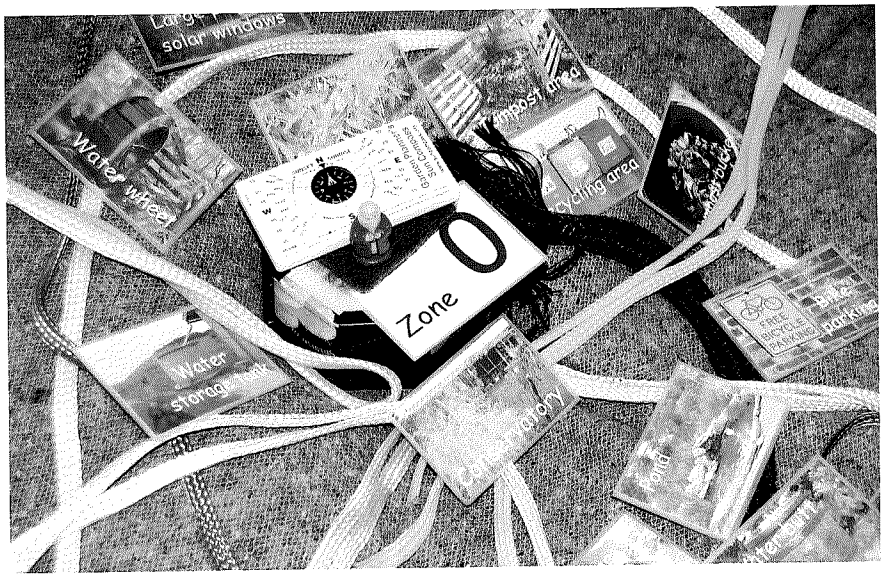
Placement

Now we'll experiment with best placements for the different elements and systems in our design. If there's a fixed point of focus on the site (such as a house), then we'll be placing everything most efficiently in relation to that. However, when starting with a 'blank canvas' we get to choose the best place to site our centre of activity. If we're arranging our design around a proposed new house or other structure, its placement will probably be our most important decision. If we're designing a site without an obvious central element, then we'll need to identify the most important elements to place first and go from there.

Around an existing main element

When designing around a fixed point of focus like a building, we've a number of methods we can use to plan the layout of the site. Using our base map and overlays from the survey, we'll aim to make our mistakes 'on paper', instead of in the landscape itself. One helpful tool for this process is the ***landscape modelling*** technique I use to teach zones and sectors.



Using landscape modelling to explore placement of systems and elements

Laying out an approximate model of the site on a floor or table using cushions, cloth and ropes, gives us a 3D space into which we can explore placement of our systems and elements. We can use the same cards we made earlier for 'random assembly', to represent elements, and by moving them about, explore the relationships between them. Creating a model can give us a landscape overview that we don't get from ground level. Imagine you're 5,000 feet tall or flying over the landscape in a hot-air balloon. Now, consider the following factors in turn to identify the best location for each system or element.

Design from patterns to details

Before looking at the finer details of your design, establish an overall pattern. This will be guided by many of the factors that follow. It's important to adapt your design to the opportunities the site offers, rather than trying to adapt the site to the design (a common human strategy now we use fossil fuels to replace skill with brute force!). You may be excited about creating a forest garden, or growing olives, but on an inappropriate site you'll be wasting time and energy fighting nature. For instance, hilly and mountainous regions are excellent for storing water high in the landscape, where it can then be made to do work (e.g. hydro-electric power generation or irrigation), but not so good for growing tender crops. Identify the opportunities the site offers and design to take best advantage of them.

Microclimates

This may seem like jumping straight ahead to the small stuff, but microclimates actually come in all shapes and sizes. The whole of Britain is a microclimate, benefiting as it does from the warm ocean currents delivered by the North Atlantic drift. South-westerly prevailing winds bring plenty of rain and the west of Britain receives more of it than the east. In turn, Dartmoor, the area of high moorland in the south-west region, has even more rainfall than its surroundings. Focusing in further, we can pick any of the valleys on the moor and find sunnier and shadier aspects, windier and sheltered spots, damper and drier areas. Look closer and you'll continue to see variations, until you pick up a single stone and find creatures there that like the dark and damp conditions it provides. Our job as designers is to spot these opportunities and place things there that will make the best use of the gifts they offer.

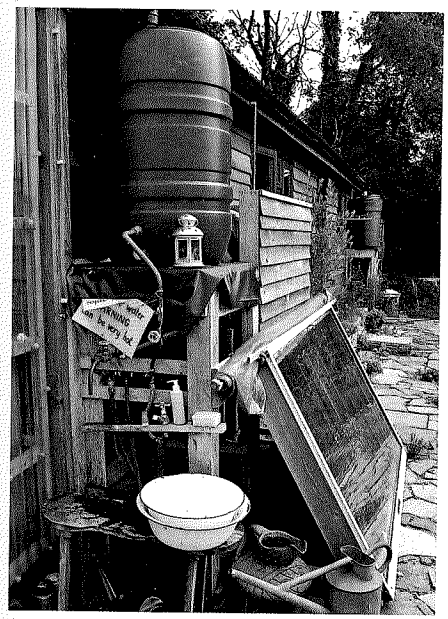
In Britain, gardeners have long taken advantage of favourable microclimates offered by south-facing walls to grow tender but highly valued crops like figs and grapes. Here's another ingenious version of this strategy but with additional functionality, devised by a great friend, Tony Martin. He not only uses the thermal mass of his garden water storage tanks to protect the crops on his northwest-facing hilly site, he also uses them as a reservoir for a capillary watering system. By growing vulnerable but high value crops like strawberries on top of the tanks he keeps them away from hungry bugs. The plants and soil also protect the tanks from much of the sun's degrading UV radiation and reduce algal growth inside. Genius! Full details of how to make them are in the online resources.¤

Perhaps the greatest skill lies in making best use of the colder, shadier and damper areas. Those are places where most life slows down, though we can still use this to our advantage. Those cooler spots such as shade-facing walls, are ideal for the things we want to keep cool to preserve them, such as food stores. Shady spots have more stable temperatures, so young plants and cuttings are less vulnerable there in winter months than in direct sunlight. Because shade-facing slopes receive less sun, trees take longer to wake up in the spring. The resultant delayed flowering can make all the difference to any early blossoming trees such as pears and cherries, when late frosts could damage flowers and ruin a fruit crop. In the tropics, shade is often sought out because photosynthesis shuts down when it gets too hot and the evaporation of water is reduced where there is less direct sunlight. We discover where and when all these microclimates occur by ***protracted observation***. This is where our diary reveals its treasures, especially the notes we made during any inclement weather. Shade maps and photographs can also help us to identify the right microclimates for the elements we are placing.

Elevation planning and aspect

By considering the altitude of a site and any slopes present, we can identify the diverse microclimates, opportunities and limiting factors that occur there. There are specific strategies that work best at each point on a slope, such as using trees to stabilise steep gradients and having vulnerable food crops growing above the frost line. The thermal belt between frosty hilltops and valley bottoms in cool temperate zones offers a slightly longer growing season. The aspect of a slope is also a factor to consider. For instance, growing conditions near the top of a sun-facing slope can equate roughly to those at the bottom on the shady side of the same hill. In other words, the extra sun compensates for the limitations of the higher altitude (temperature drops about 0.5°C for every 100 metres above sea level).

So how do the design elements need to be arranged in relation to slope? If we want anything to flow under gravity through a system, we'll need of course to place them at the correct relative heights. To move water from roof guttering, into a raised tank, then a toilet cistern, on to a septic tank and finally a wetland treatment system, each needs to be placed below the previous. Water can be pumped uphill using technologies such as the hydraulic ram, but it's simpler to work with gravity as much as we can.



An excellent solar hot water system at Ourganics making full use of both gravity and the thermosyphon effect

Similarly, a solar hot water panel is better placed below a hot water storage tank in order to take full advantage of the thermosyphon effect and removing the need for a pump. Warm air rises, so in buildings we should consider this in room placements and heating systems. It uses far less energy to draw warm air down from a ceiling than to heat the cooler air at floor level where we sit down to relax.

Zoning

Systems and elements that need the most attention are of course best placed close to our central focus, where we spend most of our time. Start by identifying which elements in your design will need most attention. Do this by thinking about how often a particular thing needs to be visited, either to clean, repair or harvest from it. A chicken shed for instance should need at least two visits a day: to let out and shut in the chickens. In addition there may be separate daily visits to collect eggs. Cleaning occurs perhaps a couple of times a week. Shed maintenance may be a few times a year. By way of contrast, a compost heap might have fresh green waste deliveries from the kitchen only every few days, need turning about once every ten days (for hot systems) and be visited a few times in the spring to harvest the compost. From this we begin to notice that some tasks take place on a daily basis and others may be more seasonal. Use this information to place elements needing most attention closest to your central point. This is a good general rule to follow, though there are exceptions, as we'll discover in the next section.

Growing my salads in zone one

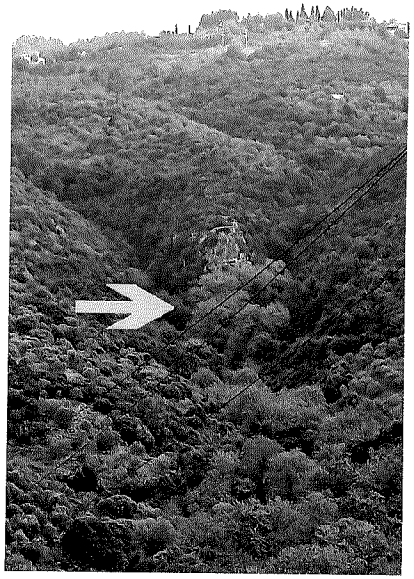
Access and desire lines

Access points and desire lines will influence the basic circular zoning pattern; regularly walked routes can also be considered as zone 1, allowing any higher maintenance systems to be sited there. Driveways are given less attention as a driver's mind is often on where they're going, or what they'll need to do on arrival at home, so design them as low maintenance areas. Conversely, you might deliberately place high maintenance systems or points of interest where they create new advantageous desire lines. An attractive new feature in a previously neglected area will get more attention, making extra zone 1 space along the path leading there.

Don't make that path too straight though if you want people to slow down and interact with elements along the way. We obtain further benefits by creating new desire lines for other creatures too. Place a high pole in the middle of an open area where you're growing vegetables to encourage birds of prey. By giving them somewhere to perch, they can help to manage rodent populations for you as another part of your Integrated Pest Management strategy. Sometimes the best placement of elements can make life so much easier. Consider how much less work it is to herd animals if gates are placed in the corners of fields instead of half way along a side.

Sectors

Now let's consider how incoming wild energies, such as wind, water and sunlight, might interact with each of our chosen systems and elements, which we can position to either harvest those energies most effectively, or to shelter other elements from them. Often, the best placements for creating a yield are where wild energies are already being focused, such as harvesting water by building a dam where an area of sloping land directs run off towards a Keypoint (arrowed). Notice how much larger the trees are, both there and in the valley below, as the water and the fertility it carries starts to settle out on the gentler slopes. As it takes a lot of energy to change the landscape (remember the *Scale of Permanence*), it's far easier to work with the existing terrain. This is why Keyline® lays out the water systems first and irrigates the land using gravity, through the use of subsoil ploughing and flood irrigation along gentle downhill gradients from valleys to lower elevation ridges. These techniques are well suited to obtain a yield from the opportunities the topography of the land offers.



A keypoint on a Greek hillside

In a similar way, upslope wind is compressed and accelerated towards the brow of hills by the rising ground below. We can use this to our advantage by placing wind turbines there. This is an example of harvesting the energy of a sector. Of course, when considering most buildings, we'd instead be looking to provide shelter from those winds to reduce heat loss. In the higher latitudes, it's also important not to block low winter sunlight from coming into buildings, so aim to keep that sector clear of anything that would reduce it. Compromises often have to be made though, such as between allowing all winter sunlight to reach a building and completely protecting it from prevailing winds. In Britain the latter come from the south-west, which is also the direction of the midwinter sunset. Which you choose to favour will probably depend on additional factors. Certainly for plants and trees, wind is the main limiting factor to growth and for pollination by insects, which don't fly when it's windy. Thus it can be a good trade off to sacrifice a little sunlight for a good windbreak.

A similar issue arises where a good connection exists between two elements that need to be physically close together, but prefer different microclimates. Low voltage wind turbines are often used to provide power to buildings, though the windy conditions that suit energy generation can reduce the energy efficiency of any building. Placing them further apart in order to overcome this increases the distance the electricity has to be transmitted, which for low voltages can result in high losses. This leads us instead to considering larger, higher voltage wind turbines more suited to serving a collection of dwellings.

To give an example here of the importance of good placement: some orchards use energy-hungry giant fans to stop cold air settling on blossoms and ruining the crop. Nature wouldn't put those trees in that frosty microclimate and if we want to avoid a whole heap of wasted energy, neither should we. Lastly, consider how to protect and enhance any highly valued sectors on the site like good views and places of tranquillity and how those unwanted sectors like bad views, noise and pollution can be moderated by good placements. Sometimes a system or element's ideal spot can be determined by simply noticing its optimum zone, sector and elevation.

Soil type

That said, when considering plants and trees, growing them in the right soil type is also important, so this is where we review what we learned from our observations. If soil conditions vary across the site, then we've a greater diversity of opportunities for growing. As gardeners we're often told that an ideal soil is a good fertile loam with a pH around 6.5, but if the soil was like that everywhere we'd see far fewer species around us. The Earth's varying soil conditions lead to a diversity of ecosystems containing a multitude of species and that extra diversity leads to more beneficial relationships, making the whole web of life stronger. ***Diversity creates stability***.

Now, the evaluation of zones and sectors may suggest growing a particular plant in a given place, but if the soil is of insufficient fertility, the wrong pH, or too wet or dry, we should probably think again. It's always easier to find plants best suited to the local soil (as nature does), than to try and modify it. That said, sometimes (with extremely acid soils in particular) it may be worth the investment of time and resources† to modify pH, at least in a small area, as part of a general soil improvement strategy for intensive food growing. This is almost always the case for zone 1.

Utilities

Don't forget that any elements needing mains utilities (e.g. electricity, gas, water, sewage, telephone etc.) will need placing where they can be easily connected, unless of course the benefit of choosing a particular site outweighs the cost of extending cables or pipes.

Visualise succession

"Vision is not seeing things as they are, but how they will be."

David Holmgren

Nature never stands still. Trees grow and throw more shade, microclimates emerge and habitats change. Old trees fall down, rivers change course and then there's climate change to consider. Depending upon the timescale of our design, these may be things that we need to consider when deciding placements.

† *Particularly if those resources are unused by-products such as wood ash.*

Observing the landscape and ***visualising succession*** enables us to anticipate changing conditions and create a design that evolves to take advantage of them. This is a skill increasingly acquired with experience. Sometimes the client's vision includes distinct phases. For example, an initial focus may be on erecting a dwelling, but with need for an intensive food-producing garden at the same time. You might start by placing the garden safely out of the way of building work, and only move it to zone 1 once the building is complete. A forest garden could then be established where the intensive garden previously was, suggesting the planting of young fruit trees there from the beginning and establishing the intensive food garden around them. Visualising the development of a site gives us clues that can help us accelerate the succession of any systems we install.

Incremental design

"Allow the system to demonstrate its own evolution."

Bill Mollison

A design drawing only provides a snapshot of how a site might look at a specific stage in its evolution, so visualise how the site is likely to mature. In addition, the needs of the client may also change. They may develop an increased dependency upon the site for food or resources, either due to scarcity of them in shops or a greater number of mouths to feed.

Future proofing: a new orchard at Ragman's Lane Farm, planted to reduce their reliance on buying in apples for their successful juicing business

Perhaps surpluses from other local growers reduce their income from what were previously high-value crops, forcing a change of direction? New people may bring new ideas. The site may be required to fulfil extra or different functions. Neighbours may change and this may bring an increased risk of pollution from the surrounding environment. Some changes can be anticipated and some cannot. By involving the client(s) as much as possible during the design process, we ensure that they're better able to observe the evolution of the design over time and to respond accordingly. A design can never be completely finished, as it will get tweaked over time to improve its performance.

An example of this is the Welsh 3,000s race, a route of around 26 miles from the top of Snowdon to Foel Fras, including some 13,000ft of ascent and 14 summits over 3,000ft. Over the years, people have tried varying the route in different ways to shave a little time off the record. Each new successful variation improves the design, but as there are an infinite number of fine tunings that can be made, the perfect route may never be found. This is classic incremental design.

The fine details...

Once we've laid out the basic pattern for the whole site, we can start to look at the finer details of each system; this is where we create our planting plans and so on. It's useful now to take our ideas and start trying them out on the site to check they work in more than just theory. By laying out our plan on the ground, using ropes, hoses or stakes as markers, we can get a sense of how our proposal looks in the real world. Invite your clients to walk around the pathways, ideally for a week or so, and then give you feedback (this could be done by moving the markers). Confirm it all when it feels right to everyone.

The Blank Canvas

From time to time we find ourselves with the additional freedom (or challenge) of designing a 'blank canvas'. Without an existing central element around which to identify any zones, we'll give more consideration to those other factors to determine the best place or places around which to focus our design. I find the following technique useful when deciding where to place zone 0.

McHarg's exclusion method

This is a useful tool to help us place our most important elements, any fussy ones needing particular inputs, or those adversely affected by multiple factors. By systematically eliminating areas or sectors not best suited to our chosen element, we can quickly narrow down options and simplify identifying an ideal site. Sometimes there are so many 'no-go' areas that we're left with only one option.

This was the case when I sought to identify the best place to plant apple trees on an Irish mountainside; once I'd ruled out the areas that were too wet, too windy and potentially frosty, I'd only one area left. Of course you may be looking to place an element that's adversely affected only by frost, or waterlogged soil, or cold winds, or by some combination of these.

This is where our overlays are really useful in making decisions, as we can choose to place only those with the relevant information over our base map. If this initial process still leaves us with more than one choice, we can then consider how all our systems and elements could integrate together. This allows us to eliminate areas unsuited to any systems and elements that we wish to integrate with zone 0.

For example, if we would like gravity-fed spring water coming into our home, then we can also discount any area of the site above the level of the spring for the build.

Determining the best place to plant apple trees on an Irish mountainside

Placement flowchart