas and intentions behind these movements are important...
if we are to be aware of the existing outcomes that can inform future possibilities. We won’t delve too deeply into the historical plant use here, just a nibble to get us started.

Reminder about future studies in design history: DLB525 History and Criticism of Landscape Design will focus on times from the 10th century and beyond.

Emerging ideas are informed from many sources. The table below emphasises the influence of Art Theory and Art Movements on contemporary planting design. The importance of science (especially concerning the environment), physical and human geography can be also noted. The review was compiled by QUT Master in Landscape Architecture student Kim Watson in 1999, who had just completed the thought-provoking unit in the Creative Industries Faculty AAB712 Contemporary Arts Issues. The movements reviewed were: Modernism; Pop Art; Minimalism; Conceptualism & Performance; Postmodernism One; Postmodernism Two; Modernist Art Photography; Feminism; Fluxus; New Realists; Dada & Surrealists; and, Constructivism. Some extra comments have been added, contained within ►these marks◄. This review is NOT the final word – merely a starting point for further discussion.

Note: KVB304 Contemporary Art Issues is the latest version of this unit at QUT.

CONTEMPORARY ART MOVEMENTS and PLANTING DESIGN

Modemism
► composition ► geometric relationships. ◄
► picturesque
► surface / flatness
► ► abstract. ◄ representation

► Also the great California School designers – Garrett Eckbo, Thomas Church and Lawrence Halprin; also early Christopher Tunnard and Geoffrey Jellicoe; etc. ◄

Mary Miss — foreshore promenade design, listed for her approach to composing the view and organization of the view. This example is also highly structured and pictorial.
Kathryn Gustafson — listed for her structured design, ► geometric relationships ◄ and sensitivity to the materials of the site.
► Also Burle Marx – for his abstract, bold patterns in paving and planting design ◄
Paul Bangay — listed for his strict organization of the view, highly clipped, manipulated and controlled planting designs. Creates a picture, view-sheds are controlled by planting whether it be, closing down the picture plane or opening it up.
► Although Bangay’s regularity is usually more in the classical tradition that Modernism ◄

Pop Art
► eccentric
► replicable
► banal
► representations of Big Business
► overt
► denotive / iconic
► the “Superstar” artist

The “quirky gardens” phenomena — listed tentatively for its eccentricity however many of the gardens are created with a passion and individuality that cannot be compared to the theories of Pop.
► Martha Schwartz for her bagel parterre, etc. ◄
Pump it out Corporate / Apron planting — listed for their banal, replicable, Ready Made qualities. Their similarities become representations of Big Business or the corporate sector.
► Also known as ‘International Resort Style’ when associated with tourist developments (anywhere in world) ◄

Round About planting/ Residential Estates/ Display Villages are all listed for as examples Ready-Mades, of replicable designs, lacking an author and lacking originality.

Hydro-seeding — listed for the its large scale production line quality. Likened to the many examples of the processed Campbell Soup Can works by Warhol — large scale production of replication and application.
Martha Schwartz, Peter Walker, George Hargreaves….big names of Landscape Architecture who have become so through signature designs and continue to ride the wave of success — listed for their super star approach to design and use of design signatures.

Minimalism
► simple complexity
► state of non description/ connotative
► redefinition of space
► simple aesthetics / deep in theories & meanings
► industrial medium
► intervention
► site specificity
► covert
► awareness of temporal & spatial elements

Rehab of toxic sites/ post industrial sites/ terrain vague — listed for the attempt to redefine the site through design by being aware of temporal & spatial elements. Many designs are supported by theories and contextual understanding of the site.

Brick Pit Student Competition ► at Sydney Olympics site,
Homebash — tentatively listed as examples of designs that acknowledge industrial history through underlying theory. Not interventionist design more so significant as
most conveyed an awareness of time and space.

Peter Latz — listed for his utility of a controlled planting palette in post-industrial landscapes. Through juxtapositions between ruins/ decay/ industrial/ pastoral/ growth/ creation/ intervention/ pure balance, he redefines the space. His designs are covert and simple.

Robert Murase & Xochimilco National Park, Mexico — both listed for their simple complexity, through their utility of materials and understanding of site. Both are examples of interventionist design as both use the collision of water, plant materials and hard scape to create a discordant harmony. However both designs are not a true intervention as all designs are ultimately beautiful and non-intrusive.

Martha Schwartz — for her playful use of materials & landscape forms.

D Block courtyard design (utility of botanical signage for all plant material used) / Queen Street Mall Design (acknowledge past design lines in present design) — listed for their recognition/ reflection of history in their designs. In both examples there is an acknowledgment of existing linkages, palimpsest, traces to the present.

Conceptualism & Performance

► language + incorporation of the written word
► enquiries into how art has meaning
► art as a system unto itself
► concerns with class and cultural constructions
► feminist/ psychoanalytical theories
► temporal
► process/ outcome redefinition

Richard Weller/ Vlad Sitta/ Anton James (maybe if he used more plant material) — listed for their designs that incorporate the written word. Designs are so loaded with meaning they are too heavy to fly off the drawing board!! Vlad Sitta's designs using fire and controlled burning off fit well into the process/ outcome equation similarly his designs are in tune with feminist theories of the temporal nature of the environment.

Designs incorporating grasses, meadow planting, crops etc. — listed in reference to the feminist theories that were incorporated in Conceptualism. Plantings are temporary, seasonal, appreciating the changing elements of the environment.

City farms/ Community gardens/ Utility of permaculture principles — listed for their adherence to systems, systems of growth, people and energy. The history surrounding city farms and community gardens reflect similar concerns with class and cultural constructions as portrayed by Conceptual artists.

► Also Ian Hamilton Finlay — poet and his Scottish garden, Stoneypath — unique place, brimming with allusions, metaphors and visual jests ►

Postmodernism One

► playful
► reflective
► concerned with "Re" — re- working re- evaluating, etc.

Martha Schwartz — for her playful use of materials & landscape forms.

► Although these are minor applications of these ideas. ◄
► Also Charles Jencks and Maggie Keswick — Garden at Dumfriesshire, Scotland; where Feng Sui meets science (Chaos Theory); re-working expressed in metaphor/ allusion + playful, curving land forms ◄

Postmodernism Two

► nihilism
► presence through absence
► process
► acknowledgment of time and patterning
► physicality

Recent works by Janet Lawrence — listed for their utility of plant material by suggestion only, following the presence by absence theory. In many of her works plant materials are written about, abstracted or used referentially instead of being actualised.

Queen Street Mall — listed for the use of motifs of plant material, ie. leaves inlaid on the ground and suspended above the pedestrian.

► Another minor application, seemingly without the intellectual depth; similarly, QUT D Block Courtyard with layers of different patterns in paving and planting including outlines of former buildings on the site ◄

Modernist Art Photography

► challenging authorship
► the "pure idea"
► documentation
► fact/ fiction/ reality/ visual constructs

Pastiche design (creating an authentic Thai garden in your home in Kenmore) — listed for the elements of distillation, adaptation and manipulation that occurs in planting design. It is the contemporary Asian cuisine approach to garden design, the creation of one thing out of so many influences that the purity of the original source is lost. Challenging the constructed reality/ pure idea/ authorship debate.

► Also part of this Thai/Asian gardening trend is the (re)appreciation of TROPICAL plants — for sub/tropical climates and as fantasies in temperate places — such as New York or London (challenging climate, the author of ecosystems) ◄

SUMMARY THOUGHT:
Names have power! Naming a type of design outcome can resonate with user and designer.

Just consider the difference it makes: garden or yard?
3. WHAT PLANTS CAN DO FOR HUMANS

This section is devoted to revealing the wide range of uses that humans have found for plants. Most plants provide more than one of these functions, even if we designers did not originally realise or intend it.

- plants for modifying microclimate
- plants for solving technical problems
- plants as spatial definers
- plants for visual effects
- plants for satisfying other senses
- plants for the mind or heart
- plants for food, fibre, fuel or sustenance.

There are so many purposes we humans have found for plants one could almost think humans were clever. Well, smart but not wise anyway. Consistent and effective cleverness would make us wise. Unfortunately, we still keep pushing the limits beyond the sustainability of Earth and its systems to be called wise. But you can make a real contribution to achieving wisdom by understanding the consequences of your design decisions.

MODIFYING MICROCLIMATE

We are talking what best suits humans here, and this may by default include our pets or domesticated animals. There are limits of tolerance that human beings must observe to survive. Too much heat or too much cold and we sicken and can die.

There is also a concept that architectural scientists use called the human comfort zone. Essentially this is a combination of temperatures and humidity that is just right.

Humans build to provide shelter for themselves and designed landscapes that may create, augment or ruin such comfort zones. Preferably, we make healthy human environments! Unbearable heat or cold can be debilitating and even lethal.

Shade is the key factor in reducing heat build-up and trees are magnificent at providing shade. Adding water features to landscape designs will raise the humidity, a welcome benefit in dry places but may be a problem in the steamy tropics.

Bamboo Avenue, Old Brisbane Botanic Gardens, September 2014. Shade makes cool rooms outside.
Strategic positioning of planting can protect living spaces from too much wind (especially cold winter winds). Research is needed to establish local climatic conditions, luckily we have government resources at hand: learn to love and navigate the Bureau of Meteorology website: http://www.bom.gov.au/. In Brisbane, our chilling winter winds come from the west/southwest so these should be blocked. In summer, the beneficial cooling breezes come from the north/northeast, so avoid blocking these. Apply that logic to other locations after researching local weather patterns.

Hedges and dense plantations of trees have been used as windbreaks for centuries and in many cultures. They are particularly useful at breaking up the wind and preventing the harmful eddies that form behind solid walls. Farmers know the worth of windbreaks even on large scales. Such uncomfortable winds occur typically on flat plains or beside the sea.

Try these PDFs & PPTs from the USA Department of Agriculture: http://nac.unl.edu/windbreaks.htm

Slide 19: "new emerging uses for windbreaks include moderating noise, screening unsightly views, reducing airborne chemical drift, improving irrigation efficiency, increasing carbon storage, and mitigating livestock odors and dust as well as using specialized windbreaks called living snow fences to keep roads clear of snow."

While hedges/windbreaks are great for moderating wind they are not effective as sound barriers. The rule of thumb is, if there is air the noise will pass through. Solid walls make sound barriers. Hedges can make only a psychological difference.

In cold/temperate climates, and even for subtropical winters, planting design can help create warmer areas called suntraps. For Brisbane, the sunny side is north so verandahs and open garden areas need this northerly aspect. Conversely, for all southern hemisphere locations, the south side of buildings is the shadiest (and coolest in summer).

Applying the basics of shading open spaces in the sub/tropics can be a benefit city-wide, reducing the overall city 'Urban Heat Island (UHI)' phenomenon. This cooling effect applies to all sorts of planting, including garden beds, grassed areas, green roofs, etc.
**Frost pockets** occur even in the subtropics when humid cold air gets trapped in a depression or valley bottom. Knowing the climate and the topography are both important regarding planting design.

**Microclimates** is the word used to describe a specific place, while Meteorologists mostly describe large scale climates. There is much more on the realities of gardening being about microclimates rather than Plant Hardiness Zones as the USDA mapped. There are larger scaled microclimates and teeny ones like the sheltered side of a large rock. Refer to helpful article from Cornell University: [http://www.gardening.cornell.edu/weather/microclimate.html](http://www.gardening.cornell.edu/weather/microclimate.html).

Leszczynski (1999, chapter 4) described three ways plants modify the microclimate, namely wind control, modification of sunlight, microclimatic elements of the garden. She listed these planting devices that help in modifying microclimate:

- arbor (arbour in Australia)
- Bosquet
- Grotto
- Hedgerows
- Shelterbelts
- Windbreaks
- Loggia
- Palisade
- Pergolas
- Pleached walkways
- Trelliswork

Be sure you know the climate of the sites for which you design. Shade may be welcome and necessary in one climate but cold and unwelcome in other places. Be open to experimentation that might really open up increased benefits for people and plants alike. As large plants mature, new microclimates are created and will require revised design schemes to suit.

**SOLVING TECHNICAL PROBLEMS**

Leszczynski (1999, chapter 4) described five basic ways that plants provide solutions to "engineering problems" namely, visual regulation, erosion control, sound mitigation, traffic control, and pollution control. Included in these problems are dust and chemical drift (part of air-born pollution) which has been raised already under windbreaks.

Erosion control methods are widely used in effective agricultural developments and adapted to amenity horticulture, such as for public parkland or other urban space management. Methods that incorporate plants include:

- buffer strip
- crop rotation and conservation tillage
- contour bunding and contour plowing
- cover crops
- ditch liners and fiber rolls and gabions
- hydroseeding
- mulching
- perennial crops
- reforestation
- riparian strip
- strip farming
- sand fence
- turf reinforcement mats
- vegetated waterway (bioswale)

Farming experiences in early Australia (especially in SA) in semi-arid/desert climates only reinforces the need for careful attention in agriculture and horticulture. Check out the horror stories of 1930s USA and the Dust Bowl phenomenon on the Prairie landscapes. [http://en.wikipedia.org/wiki/Dust_Bowl](http://en.wikipedia.org/wiki/Dust_Bowl)

Pollution can be mitigated to a certain extent when certain specific plants are effective at removing toxic chemicals from water and soil. There are several processes and terms involved here. **Bioremediation** is a waste management technique that involves the use of organisms to remove or neutralize pollutants from a contaminated site. [http://en.wikipedia.org/wiki/Bioremediation](http://en.wikipedia.org/wiki/Bioremediation)

The actions of bacteria and fungi are relevant in bioremediation. For example, composting toilets make useful plant growing media while disposing/cleaning human excreta. Win-Win!
Phytoremediation is the use of plants able to contain, degrade, or eliminate metals, pesticides, solvents, explosives, crude oil and its derivatives, and various other contaminants from the media that contain them.

http://en.wikipedia.org/wiki/Phytoremediation

These are amazing attributes! Plants are awesome! Often these plants store the problem chemical in their leaves or roots which can be harvested away.

Examples of phytoremediation include:
- **Arsenic**, using the Sunflower (*Helianthus annuus*), or Chinese Brake fern (*Pteris vittata*).
- **Cadmium**, using willow (*Salix viminalis*).
- **Cadmium and zinc**, using Alpine pennycress (*Thlaspi caerulescens*).
- **Lead**, using Indian Mustard (*Brassica juncea*), Ragweed (*Ambrosia artemisiifolia*), Hemp Dogbane (*Apocynum cannabinum*), or Poplar trees, which sequester lead in their biomass.
- **Salt-tolerant** (moderately halophilic) barley and/or sugar beets are commonly used for the extraction of sodium chloride (common salt) to reclaim fields that were previously flooded by sea water.
- **Caesium-137** and **strontium-90** were removed from a pond using sunflowers after the Chernobyl accident.

(See full 'Table of hyperaccumulators' http://en.wikipedia.org/wiki/List_of_hyperaccumulators).

Also this local scientific paper: http://www98.griffith.edu.au/dspace/bitstream/handle/10072/38972/69747_1.pdf;jsessionid=BFCFCCC580663CFE1FB52DE946BA3688?sequence=1 which describes all sorts of versatile microbes, plants and earthworms that are helpful!

The idea of cleaning sewerage effluent to create clean water, is called locally 'water mining' and was trialed very successfully by Brisbane City Council at Rocks Riverside Park (2000-2006, and ongoing). The native wetland reed *Phragmites australis* was the hero plant filter. See http://waterbydesign.com.au/rocks-riverside-park/ and similarly this source about recycled water: www.recycledwater.com.au/uploads/File/newsletters/reWater_dec_07.pdf

"Carbon sink" is one of the buzz phrases used to describe sequestering (storing) carbon safely out of the atmosphere which helps the environment (see http://en.wikipedia.org/wiki/Carbon_sink).

One of the best ways to store carbon is planting trees! The more long-lived the tree, the better is the result in this scenario. Such trees can be provide more than one outcome if used in a windbreak.

**SPATIAL DEFINERS**

Landscape designers make outside spaces for people to use: they range from effective hallways to giant arenas and every size/shaped space in between. This applies to public urban places as well as private residential gardens. Every home garden has more than one garden space, even tiny courtyards. Landscape and garden designers often use the term 'garden room' or 'the room outside'.

While hardscape walls and fences can be used to help create these rooms we can also use hedges, climbers on trellises and dense shrubberies with trees to form the boundaries of spaces. Some plants make excellent definers of space, and there is a great range of plants to select from small knee-height edgings, waist high, chin high or shrubs and trees that are well over the height of a human. And the variety includes visually solid, partially see-through and many colours and textures.

While outdoor rooms is a term commonly used in planting design books to described openings, Loidl and Bernard (2003, 85-87) use the term 'Grove' to describe being inside a 'roofed' room. Being inside the grove is like being inside a building, but typically with more columns (tree trunks) breaking up the space.

They also classify groves into **FORMAL** or **FREE**:

And make an observation about density:

The basic spatial elements are typically listed as floors, walls, and ceilings (the enclosing elements that create spaces). Even so, different authors have augmented and reinterpreted these elements.

Leszcynski (1999, chapter 4) described plants that create an “architectural” framework and classified the basic structural elements involved as the garden floor, the ceiling, garden walls, openings, and the garden hallway. The examples of these elements in use with plants included:

- **Garden Floor**: carpet bedding, lawn, meadow, parterre, pathways, tapis vert, terrace
- **Ceiling**: arbor, grove, pergola
- **Garden Walls**: espalier, hedges, palisade, treillage
- **Openings**: arbor, arch, gate, trellis
- **Garden Hallway**: allée, border, hedge, pergola, pleached walkway

Openings and linkages between spaces is a vital additional consideration here.

Robinson (2011) listed these ideas about spatial design with plants in chapters 3, 4, and 5:

**Chapter 3 Spatial Characteristics of Plants**
- **Spatial Functions** of Plants in the Human Landscape
- Ground-level Planting (Carpeting Plants)
- Shrubs and Herbaceous Plants Below Knee Height (Low Planting)
- Knee to Eye Level Planting (Medium Height Planting)
- Planting Above Eye Level (Tall Shrub/Small Tree Planting)
- **[Tall] Tree Planting**

**Chapter 4 Creating Spaces with Plants**
- **Experience of Space**
- **Use of Spaces**
- **Elements of Spatial Composition**
- **Enclosure** (Degree of Enclosure; Permeability of Enclosure)
- **Dynamics** (Shape; Vertical Proportion; Slope)
- **Focus** (Symmetric Focus; Asymmetric Focus; Focus on the Boundary; External Focus)

**Chapter 5 Composite Landscape**
- **Spatial Organizations** (Linear Organizations, Clustered Organizations, Contained Organizations)
- **Hierarchy of Spaces** (Hierarchy According to Function)
- **Transitions** (Transitions between Abutting Spaces, Transitions between Interlocking Spaces, Transitional Spaces, Entrance Zones)

All these ideas will be illustrated in the lectures later in the semester.

Perhaps using plants as space makers (spatial definition) is what resonates most with architectural designers. However, we landscape architects know that space is but one of the functions we can find for plants, and typically there will be more than one function!

### VISUAL EFFECTS

The reaction among some contemporary landscape architects to this topic can be extreme: they simply refuse to acknowledge that visual effects matter or are even used in landscape design. That position confuses me. It is nonsense. Planting design has many qualities and visual character is one of them. That is a reality. Arguably however, some designers (especially garden designers) put too much emphasis on the look of a scheme compared to other functional matters. Getting the balance of priorities is what makes for successful design outcomes.

Consideration of visual effects (principles and composition) is a primary component of most publications on planting design. Can they all be delusional? I suspect there is a warped postmodernist sub-agenda going on in rejecting grand (all-encompassing) theories, especially concerning notions of the visual preference for the Golden Mean in proportion. Another observation is the lack of mixed shrubberies and herbaceous borders in landscape architectural designs; their design is largely based on the principles and composition of visual elements. Have a read of these:

- [http://www.botanic-garden.ox.ac.uk/herbaceous-border](http://www.botanic-garden.ox.ac.uk/herbaceous-border)

A Proper Herbaceous Border at Oxford Botanic Garden. I suspect the slope on the bed really augments the display!
Leszczynski (1999, chapter 4) described plants and hard landscape features that produce "aesthetic effects" namely special design ideas/outcomes:

- Eyecatcher or Folly
- Giardino segreto (secret garden)
- Giocchi d’acqua (water games)
- Green theatre
- Maze
- Rill
- Sculpture
- Specimen plant
- Topiary

There are four major topics discussed further: visual principles and composition, visual characteristics of plants (plant form or habit), colour and pattern.

**VISUAL PRINCIPLES & COMPOSITION**

Leszczynski (1999, chapter 5) describes composing the planting design and lists five fundamental elements of planting composition as: 'design components' (balance, emphasis, proportion, repetition, rhythm, scale, sequence, simplicity, symmetry, and variety): Line; Form and Mass; Texture; and Color [colour in Australia]. Simplicity is an interesting idea to single out here as it is often included in the design books. Robinson (2011, 84-130) also describes all sorts of visual properties of plants with illustrations.

Traditionally the basic visual elements in art and design are listed as point, line, shape (2 dimensions), form (3 dimensions), colour/tone and texture. Organising these elements are principles which include: unity and variety, emphasis or focalisation, balance (symmetry and asymmetry), scale, proportion, contrast and tension, movement and rhythm, and pattern.

Design Principles govern the manipulation of visual elements to certain effects; also, they influence the way we perceive compositions. The description of design principles was largely taken from Sections 1 and 2 of this teaching resource: Sim, Jean C. 2012. *Design basics: an introduction to rudimentary design ideas and sources*. Available digitally [http://eprints.qut.edu.au/59034/](http://eprints.qut.edu.au/59034/)

**Unity / Variety**

**UNITY** or harmony implies elements in a composition belong together.

- Unity = coherent, understandable design
- Lack of unity = fragmented design

Unity is created by continuity or repetition or proximity of elements.

**VARIETY** provides interest.

There is a need to have unity within variety; theme within variation e.g. vernacular architecture. Conversely, there is a need for order with hint of spontaneity.

**Emphasis / Focalisation**

Focus **ATTENTION** to increase excitement!

- Focal point (eyecatcher) = an element with a difference.

**Converging lines** = focalisation → or FOCUS. Use with restraint so as not to destroy overall unity!

**Balance**

Balance = visual resolution of forces. There are two kinds of balance: symmetry or asymmetry.

- **Symmetrical balance** = aka. Formal balance:
  - = mirror images about an axis or axes; predictable and reliable; a Classical Tradition.
- **Asymmetrical balance** = aka. Informal balance:
  - = balanced dissimilar elements.

Arcane or informal balance is more dynamic! Asymmetry often used in Romantic Traditions.
Scale

Scale is concerned with interpreting relative size via some unit of measure especially a human being.
- intimate human scale (maximum about 16 x 6m in plan)
- human scale (about 24 x 10m)
- public human scale (about 250m wide)
- superhuman (monumental)
- extra-human, vast non-human scale of nature (desert, sea, sky, etc.)

Proportion

Proportion is concerned with the relative dimensions of elements (length to width to depth). The search for a ‘perfect’ proportion is ongoing. Since the times of Ancient Greece, the ‘Golden Mean’ or ‘Golden Section’ has been thought by some as the perfect proportion.

Golden Section = 1 : 1.618034… [etc.]
or phi $\Phi$ aka. 1: (1+$\sqrt{5}$)/2 or about 3:5

Often found in nature, e.g. ram’s horn, nautilus shell, etc. See more in later section on Natural patterns.

Contrast / Tension

Tension = contrast or the opposition of various forms to produce a feeling of energy and vitality.
- too much tension is not pleasant!
- too little contrast can be boring
Black and white has maximum contrast.

Movement / Rhythm

This concerns the illusion of movement across a visual composition. Visual designers have been using implied motion since ancient times, from running patterns like frets to the use of dynamic lines like diagonals or obliques. The rate of implied movement and the rhythm of repetitive shapes can be measured using a musical metaphor. Motloch (2001:146) describes legato (slow, flowing) and staccato (agitated) rhythms.

Pattern will be discussed separately after Colour. Designers (and artists) use the visual elements and basic design principles to create designs – along with many other factors influencing their work. They can be applied to hard landscape forms as well as plants. The language of art is also used to explain these creations to others – orally or in written form. Traditionally critics and historians also use these descriptors to interpret creations.


PLANTS’ VISUAL CHARACTERISTICS

Robinson (2011) describes these ideas which pick up some of those basic elements discussed here already but he attaches plant examples:

Chapter 6 Visual Properties of Plants

- Subjective and Objective Responses to Plants
- Analysis of Visual Characteristics
- Form (Prostrate and Carpeting Forms... Hummock, Dome and Tussock Forms... Erect or Ascending Form... Arching Form... Palm Form... Succulents and Sculptural Form... Oval Upright Form... Conical Form... Fastigate and Columnar Forms... Tabulate and Level Spreading Form... Open Irregular Form... Trained Form)
- Line and Pattern (Ascending Line... Pendulous Line... Horizontal Line... Diagonal Line... The Quality of Line... )
- Texture (Fine Texture... Coarse Texture... Medium Texture...)
- Colour (Hue... Value... Saturation... Colour Perception... Colour Effects)
- Visual Energy...(Combining Plants)

The overall form of plants which is greatly related to their habit of growing is another basic idea discussed in most planting design publications. Little sketches or silhouettes are used to illustrate their classification of forms.

“Three types of Greek fret patterns. 
a) simple fret, 
b) a compound fret, 
c) rosetted fret. 
http://etc.usf.edu/clipart/10100/10160
Different reference texts have slightly different versions – but you get the general idea here.

- **Columnar**
  e.g. Lombardy poplar, Cook Is pine

- **Fastigiate**
  e.g. Pencil pine
  Very narrow shape

- **Open**
  e.g. Eucalypts

- **Pyramidal or Conical**
  e.g. Liquidambar, ‘Christmas tree’ shape, blue spruce

- **Round**
  e.g. brush box trees, or hummock or dome shaped shrubs and herbaceous plants

- **Spreading / horizontal**
  e.g. Cedar of Lebanon trees or Grevillea ‘Robyn Gordon’ shrubs

- **Upright shrubs**
  e.g. Sacred Bamboo

- **Vase-shaped shrubs**
  e.g. crotons

- **Twisted trees**
  e.g. Banksia

- **Weeping**
  e.g. Weeping Willow, Wisteria; includes arching shrubs e.g. Buddleia species shrubs


They always forget these guys!

- **Palm shapes:**
  Solitary trunks or clumping sorts or branching sorts;
  Leaf shape: fan (palmate) or divided (pinnate, bipinnate) or fish-tail shaped leaves, etc.
  [JS drawings]
NOTE: Reid always includes the VERY IMPORTANT ground line in these sketches.

SOURCE:
Colour

In art and her related applied design fields, colour has been designated as having broad groupings such as warm colours (reds, yellows, oranges) and cool colours (blues, greens, violets), and neutrals (creams, beige, browns, greys).

Black and white are colours outside these sets. Scientifically, black is the absence of light while white is the presence of all light waves.

"In colorimetry, the MUNSELL COLOR SYSTEM is a color space that specifies colors based on three color dimensions: hue, value (lightness), and chroma (color purity). It was created by Professor Albert H. Munsell in the first decade of the 20th century and adopted by the USDA as the official color system for soil research in the 1930s." http://en.wikipedia.org/wiki/Munsell_color_system

Another common categorisation of the colour spectrum concerns 12 colours: primaries (red, yellow, blue), secondaries (orange, green, violet) and tertiaries (red-orange, yellow-orange, yellow green, blue-green, blue-violet, red-violet).

As designers, we borrow from scientific understanding, technological developments and art theory to use colour that best fits our purposes: to invoke moods, provide social meanings, draw attention, mask or hide things, inform, beguile, entertain, and so on. Colour is awesome!

Sources about plants and colours:

There are many opportunities in planting design to include patterns, chiefly in the arrangements of groups of plants. The most common way to classify arrangements is by degree of regularity. Precise, regular, often symmetrical, often linear arrangements are provided by grids. Grids are the fundamental approach used by farmers, orchardists and foresters to achieve maximum crop coverage and yield. Similarly, French urban parks are famous for their square grids of trees with clay-sand mulch understorey (effectively these are groves). Mass-planting herbaceous plants is often arranged in an alternating pattern that is really a triangular grid that ensures all the ground is covered with no pesky gaps.

Irregular planting arrangements are more difficult to set-up and look ‘natural’. True randomness includes plants too close and far apart and that is hard NOT to correct! Australian garden designer Edna Walling (1895-1973) was famous for achieving this wild randomness. For more: http://www.abc.net.au/walling/

**EUCLIDIAN GEOMETRY and dimensional patterns:**

2 DIMENSIONAL = shapes, for example…
- rectilinear □ □ ◆ ◗
- triangular ▲ ▼ ▣ ▤ ▥ ▦
- circular ● ○ ◗ ◘
- freeform ◙ ◔ ◕ ◖ ◗ ◘ ◙
- combinations ■ ◑ ◒

3 DIMENSIONAL = volumes (forms), e.g.…
- cuboid / prismatic
- pyramidal / prismatic
- spherical / tubular / drum
- freeform . . .
- combinations

**Euclid** was an ancient Greek mathematician who lived in Alexandria (Egypt) 3rd century BCE. Motloch (2001,147) describes the four types of Euclidian geometry as: rectilinear, angular, circular and composites of these. A designer utilizes these geometries singularly or in combination, along with the ordering mechanisms of the visual arts to create successful and interesting schemes. Different human cultures attach distinct emotional characteristics to these geometries. See if you agree with Motloch’s descriptions of emotional associations to geometries.

**RECTILINEAR GEOMETRY**

Rectilinear 2D shapes and 3D forms have the right angle (90°) as the determining component. Squares and rectangles are flat and two-dimensional. Cubes and some prisms are the solid forms of these. Motloch (2001,147) describes 3 visual forces inherent in rectilinear geometry: horizontal lines, vertical lines and right angles.
**ANGULAR GEOMETRY**

Angular 2D shapes and 3D forms have a smaller (acute angles) or greater (obtuse angles) angles than the right angle (90°) as the determining component. Equilateral triangles are based on three 60° angles and three equal sides. Triangular prisms are the solid forms of this geometry. Motloch (2001,148) describes 3 forces in angular geometry: point, radiating lines and angles. He maintains that acute angles generate energy – intensifying and increasing the dynamic qualities – while obtuse angles "convey a controlled, subdued, or refined energy."

**CIRCULAR GEOMETRY**

Circular 2D shapes the perfect roundness of the circle and includes the 3D forms sphere, drum or cylinder. Motloch (2001,149-150) describes four inherent forces in the circle: the generative point, the arc, the radial forces, and right angle where radials meet arcs.

4 DIMENSIONAL = time & movement, for example…
- movement through space: e.g. fast or slow, smooth or jerky, up/downwards...changes & events over time
  - solar patterns (day & night)
  - lunar patterns (over month)
  - seasonal patterns (over year)
  - generational patterns etc.

**Natural Geometry Patterns**

The mathematical principles on which nature’s patterns are based can be useful tools and insights for designers of all sorts. Designers are interested in both the structural patterns (frameworks, load-bearing systems, arrangements of parts) and the decorative aspects (colouration and surface patterning). However, we designers usually make use of the findings of the scientists who have provided the detailed understanding and measuring of these systems and patterns.

Biologist D’Arcy Thompson (1860-1948) first published his influential book On Growth and Form in 1917 and it still remains relevant today – although there have been enormous advances in understanding the workings of the natural world and the variety of species within it. While this work is naturally important to biologists, mathematicians and other scientists, it also intriguing to designers. With the growth of Modernism in the post-WW2 era, and efforts to remove 'style' from 'good design', the lessons that Nature offered seemed particularly tempting as a source of ideas. Many introductory texts for designers in 1960s and 1970s were full of references to organic forms and natural geometries. However, Nature’s solutions to problems of structure and arrangement remain of interest in the 21st century for all sorts of reasons, including recent explorations regarding the use of metaphor and the fascination of Chaos and Gaia Theories. Contemporary designers and scientists use the term BIOMIMICRY to describe learning from nature’s design solutions (and patterns).

The following brief discussion of natural patterns includes: branching systems, spirals, hexagonal systems and hydraulics. Without digging into the complex mathematics too much, the inspiration for designers is often in the visual arrangement, so illustrations have been incorporated here.

**BRANCHING SYSTEMS**

= Bifurcating linear patterns!
- Trees and their leaves
- River systems (whole sets of catchments, from the tidal mouth to the smallest creek)
- Blood circulation in some animals, e.g. humans and other mammals
- Some forms of lightening or other electrical discharge.

[Colorado River system image: Rowland 1971:80]

[Tree branches image: Rowland 1971:80]
SPIRALS
(found in plants and animals and beyond)
Curvilinear patterns! True spirals have the same radius of curvature, such as the helix or the screw. **Equiangular spirals** have a radius of curvature that increases (based on the Fibonacci number series) and are the most common form of spirals in nature. They include:
- Pinecones and pineapples
- Flower centres in the Compositae family (daisies).
- Shells (sea-shells — nautilus, cone, etc.)
- Horns of some goats, sheep, etc.
- Some microscopic creatures, e.g. Radiolarians
- Galaxies of stars!

*Fig. 73. The equiangular spiral.*

[Radius of curvature images: Thompson 1971:177]

HEXAGONAL SYSTEMS
- Snowflakes (or water crystals) are based on the six-pointed star ⋆ that is comprised of 6 angles of 60° each (= 360°).
- Bee’s honeycomb cells are based on a hexagonal prism — very strong and very compact.
- Some rocks form around hexagons — basaltic prisms, or some semi-precious gems

*Fig. 42. Pattern of a honeycomb. From T. Raymont, A Cluster of Bees (The Bulletin, Sydney).*

[Sheep’s horn image: Thompson 1971:209]

[Sheep’s horn image: Thompson 1971:209]

[Sheep’s horn image: Thompson 1971:209]

[Bee cells image: Thompson 1971:109]

[Radiolarians image: Thompson 1971:168]
HYDRAULICS
Liquids in action! Leonardo da Vinci was fascinated by the flow of water and drew sketches from observation. Slow-motion photography described the action of things that occur too fast for the human eye to perceive – and has been used by advertisers ever since! Fountain designers are the artists of water while hydraulic engineers and their scientific understanding of water, save our cities from floods and storm run-off damage. Consider:
- Flows: swirling, curling, surf, tides
- Drops and splats
- Bubbles and froth
- White noise or tabletop trickles and Feng Shui!

The GOLDEN RATIO (aka Golden Section, Golden Mean) is described with the Greek letter Phi (upper case $\Phi$) and is expressed as $1:1.618$ or
$$\varphi = \frac{1 + \sqrt{5}}{2} \approx 1.6180339887 \ldots$$

Ratio is another word for proportion to designers and artists and the Golden Ratio has been used by designers since the Ancient Greeks. The principles of the Golden Ratio were described in detail by Renaissance scholar Luca Pacioli in De Divina Proportione (1497). For more:

FRACTAL GEOMETRY is a phenomenon that is based on replication at every scale (or thereabouts). The Mandelbrot Set is an example of this self-similar patterning. Another classic example is the Koch snowflake, a fractal that begins with an equilateral triangle and then replaces the middle third of every line segment with a pair of line segments that form an equilateral "bump". Both Mandelbrot and Koch sets are perfect (self-similar at every scale).

Koch Snowflake (first 4) & 2 sizes tessellation
(See http://en.wikipedia.org/wiki/Fractal for nifty illustrations and descriptions.) In nature, fractals display self-similarity typically only within finite scale ranges. The branching and spiralling patterns mentioned previously are mostly fractal (self-similar) as well.

Best ever explanation for all Fibonacci maths that doesn’t frighten mathophobes like me is 3-part video series by VI HART: http://www.youtube.com/watch?v=ahXIMukSXX0&index=52&list=UUOGeU-1Fig3rrDjhm9Zs_wg

OTHER NATURAL GEOMETRIES
Using the expression 'natural' pattern can be tricky when you consider the reliance nature has on maths! She has a particular fascination with the FIBONACCI SERIES or SEQUENCE [0,1,2,3,5,8,13,21,34,55, etc.) which is the basis of the GOLDEN RATIO. This sequence is created by adding the previous numbers. Le Corbusier’s ‘Modular’ Man proportion is based on the Golden Ratio (see below).

ISO paper series comes close (at $1:1.414$ or $\sqrt{2}$) but not exactly the same.

= means equal.

Close-up of succulent Aeonium tabuliforme showing multiple spirals that reflect Golden Ratio and the Fibonacci series.
SATISFYING NON-VISUAL SENSES

If sight has been discussed, then that leaves the other four basic senses of smell, sound, touch and taste to consider. We will present some fundamental ideas about these sensual characteristics and urge you to find sources that provide examples of plants with these traits.

Lists of plants with certain characteristics are useful resources for plant selection. They can be positive for certain sensual characteristics or negative. Apart from fragrant plants, it is actually difficult to find such lists in the literature. We should concoct a few!

Never-the-less, here are few things to ponder.

Smell

This is the most commonly considered sense apart from vision. It has huge potential for pleasure, because even human noses are hardwired to our brains and create strong reactions. Most plant books will provide lists of fragrant plants, but don't forget to find out WHEN and WHAT is fragrant.

Often the flowers are the source of fragrance (to do with attracting pollinators, but we humans get turned on as well) But when are the flowers around? That is the thing to be aware of well. I'm writing this in November and I have true jasmine flowering (Jasminum sambac ‘Grand Duke of Tuscany’), particularly stronger in the cool of the evening when the breezes are slight so the smell stays put. However, back in August-September with late Winter, the Jasminum polyanthum (pink jasmine) was flowering and heralding the Spring. In between these times was Trachelospermum jasminoides (star jasmine). You can see the succession of smells!

Apart from flowers, foliage is another source of fragrance. Thus, lovely scents are emitted when people brush pass plants along a path. Most plants in the LAMIACEAE family have lots of oils in their leaves that smell, for instance, most Salvias will provide a spicy smell but basils are even better. The most drought tolerant is the perennial basil (Ocimum gratissimum). The other king of smells is Tagetes lemmonii (tree marigold) which is VERY fragrant when touched smelling like lemons and marigolds!

It is also important to remember that many people have allergies and flower pollen can be a problem, especially from acacias and grasses. There is also variation between people's likes and dislikes with fragrances. One person's fragrance is another's pong, such as Magnolia figo (syn. Michelia figo) called port wine magnolia or Banana magnolia (the old stinky sort)!

Some plants smell awful because they are seeking to attract insects that like the smell of rotting flesh or faeces! The worst of these are fungi (all the stinkhorns) and the Aroids with attitude (carrion flavoured 😞), e.g. Titan arum (Amorphophallus titanum). Landscape designers don't usually deal with these plants (and fungi) but imagine a commission by a botanic garden to create a collection of them! The need there might be to contain each smell so they did not mingle! We could call such a collection a VOMITORIUM! 😊 Variations…

Touch

I will confess to being a fondler of plants! Maybe I rub leaves to get the fragrance but the touch feedback is another pleasure again. Have you ever stroked a huge glossy Monstera delicosa leaf? Or felt the fur on Senecio cineraria ‘Dusty Miller’? Some flowers have touch appeal, such as roses and gardenias and even the fuzzy flower heads of grasses such as Pennisetum.

The bark on tree trunks and branches are also touchable! Old varieties of Lagerstroemia indica (crepe myrtle) and Eugenia uniflora (Brazilian cherry) have lovely smooth satiny bark. The rough barks of old Callistemon trees and ironbark Eucalypts are not exactly pleasurable to fondle but they are interesting and make great places for epiphytes to cling to!

The other thing to remember about touch is that it may not be for pleasure purposes that humans touch plants. I use strong branches of small trees to hold like grab-rails to steady my lack of balance. These favoured branches become like reliable sturdy friends and mark my interactions with place and plant. Touch is important for human well-being.
Then there is the negative side of touch. Avoiding prickles and thorns is very important especially when designing for children, the very elderly and infirm. Refer to the problem plant section for more.

Touch should not be equated with texture. TEXTURE is the VISUAL surface quality of works of art and design.

**Sound**

Now there are some very subtle things happening with plants; some of them make windchimes! Bamboo is renowned for its whispering. A writer in the *Queenslander* newspaper described this phenomenon as "the susurrus of the sleepless bamboos imparts an irresistibly pleasing drowsiness to the nerve" (‘The Sketcher’, "The Brisbane Botanic Gardens" In Queensland, 8 April, 1876, 12).

Another group of whispering plants are Casuarina, especially *Allocasuarina equisetifolia* (coastal she-oak). And of course, mass planting of ornamental grasses can make for a fine rustling sound in the wind. Rattling pods on some trees can be more annoying than pleasurable, e.g. *Albizia lebbeck* (woman’s tongues tree)!

**Taste**

Plants for food are discussed separately under 'sustenance' but apart from productive gardens and landscapes, there is nothing to stop a designer including tasty plants amongst ornamental schemes. Common mint *Mentha viridis* (or any of its relatives) and parsley (*Petroselinum crispum var crispum*) are great plants to steal tips and refresh the mouth!

Lastly, become aware of the problem plants to be sure you don’t use them in the wrong circumstances. There is more written about problem plants later in this section.

We could argue that plants can offer all sorts of sensual character to a design, beyond being visually interesting or offensive! Forgetting that a plant gives off a disgusting smell would be a grave mistake if that plant was positioned near an eating space.

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**PLANTS FOR THE MIND OR HEART**

When we design, matters of philosophy, beliefs, and other intellectual intentions also come into play. Similarly, cultural values, social meanings, personal and community identity are important factors influencing the client’s wants and our decisions.

**Sacred Plants**

Some plants have great significance to various established religions, and some are commonly valued, such as the sacred lotus. Here is a sample: *Nelumbium speciosum* Sacred lotus... (Egypt→Asia) *Ficus religiosa* Peepul ......(to Buddhists & Hindus) *Kigelia pinnata* .........................(in Tropical Africa) *Melia azedarach* ...........................................(India) *Nandina domestica* Sacred bamboo(China & Japan) *Ocimum sanctum* Sacred basil .................(to Hindus) *Plumeria acutifolia* Temple tree.................. 

.............................................................(to Buddhists & Hindus) *Myrrh Commifera spp.* ................................(in Bible+)

**Frankincense Boswellia carterii ...............(in Bible+)**

**Landmarks (as points of identity)**

There are a number of trees with a distinctive form that are visible kilometres away. These can be especially prominent in flat plateau landscapes, which made *Araucaria bidwillii* (bunya pines) a favourite homestead marker inland on the east side of Australia.

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LEFT: Sometimes form is made stranger by the effects of wind or bifactions of trunks, e.g. the forked hoop pine (*Araucaria cunninghamii*) located at Cleveland Point is used by seafarers in Moreton Bay as a vital wayfinding device. (JSim 2006)
Social Status or Botanic Obsession

Some people make gardens to show their wealth, and similarly there are public parks and gardens that seek status appeal. Such private gardens are typically ‘designed’ in whatever is the most fashionable look at the moment somewhat like interior do-overs. For the gardening cognoscenti a prestigious garden might be a replica of Sissinghurst’s White Garden (think classic beige interiors), lots of clipped hedges and being selected for the Open Garden Scheme! So as a designer aware of current trends, you would be able to talk fashion statements with your client!

Recent finds from the wild are often in the true collectors must-have list, e.g. foxtail palm (Wodyetia bifurcata) and Wollemi pine (Wollemia nobilis). Of course, after the true enthusiasts, these same plants can be symbols of status for some. Other collectors specialise in plant types. It would be a real treat to work with an expertly knowledgeable client to design their garden or arboretum. Imagine the collaborative rewards!


Intellectual Investigation/ Declaration

Dignitaries, royalty and celebrities have been known to plant trees to mark a point in time and their lofty presence in certain places. The selection of species (and specimen) is critical and depends on the circumstances. Seek advice from arborists and horticulturists to be sure your selection will be suitable. Politicians’ requests have to be countered with sound scientific knowledge if they try to insist on planting Quercus robur English oak trees in Brisbane (they do not do well here)! On the other side of this category would be intellectual teases (mazes and labyrinths) and experimental planting. For example, from the 1970s in Queensland, many native plant enthusiasts began planting up their backyard with rainforest plants to create Rainforest Gardens, an innovative wild garden form yet to be truly recognised by garden historians.

Memory and Identity

Of course there are personal markers of memory which may be requested by clients, but some are linked to community memory associations, such as red poppies (Papaver rhoeas) and rosemary (Rosmarinus officinalis) for remembrance.


Since ancient times this aromatic herb has been believed to have properties to improve the memory. Perhaps because of this, rosemary became an emblem of both fidelity and remembrance in literature and folklore. Traditionally, sprigs of rosemary are worn on Anzac Day and sometimes on Remembrance Day, and are usually handed out by Legacy and the RSL. Rosemary has particular significance for Australians, as it is found growing wild on the Gallipoli peninsula.


Healing and Refuge

There is an increasing amount of research supporting the benefits of gardens for soothing troubled souls, especially the sick and the elderly. Healing Gardens should be mandatory for all hospitals and care facilities. Consider doing some serious searching in the available literature and be amazed! These effects can be both psychological and physiological. Rather than specific plants here, it is plants in a garden with various facilities (like sitting spots, universal access paths and handrails) and typically designed in collaboration with users.

Most home gardens can become a refuge, with even a small courtyard providing privacy and peace. Ideas about simplicity and elegance (instead of bold, cluttered designs) are typically important in refuge situations. Another name for such places is Meditation Garden. Then again, the sociability of community gardens can be a safe refuge of another sort, freedom to mix with different people and enjoy life and yummy food plants and pretty flowers. One beautiful flower can be soothing to an upset heart.

Another tradition in European Christian countries is to plant evergreen trees in cemeteries – making a connection between heavenly paradise after death and where one is 'planted'. In Europe, yews (*Taxus baccata*) are favourites because individual specimens are known to live a thousand years.

Yew is over 1600 years old; Le cimetière d’Estry (Calvados, France), 2011 [Wikipedia commons]

### Floral Emblems

There are plants declared as national floral emblems which are community identity markers.

**Australia:** Golden Wattle *Acacia pycnantha*

**Vic:** Common Heath *Epacris impressa*

**Tas:** Tasmanian Blue Gum *Eucalyptus globulus*

**ACT:** Royal Bluebell *Wahlenbergia gloriosa*

**SA:** Sturts Desert Pea *Swainsona Formosa*

**WA:** Mangles Kangaroo Paw *Anigosanths manglesii*

**NT:** Sturts Desert Rose *Gossypium sturtianum*

**Qld:** Cooktown Orchid *Dendrobium phalaenopsis*

**NSW:** Waratah *Telopea speciosissima*

Let’s look further in this genre of planted landscape. As landscape forms and systems, agriculture contributes to the countryside or regional cultural landscapes. Smaller scale productive enterprises contribute to the peri-urban, suburban and urban landscapes. Community gardens and city farms are increasing the food supplies and helping to strengthen social groups into successful networks. The backyard vegetable and fruit garden is regaining popularity with ordinary private citizens, conscious of making sustainable lifestyle opportunities that include good health and wellbeing.

And finally at the detail scale, organic horticultural approaches offer so many opportunities for design that are good for people, the environment and economies, that the new term to use overall is SUSTAINABLE HORTICULTURE. Indeed, the expanding quest for a sustainable human existence on our Earthship has opened all sorts of opportunities for mixing up planting design functions and outcomes. We can decrease city 'heat-sinks' by increasing the vegetation while providing food or other sustenance at the same time. This is the age for planting designers to really get creative and think outside the traditions of singular use or superficial visual styles. It is a very exciting time and full of heart-warming hope!

The following lists are a start at understanding something about the number of uses people have...
found for plants. There is a specialisation called ETHNOBOTANY that seeks to learn about plants used by traditional cultures. Science is still finding secrets in old forests and in old cultures.

**HUMAN FOOD TYPES:**

- **FORAGE, PASTURE & FODDER PLANTS** (for animals that we eat)
- **PLANTS for BEES (to make HONEY)**
- **CEREALS**
- **VEGETABLES**
- **FRUITS (and NUTS)**
- **SPICES, CONDIMENTS, SEASONING HERBS**
- **BEVERAGES and other edible products**

**Major HUMAN FOOD plant families:**

- **GRAMINAE** (grass family)
  - cereals, wheat, rice, maize, sugarcane
- **CUCURBITACEAE**
  - melons, cucumbers, squashes, gourds
- **FABACEAE** (syn, LEGUMINOSAE)
  - legumes, peas, beans, pulses
- **ROSACEAE**
  - apples, pears, plums, cherries, almonds, apricots, raspberries, blackberries
- **CRUCIFERAE** (mustard family)
  - green vegetables (brassicas), cabbages
- **PALMAE** – coconut, date, sago, oil palms
- **EUPHORBIACEAE** – cassava
- **MUSACEAE** – bananas
- **SOLANACEAE**
  - potatoes, tomatoes, capsicum, chillies

**PLANTS THAT MAKE BEVERAGES:**

- China Tea = *Camellia sinensis* var. sinensis
- Indian Tea = *Camellia sinensis* var. assamica
- Carob = *Ceratonia siliqua* (fermented to make chocolate)
- Coffee = *Coffea arabica, C. liberica*
- Cocoa/Chocolate = *Theobroma cacao*
- Cola = *Cola acuminata* seeds
- Camomile (tea) = *Chamaemelum nobile*
- Chickory = *Chichorium intybus*
- Guarana = *Paullinia cupana*
- Kava = *Piper methysticum*
- Sugar cane = *Saccharum officinarum*
- Palm-sugar = *Arenga saccharifera*
- Sugar maple = *Acer saccharum*
- Beet-sugar = *Beta vulgaris*
- Rice = *Oryza sativa*
- Sago palm = *Metroxylon sagu*
- Coconut milk/cream = *Cocos nucifera*
- Plus fruit juices!! And plants that are distilled to make alcohol (e.g. vodka from potatoes, gin from juniper berries, and wines from grapes).

**BUSH FOODS**

Learning from Australian indigenous people, so many new foods are being explored derived from local plants. Many of these plants are beginning to be farmed commercially for the growing gourmet / foodie markets and further developed by nursery owners to create newer, stronger better forms. These are exciting times!

Here is a small collection:

- *Macadamia spp.* (nut)
- *Podocarpus elatus* Brown pine (‘nut’)
- *Araucaria bidwillii* Bunya pine (‘nut’)
- *Backhousia citriodora* Lemon myrtle (flavouring)
- *Citrus australasica* Finger limes (fruit)
- *Syzygium australe* Lillypilly (fruit)
- *Tasmannia lanceolata* Mountain Pepper Berry
- *Solanum centrale* Bush Tomato or Desert Raisin
- *Acacia victoriae* Wattle Seed
- *Rubus probus* Atherton Raspberry

**USES of PLANTS (not as food)!**

Botanists call all these “economic plants”.

- (bad) POISONS ! to humans & animals
- (good) DRUGS!
- HEALING and CLEANING PLANTS
- PERFUME-YIELDING
- WEARABLE MATERIALS (fibres & beads for weaving, twining, sewing)
- DYES for colouring fibres or paint
- FURNITURE & BUILDING MATERIALS
- OILS, WAXES, GUMS, RESINS, TANNINS
- SACRED and CEREMONIAL PLANTS etc.

There are further useful plants described in factsheet 11 USEFULS.pptx > PDF.
PROBLEM PLANTS

We have discussed so many things that plants provide to human beings that are good, helpful and even wonderful, but we need to be aware that sometimes they can be problematic. Remembering all the characteristics of plants is important when designing and selecting plants. While most plants are not intrinsically dangerous, they may be inappropriate in certain circumstances or certain seasons. No one wants children endangered or pets harmed by plant toxins. Similarly, at certain times of the year, some plants provide trip hazards if not groomed appropriately. In these instances, the key is to know what to expect when, select appropriately and maintain accordingly. Apart from the moral issues, canny landscape managers know the realities of legal implications of endangerment and damages. Designers need that same pragmatism and sense of responsibility to be inherent in their design decisions about plants. These sorts of problem plants are described in further detail in these 3 factsheets – they have even more of the important relevant online sources noted:

Poisonous and Toxic Plants
Factsheet 08 TOXIC.pptx > PDF

Physical Hazards
Dangerous plants to humans are often exhibiting defence mechanisms that evolved to protect the plant from grazing animals! Chemical defences include poisons, toxins, bitterness taste while mechanical defences include spines or thorns or prickles! Other problems for humans come from slip hazards (dropped slippery fruit or leaves) or drop hazards (falling heavy fruit like coconuts).
Factsheet 09 DANGEROUS.pptx > PDF

Weeds, Pests & Diseases
WEEDS = a plant in the wrong place! Authorities have classified weeds as either:
- Invasive species
- illegal species
- noxious species.
Weeds of National Significance (WONS)!
Factsheet 10 WEEDS PESTS.pptx > PDF

These factsheets are starting points only and are not intended to be totally comprehensive.

PLANTING DESIGN ARCHETYPES

We have devised a set of terms for archetypes in an effort to help students of planting design understand the possible sorts of outcomes that commonly occur. You can see these terms are a combination of functionality and visual character and growth habit.

FEATURE SPECIMEN:
Visual stand out due to massed/bold/colourful flowers, leaves or other distinction; e.g. Delonix, Jacaranda, Crepe Myrtles, Hoop Pine

SCULPTURAL FORM:
Visual stand out due to interesting or weird form; e.g. Dracaena marginata, Agave, Yucca, bamboo

WINDBREAKING:
Capacity to tolerate wind while dense foliage means the lee side is protected; e.g. larger Grevillea, Hawthorne, Melaleuca pallidus, Casuarinas

HEDGING:
Hedges are comprised of shrubs/small trees that tolerate pruning to keep a regular shape, typically with small leaves, e.g. many Syzygiums, Murraya paniculata, Duranta repens, Acalypha compacta

SHRUBBERY / filler:
Collations of shrubs (plus possible small trees and herbaceous plants) that are loose and irregular compared to hedges; interweaving and mingling of plants typical, with mixtures of leaf shapes, colours and sizes, e.g. Acalypha wilsonii, Mussaenda, Eupatorium megalophyllum, etc.

EDGING:
A small height plant placed in a line along the edge of a bed or border that makes a mini-hedge boundary; clumping habits very useful here, e.g. Mondo grass, Liriope, Zephranthes and pruned Alternanthera

GROUNDCOVERING:
Plants used en masse (either mixtures of species or a single species) to cover the ground in a bed or border, typically low height up to 1m; spreading, intermingling habits most effective, e.g. Philadendron ‘Xanadu’, Dianella, Variegated Star Jasmine, Erigeron karvinskianus
Dense SHADING:
Typically trees that provide shade underneath their thick canopies, mostly all year; thus creating a 'Shade Bath' when extremely dark and cool, e.g. tropical evergreen fig trees, many Rainforest trees

Dappled SHADING:
Typically trees (sometimes vines) that provide shade under a light canopy or defoliated deciduous trees/vines (seasonal situation), e.g. most gums are open canopied, Crepe Myrtles in winter, Delonix regia

EMERGENT / Silhouette:
Tall and interesting forms (trees or palms) that rise above surrounding canopies or are used along a ridge by themselves making distinctive eyecatchers, e.g. hoop pines, bunya pines, tall palms

Are these terms helpful or are they too generic? Please let us know what you think.

For more descriptors of planting design terms, forms and ideas, refer to the GLOSSARY at the end of this document.

SUMMARY THOUGHTS:
Plants are AWESOME!
But… we designers are responsible for selecting the RIGHT plants for the RIGHT spot, otherwise they are problems.
4. MANAGING INFORMATION

Getting to know plants is like the most delicious wallow in chocolate mousse! Except you never feel sick afterwards because you ate too much. We find that discovering another plant or finding out some new bit of insight about a familiar plant is a joy that is addictive. However, if you don't develop clever strategies to keep up with new information, you will quickly sink and drown. This section is about some of the strategies you can use to keep up-to-date and in control of potential information overload.

The other important reminder here is the phrase:

👉 use it or lose it! 👈

If you don't keep your memory primed with names and plant data, your mind will place it far away in a remote section that gets dusty, brittle and then falls apart. It is like trying to remember a person's name that you have just met. You need to get those memories laid down properly and securely and then keep visiting them to keep them alive.

Keeping alive the passion!

Or is that obsession? Engagement with plants is the key here: keep it alive and thriving! There are many ways to do this and maybe gardening is not needed, but we really think it is for the best results! Playing with plants feeds your inner curiosity and can feed your tummy! Start gardening, however small and you will be rewarded exponentially and continually.

Visit other people's gardens. Look over fences when you take your dog for a daily walk. Visit well designed public parks and well labelled botanic gardens. Seek out historic gardens and contemporary masterpieces while travelling abroad and locally.

Observing gardens, landscapes and the whole natural world is wonderfully therapeutic and very conducive to reflective practice. Being in the landscape physically makes a huge difference in your understanding and the application of knowledge and experience to design and management.

Many landscape architects are avid bush-walkers. Many horticulturists visit open-gardens for the same thrill and awareness. Some folks do both sorts of plant appreciation. Experiencing the actual plants will always trump remote access through books and magazines or the Interweb. However, the real experience should be supplemented with factual research to get all the data you need for design decisions and creations. Hence, there is the need to organise your data and your physical experiences.

Where once we would recommend a handwritten journal to record plants that you meet or observe, nowadays, even a smart phone can help you write a name and a comment or take a photograph. Or maybe you find a combination of tradition and new gadgetry is the winner. The key is then to organise these bits of data so you can retrieve them later.

Contemporary technology has made reflective practice part of a public realm; blogs and other social media can be very useful if managed sensibly. We have found a few of really good gardening/plant appreciation blogs but this is a volatile area so we make no assurance that the sources are still current! Checkout Factsheet #01C “Webs of Worth” for more.
If you are actively gardening, then you must keep a garden log and/or plant acquisition list. Computer software that help with such databases includes MS Access but that is no standard in Windows Office so using the widely available MS Excel is recommended – or the equivalent Apple product. Such digital records enable long term record keeping and analysis. If you include data about plant growth problems then such a record is even more useful. Many designers like to grow new plants themselves before inserting them in a planting design for a client.

**Keeping up-to-date & aware**

If you want a truly INSPIRATIONAL VISUAL and INTELLECTUAL FEAST: Tom Lenigas set up a great Tumblr site that just keeps growing, since August 2009! [http://landscapehorticulture.tumblr.com/](http://landscapehorticulture.tumblr.com/)

Blogs and newsletters from reliable sources are excellent sources of the latest news. Some Friends of Botanic Gardens groups are useful here as well.

You never know when taxonomists will reorganise the Myrtaceae family! And in the future, more threats will probably occur just as we found Myrtle rust or fire-ants in recent years. Commercial plant production means new varieties and species available annually. There is a lot of new information coming in and this will build on the important foundations laid in your university studies and beyond.

The key to making sense of all this data is learning to discriminate between unreliable, derivative, superficial sources and the tried and true. We will supply you with the basic indispensable sources, so you can keep that list growing.

**Cultivate your own plant data garden!**

Establishing and using a professional library is most advisable and acquisitions are tax deductible! We have prescribed several textbooks for DLB320 Landscape Horticulture and that is intentional. We consider these books to be with you for your entire career. The list of references for this Sourcebook is another indication of the breadth of publications available. Even more are selected for

**Factsheet #01A.** Buy wisely and avoid the "fashion-hacks"! Good places to visit and read these textbooks are our QUT/GP library, Brisbane Botanic Garden Library (Mt Coot-tha) and Qld State library. Then decide which ones you can’t live without and buy! **Books are awesome!**

In addition to these traditional sources of information there is the ever growing resources found on the Internet and websites of public libraries. **Factsheet #01C** captures some of the most reliable of these online sources, but essentially you should seek out the official government websites of agricultural and environment departments, as well as big botanic gardens that have a large research/science agenda.

USDA (United States Department of Agriculture) prepared and administers the Plant Zone system but also has a gigantic database on plants. Agricultural departments create useful technical sources about water, soils, weeds and more and sometimes it is useful to compare their sites, e.g. compare NSW, Victoria and Queensland.

The other invaluable sources are created by specialist plant groups, such as the Society for Growing Australian Plants, Brisbane Rainforest Network, Palm and Cycad Society, and Bromeliad Society, UK’s Royal Horticultural Society (RHS), and so on. Some of these amateur enthusiasts are so knowledgeable that botanists refer to them!

Some large commercial nurseries also maintain useful websites rich with plant-data and increasingly some include social media to get users’ feedback. Some favourites are listed on **Factsheet #01B.** This feedback is particularly useful when experimenting with plants in new locations or new plants generally.

Learning from other cultures about their traditional plants that might also be grown here is particularly useful. Australia’s current brilliant foodie repute is due to the fusion of cultures (and foods) we have gathered in our society and the spirit of adventure that says ‘give it a go’! Community Gardens that contain many cultural groups are wonderful learning places. They often include wise elders among our Australian society, like grandads and grandmas with decades of experience of growing particular plants in the same climatic situation. Learning from others by word of mouth is rewarding to all concerned. Continuing such hard-won knowledge is a responsibility and a joy.
Some useful sources include [access check November 2014]:
- BCC local government
- Australian Food Sovereignty Alliance – http://www.australianfoodsovereigntyalliance.org/
- Brisbane Local Food – http://brisbanelocalfood.ning.com/

Keeping data manageable & accessible

Everyone has different capacities for organisation and neatness. Some of us are cursed with clutter because we gather too much. In the end, you have to find your own comfort zone AND be efficient. That means sufficient gathering of data that is accessible. Ultimately there will be a mixture of sources and technologies: books, magazines, your own records, apps, blogs and websites.

Some essential tips for managing plant data:
- Get a few really good hardcopy publications that you know will be constantly used. These are the basis of your professional reference library.
- Keep your best journals and magazines sorted together in chronological order using magazine holders. Keep their indexes if provided.
- SubTropical Gardening Magazine has bundled many back issues into CDs which is very space efficient. There are other publications available on CD, e.g. Cordyline Society’s booklet.
- Most journals are available digitally today so that saves room and we all pray that the "CLOUD" will survive forever with our subscriptions intact!
- Keep a catalogue of your reference library: invaluable when you decide to buy a new book only to realise you already have it or that a friend has borrowed it and not returned it. You can also justify this as a part of your contents’ insurance and for replacement purposes.
- Storing brochures, fliers, nursery pamphlets and handouts all in one place (e.g. a big ring binder) is useful. Typically, I keep hardcopies and digital copies if possible.
- Similarly, brochures and handouts that are digital should be kept in one place (plus backup!), such as a USB devoted to plants and gardening: name it PLANT DATA for easy recognition. You can keep your garden database / log and plant photographs on this USB as well.
- Keep any plant tags (those plastic labels) you get from personal garden purchases, but they can be tricky to sort into logical groups for future access. Remember they have data on both sides so you can't stick them down on a page! Using clear (no glue!) photographic albums is one way to keep back and front visible and enables sorting the pages into groups that might reflect the garden beds where the plants are growing.
- Establish your own set of plant profiles and planting lists. Again, these should be saved digitally and in hardcopy form: in your PLANT DATA USB and PLANT DATA folder.
- Collect images of successful planting schemes, either from the Internet, magazines or your own photographs. Similarly, Expand your library to include published books on specific collations of plants, focused on foliage, colour, microclimate, etc.)

When you are designing, all this data is available for you to peruse. You can actively research a particular plant or go searching by ambling through the images and get inspired that way.

SUMMARY THOUGHTS:
Find your own comfortable and effective strategies to keep and acquire data about plants.

Reflective practice helps with maintaining and increasing design skills and remembering plant data!

And you might find your career is connected to professional blogging about plants and planting design!
5. DESIGN PROCESS and DRAWING

Plonking plants anywhere on a site, without a design prepared beforehand, usually comes back and bites you, even in a small domestic garden. Some garden and park managers may seem to operate without reference to a plan, but the best of them have the design intent etched on their minds and follow through on a daily basis.

For professional designers, drawn designs are a vital mode of communication to use with clients, government officers, other consultants and contractors. However, we use a different graphic language for convincing a client or our professional colleagues compared to informing a landscape contractor what to plant where.

There are several key publications to help you learn graphical languages for the different stages in the design process. Former staffer at QUT Glenn Thomas compiled his SAD book about Site planning in 2002, which contains lots of examples, especially of site appraisal, concept and sketch design stages. The other mainstay reference is by Grant Reid called Landscape Graphics. Although it has an old fashioned hand-drawn feel to the drawings and a temperate climate/USA bias regarding plants, it has some great basic truths and ideas. You might also like to review the other American publication that has been around for decades: Booth and Hiss 2011 (the sixth edition!): still relevant to graphics discussion despite focus on residential design.

This section is about learning skills that help us design as well as help communicate with others about our designs and our decisions or rationale. Landscape architects vary our landscape design drawings generally, and for planting designs.

(1) Site Appraisal Plans

Typically, we begin with a plan that describes what exists on site: the SITE SURVEY. This gives us the important size, character and conditions of the place. For planting design we must know what the soil is like, the microclimates or shade or sunny areas, wet, boggy areas or dry wind-ravaged areas. We need to know what is already on site, including built structures and existing vegetation, and extent. We need to identify what that vegetation is, especially if it is weedy or showing signs of damage and distress. Even if the land has been cleared of everything down to the subsoil, we need to research what the local indigenous vegetation would have been. This will help us make decisions later in our design process.

Thomas, Glenn 2002. S.A.D. = Sustainable and delightful: A designer’s guide to sustainable site planning. Brisbane: School of Design and Built Environment, QUT.


(2) Functional Diagrams

We can draw to help us design: making sketches (plans and sections) of our multiple attempts to bring all the threads together. These can be very rough and quick and are not intended to be readable by anyone but ourselves. We often begin with diagrams that describe broad functions, trafficways or problems like eyesores or potentials like glorious views. These are called FUNCTIONAL DIAGRAMS.
Next we start the sketching of possible outcomes, the CONCEPTUAL DRAWINGS. These kinds of drawings can be very diagrammatic as well. They can be very useful to show clients to capture the essence of a scheme, but they don’t attempt to show detail. They are the visualisation of the big design intent you have settled on. Sometimes we use 3D models to express these ideas as well.

Next we start making the intent fit the site, so understanding the scale and orientation of the place is vital. These drawings are called SKETCH DESIGNS but are still comparatively loose and full of character. We can even make models to show the three-dimensional character and conditions of design ideas. At this stage, we start listing the preferred plants in a plant schedule which can be used as part of the legend. Once we have a final solution, or perhaps a couple of options, we can work up the sketch designs to be more evocative for the client. Colour rendering is typically at this stage and depictions of people in sections and three-dimensional views are useful to get the client to understand the scale of your design ideas.

Finally, all the decisions have been made and the client agrees and we’ve checked the plants are available. So now we start producing drawings that will communicate to the landscape contractor exactly what plants go where. We used the term WORKING DRAWINGS in the past. Now we use the term IMPLEMENTATION DOCUMENTS (which includes drawings and written specification). There will be further information in the specification about our expectations as the designer. The planting design drawings at this stage are very simple and should be easy to read. The final planting schedule should contain the vital data that is needed for purchasing the right plants and in the right number.

In previous years, the designers would tally the required number of plants to ensure we got good coverage and the right size of plant. Some professional offices now recommend listing just the spacing required and letting the contractor tally up the required number of plants.

The standard professional way to approach design and decision making is to capture the results as a plan, or similar mode of representation. The idea being that this becomes the contractual document that guides landscape contractors who implement the design on the ground. Time and experience has shown this is the best way to go in most circumstances. However, as a practicing gardener, the immediacy of responding to dynamic landscapes includes designing without paper. When to apply the on-ground design approach takes critical judgement. It could be easily part of the regular maintenance regimes of pruning, weeding, and perennial management, where replacement infilling of gaps in beds and shrubberies are needed.

As a guide, if the on-ground design includes major changes such as the placement of paths or lines or groves of trees, or repopulating an entire garden bed/border, then you need to go back and make decisions recorded on paper BEFORE implementing on ground, even if you are your own client/user. The main concern is that changes to the original design need approval from the client/user before they are carried out. Some design ideas maybe difficult to describe on paper, especially if there is some clever maintenance regime required to make the design a reality. Most likely, the solution is a combination of traditional representation plus written notes or specification.

**SUMMARY THOUGHT:**
Graphical representation of ideas, especially landscape and planting designs, comprises a range of communication purposes that require appropriate and variable languages to be successful. Getting the right language for the right purpose is vital!
Conclusion

Putting together all the ideas examined in this Sourcebook contributes to finding a personal planting design process.

The most experienced designers, horticulturists and gardeners know that we never stop learning about plants. Never ever! New ones are developed by skilled propagators and botanists find new ones in the wild.

There are so many plants in the world and only one lifetime, so we stand on the shoulders of all the passionate 'phytophiles' that have preceded us and extend the knowledge for the next generation.

Lifelong learning is the key to understanding Landscape Horticulture. And as Thom Lenigas, said so passionately, *plants are awesome!*

More Information:
DLB320 FACTSHEETS (for 2015)

- factsheet 1A REFERENCES
- factsheet 1B NURSERIES
- factsheet 1C Webs of Worth
- factsheet 02 OBBG sample
- factsheet 03 OZ ICONS
- factsheet 04 OLD FAVS
- factsheet 05 palm bamboo
- factsheet 06 cordylines
- factsheet 07 broms succs
- factsheet 08 toxic
- factsheet 09 dangerous
- factsheet 10 weeds pests
- factsheet 11 useful
REFERENCES

Refer to the illustrated version in Factsheet #01 which also has reliable Internet sources and recommended magazines and journals.


APPENDICES

APPENDIX A: PLANT TYPES

For landscape designers, we often think in short cuts about plants, which is why many design schemes are reduced to three sorts of plant groups: trees, shrubs and groundcovers. However, we can learn from botanists to see a wider range of types, e.g.

EXPLANATIONS OF ABBREVIATIONS:

- An. = Annual
- Ba. = Bulb or Corm
- Cl. = Climber
- Cr. = Creeper
- Epi. = Epiphyte
- H. per. = Herbaceous perennial
- Per. = Parasite
- Sh. = Shrub
- Su. = Succulent
- Terr. = Terrestrial
- Tw. = Twiner
- Und. shr. = Under-shrub or small shrub

[Above: Bailey 1885, vi & below: Hill 1875, xi]

APPENDIX B: HABITATS

Plant formations in Australia (Read 1994,31):
- Freshwater Wetlands
- Coastal Heath
- Tidal wetlands
- Dunes & Headlands
- Open Shrublands / spinifex understorey*
- Shrublands*
- Closed/Open Scrub & Heath
- Open Woodlands
- Woodlands
- Open Forests
- Closed Forest (Rainforest) tropical or temperate Alpine Herblands
- Herblands*

* = has wide open spaces

SOURCE:

Broad Vegetation Groups in Queensland

Broad vegetation groups (BVGs) are a higher-level grouping of vegetation communities. Queensland encompasses a wide variety of landscapes across temperate, wet and dry tropics and semi-arid to arid climatic zones. Broad vegetation groups provide an overview of vegetation communities across the state or a bioregion and allow comparison with other states.

SOURCES: Bailey, F.M. 1885. Catalogue of Plants in the Two Metropolitan Gardens, the Brisbane Botanic Gardens and Bowen Park... Brisbane: Government Printer.
Here is my version of plant forms with examples of the sorts of plants that would be found in Queensland. This checklist of plant forms is arranged under three basic plant sorts: trees, shrubs and groundcovers.

### FORM [HABIT] TREE [woody]

<table>
<thead>
<tr>
<th>Form</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>e.g. Eucalypts</td>
</tr>
<tr>
<td>Rounded</td>
<td>e.g. Brush box</td>
</tr>
<tr>
<td>Columnar (top point)</td>
<td>e.g. Cook Island pine (if very narrow = Fastigiate)</td>
</tr>
<tr>
<td>Columnar (blunt top)</td>
<td>e.g.</td>
</tr>
<tr>
<td>Conical</td>
<td>e.g. Liquidambar, blue spruce</td>
</tr>
<tr>
<td>Broad-headed</td>
<td>e.g. Poinciana</td>
</tr>
<tr>
<td>Weeping</td>
<td>e.g. Weeping Willow</td>
</tr>
<tr>
<td>Horizontal</td>
<td>e.g. Cedar of Lebanon</td>
</tr>
<tr>
<td>Twisted</td>
<td>e.g. Banksia</td>
</tr>
</tbody>
</table>

### FORM [HABIT] SHRUB [woody]

<table>
<thead>
<tr>
<th>Form</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vase-shaped</td>
<td>e.g. Crotons</td>
</tr>
<tr>
<td>Upright</td>
<td>e.g. Sacred bamboo</td>
</tr>
<tr>
<td>Rounded</td>
<td>e.g. Westringia</td>
</tr>
<tr>
<td>Open</td>
<td>e.g. Hovea, Leptospermum</td>
</tr>
<tr>
<td>Arching</td>
<td>e.g. Bougainvillea, Spiraea</td>
</tr>
<tr>
<td>Irregular/twisted</td>
<td>e.g. Banksia, Poinsettia</td>
</tr>
<tr>
<td>Tufty / spikes</td>
<td>e.g. Yucca, Pandanus</td>
</tr>
<tr>
<td>Spreading / horizontal</td>
<td>e.g. Grevillea 'Robyn Gordon'</td>
</tr>
</tbody>
</table>

### GROUNDCOVER [herbaceous]

<table>
<thead>
<tr>
<th>Form</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upright / bushy / large</td>
<td>e.g. Strelitzia, Musa, Alpinia, Dracaena, Philodendron</td>
</tr>
<tr>
<td>Spreading</td>
<td>e.g. Gazania, bromeliads</td>
</tr>
<tr>
<td>Carpet</td>
<td>e.g. Erigeron, native violet</td>
</tr>
<tr>
<td>Clumping / rosettes</td>
<td>e.g. Canna, Agave, Aloe, Clivia</td>
</tr>
<tr>
<td>Tufty / spikes</td>
<td>e.g. Liriope, Dianella, ornamental grasses</td>
</tr>
<tr>
<td>Vertical climber/twiner</td>
<td>e.g. wisteria, creeping fig</td>
</tr>
<tr>
<td>Horizontal trailing</td>
<td>e.g. Star jasmine, Monstera</td>
</tr>
</tbody>
</table>

### COMMENTS:

If you can think not all plants fit easily into this categorisation, then you are wise! There are epiphytes like Staghorn and Elkhorn ferns that are not readily slotted into the herbaceous (groundcover category) since they want a tree trunk or wall as a growing location. The category Upright/bushy/large is for non-woody specimens like Strelitzia nicolai or bug shrubby gingers!

What about the traveller's palm Ravenala madagascarensis? Looks like a solitary tree when it is managed that way, but check the rapidly expanding clump in the OBBG near the top pond. Planted in about 1960 it is wild (unpruned for decades) and may yet take over the world! Image: [http://en.wikipedia.org/wiki/Ravenala](http://en.wikipedia.org/wiki/Ravenala).

BTW Botanic Gardens Conservation International has Ravenala as its very gorgeous logo: [http://www.bgci.org/](http://www.bgci.org/)
APPENDIX D: PLANT ORIGIN / LIFE / TAXONOMY

Other ways horticulturists and gardeners describe plant types are according to their origin and their longevity.

PLANT ORIGINS

Exotic Plant: originally evolved in another country
Native Plant or Indigenous Plant: originally evolved in this country (e.g. Australia)
Endemic Plant: specific location of origin locality known (maybe limited to area) (e.g. Fraser Island or Lamington Plateau)

PLANT LIVES

Evergreen = long lived, keeping leaves in winter
Deciduous = long lived, shedding leaves in winter
Perennial = moderate/long lived, herbaceous
Biennial = 2-3 years of life, herbaceous
Annual = short lived, herbaceous
Pioneer = 5-8 years lifespan as cover between disturbance to permanent vegetation.

TAXON (singular), TAXA (plural)
= general term for a taxonomic unit (one part of the system) e.g. species, variety.

HIERARCHY (from big groups to smallest units):
FAMILY
   GENUS
      SPECIES
         VARIETY

Just to give you a fright here are some factoids:
There are over 1235 taxa within the OBBG!
RHS Plant Finder 2004-5 lists 75,000 plants; Aussie Plant Finder 2004 lists a mere 35,000 plants available from local nurseries!!! And Wikipedia estimates 300,000-315,000 plant species altogether in world!

APPENDIX E: DESIGN USEFULNESS

Summary of possible plant uses or purposes:

<table>
<thead>
<tr>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDIBLE fruit / foliage / roots [which?]</td>
</tr>
<tr>
<td>FORAGE food for animals</td>
</tr>
<tr>
<td>CUT FLOWER / FOLIAGE</td>
</tr>
<tr>
<td>FEATURE SPECIMEN</td>
</tr>
<tr>
<td>SCULPTURAL FORM</td>
</tr>
<tr>
<td>WINDBREAKING</td>
</tr>
<tr>
<td>HEDGING</td>
</tr>
<tr>
<td>SHRUBBERY / filler</td>
</tr>
<tr>
<td>EDGING</td>
</tr>
<tr>
<td>GROUNDCOVERING</td>
</tr>
<tr>
<td>Provides DENSE SHADING</td>
</tr>
<tr>
<td>Provides dappled SHADING</td>
</tr>
<tr>
<td>EMERGENT / silhouette value</td>
</tr>
<tr>
<td>Toxic REMEDIATION (filtering)</td>
</tr>
<tr>
<td>Attracts BIRDS</td>
</tr>
<tr>
<td>Attracts BUTTERFLIES</td>
</tr>
<tr>
<td>DANGER: thorns, prickles</td>
</tr>
<tr>
<td>DANGER: heavy drops of fruit, cones, fronds</td>
</tr>
<tr>
<td>DANGER: slip hazard fruit / nuts</td>
</tr>
<tr>
<td>DANGER: toxic / poisonous</td>
</tr>
</tbody>
</table>

And ? … what else ?
These are terms commonly used in planting design.

**ARBOUR**: small gateway or shelter or bower over a seat, often an archway framework covered with plants (e.g. creepers).

**AVENUE**: 2 parallel rows of trees, typically with a pathway between the rows; variations include double rows of trees on both sides of path as in fig trees in Hyde Park, Sydney.

**BED**: garden bed for cultivation of plants (mostly herbaceous plants, groundcovers and shrubs); comes in several forms, see massed and mixed beds/borders.

**BORDER**: garden bed of plants, usually linear in form, often at the edge of a space or beside a path.

**BORROWED LANDSCAPE**: including the plants and landforms over one’s boundaries within the visual limits of one’s own garden thus visually extending the boundaries.

**BOSCO** (Italian) and **BOSQUET** (French) plantation of trees regularly arranged (on a grid) e.g. two plantations of *Harpulia pendula* at QUT/GP.

**CANOPY**: tree or large shrub foliage overhead, that can range from very dense (closed) or dappled (open); **Cover** used more for smaller shrubs/groundcovers.

**CARPET BEDDING**: (bedding out) seasonal display of low-growing plants, often small succulents to form patterns of colours and foliage; plants propagated in glasshouses ready for outdoor transplanting when all frosts are over. **Mosaiculture** Fr. very short/line carpet bedding.

**CLIMBING PLANT**: various means of reaching great heights: twining stems, sucker discs, tendrils, hooks or trailing stems; can be trained over arbours, archways, banks, pillars, pergolas, walls, fences etc.

**CLUMP**: Grouping or massing of trees or shrubs within a larger area of lawn or pasture; Guiffoyle made glorious subtropical clumps at RBG Melbourne.

**CLUMPING HABIT**: plant with several stems (bamboo has culms) arising from one root mass (alternatively, running bamboo); thinning out required after several years e.g. herbaceous perennials.

**COMPARTMENT**: A distinct area within a garden sometimes fenced or hedged; a room (Symes 1993,37).

**COMPOST**: yum! decomposed dead plant and animal matter that provides food for living plants by enriching soils; ultimate in recycling materials and dealing with waste. **Aerobic composting** is odourless, processing material runs hot and fast (weeks or less); **anaerobic composting** is smelly, runs cool and slow (months).

**CONIFER**: gymnosperm (no flowers; has cones); e.g. pines, cypress, cycads, etc.

**CONTAINER PLANTING**: planting receptacle not the ground e.g. using pots, urns, planters, hanging baskets, window boxes and podium planting is really a large scale version of container planting.

**COPPING**: woodland trees that are cut to near ground level every few years and then grow again from the stool for another crop. Part of traditional European forest management regimes.

**COPSE**: variant spelling of coppice; a woodland managed this way.

**DRIFT**: elongated bold sweep of massed planting (often the same species/variety).

**ECONOMIC PLANT**: botanists term to describe a plant that provides a useful product e.g. food, fibre, drugs, dyes

**EPIPHYTE**: plant that grows on another plant, but is NOT a parasite (does not take nourishment from host plant) e.g. many ferns and orchids!

**ESPALIER**: usually a fruit tree trained into a flat fan or other shape against a wall or fence to maximize space & crop

**DBH**: tree trunk diameter at breast height; 1.3 or 1.5 m from ground

**EDGING**: planting (or hard landscape) marking the outer edge of a bed, often low height (150-450mm)

**FORMS OF PLANTS**: Weeping (habit if branches hang downwards), dwarf (short version), standard (main plant grafted on rootstock which forms pole-like trunk or pruning one plant to form lollipop on a stick)
FOREST: In Australian usage, a natural plant formation that has taller trees (with varying canopy closure from closed to open) and varying understorey planting.

GLADE: opening or clearing in a wood/forest (open space surrounded by plants)

GRAFTING: The inserting of a small part of a plant (scion) into a full plant (stock). (Symes 1993,59); vegetative propagation of plants typically one for root stock and one above that provide best flowers/fruit; can have many grafts on top creating space saving trees with multiple types of fruit (same genus).

GROVE: grouping of trees usually of the same sort; bigger than a clump, more like a mini-wood, set within grassland/paddock so it has a distinct visual grouping.

HARDWOOD tree: Hardwoods are not necessarily harder than softwoods. In both groups there is an enormous variation in actual wood hardness, with the range in density in hardwoods completely including that of softwoods; some hardwoods (e.g. balsa) are softer than most softwoods, while yew is an example of a hard softwood. The hardest hardwoods are much harder than any softwood. There are about a hundred times as many species of a hard softwood. The hardest hardwoods are much harder than any softwood. There are about a hundred times as many hardwoods as softwoods.[Wikipedia]

HEARTWOOD: dead old wood in the centre of a tree trunk; sapwood contains living tissue. Image source: www.dlogs.com/faq.html

HEDGE: closely planted line of shrubs or small trees, usually of the same species/variety; often used as a physical and/or visual barrier; height can vary (short/tall).

TAPESTRY HEDGES: comprised of different species for colour and/or texture effects.

STEP-OVER HEDGES: short ones (?400mm height). Maybe more likely to be trampled by visitors!

HERBACEOUS PLANT or Herb (botany sense): vascular plant with no woody material (secondary growth), typically ephemeral, annual or perennial duration.

HERBACEOUS BORDER/BED: mixture of plants, mostly herbaceous perennials & annuals, bulbs, etc., often with background permanent structure plants (hedges).

HERBLAND: In Australia, a plant formation without any woody plants; comprised of sedges, grasses, etc.

ISLAND BED: garden bed of plants in the middle of a lawn or paving; if contains mostly taller trees & shrubs, then better termed a clump in a visual sense; beds you should be able to see over and/or through an island bed.

LAWN: ground covering with matting grass, mown short; large open spaces to small areas.

LIFTING A CANOPY: careful pruning of lower branches of trees or shrubs to reveal more trunk or provide head-room for pathways.

MAZE: puzzle path with multiple routes through and dead ends; made with plant hedges of various heights; Hampton Court maze ➔ Solved using the 'hand-on-wall' method.

MEADOW GARDEN (Flowery Meads): mixture of grasses and herbage usually not mown (maybe once a year for fodder), changing with seasons, dying down in winter, self-seeding and growing anew in Spring.

MIXED BORDER OR BED: mixture of species, varieties and forms of plants (mingling, was term used in 19th century)

MULCH: (1) inorganic (inert, like gravel or scree) or (2) organic (dead plant or animal materials e.g. sugar cane, lucerne or bark chips); ground covering material that protects soil from rain compaction, light penetration (thus preventing weed seed growth), insulates from heat/cold AND may breakdown to feed soil of an organic mulch 75-100mm just right depth (too thin and too thick are problematic).

ORNAMENTAL PLANT: in botanist's sense, as distinct from economic plant, these are for decorative purposes

PALISSADE (Fr.) or Palisade (English): hedge of trees; Palissade à l'italienne means the lower branches are pruned away leaving a hedge on stilts

PARTERRE: flat terrace adjacent a residence with regularly arranged hedges/edgings, garden beds, graved areas and/or lawn to create decorative patterns, best viewed from above (e.g. upper floors or roof). Parterre de broderie Fr. very elaborate, curly (fashionable in France 17th-18th C)
PLEACHING: entwining, interlacing, plaiting etc. plants (even tree boughs) to form arbours or archways; usually a support trellis or frame is required, e.g. using hornbeam, beech, apples, pears, grapes, wisteria etc.

POLLARDING: heavy pruning back of trees to restrict height every year or 3-5 years; once common in European urban spaces and even Australia

POTAGER: Fr. ornamental vegetable garden particularly favoured in France; tends to mean a set of plants mature all at once instead of providing a sequence of supply of food; often a structure (e.g. non-productive box hedges) planting takes garden form through non-growing season.

PROCUMBENT PLANT: horizontally spreading plant or a lazy climbing plant!

PROSTRA TE PLANT: spreading form, some layering or rooting from stems and others more woody that rarely produce ascending stems e.g. Juniperus horizontalis.

PRUNING (including Tip Pruning, Thinning Out, Deadheading, Opening Up): cutting back branches, leaves, or flowers to encourage new denser leaf growth, more light penetration into middle of plant or removal of spent flowers before fruit/seeds can be formed. Even native shrubby plants should be tip pruned to encourage more growth. Some fruit trees need defruiting (if not harvested already) before next flowering can occur.

QUINCUNX: planting arrangement of five plants to form a cross or a square with last one in middle; great way to display rare tulips in 16th & 17th centuries; as in five-spot on dice or cards

QUINCUNCIAL LOZENGE: planting arrangement that is really based on diamonds (joined equilateral triangles). Frontispiece to The Garden of Cyrus (Thomas Brown 1658).

RAISED BED: using walls or other built edgings (from 150mm to 1200mm height) to provide space to build up soil, improving soil composition and drainage, has easier access and less bending, etc.

ROCKERY, ROCK GARDEN: (a) Alpine Garden or (b) raised bed using rough rocks.


ROUTES, AERIAL: these roots are born above ground and can find their way to the ground. e.g. Banyan figs.

ROUTES, BUTTRESS: these are projections from the trunk of some rainforest trees that provide extra stability for tall trees in shallow soils e.g. Moreton Bay figs.

ROUTES, STILT OR PROP: above ground roots that support the plant e.g. Pandanus, corn.

ROUTES, AERATING (pneumatophores): enable gas exchange when plants are inundated, aka knee roots, e.g. Mangroves; swamp cypress (Taxodium distichum) from Florida.

ROUTES (other – Bulb, Rhizome, Tuber, Corn): are various kinds of herbaceous plants that typically die down in winter (back to this underground part); some are climbing plants; some are not deciduous.

SAPWOOD: is the younger, outermost wood; in the growing tree it is living wood, and its principal functions are to conduct water from the roots to the leaves and to store up and give back according to the season the reserves prepared in the leaves [Wikipedia].

SCULPTURAL FORMS: Distinctive (eye-catching) plant forms e.g. agave, yucca, Dracaena draco, Strelitzia, Gingers.

SHRUB: a woody plant usually not above twenty feet [c.6.6m] in height of which apical dominance is replaced at an early growth stage by lateral branching so that no single stem is dominant [Dobzhansky, C (1971). The Language of Botany. SGAP]

Shrubbery: a garden bed that contains mostly shrubs, edging or groundcovers; can be effective medium sized spatial definer, but softer looking than hedge.

SHRUBLAND: In Australia, a plant formation that has shrubs as upper canopy (up to 8m height, varying from open to closed canopy coverage).

SOFTWOOD tree: The term softwood is used to describe wood from conifers. It may also be used to describe these trees, which tend to be evergreen, notable exceptions being bald cypress and larches. [Wikipedia]

SPECIMEN PLANT / TREE (aka feature plant): Single plant placed as a visual focus in a space or perhaps at the end of a vista

SUBTROPICAL BEDDING: term coined in 19th Century in Europe to describe seasonal displays in garden beds of lush herbaceous plants from warm climes, e.g. Musa, pampas grass, Cordylines, palms.
**SUCKERING HABIT**: tendency for tree or shrub to sprout new stems/trunks from root mass, especially if roots damaged e.g. Lagerstroemia indica or Nandina domestica.

**TOPIARY**: art of clipping and training trees and shrubs (esp. fine-leaved plants) into specific shapes (geometrical cones, balls, squares or figures of animals).

**TREE**: a woody plant that typically has apical dominance creating a single trunk, but may also have multiple trunks shooting from a shared root mass.

**TRELLIS**: constructed framework for supporting creepers or climbing plants, usually vertical, maybe used with horizontal frame (pergola). Elaborate ones Treillage (Fr.) or Trelliswork.

**TUNNEL-ARBOUR**: vaulted (or flat) roofed trellis over pathway to shape plants or support creepers thus recreating shady route; also used to grow vines with hanging flowers e.g. wisteria, laburnum or hanging grapes, gourds or cucumbers.

**TURFED SEAT**: special sort of raised bed that has grass (or chamomile) as ground over and thus creates a sittable ‘upholstered’ garden seat.

**TURF WORK** (Gazon coupé Fr.): when turf is cut away to create various decorative shapes then bare areas filled with sand/gravel; needs thin edging (plastic or metal strips) to keep grass from invading shape.

**TUSSOCK**: e.g. grasses, Liriope, etc.; tufty plants similarly shaped that can be massed as a ground covers or as a lineal edging or singly; large scale tussocks are better used as specimen plants or in lines as screens like hedges.

**UNDERPLANTING / UNDERSTOREY**: planting under trees e.g. shrubs and groundcovers, generally part/shade tolerant

**WEED** (includes Invasive species): any plant that is in the wrong place! Some are so problematic to agriculture or protection of natural habitats that they have official government weed status and it is illegal to plant or grow.

**WOOD (woodland)**: In Australia, woodlands are plant formations that can range from closed to open canopy coverage, but usually have shorter trees with distinct spacing between trees and often with grassland understorey (like a savannah)

**XEROPHYTE**: a plant that is adapted to low water situations, thus able to tolerate most droughts, e.g. many cacti.

**REFERENCES for GLOSSARY:**


All images drawn or photographed by J. Sim except where noted.

Source for coppicing, pollarding & suckering pics:


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**QUESTION** for YOU:
We want to plant a special tree to mark 50 years of landscape architecture education at QIT/QUT! Yay!

What native Queensland species should we select?
And where should we plant it??

?