A participatory protocol for ecologically informed design within river catchments

A thesis submitted to the University of Manchester for the Degree of Ph.D. in the Faculty of Arts

2004

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Abbreviations & Conventions Used in Text

Abbreviation /Acronym	Full Name/Explanation
ABROS	Company name, capitalised by the company, word is Greek for 'delicate or graceful'
ADAS	Formerly stood for Agricultural Development Advisory Service, now known as ADAS Consulting Ltd. Is a consultancy and research for land-based industries.
CABE	Commission for Architecture and the Built Environment
BTCV	British Trust for Conservation Volunteers
CAG	Co-operative Advisory Group Consultants
CatchMod	European Commission cluster on Integrated Catchment Water Modelling
CEO	Chief Executive Officer
CBA	Cost Benefit Analysis
CIS	Common Implementation Strategy for the Water Framework Directive being developed jointly by the Member States and the European Commission
CPD	Continuing Professional Development
CURE	Centre for Urban and Regional Ecology, University of Manchester
DEFRA	Department for Environment Food and Rural Affairs
DETR	Department of Environment, Transport and the Regions
DNA	DesignWays Tool for ecological design – **D**esigning Edge, **N**odes and Networks, **A**nalysis of Flow
DSS	Decision Support Systems
EA	Environment Agency (UK)
EASEL	DesignWays Tool for structuring ideas – **E**conomics, **A**ctivities, **S**ocial Capital, **E**lements and Settlements, **L**andscapes
EC	European Commission
EIA	Environmental Impact Assessment
ESRC	Economic and Social Research Council
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GIS	Geographic Information Systems
GO-NW	Government Office North West
HarmoniCOP	European Union project (Harmonising Collaborative Planning)
HEI	Higher Education Institute
HMSO	Her Majesty's Stationery Office
IALE	International Association of Landscape Ecology
ICLEI	International Council for Local Environmental Initiatives
ICM	Integrated Catchment Management
ICT	Information and Communications Technology
IPCC	Integrated Pollution Prevention and Control Directive
IVP	Irk Valley Project
LA21	Local Agenda 21 (outcome of 1992 Rio de Janeiro 'Earth Summit')
LEAP	Local Environment Agency Plan (of the Environment Agency)
LGMB	Local Government Management Board
LSP	Local Strategic Partnership
MANCAT	Manchester College of Arts and Technology
MBC	Mersey Basin Campaign
MULINO	Multi-sectoral, Integrated and Operational decision support system
MVRA	Moston Vale Residents' Association
NEPA	National Environmental Policy Act (USA)
NGO	Non Governmental Organisation (Not-for-profit – USA usage)

Abbreviation /Acronym	Full Name/Explanation
NVQ	National Vocational Qualification
NWDA	North West Development Agency
NWRA	North West Regional Assembly
OCN/MOCN	Open College Network/ Merseyside Open College Network
ODPM	Office of the Deputy Prime Minister
PELUM	Participatory Land Use Management
PPS	Planning Policy Statement
PSA	Public Service Agreement
QSR	Qualitative Software Research – QSR is a company name
RBMP	River Basin Management Plan (requirement of the WFD)
RBD	River Basin Districts (delineation of catchments in the WFD)
RRA/PRA	Rapid Rural Appraisal/Participatory Rural Appraisal
RPG	Regional Planning Guidance
RQO	River Quality Objectives
RSS	Regional Spatial Strategy
RVI	River Valley Initiative (local partnerships of Mersey Basin Campaign)
SEA	Strategic Environmental Assessment
SME	Small to Medium Enterprises
SocEnv	Society for the Environment – umbrella body for environmental institutions
SSM	Soft Systems Methodology
SSSI	Site of Special Scientific Interest (UK landscape designation)
SUDS	Sustainable Urban Drainage Systems
TCPA	Town and Country Planning Association
T/EASEL	DesignWays Tool for decision making – **T**esting Ideas on the **EASEL**
TNS	The Natural Step™
TVA	Tennessee Valley Authority
UN	United Nations
UN ECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
UN	United Nations
WFD	European Union Water Framework Directive
Wrc	Water Research Centre
WWF	World Wide Fund for Nature (in USA World Wildlife Fund)

Citations from the literature are indicated with this font change.

Quotations from interviewees are indicated with this font change.

Case studies are denoted by this format.

Gender specific language in quotations has been left as is, e.g. mankind, but effort has been made to use gender- neutral and non-racist language in the author's text. How to describe countries of the world that have historically been called 'less developed' is fraught with difficulty. In this text they are described as 'less industrialised regions' whilst the 'developed world' is termed 'industrialised'.

All photographs were taken by the author, or by Anne Kolodziejski (participant) and used by permission, unless otherwise noted. All diagrams were developed by the author, and drawn by Buddy Williams, unless otherwise noted.

Abstract

The European Union Water Framework Directive (WFD) offers an unparalleled opportunity for improving river basin management, whilst moving towards a sustainable future. Sustainable management of water requires integrated planning, recognising interconnections between systems operating at different levels of scale. This is an endeavour in which systems thinking could provide useful tools. Systems orientated models can facilitate work across levels of scale, enhance dialogue, and improve perception of the ‘whole picture’.

This research examined the emerging role of active participation in 'planning for sustainability' in the context of river catchments. The DesignWays process, developed by the author, was tested in the context of regeneration in the Mersey Basin of NorthWest England. The development of DesignWays was a conscious attempt to embed ‘new paradigm’ living systems metaphors into a participatory protocol for ecologically informed design.

The research tested DesignWays at the landscape and site levels of scale, using an action-based, interpretive methodology. Challenges posed by the WFD were identified, from which criteria were developed for assessing this approach. Interviews were conducted with participants before and after the process, providing data about changes in understanding resulting from their experience. Interviews with key decision makers in the NorthWest were used to test and develop the findings.

This research had two major outcomes: a contribution to theory through an in-depth exploration of the theoretical basis of participatory, ecologically informed design, as exemplified by the DesignWays approach; and a contribution to practice through investigating its potential to meet key challenges of the WFD. This research points to the importance of understanding participatory planning as a societal process, aiming to make the process engaging and meaningful. It explored the value of integrating participatory planning and education for sustainability. It demonstrated the benefits of an iterative process in which planning at the landscape level of scale informs, and is informed by, work at the site level. It has shown that an approach consistent with a living systems paradigm can contribute to the development of more integrated, ecologically sound solutions.

Declaration

No portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other University or other institute of learning.

Copyright

Acknowledgements

Supervisors: Professor John Handley and Joe Ravetz
Centre for Urban and Regional Ecology, University of Manchester
Walter Menzies, Chief Executive, Mersey Basin Campaign

I would like to extend particular thanks to John Handley for his intellectual curiosity and support during this research. Joe Ravetz and Walter Menzies have both challenged me along the way and provided invaluable assistance. Working with this team of supervisors has been a pleasure and a privilege.

Excellent colleagues in the Mersey Basin Campaign and the River Valley Initiatives have made this three-year association stimulating. In particular I would like to thank Amanda Wright, Caroline Riley and Jeff Hinchcliffe. I have learned a great deal from the many partners of the Campaign and the decision makers I have interviewed, who have been generous with their time and ideas.

I would like to thank Matthew Wilkinson for his superlative assistance, both academic and technical. Thanks to Zinnia Clark for facilitating community mapping and to Nuala Murphy, Angus Soutar and Ann Kolodziejski for assistance many and varied in the planning process. The participants on the Irk Valley and Moston Vale workshops have been unfailingly generous with their time, enthusiasm and ideas. In particular, Dave Barlow and Janette Bennett were tireless in instigating a new process.

I would like to thank the following for their insightful comments: Angus Soutar, Joe Howe, Ian Douglas, Emma Griffiths, Matthew Wilkinson, Aidan While, Michael Guerra, Liz Turner, Anna Carr, Ann Kolodziejski, Steve Martin and Perry Walker.

The Economic and Social Research Council and the Mersey Basin Campaign provided financial support for this research. The planning workshops were supported by Newlands (Forestry Commission and North West Development Agency), North City Arts, Milliken Industrials Ltd., Avecia, British Vita, Countryscape and HMG Paints.

My family have been extraordinary throughout, with support ranging from discussions of the nature of ecological design over splendid organic dinners, to technical phone calls about the vagaries of Word. None of this would have been possible without the support of my wonderful husband, Buddy Williams. Thank you.

Preface

This research tested the DesignWays approach to participatory planning. The author has developed this approach over the last ten years in England, Africa and the United States. This preface introduces the relevant experience of the author, through a description of how the process was developed.

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Figure 0-1 The DesignWays process in use

The initial impetus for developing DesignWays stemmed from two realisations: firstly, 'business as usual' (even with a green tint) was not going to deliver a sustainable future; secondly, changing mental models of the nature of human relationships with the environment could play an important role in achieving change that went beyond 'business as usual'.

My interest in practical measures to improve the environment stemmed from living and working on an organic smallholding whilst a teenager. Whilst our family's attempt to live the 'good life' on the farm only lasted two years (having moved from South Carolina to the Pennine hills in North England, we had not quite reckoned with the

bleak winters) this experience inspired me to learn more about human impacts on the landscape.

DesignWays was initially conceived as a method of applying permaculture design. Permaculture is a design method based on ecological principles, with a focus on creating high quality, sustainable human habitats (Holmgren 2003; Mollison 1990, 1997). The first years of developing DesignWays involved creating innovative ways to teach permaculture and a search for a process of design to apply the concept. This included gaining a Diploma of Permaculture design through applied work, and taking studios and theory classes in environmental design at graduate level at the University of California at Berkeley. These studios were led by Christopher Alexander (originator of the 'Pattern Language' theory, see description in Chapter 5 on pg. 196) and Sim Van der Ryn (former California State Architect and early advocate of ecological design, see www.vanderryn.com). In my B.A. dissertation I explored the possible relationships between permaculture design and chaos theory, under Prof. Alan Holland, Director of the Institute for Environment, Philosophy and Public Policy at Lancaster University (Tippett, J. 1994).

As well as the agricultural side of ecological design, I was interested in other production processes, such as building and manufacturing. This stemmed from a realisation that a bucolic countryside is also under threat from invidious pollution from the way we make and use material goods. Much of the environmental improvements in business talked about in the early nineties, when I began developing this ecological design process, were based on the premise of increased resource efficiency use and safer practices in the handling and disposal of hazardous materials. Typified as 'end-of-pipe' solutions, improvements often involved better storage of hazardous materials, and better filters to prevent point discharges of pollution into the environment. This has resulted in significant improvements from reduced pollution, especially from point sources. Several commentators on the process of 'greening industry' have suggested, however, that many of these improvements did not involve a change of direction. They did not treat the cause of the problems, but instead dealt with the symptoms. The same basic design of the system would continue to cause environmental pollution and damage, it would just do it more slowly (e.g. Hawken 1998; McDonough and Braungart 2002; Orr, D. 1994). This critique of 'end-of-pipe' solutions, prepared the way for proposals to re-engineer 'upstream' to eliminate problems. The concept of Industrial Ecology promoted improved process design, and the application of eco-cycle principles to energy

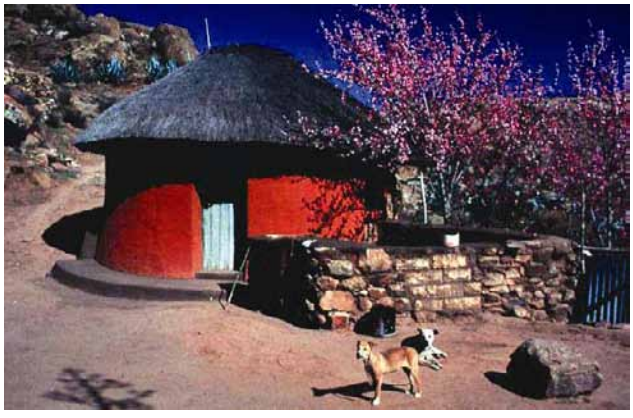
provision and manufacturing (e.g. Lovins and Lovins 2001; McDonough and Braungart 1998; Tibbs 1993).

As suggested in the title of Ornstein and Erhlich's (1995) book *New World New Mind*, a change of approach to designing human settlements and infrastructure to better fit with ecosystems requires new thought processes. The intertwining of practical ecological design methods and shifts in scientific paradigm has characterised my work from the beginning. This was inspired by Capra's (1982) exploration of the profound impact of a worldview originating from a mechanistic concept of the world on many aspects of society, and his subsequent work developing ways to apply insights from living systems theory to both social and material systems (Capra 1996, 2002). This is typified in the following quote:

> *"As the [last] century [drew] to a close, environmental concerns have become of paramount importance. We are faced with a whole series of problems that are harming the biosphere and human life in alarming ways that may soon become irreversible… Ultimately these problems must be seen as just different facets of one single crisis, which is largely a crisis of perception. It derives from the fact that most of us, and especially our large social institutions, subscribe to the concepts of an outdated worldview, a perception of reality inadequate for dealing with our overpopulated, globally interconnected world" (Capra 1996, pg. 4-5).*

Reading Capra's book *The Turning Point* whilst studying for science 'A level' exams was indeed a turning point for me, when I started to consider the connections between paradigms of reality and different ways of living in the world. Whilst I am not a systems theorist as such, what I have attempted to do in my study and work was question how these shifts in understanding and paradigm might relate to the practical process of designing landscapes, buildings, business processes, agro-forestry systems and their associated economic and cultural systems. It was in Southern Africa (Figure 0-2) that I developed new ways of communicating these ideas, starting with educational and communication techniques that also had their roots in systems thinking, such as Mind Mapping.

Figure 0-2 Traditional house in Lesotho



As a participatory tool, DesignWays was piloted in a rural area of South Africa and in Lesotho, a small mountainous kingdom completely landlocked by the Republic of South Africa. I worked in Southern Africa for two years, initially as the permaculture coordinator for a network of schools (Berea Agricultural Group), and then with a variety of rural regeneration projects, such as the Agro-forestry Network and the Soil and Water Conservation Organisation.

Lesotho has a high dependency on foreign aid, importing 90 % of its food and with few exports apart from manpower for the mines of South Africa (and now water to South Africa). The high veldt landscape is characterised by grassland with shrub and tree cover, with denser tree cover in riparian zones. Alpine wetlands contribute to biodiversity in the highlands (Schmitz 1984). In both Lesotho and the Republic of South Africa the landscape is in ecological decline, with severe erosion and desiccation. This was particularly extreme in the lowlands of Lesotho, where a large proportion of the population is concentrated, and very few patches of native vegetation remain (Figure 0-3). The few forested areas are largely composed of eucalyptus and pine, non-native species promoted by government and foreign aid forestry programs. Water erosion, leading to sheet and deep gully erosion (Figure 0-4), is the most visible form of land degradation. In the dry winter months, wind erosion dominates (Grab 2000), and dust storms in the lowlands of Lesotho are common occurrences.

Figure 0-3 Small area of remnant forest in Lesotho – with running stream, unusual in dry season

Figure 0-4 Typical erosion in the lowlands of Lesotho

I started work in Lesotho with the assumption that conventional development was not going to pull people out of poverty, and that it would lead instead to increased environmental degradation, with a loss of future development options.

There are many drivers of landscape change in Lesotho, including an increased level of unemployment amongst men who can no longer find work in the mines in Southern Africa, and the breakdown of traditional grazing management as the chieftainship structure is eroded, being replaced by a largely urban political elite. These social pressures are compounded by an increase in the use of herbicides and tractors (initially funded by aid projects). These are used to clear areas of native vegetation for intensive agriculture, often leading to intense erosion of the fragile soils on steep slopes. A generation of farmers has lost the skills of working the land without pesticides and herbicides. The need for the use of pesticides increases with the diminishing native vegetation, which provided some natural control of pest populations, and the loss of

many traditional open-pollinated seeds, which are hardier than modern hybrids. Economic pressures on farmers are increasing, as they find it increasingly difficult to afford pesticides and hybrid seed. Many of the farmers I worked with were delighted to learn low cost ways of managing their land using local and traditional resources.

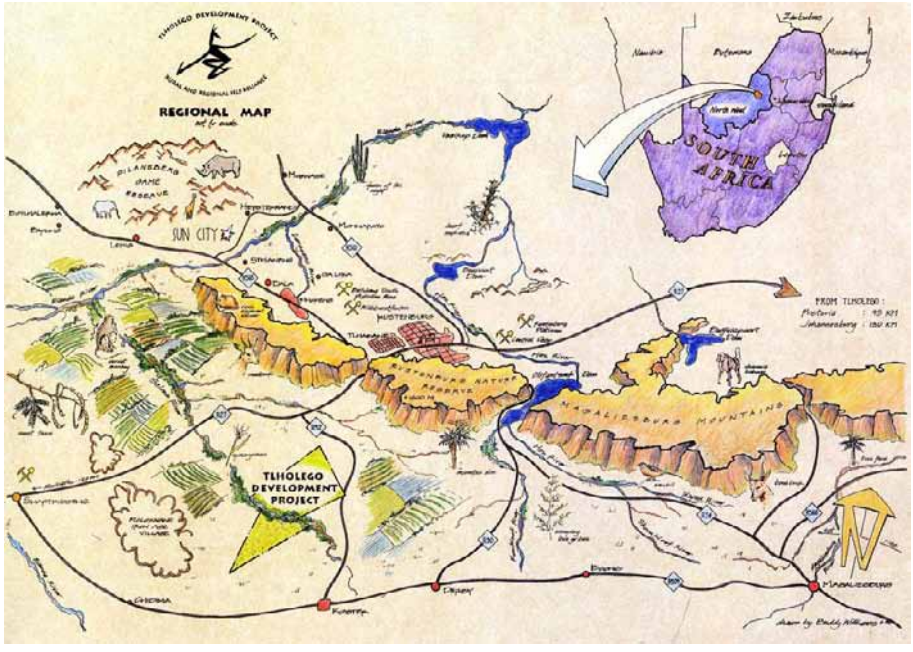
Many of the pressures on the landscape and the remaining vegetation stem from people attempting to meet basic needs, such as wood for cooking and heating (exacerbated by the extremely cold winters). This pressure has led to a high level of deforestation, with overgrazing preventing reforestation (Figure 0-5). With a reduction in traditional uses of native grasses for thatching and basket weaving, there is an increase in the burning of these coarser grasses and the reedy vegetation around alpine wetlands, in order to increase the growth of grasses palatable for grazing.

Figure 0-5 Typical scene of landscape use

As well as working in Lesotho, I worked on the Tlholego[1] Development Project near Rustenberg in South Africa (Figure 0-6). Drying up of the land, reduction of sources of water, and increased violence, is leading some landowners (largely Afrikaner farmers) to abandon the area. Left behind is a population of semi-illiterate former farm workers, often with few skills in landscape or farm management. Some knowledge of traditional land use practices has been retained amongst the older generation[2]. There is extreme rural poverty and there are few sources of employment. There are more areas of native vegetation extant, and less obvious signs of erosion than in the hills of Lesotho, but sheet erosion and reduction in productive capacity of the soil is a severe and growing problem.

[1] Tlholego is a Setswana word meaning: 'creation from nature'. See http://www.sustainable-futures.com/ for more information about the project.
[2] Note that traditional in this sense refers to Tswana herding and crop growing practices, not to the indigenous land use of hunting and gathering of the KoiSan people, who were the indigenous dwellers in the landscape.

Figure 0-6 Bioregional map created by Holocene Design to show the context of the Tlholego project



Many of the development projects that have been undertaken in Southern Africa have focused on large-scale infrastructure projects, which have neither worked to preserve the local traditional culture, nor developed small-scale centres of local economic growth (Figure 0-7).

Figure 0-7 Typical 'affordable' housing in the area

An understanding of the interrelated pressures leading to landscape decline in these areas led us to a realisation that an attempt to address landscape regeneration required a holistic view of the ways in which human needs were being met in the environment. It also required solutions to meet those needs in a way that would reduce the pressures on the surrounding landscape, as in the following rural homestead (Figure 0-8 and Figure 0-9), which was designed with local participation by my partner, Buddy Williams. The

building collects rainwater and produces energy. It is passively heated and cooled. Grey water is used to irrigate a small garden. A compost toilet allows for no-water sanitation and provides fertiliser.

Figure 0-8 Lelapa – a model rural homestead

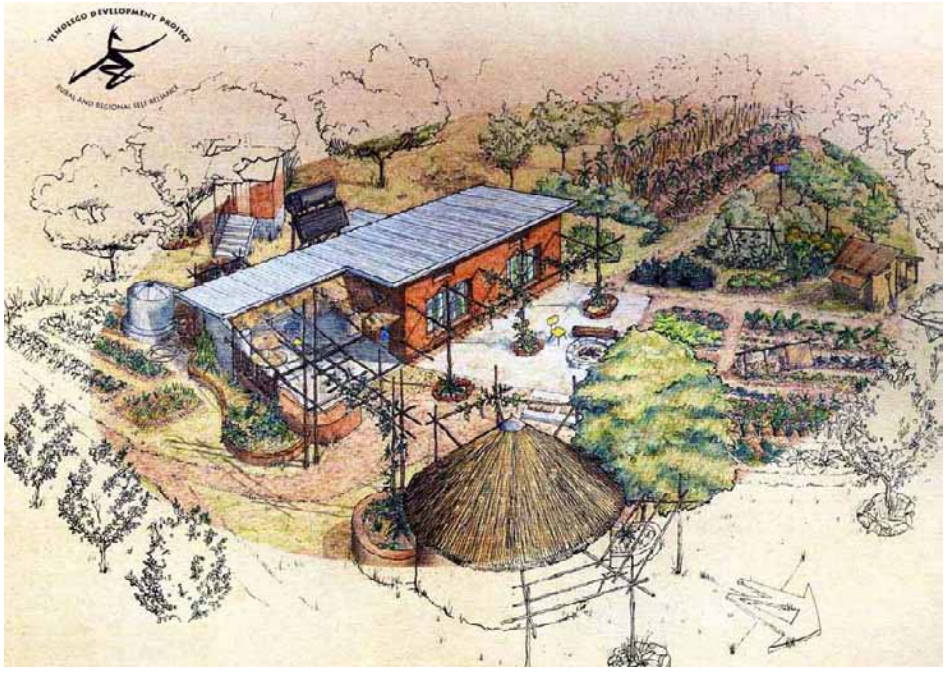


Figure 0-9 The first model household and compost toilet built at Tlholego

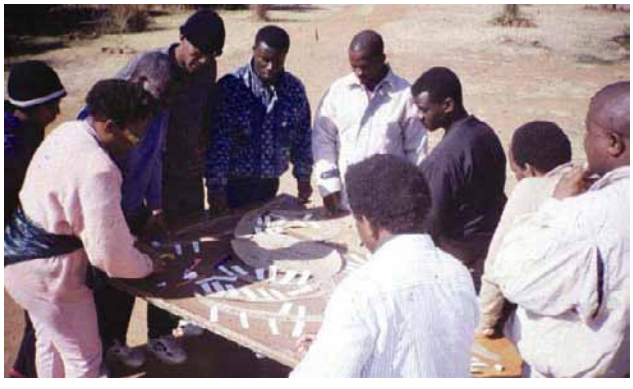
An example of meeting basic human needs through the application of ecological design can be seen in the work of Mike Masuku, a community development officer with Ecolink and a graduate of two DesignWays courses I led in South Africa. Mausku went on to use elements of the process to help meet the needs of poor rural schools in South Africa. By assisting schoolteachers and students to design and develop organic food gardens and forestry on school grounds, he is able to combine ecological restoration

with improving nutrition. As he said in his presentation to the International Permaculture Conference in Perth (1996):

> *"People will no longer have to waste all their money on food, they can save some through permaculture. Permaculture is a solution to a major problem in South Africa, especially in the rural places that we are working in".*

My initial work in Lesotho confirmed my assumption that participation in planning would be very important to create locally adapted solutions that people actually wanted. Difficulties in communication due to language differences led me to develop engaging ways of attempting to elicit this participation (Figure 0-10). The fact that the results of the participation would have a direct and immediate bearing on people's lives added to my sense of the need to develop a meaningful way to participate. Most of this work was done with a very low budget, showing people how to use resources at hand.

Figure 0-10 Engaging participation in planning in South Africa



Developing different models of communication was given further impetus from the difficulties encountered in teaching ecological design in the way I was used to in the West (UK, California, Germany). Most of the ways I used to present information about ecology had little meaning to my colleagues in Southern Africa. For example, suggestions that people 'think of a forest as a model', or to think of the 'whole being more than the sum of the parts', were not met with the easy acceptance I was accustomed to. This forced me to think deeply, both about what I really meant and why these principles were important. This caused me to re-evaluate my facile acceptance of principles at their face value, and led me to think of different ways to communicate these concepts.

I tried to think through what the ideas actually meant, so that I could teach them in a way that could be understood by anybody, regardless of background and experience.

This meant in particular thinking how to communicate in terms of movement and analogies. For instance, in teaching about utilising the sun and wind (permaculture principle of sectors) I would demonstrate the principle using string, a stick and a box (Figure 0-11).

Figure 0-11 Teaching ecological design principles in South Africa

This may seem rather trivial, until we look around and realise that architects with advanced education often miss the point about orientating buildings to capture winter sun. Indeed, learning how to understand energy flows, and patterns in natural systems, is often missed in 'modern' Western education. Even when the principles are taught, often they are neither deeply understood, nor related to the learners' own behaviour. This lack of 'deep' understanding of connections to the natural world is reflected in both our physical environment and economic systems. Part of the DesignWays process involves asking participants to look at and learn from ecosystems in their area (Figure 0-12), then relating what they observe to the principles of design they are learning.

Figure 0-12 Mr. Sipho observing the veldt near Tlholego during a DesignWays workshop

In developing this teaching, I was not using a 'conduit' metaphor, in which there are object-like principles that can be transmitted to the minds of pupils (Lakoff and Johnson 1999). Rather, the aim was to develop a process in which participants can build their understanding of the basic principles, and relate this to their own knowledge and values (Figure 0-13). Through applying the principles in project based learning, participants are encouraged to develop an enhanced sense of connection with the natural world.

Figure 0-13 Pulling the pieces together - review of the process

In developing this process, I worked on projects ranging from the design of rural school grounds, to a community farm plot for local self-reliance. The design process was seen as having some success, exemplified in the work of Shirley Sifunda, a community information officer with Ecolink (See http://www.ecolink.za.org/) and a student on two of the DesignWays courses I taught at the Tlholego Development Project. In her presentation to the International Permaculture Conference in Perth, Australia in 1996, she talked about using these design principles to encourage 500 women in an impoverished region of South Africa near Swaziland to grow food and develop an income from the resources in their villages. They then turned to the task of reclaiming a degraded hillside, designing and implementing a productive agro-forestry system, with trees for fuel and fruit, as well as herbs for medicine and animal fodder. She also talked of her work teaching prisoners the skills of design, and the increased sense of hope for the future engendered by this process, due to the awareness that they were learning skills that could improve their surroundings and create possibilities for employment. As she states, *"[this] is a useful resource because it shows us how to identify community needs and how to create job opportunities"* (1996).

Figure 0-14 and Figure 0-15 were taken in the village of Ha Souru, Lesotho, where my partner and I worked with community members of the NGO Ketso ea Bua (Action Speaks) to develop a permaculture design for a 3.5-acre plot of land as part of an income generation scheme.

Figure 0-14 View of the Ketso ea Bua site

Figure 0-15 Implementing permaculture design developed in collaboration with community members (1996)

Today, two villagers make a living growing vegetables on this land, supporting extended families. Twelve further villagers supplement their incomes from selling produce. This is used for school fees and doctor's bills. The fruit is eaten in the village. The windbreaks and trees planted on the contour have helped build the soil in an area of extreme soil erosion. The swales capture the intermittent rain and provide a soak-away for the capped spring, helping the fruit trees grow at an unprecedented rate (Figure 0-16).

Figure 0-16 Crops growing in the agro-forestry system at Ketso ea Bua 7 years later

Even in the early stages of its development, an important aspect of DesignWays was helping to provide a new way of thinking. In a letter from a participant on one course[3], enquiring about opportunities for further training, Vincent Mothabeng stated *"I told my wife and my children that you know how to teach adults and they said you keep on going. Nthabiseng[4] really there is nothing in my mind except Permaculture"* (1995). A teacher and chief wrote the following poem during a two-week permaculture design workshop co-facilitated by the author. Figure 0-17 shows his permaculture plot.

[3] In total, I was the lead facilitator on 3 two-week and two 1-week courses in Southern Africa and a co-facilitator on another two-week course.
[4] Nthabiseng (be joyful) was my name in Sesotho.

PERMACULTURE

By Chief Maama Masopha, 1994

Working with nature is my hobby,
Working with nature is part of my life.
Permaculture, where were you
When we lost the vegetation we had?
Permaculture where have you been?
Now that we are starving,
Why did you delay to be known,
While we have many specialists?
My country is now bare.
Who can we blame?

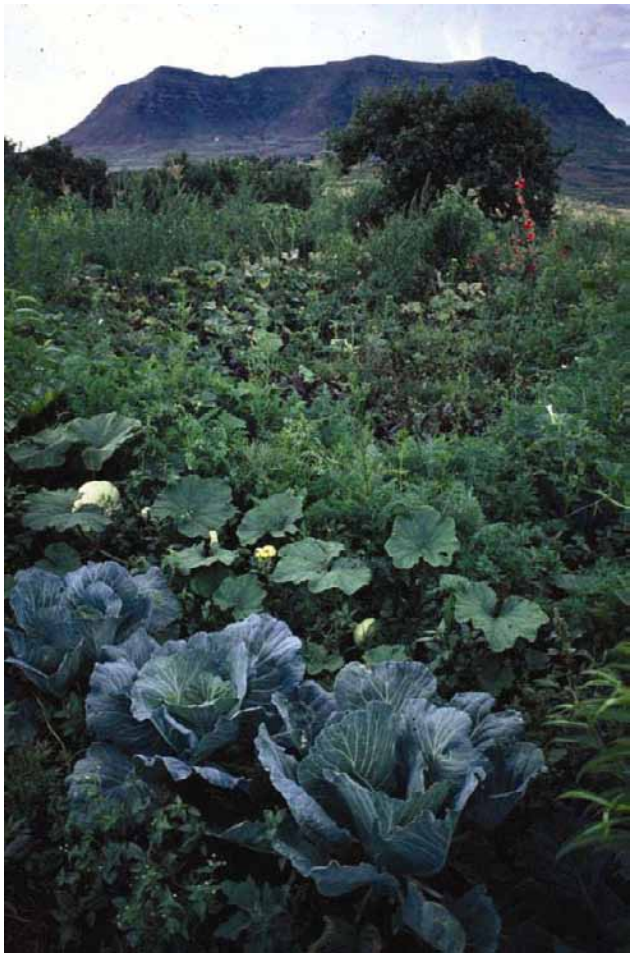
Herbs are diminishing,
Drought has taken advantage.
Where shall we get the herbs?
What will the herbalists do?
Importation is becoming our motto.

Our soils are very poor,
Their good structures are gone,
Their textures are destroyed,
Yet you are present and silent.

Why did you hesitate so long to be applied in Lesotho,
Yet you are known by the world?
Chemicals have spoiled our soils,
The ecosystem is disconnected,
People and animals are suffocated,
Chemicals are very expensive,
Farmers cannot afford.

How can we solve this problem?
For how long do we ask for funds
From countries which have the same problems?
Why can't we change?
Not only the attitudes of people,
But do.

Figure 0-17 Chief Maama Masopha's permaculture plot, in Sefikeng, Lesotho



The next stage of development involved seeing if this process could be transferred (back) to the West. I also wanted to develop a clearer model for assessing whether or not the projects and designs developed were moving towards long-term sustainability. The incorporation of the 'The Natural Step' (TNS) model (see Chapters 5 and 7 for more information) helped in both of these respects. I developed tools for teaching TNS and included them in the DesignWays process[5]. I then used the process to run interactive workshops on sustainability in business for the Dominican University Business School, Hewlett Packard and Mondavi Vineyards.

[5] Following a three-week workshop 'The Ecology of Commerce' with Karl Henrik-Robert, Jonathon Porrit and Paul Hawken at Schumancher College in 1997.

I developed a curriculum for an undergraduate environmental science course entitled '*Environment and Ecology'* at Dominican University in California[6]. The DesignWays process provided a mechanism for teaching transferable skills, deepening participants' knowledge of how to apply disciplinary learning to develop practical plans and solutions (Figure 0-18). As one student wrote *"I was able to learn... not only the key issues concerning the environment, but also what I could do to be part of the solution, not just part of the problem"* (Tristan 2002).

Figure 0-18 Students and the author working on creek rehabilitation as part of course

The value of the process as an educational tool was recognised by a teacher trainer on the course, who stated, *" [this course] enabled me to realize the role I have both as an inhabitant of the earth and to the children I will teach in the near future"* (Sanders 2002).

The next stage of development required a larger scale test. In this research the process was tested in the context of the Mersey Basin Campaign as the vehicle for exploring the value of an integrative systems thinking paradigm in 'planning for sustainability'.

[6] For curriculum, see www.holocene.net/sustainability/dominican.htm.