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A Pattern System for Permaculture Design

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Introduction

The Pattern System for Permaculture Design integrates *goal formation*, *participatory design* and *permaculture design tools* in an easy-to-follow, step-by-step process. Templates are used in the process of collecting and analysing information for design. The physical design is built up in layers of analysis, using permaculture principles to inform design decisions.

The templates used in this approach are based on patterns found in natural systems, with a branched, spiralling form. They employ *mind-map* techniques. A mind-map is a graphic technique for representing ideas, developed by Tony Buzan. A mind-map has a central image for the main idea, and branches for major themes radiating from the centre, with associated ideas and topics connected to these branches to form a “connected nodal structure” (Buzan, 1993, pg. 59). A node in this sense is a dense centre, or area, of information. This structure, and the categories of the templates, encourages participants to look at the resources they have, to search for local resources and to see ways of making functional connections between elements and resources. The inclusion of permaculture principles in the templates helps to make these principles easily applicable to design.

The aim of this paper is to introduce this system, including where and how it was developed and how it is integrated with permaculture training, concluding with the advantages and a few of the potential applications of this approach.

Development of the process

I worked for two years in Lesotho, a small mountainous kingdom, completely land-locked by the Republic of South Africa. This involved working with community organisations, schools, government extension workers and farmers. This work was done through Holocene design company, which was established in 1994 with the idea of combining Joanne’s work in permaculture and systems theory with Buddy’s experience in ecological design, architecture and site planning.

The context of working in Lesotho is one in which the worst of chalk and talk and linear thinking from the Western education system has become deeply entrenched. This has resulted in a degraded ability to analyze problems in a holistic context, a degraded traditional knowledge base and a lack of knowledge about ecosystems. This is intensified by the ecologically degraded environment. It is difficult to learn how to design with ecology when there are few examples of un-degraded systems available to learn from.

I was working in this environment as an outsider, in an ambiguous position of saying that working with nature and traditional knowledge offers a more sane path for development than to follow the paths set by the large development organizations which abound in the region. I was aware of the need for a system of making permaculture principles comprehensible and applicable to design, at the same time as encouraging participation in the design process by people from many different walks of life, including those with little formal education.

This pattern system of permaculture design began as a new way of teaching the permaculture classic, the 'Parable of the Chicken', in a way which helped to graphically represent the principles behind the parable. Once started on this path, my fascination with design and patterns took over. I have studied with Christopher Alexander in California and have always felt that pattern languages and holistic thinking were key to ecological design. I have seen, however, that it is easy to feel attracted to these ideas, even to teach them, without making them very practically applicable. This design process evolved as I experimented with ways to use mindmaps, integrated with ideas from Alan Savory's work with Holistic Resource Management and my permaculture design experience. Its development also included looking at what was working in the areas of sustainable agriculture, seeing what made sense to people and experimenting with how to translate that into principles which people could understand and apply to their own situations.

Working at Tlholego Development Project, near Rustenburg in South Africa, I was able to put the process and integrated method of teaching permaculture principles to the test, teaching two full permaculture design courses, one for school teachers and administrators, and one for community development workers and agriculture extension agents. This process was also used for a permaculture design which Holocene Design Co. carried out for an NGO in Lesotho, called Ketso ea Bua, or Action Speaks.

Permaculture training and the pattern system approach

Permaculture principles inform this design process, in the types of questions asked and the structure of the process, as well as by applying principles directly to design and decision making. The principles I have used in this process have been re-organised slightly, in order to make them more structured and easily applicable to practical design.

One of the permaculture principles which has a major influence on the design approach is Pattern Application. This involves learning from patterns in nature, including branching structures, patterns caused by flows (of water and air), and the way in which these patterns are self-similar at different levels of scale. Patterns in

nature inform the design process, in terms of templates and the way in which design is applied on the land.

As well as permaculture principles, this design process is based on systems thinking. This way of viewing the world is different to a 'mechanistic' way of thinking which sees distinct objects, which work as a machine. One of the major differences in the two ways of thinking is in the view of cause and effect. A mechanistic way of thinking tends to see a linear relationship between cause and effect, where any action produces a direct effect, which is in direct relationship to the action, on the object being acted on, but does not affect the whole system.

As these three concepts are integral to the design process, I will describe the design course structure which has been integrated with the teaching of the pattern system for permaculture design.

Permaculture principles form the backbone of the first week of the design course. Group work, practicals and topics (such as agroforestry and natural pest management) are used to reinforce the principles. On the first day, participants are introduced to the tool of mind maps, which are used in participatory work, teaching posters and exercises throughout the week. Principles are reinforced and elaborated on in the second week, in which the design process is taught.

In the first week, participants look at how ecology works as a whole; how if you affect one part, you affect the whole. The design tools and approaches which are taught throughout the course have systems theory as their foundation – viewing a whole system, seeing connections as more important than the objects themselves, understanding that every element has an effect on the system of which it is a part, that every sub-system, or guild, has an effect on the ecosystem of which it is a part.

The principle of edge effect helps to clarify the relationships between element, guild and whole system. Every element is embedded in a whole; it cannot exist without the whole, or as an independent entity. Each element, however, does have an edge, which defines it as an entity.

This edge is not a rigid boundary, but is a diffuse area of exchange. The edge is a very important area – it defines, it is an area of opportunity, exchange and productivity. It is a very distinct area, which often has special properties. Think of the membrane of a cell. It defines the cell, bounds it and holds it together. It is also semi-permeable, allowing in some substances, keeping out others. When designing guilds in the first week, participants are encouraged to think of the edges between elements and of the edges between guilds.

The second week begins with the final permaculture principle to be taught – pattern application. Participants are given leaves, flowers and other natural objects, and pieces of chalk and asked to draw patterns they see in the pieces of plants they have on the ground – concentrating on copying the patterns at different levels of scale and how their drawings interact with those of their neighbours. This is used to introduce the idea of learning from patterns in nature and using them in design, especially in order to increase beneficial edge effect, and as an introduction to the pattern-based design process.

The concept of roles and functions is then introduced with a game, and the first exercise of the design process is carried out, looking at organizational structures and roles within the group for which the design is being carried out. The rest of the second week focuses on introducing the design process, mainly through group work and practicals, in such a way as to consolidate the ideas and principles learned in the first week.

How the design process works

This process is structured in a series of steps, focusing at first on the **BIG IDEA** then **small details**, analyzing the existing situation, deciding what the group needs (goals, elements and activities), then working out how to achieve those goals in a sustainable way. This design process can employ a sliding scale of participation, from a full scale community design process to a professional designer using templates to gather and analyze information from a client.

There are ten types of templates which have been developed for broad design, and three for detailed design. These are:

- Quality of Life Values Template.
- Observation Template.
- Resource Inventory Templates (Within The Project).
- Project Inputs And Outputs Template.
- Goal Formation Template.
- Future Economic Elements and Activities Template.
- Local Resource Inventory Templates.
- Limiting Factors Templates.
- Analysis Of Elements Templates.
- Design Information Charts.
- Analysis of Components of Elements templates (Plant, Structure and Technology, and General).

For group work, the templates can be copied onto large sheets of paper. Small pieces of paper can be used with these charts to build up a mind map of the group's ideas, using "bluetack" to stick the papers down. It is also possible to use the templates to cut out charts with separate pieces of paper for each major section, or branch of the template. These can be used to build up a large mind-map with participants. This process allows for flexibility, as pieces of paper can easily be moved around and changed. The use of large templates, colour, symbols, string and small pieces of paper for recording ideas helps people try new combinations of ideas. When using large templates in this way, the template can be tailored to the needs and interests of the group. Symbols or objects can be used instead of words to represent ideas.

The design process encourages integration of information. One of the principles of permaculture is stacking in space and time. This process gives tools for integrating many different types of information into an ecological design. The fact that this process is structured in a step-by-step way makes it possible to collect a lot of information and organize it in a way which makes it useful for design.

The brainstorming processes start with each individual writing (or sketching) their ideas down on small pieces of paper, all of which will be included in the initial

building up of the template. This allows every member of the group to have a part in the discussion (often a problem with large group processes), as well as allowing all ideas to be placed “in the picture” for consideration. Once a full picture of the thought process of the group has been built up, ideas can be consolidated, refined, and adjusted to best represent the ideas of the whole group. The use of mind-map structures in the templates encourages creative thinking and making connections and associations between ideas. At the end of the session, the large chart can be copied onto a blank template to record that stage of the design process. Each template is revisited at some point in the design process, to allow feedback loops between information and ideas from different stages of the design to be developed.

Once information about the project, area and goals has been collected, and the list of future economic elements and activities has been decided upon, permaculture principles are applied to these elements and activities, by filling in Analysis of Elements Templates and Design Information Charts for them. There follows examples of a Resource Inventory and an Analysis of Elements Template, filled in during a permaculture course in South Africa.

Detailed information about the land is then collected, including making a base map. The land is analyzed in terms of zones, sectors, soils and vegetation. Overlays are used to build up a physical design. This includes designing for sectors and a water harvesting plan (if applicable). A plan for wildlife areas includes habitats to be protected, areas for developing as wildlife zones, and corridors to be developed between various habitats. Information for a physical design is built up in layers.

The information from the templates is then used to plan the relative location and patterning of future elements on the land, in a process called Bubble Map. Elements from the Future Economic Elements and Activities Template are written or sketched on pieces of paper, and grouped in the guilds which were determined using Design Information Charts. These guilds are then placed on the overlay of zones and sectors on the base map, and are moved around and discussed until the designers are happy with their relative location on the land. The bubble map is the stage where you COMBINE the information in the **Design Information Charts** and the **Analysis of Elements Templates** with the information about the LAND itself (collected during *observation*). The use of pieces of paper and bluetack encourages a sense of flexibility to try different ideas which could be lost if going straight into drawing and writing on the paper. Discussion during the bubble map process is centred on how the changes proposed will affect the land, and how to apply permaculture principles, such as Stacking in Space and Time, Pattern Application and Edge Effect, to the design.

The Bubble Map is combined with the previous steps of design on the land (wind-breaks, water harvesting and waterworks, wildlife areas, etc.) and a plan for access routes, to produce a rough sketch of the future design. After discussion, this rough sketch can be consolidated into a broad design for the land.

After the broad design has been completed, detailed design for sections of the broad design can be carried out. The detailed design is the stage at which the elements

which have been placed in the broad design are planned in more detail, looking at issues such as : species, smaller pathways, fencing, minor waterworks and irrigation, structures and shapes and sizes of buildings.

As the broad design has been completed *before* this step, the designer can be reasonably certain that the placement of elements will work well in terms of energy, zoning, conditions on the land, what the people involved want, productivity, recycling and beneficial relationships.

The same principles and methods used in the broad permaculture design apply to detailed design. Much of detailed design can be done by staking out and marking elements on the ground, and by using Analysis of Components of Elements Templates.

Following the design, an action plan for implementation is devised, including financial planning, assigning areas of responsibility and roles, and working out priorities and timing.

Advantages and potential applications of the pattern system approach

This method of teaching permaculture principles, and of using templates in design, helps to make principles easily understood and applied in a practical way. It offers a framework for design, especially participatory design, which involves collecting and analysing information from many sources. The potential for group work and input into design could be used for integrating Local Agenda 21 into permaculture. This process has been used in the design of a school in South Africa, and could be further used in participatory school designs.

One of the features of this process is the focus on analysis, using templates. Whilst encouraging participation and input from many members of a group, this focus on analysis helps to steer discussion away from personalities and prejudices. The aim is to make a comprehensive graphic representation of the situation, which can be analyzed in its entirety, whilst following steps to use the information gathered in decision making processes and design. This can help to solve many problems which often arise from participatory work, such as foundering on detail and personal prejudices early in the process.

By giving a series of simple steps to follow, the design process can facilitate creativity. This works in a similar way as the Pattern Language elucidated by Christopher Alexander. Simple patterns, once learned, can be applied again and again to design, each time producing a design suited to the site and the needs of the users. Templates can act as a quick way for a designer to compile information. The filled-in templates can act as a bank of information about the elements used in design, and the decision making process for the particular design, acting as a useful resource of information for future developments.

The use of templates helps to facilitate communication between people in a group, and between different projects and groups. Interdisciplinary thinking involves exchange across edges of disciplines (eg. communication between forestry, livestock, crops departments). Permaculture makes edges between areas of knowledge more

productive and meaningful by giving us a framework for understanding and communication. Permaculture principles can be applied over and over, with infinite possibilities and differences, but using the same basic language. These templates can act as a tool to facilitate this process. In this way, this approach to design could be helpful for integrating permaculture into education programmes, using a principles – based, interdisciplinary approach to analysis and teaching.

Summary

The aim of this design process is to integrate pattern application and permaculture design tools in a new way which helps make information useful and applicable to design. As each area of land and group of people carrying out a design is different, each permaculture design is different. This implies that the design steps should be adapted to suit the circumstances of the group. This design process is a tool to facilitate people's creativity and to empower people to look at their situation through the lens of permaculture principles, focusing on regeneration of human and physical resources and ecological sustainability.

The structure of the design course focuses on permaculture principles and making them applicable to practical design. Every idea is reinforced and introduced in several different ways, with the teaching methodology aiming to help people work out how much they already know about ecology and design and giving them a framework for using that information.

This design process comes out of experience of teaching and working with permaculture in Lesotho and Southern Africa. I have taught and used this design system in those countries, and am now planning to teach and trial this process in the UK and USA. A manual about this process, with examples and photos, is forthcoming. I will be available for running two week design courses and advanced design courses after mid-February 1997.

Bibliography

- Aberley, D. (ed.) 1993 *Boundaries of Home, Mapping for Regional Empowerment*, New Society Publishers, Gabriola Island, BC, Canada.
- Alexander, C. et al (1977) *A Pattern Language*, Oxford University Press, New York, U.S.A.
- Alexander, C. et al (1979) *A Timeless Way of Building*, Oxford University Press, New York, USA.
- Bateson, G. (1979) *Mind and Nature, A Necessary Unity*, N.Y. Bantam, USA.
- Buzan, T. (1993) *The Mind Map Book*.
- Capra, F. (1983) *The Tao of Physics*, Flamingo, Fontana Paperbacks, London.
- Downs, R. and Stea, D. (1977) *Maps in Minds*.
- Fiske, P. *Sustainable Design Compendium*, Center for Maximum Potential Building Systems, Austin, Texas.

- Gold, J. (1980) *An Introduction to Behavioural Geography*.
- Gleick, J.(1987) *Chaos, The Making of a New Science*, Sphere Books, London.
- Gleick and Porter (1991) *Nature's Chaos*, Cardinal, London.
- Kropotkin, P. (1902) Reprint 1987 *Mutual Aid, A Factor of Evolution*, Freedom Press, London, UK.
- Lewin, R. (1993) *Complexity, Life at the Edge of Chaos*, JM Dent Ltd. , London.
- Mollison, B. And Slay, R.M. (1991), *Introduction to Permaculture*, Tagari Publications, Tyalgum, Australia.
- Mollison, B. (1988) *Permaculture, A Designer's Manual*, Tagari Publications, Tyalgum, Australia.
- Parkin, D. (1982) *Semantic Anthropology*; Academic Press, London.
- Savory, A., *Holistic Resource Management*.
- Shiva, V. (1989) *Staying Alive, Women, Ecology and Development*, Zed Books, Bath.
- Thompson, W.I. (ed.), (1987) *Gaia : A Way of Knowing, Political Implications of the New Biology*, Lindisfarne Press, USA.
- Todd, N. and J. (1984) *Bioshelters, Ocean Arks, City Farming, Ecology as the Basis of Design*, Sierra Club Books, San Francisco.
- Turner, E. (ed.) (1985) *On the Edge of the Bush, Anthropology as Experience*, University of Arizona Press, Tucson Arizona, USA.