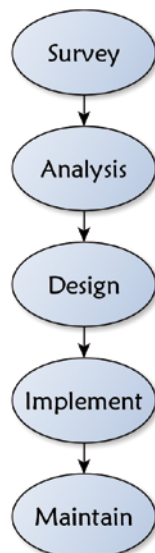




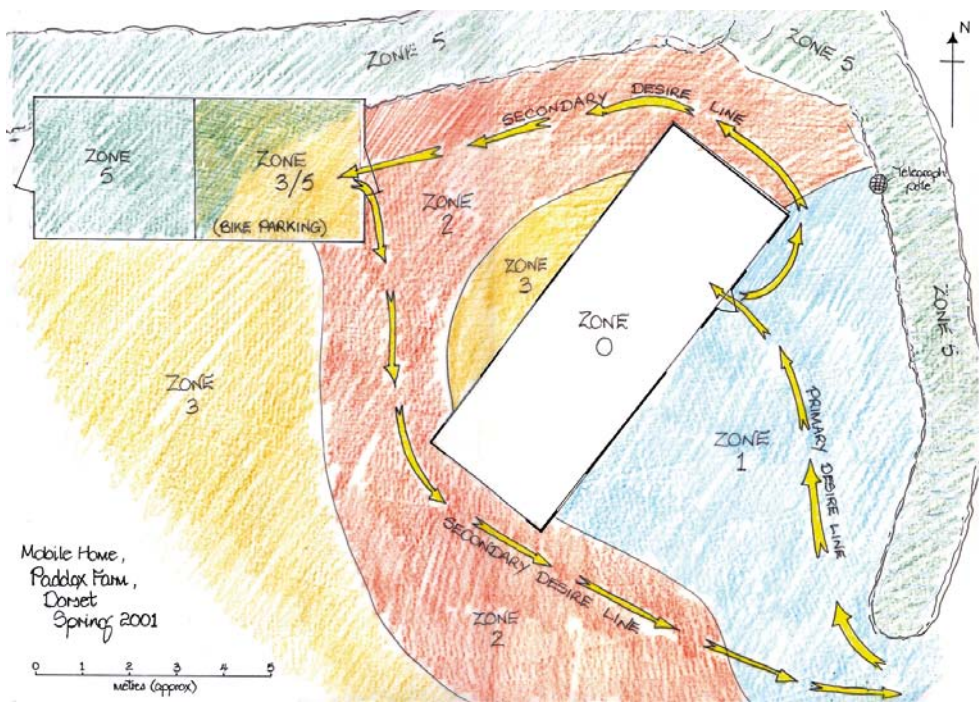
Aranya explains how to place each element into a coherent design, making the many pieces of the permaculture jigsaw fit!



Demystifying Permaculture Design



A good friend of mine once described to me a phenomenon which may be the biggest curse of the modern plant collector. It's what happens when people return home from their local garden centre with that plant they just couldn't resist and go looking around the garden for a gap to put it in. Mmmm... sound familiar? He appropriately calls it 'gap gardening'. Perhaps we might substitute 'local garden centre' with 'Permie Plant Heaven Catalogue', but the temptation can still leave us with trees and plants that we bought on a relative whim. I've certainly done it and I suspect you may



are the best for recreating a reasonably accurate landscape. I then experiment with placing cards, each representing a different element I've identified as being well suited to meet my desired functions. I can move these around until I'm happy with where they are placed and feel confident enough to commit my plan to action. This technique works well for groups too when designing a project together. So what are the different factors to consider in identifying these best placements?

PULL OUT YOUR SITE OBSERVATIONS

This is the point at which the thorough observation process that I presented last time

Above: The desire lines around my mobile home shaped my zoning of the space.

Bottom right: A keypoint on a Greek hillside.

Previous page: Designing in 3D with a bean bag, blanket, cords and cards.

have too. So in my final look at the design process I'm going to describe some of the tools and methods that permaculture offers to best place and integrate many different elements into our designs.

Nature of course does its own kind of gap gardening; no niche is ever left unoccupied for long. Wherever an opportunity arises, something will make a home there. Of course these plants and animals will be the very ones best adapted to live in those conditions. Plants often arrive as seeds and have to compete with others to take that territory. Nature is very abundant and the strategy of seeds is to throw a huge amount at the landscape knowing that only a few will ever grow to maturity. That's a strategy we can only model if we save our own seed, but Fukuoka did just this very successfully, scattering seeds around his orchards and allowing the plants to show him where they most wanted to be. Most of us don't have very many seeds to risk though, and even an established plant will struggle in a site unsuited to its needs. This is where some permaculture planning bears fruit.

MAKE YOUR MISTAKES ON PAPER, OR BEAN BAGS

While a theoretical layout might never behave exactly how we expect when applied in the real world, some planning can help us to anticipate relationships that may or may not work well in our design. Putting pen (or pencil) to paper is just one medium by which we can explore ideas in advance of implementation. These days some of us can play with different layouts on computers too.

My own favourite tool is making a model. I use whatever I have available, but I find bean bags, cushions and blankets

(PM73) begins to pay off, especially if you've been out in some of that inclement weather. You'll now know where the summer and winter winds come from and where the sun rises and sets throughout the year. How these interact with the topography of your site will create microclimates in different places and these are the niches that you can exploit in your design. Plants will give pretty clear feedback about how well they suit your choice of placement for them, whereas inanimate objects like buildings not well sited will just cost you more to maintain.

On my model I lay out different coloured cords to identify these sectors, but if you're working on paper you might use tracing paper overlays like the ones illustrated in my previous article, or 'layers' on a computer program.

Next I lay out the optimum zoning onto the site, again using cords. Remember that in the real landscape these rarely follow a pattern of concentric circles; instead they flow along those desire lines you also identified earlier and are stretched out along contour. It's always easier to walk along the flat rather than up or down a slope (especially as going down usually means coming back up again!).

DESIGN FROM PATTERNS TO DETAILS

Before looking at the finer details of any design, I always establish an overall pattern. So with this in mind I begin by writing down my key systems onto pieces of card and placing them on my nice 3D model with the zones, sectors and desire lines marked out. Later, once I've identified the best layout for the different systems across the whole site, I can make other models or maps covering specific areas and repeat this process to fine tune the details. I make my first placements by initially just considering these aforementioned factors. How close does each system need to be to my main hub of activity? Does it need to be protected from any incoming energies, or placed to best harvest them?

FACTORS TO CONSIDER IN PLACEMENT

Elevation planning: If we want anything to flow under gravity through a system, we'll need to place it at the correct relative height. Even if you don't have any significant slope, to move water from roof guttering into a raised tank, then a toilet cistern, on to a septic tank and perhaps even 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. 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.

Zoning: Consider the different zones on your model or map. Identify which of the elements in your design will need most attention. Think about how often a particular thing needs to be visited, either to clean, repair or harvest from it. 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.

Access and desire lines: Regularly walked routes can be considered as extensions of our zone 1 (see diagram left), allowing any higher maintenance systems to be sited there. An attractive new feature in a previously neglected area will get more attention, making extra zone 1 space along the path leading there. We obtain benefits by creating 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.

Sectors: Often, the best placements for obtaining 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 right). 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. Because it takes a lot of energy to change the landscape, it's far easier to work with the existing terrain.

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.

Soil type: When considering plants and trees, growing them in the right soil type is important. If soil conditions vary across the site, then we've a greater diversity of opportunities for growing. 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.

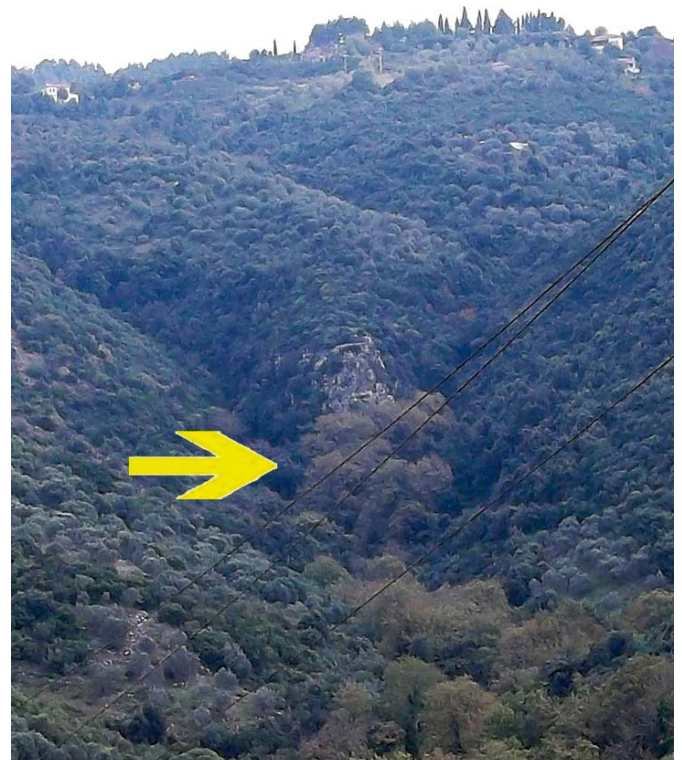
Utilities: Don't forget that any elements needing mains utilities (e.g. electricity, gas, water, sewage, telephone etc.) will need placing where they can be easily connected, unless of course the benefit of choosing a particular site outweighs the cost of extending cables or pipes.

Visualise succession: 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 on the timescale of our design, these may be things that we need to consider when deciding placements. Anticipate changing conditions and create a design that evolves to take advantage of them. A drawing only provides a snapshot of how a site might look at a specific stage in its evolution, so visualise how it 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 the scarcity of them in shops or having a greater number of mouths to feed.

INTEGRATE RATHER THAN SEGREGATE

Having placed all systems and elements where they each appear to work best, I then consider possible integrations and if those suggest any better layouts. As before, there are a number of tools we can use to guide us in making these decisions.

Energy cycling: Design to make the best use of any energy or resources moving through a site. Link as many elements together as you can to create self-sustaining cyclic systems and to build fertility or produce a surplus. By connecting elements you can reuse a valuable resource like water several





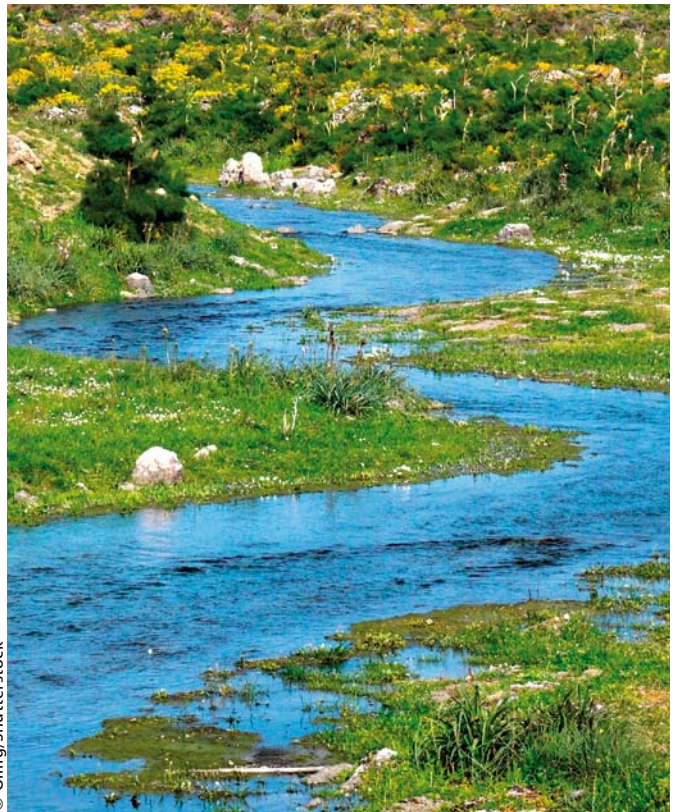
times and clean it before it leaves the site. For water needs, identify which elements require the highest purity and chain them together in the right order.

Creating cycles can also help by highlighting any important elements we've overlooked, in the same way that doing a jigsaw brings a missing piece to our attention. This might illuminate previously unseen opportunities.

Process flows: While the ideal is to create localised cycles to build on-site energy and resources, some will extend beyond the boundary of our design and involve exchange with the outside world. That's OK: life trades resources all the time and it's a perfectly normal thing for us to do; in fact it creates the resilience of nature's web. So to make something of value to trade, we might bring in some off-site materials in addition to harvesting wild energies and utilising those we already have on-site. We might import manure to enrich the soil and help us grow fruit and vegetables to sell. If so, arrange it so that each end of this chain has good access on and off the site. When the manure is delivered, you want a drop off point close to the garden to avoid a lot of barrowing work. At the other end, position any sales area or collection points close to a good access.

Patterns and principles: As well as defining the overall site design, we can use patterns to help us integrate our elements into systems. Consider which of nature's successful patterns are best suited to our situation. Where can we apply the principles of ecology, energy cycling being one such example? How can we create beneficial relationships? Where can we make best use of succession or stacking to integrate elements?

Edge effect: The boundary between systems is a fertile place, because this is where interactions take place. Straight edges are rare in nature. We find spheres and domes where protection or energy conservation is required. Many patterns have much more edge though. Rivers take a winding course to deliver life-giving water and fertility over a wider area. Trees branch to increase their exchange with the sun



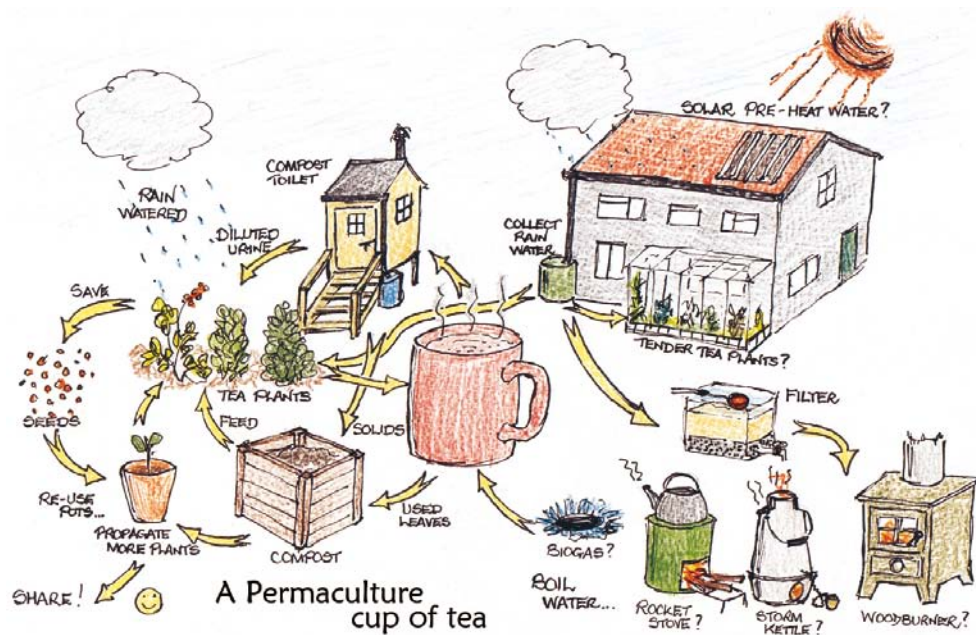
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Above: In nature, boundary edges are rarely straight.

Below: How to make a permaculture cup of tea.

and the atmosphere. All are more integrated and efficient because of this.

However, while increasing edge in our designs to increase yield is often helpful, we should optimise rather than maximise it. Overproduction is as much of a problem as not having enough. Unharvested crops can create an imbalance in the system, unused resources having the potential to become pollution and attract pests. Don't be greedy, match your design to your needs and increase that edge again later when you need more. Remember, start small and work out from well managed areas.



Guilds and companion planting:

We see these assemblies everywhere in nature, because when seeds fall near those of other beneficial plants they will grow much more abundantly, those guilds ultimately dominating the space. Animals also thrive where the plant species that support them already grow. Place smaller plants around the larger ones you have already placed to create your own locally suited guilds. Books can help, but they also often just report on the author's own experience in their own specific circumstances. Experiment for yourself and share what you learn with others.

PUT IT ALL TOGETHER

Play around with placing systems and elements until it feels like you've created the most effective layout. The obvious solutions aren't always the best ones though, so try out some random combinations too. Here's an example involving ducks in a market garden:

If our main purpose for including ducks is egg production, we can most easily keep them safe from predators by placing their house on an island in the middle of a pond (we'll need to have a strategy for collecting the eggs though). However, if we also wish to employ the ducks as part of a slug control system then we need to create a desire line for them through the vegetable garden. This we can do by locating the duck house and the pond at opposite ends of the garden, so every morning and evening our feathered friends pass through it, eating slugs as they go. Using this layout we create a flow of ducks, or slug-eaters, where we most need them. If they ultimately develop a taste for greens, we can feed them a 'permitted ration' each time before they pass through.

The pond could of course also be used to provide regular or emergency irrigation for the vegetables. If so, placing the garden down-slope of it will allow this to happen under gravity.

Considering the way the pond itself is fed may determine its own location. A pond can also reflect valuable extra light into a building during winter. Such a building may be your zone 0 focus around which everything else is located. This may seem like a complex process, but each relationship is a simple one. We just need to put them all together,

prioritising the most important connections whenever a choice must be made.

TRY IT OUT ON THE GROUND

At the point that we feel it works 'on paper' we should lay out our plan 'on the ground'. By using ropes, hoses or stakes as markers, we can get a sense of how our proposal looks in the real world. Walk around the pathways, ideally for a week or so, and improve it by moving the markers. Start the implementation when it feels right to everyone.

PICK JUST FIVE BOOKS?


In addition to my own, of course, these great books will help you start applying permaculture principles in your home, garden and life in general:

The Permaculture Way by Graham Bell.

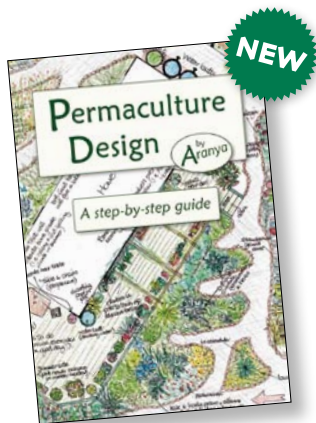
Toolbox for Sustainable City Living by Scott Kellogg and Stacy Pettigrew.

Gaia's Garden by Toby Hemenway.

The Earth Care Manual by Patrick Whitefield.

People and Permaculture by Looby Macnamara 

Aranya is a permaculture teacher and designer. His new book *Permaculture Design – A Step by Step Guide*, is available from *Green Shopping*. See advertisement below.



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