Design process (there are many variations!)

- Survey
- Analyse
- Design
- Implement
- Maintain (and monitor)
- Evaluate

Design stage	Techniques	Tools	Artefacts & outputs
Survey	Client interview with PASE sheet Base mapping Surveys (wildlife, soil, vegetation, etc) Listing resources Setting up recording systems & baseline data for evaluation Direct observation Walk boundaries Identify areas of leakage (time, soil, water, labour, money, nutrients, skills) Background research (maps, local knowledge, elders, weather records)	Survey tapes (30/50m, 3m), clipboards, paper and pens, camera, recording posts in the ground, Notebook Compass, Large white chalks A-frame Water level	Project brief Client interview PASE sheet Photos Base map Survey(s) information Resource inventory Notes and observations
Feedback to client - check data and assumptions			
Analysis	Input/output analysis Apply ethics Identify limiting factors McHarg Exlusion method Sector analysis Areas of production	computer, CAD, google maps, calculator, library and internet	Notes, questions, list of desired elements to include in design
Feedback to client - check analysis and revise brief if necessary			
Design	Pattern language – Christopher Alexander et al Zoning Scale of permanence (PA Yeomans) Bubble design Apply principles Placement of elements and relative location Sectional elevation	Google sketch-up, Gimp (open source image software) colour pens and pencils, pencil and rubber, tracing paper, range of papers and sizes, scale ruler, french curves	Report, scale maps and plans, 3D models
Feedback to client - check design, especially phasing, budget and level of detail			
Implementation	Phasing (now, soon, later) Planting plans and species lists Multiplication strategies	Huge array of possible kit depending on the project!	planting plans detailed drawings (eg buildings, sheds, ponds)
Feedback to client - keep informed of progress and any arising challenges			
Maintenance & monitoring	Diary of activity Maintenance plans and schedules	Huge array of possible kit depending on the project! For example, long thermometer to measure compost heap internal heat.	Schedules for monitoring and maintenance
Feedback to client - keep informed of issues arising and progress towards longer term goals			
Evaluation	PMI thinking tool, dartboard evaluation, test specific criteria against brief	Large room and cups of tea for everyone involved!	Reports and recommendations.
Feedback to client - share insights and reflections on performance on project and consider next steps for further design as needed.			

Apply ethics – earth care, people care, fair shares

The ethics act as a powerful reminder of what we are trying to achieve. They can also act as useful questions – “How can I best care for the earth in this situation?”, “What people needs are not being met, or could be met more sustainably?”, “How could this design help to reduce consumption levels?”

Apply principles

Use the permaculture principles to guide you in your design work. The 'original' principles as proposed by Bill Mollison are particularly useful for designing, in particular:

- Relative location.
- Each element performs many functions.
- Each important function is supported by many elements.
- Efficient energy planning: zone, sector and slope.
- Cycling of energy, nutrients, resources.

Areas of production

What is needed to increase site productivity and self-reliance. What new areas of production will most improve the sustainability of the site. Which new areas of production make best use of the space and opportunities? This could include: fuel wood, heat, aquaculture, fruit, veg production, bees, fodder, privacy, wildlife, soil, compost, windbreak, tree nursery, cash income, water storage.

Background research

This can include:

- maps
- local knowledge
- elders
- old photos
- weather records

Visit the local library to find archives and old maps to find out how the space has been used in the past. Talk to local people, see what they know. Ask elderly members of the group about their memories of the place and its previous uses, ecology and characteristics.

Base map

The base map can be thought of as the foundation of your design. It will include a scale e.g. 1:100, site orientation (showing north), site title and location, and key features. The base map shows the important and permanent features, not every detail. When a base map has been produced it can be copied and used to record observations, as a base for transparent overlays, to test ideas and to build the final design.

Bubble design

Before getting into the detail use 'bubbles' and rough sketches to try different ideas out. This takes less time, can be used in groups to develop different options and allows you to think through different possibilities quickly. Promising ideas can then be worked up into more detail.

Client Interview

This can help you to understand the needs and resources of a group that you are working with, or you can use it to ask yourselves important questions about your own wants, needs and resources. Use pre-prepared questions, but don't feel you can't ask others, or need to ask them all. Remember the point is to listen. The less you say, the more they will talk.

Develop multiplication strategies

Plants can be very expensive, especially if you want a lot of them. Your design can take this into account by putting into place 'multiplication strategies' that can take a small amount of stock and increase it. For example, establishing a nursery within your site and using this to develop your own native trees from seed, taking hardwood cuttings for shrubs, or grafting from orchard cuttings (scion wood) onto rootstocks to create your own fruit trees.

Direct observation

- **NON-SELECTIVE APPROAC**H where you wander around, open-minded, noting anything that catches your eye (child-like approach)
- **THEMED APPROACH** where you look for particular categories of information such as water, habitat, desire lines or energy sources
- **INSTRUMENTAL APPROACH** where you measure things using suitable tools/equipment
- **EXPERIENTAL APPROACH** where you use all of your senses as instruments, gaining specific details, but also sensations and the ambience of the location

Observation is a principal method in site surveys, and is as much an ability to absorb the reality of a location as it is the simple use of our primary senses. It must be carried out at the location, unlike the preceding analysis of elements that can take place anywhere. We can approach the task of observation in a number of ways, each having the potential to reveal different information.

We can sit for a time and begin to notice patterns and processes and build up information in a site survey: how some trees prefer to grow in rocks, some in valleys, others in grasslands or clumps. We can observe waterflows on the site, where winds have bent branches or deformed the shape of trees, how the sun and shadows move, and where we find signs of animals resting, moving, or feeding. The site is full of information on every natural subject, and we must learn to read the landscape and its indicators. Be aware that information from one site visit tells us only the natural order in that season - if we can, we should make return visits over a year so that we see each season and its changes.

Ecological footprint analysis

This can be used as a design tool, in particular to check the ecological impact of different designs and existing situations. Lots of really useful work done in this area already, so a wealth of data and calculators available that can help guide decisions.

Useful books include: *Our Ecological Footprint: Reducing Human Impact on the Earth*. Mathis Wackernagel and William E. Rees, 1996. New Society Publishers, Gabriola Island, BC. and

Sharing Nature's Interest: Ecological Footprints as an Indicator for Sustainability. Nicky Chambers, Craig Simmons and Mathis Wackernagel, 2000. Earthscan, London.

Flow diagrams

This is a design method for workplaces, from kitchen to factory. The preceding methods are not so important here as is the understanding of the flow through the process(es) involved in the work. The intention is to create an efficient workplace, as much as zonal analysis looks at creating an efficiently integrated location. Thus for a kitchen, it is worth mapping out a flow chart of typical activities and from these devise the best location for each element. You can mark out these locations on the ground, walk around and imagine you are preparing a meal. Are the knives and bowls stored close to the preparation area? Is the worktop stable enough for chopping and kneeding? Do you have to walk too far to the fridge? The technique of flow charts is about schedules or time-place movement. Thus it can also be used in designing traffic-ways, whether it is people flows through a location or transport carriers bringing in goods and loading and taking them away.

3D models

Detailed and to scale, or on top of a pizza, 3D models can be a great way to get participation and creative input into the design process. Computer 3D modelling is also possible using programmes such as Google's Sketchup.

Identify areas of leakage **(time, soil, water, labour, money, nutrients, skills)**

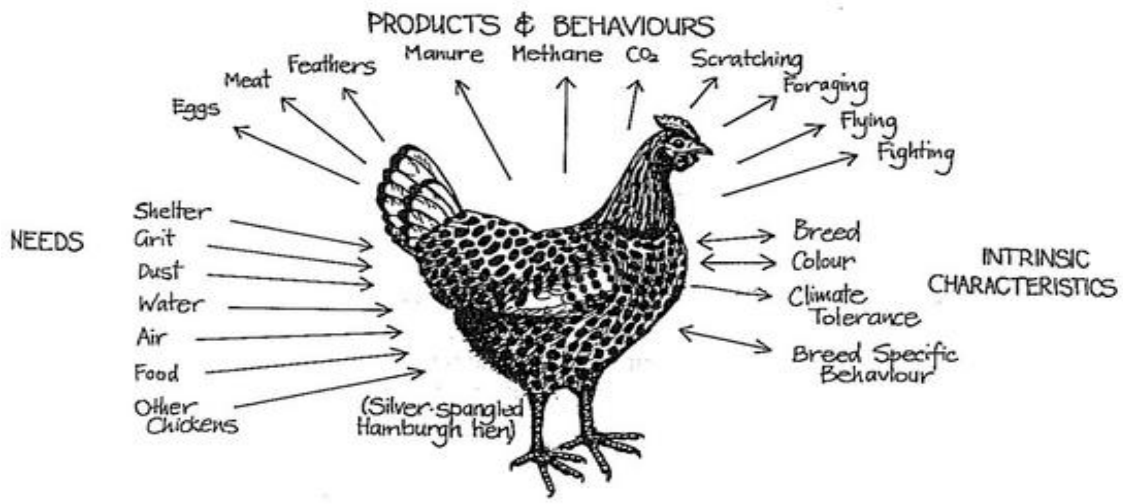
How are energy and nutrients leaving the site? Is soil washing down the driveway, or nutrients flowing downhill into the river, or money being wasted on inefficient appliances, or youngsters leaving because there are no jobs? Identifying areas of leakage through observation will enable you to develop strategies to reduce leakage and increase productivity

Identify (and then remove) limiting factors

System health and productivity is often held back by 'limiting factors' or constraints. For example, many fields would turn to woodland quickly if they were no longer grazed. The sheep are a limiting factor, and if removed the woodland would emerge. There would then be another limiting factor, which could be water, or seed diversity. By identifying limiting factors, you can then identify ways that you can help the system to evolve.

Common limiting factors in the local landscape, include lack of sunlight, steepness of slope, risk of flooding, and cold winds and frost pockets. Limiting factors are not confined to the physical and can include financial, social, cultural or ethical considerations.

Input-Output analysis



“The purpose of a functional and self-regulating design is to place elements or components in such a way that each serves the needs and accepts the products of other elements.” (Designers Manual p37) Therefore a useful technique is to analyse elements that will be included in the design. This can help to point out where relationships can be made between elements, to reduce work (by making sure an element's needs are met by other parts of the system) and pollution (by making sure the outputs will be used by another part of the system).

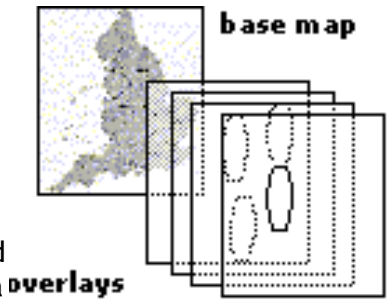
Maintenance plans and schedules

As the project develops you will move from the implementation and creation of new systems, to their maintenance. Trees that have been planted will need to be pruned and stakes checked. Developing maintenance plans and schedules makes it easier for volunteers to get involved, for you to plan your weekly and monthly work, and ensures that systems you have developed are kept in excellent condition.

Monitoring

In some systems ongoing monitoring is essential, such as for aquaculture systems for fish. Without regular monitoring these systems can quickly decline if problems arise. Monitoring can take many forms – direct observation to look for build up of pests in the orchard, soil samples to detect longer term changes in its quality, or electronic monitoring of thermal performance in buildings. If social goals are important you may monitor numbers of visitors, or satisfaction of employees.

McHarg Exclusion Method



If you get stuck sometimes in deciding the placement of an element, then a way to break out is to decide where it shouldn't go! This design method owes its existence to Ian McHarg, a Scottish landscape architect and planner, who spent most of his working life in N. America. When invited to assist a community in protesting a proposed new road, he produced a base map of the area and a series of transparent overlays. The overlays mapped areas where there were good reasons why the road should be excluded, such as too close to housing, through a wildlife area or woodland, or where extra cost would be incurred through needing bridges to be built. Once all the overlays were placed on the base map, there were areas that were left blank showing potential routes for the road. Where these did not join up together, areas with the least constraint (but which were not blank) were identified. McHarg was one of the first to bring environmental concerns to planning and landscape architecture, in his book from 1967 – Designing with Nature. See http://www.csiss.org/classics/content/23 for a good overview of Mcharg and his work.

McHarg, I. L. 1969. *Design with nature*. Doubleday & Co., Inc, New York, 198 pp.

Observe the four seasons

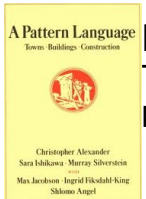
The site will be different throughout the year. Wherever possible observe the site across all four seasons and record these observations to inform any major design work. Go out on very cold and frosty days to see where frost settles, on very wet days to see how water runs through the site, on warm days and spot where the cat sits (the warmest spot!).

Observation as a design method

The experiential approach leads us into using observation as a design method. After the initial site survey, you should take the opportunity to sit down in a location again and just look around. You are not necessarily looking for anything in particular, more for what the location returns to you during your period of observation (i.e. what it tells you). In urban areas, this often turns into people-watching, seeing the patterns of movement through a location, seeing where people stop to talk, where they sit and what parts they hurry through. You may then start to tie in features or conditions that are causal for this range of activity. Given the design brief, you can then begin to work out how you can build onto those features and conditions to achieve the outcomes required in the design. In a land-based design, you would be looking for feedback from the immediate topography/surface layout of the landscape, to see where elements may best be sited, such as a natural damp hollow for a water feature or a flattening out of the slope for the location of terrace beds. This is designing by expanding on direct observation of the site

Overlays

Overlays are useful for explaining one aspect of a design, for example 'water features and flows', or 'annual plantings', etc. Use tracing paper, greaseproof paper, or a computer packages (free such as 'gimp' (open source and free), google SketchUp, or AutoCAD (student versions available for not too much money)



Pattern language

This is a book by Christopher Alexander et al (Oxford University Press), that has uncovered patterns that can be observed in the way we create places to live and work. Highly

recommended and an invaluable source of inspiration and guidance. Especially useful for building and urban projects.

Phasing (now, soon, later)

You have decided what you need and where it is going to go, now you need to decide when it is going to happen. This is about deciding what order you are going to put systems in place. This will depend on availability of skills, labour, money, the right weather and so on. Phasing can be as simple as describing “what we will do now”, “what we will do soon” and “what we will do later”, or could be a formal workplan or Gantt chart that describes activities week by week or month by month.

Placement of elements

Once elements have been chosen to include in the design, you need to decide how to place them on the site. This should be done to maximise beneficial relationships between elements, keep the amount of travel time to a minimum and so that each element can perform more than one function, eg trees can also be used for windbreak or privacy.

Planting plans and species lists

Following the principle 'design from pattern to details', this work takes place after the decisions have been made about how the site will work overall. Once intensive growing areas, orchards and other planting sites have been allocated, you can then decide which specific plants to use (species list) and how to arrange them in the areas (planting plans). This may or may not be a level of detail needed in the initial design.

PMI Thinking Tool

This stands for Plus, Minus and Interesting. It is an evaluation tool that enables you or your group to give a balanced evaluation or assessment of an issue or project. All points are accepted and can even be contradictory - 'detailed' may be seen by some as a plus and by others as a minus, but both are accepted and this can highlight areas that may benefit from further thinking. By providing 'rules' for thinking, Edward De Bono has made thinking an activity that can be highly cooperative and productive within even the most diverse of groups. When used alongside Mind Mapping, as pioneered by Tony Buzan it can have amazing results and lead to much more productive, creative and cooperative meetings. Over 60 other tools exist and can be used to enhance many different aspects of the design process.

Recording your project

Good documentation of your project can be invaluable. It is easier to identify trends and for new observations to emerge when you can look back and reflect on the progress of the project over time. This means you need to record from the start. You can keep a journal of activity and site observations. Another highly effective method is to decide on key points across the site from which you can take regular photos. Sometimes this can mean using existing features (a fence post for example) or putting in posts, so that you can take photos each season. Over many years this builds up to be a very rich record of the sites development, which alongside written records can provide useful resource for researchers.

Resource inventory

“Make best use of available resources” is a useful permaculture slogan. This suggests you know what the resources are! List key physical resources available on the site. You may also find out and record nearby resources or possible resource flows (e.g. local gardening companies with spare woodchip)

Set the brief

If you are working for others, it is essential that you are clear about what the project is. This is called

setting the brief. The brief sets out what issues or challenges need to be overcome, the purpose of the design, its desired functions and elements.

Often people aren't completely sure what they want to do, so some time should be spent discussing options and working out what the key focus for the work will be. The brief can come out of the client interview process. It is useful to include a budget for the work, how you will report on progress and terms of how you will be paid.

After the survey and analysis stage of the design process review the brief and feedback to the clients. You may need to reset the brief due to new information or constraints that have been identified.

Sectional elevation

A sectional elevation is a drawing that looks like a slice through the earth. The site is seen side on, and allows you to think about how we can use gravity to maximum effect, in particular water and water, storages, flows of cold air (frost acts like a liquid that flows downhill), movement of warm air (rising), and movement of nutrients down slope (create nutrient traps.)

In addition a sectional elevation reminds us to design in 3D and make use of the permaculture principle of “stacking”. Use of trellis, climbers, and structures to allow stacking of plants can all make better use of space and increase productivity.

Sector Planning

The site is drawn and lines showing north, south, east and west are added (sectors). Winds, path of the sun (in winter and summer), water movement, wildlife patterns and movement, vehicles and other energies are added to build up a picture of how things flow. By understanding this we can devise strategies to trap the useful energies, build fertility and yields and deflect unhelpful energies like harsh cold winds.

Walk boundaries

A very useful way to get to know the site is to walk the boundaries. Often you will find hidden treasures and piles of 'stuff' that people forgot about. Sometimes that stuff is really useful. Walking the boundaries also gives you the chance to see what is across the boundary on the other side of the fence.

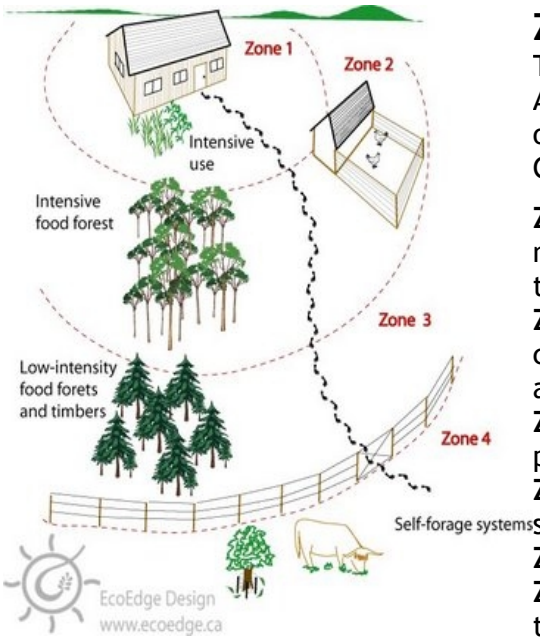
Written report and design drawings

This will will vary depending on the scale of what is needed, but may include the following: project brief, site history and background, survey findings, design overview, key elements and design details, appendices (suggested species, plant suppliers, useful organisations, detailed survey info, etc.)

Yeomans Scale of Permanence

1. Climate
2. Land form
3. Water
4. Roads
5. Trees
6. Buildings
7. Subdivisional fences
8. Soil

This is a recommendation from the late Percival Yeomans about the order of planning. The concept is to deal with the most permanent and least changeable aspects of the landscape in the most appropriate fashion before dealing with the changeable aspects. You can't change the climate, nor the overall landform. Water, and how it flows across the landscape is the first level at which we can make major interventions, it is therefore the most strategic place to start.



Zoning

This is a way of designing to maximise energy efficiency. Activities are put in different zones, depending on frequency of use, maintenance, visits etc.
Generally, activities and structures are placed as follows:

Zone 0: Centre of activities - the house. This is high maintenance, high use and requires considerable investment of time and energy.
Zone 1: Annual plants, herbs, compost, plant propagation, construction and maintenance, bike store and other high use activities, greenhouse. Often irrigated
Zone 2: Dense planting, poultry and small livestock, orchard, polytunnels.
Zone 3: Large water storage, main crops, sheep, cows, field shelters.
Zone 4: Forestry, wood-pasture, dams, forage.
Zone 5: Wild zone, where nature is in charge and where we go to learn and harvest only that which is abundant.