

Quinta do Vale da Lama Outline Design Annex

Authors:

Annelieke van der Sluijs

Cândida Loureiro

Jorge Crespo

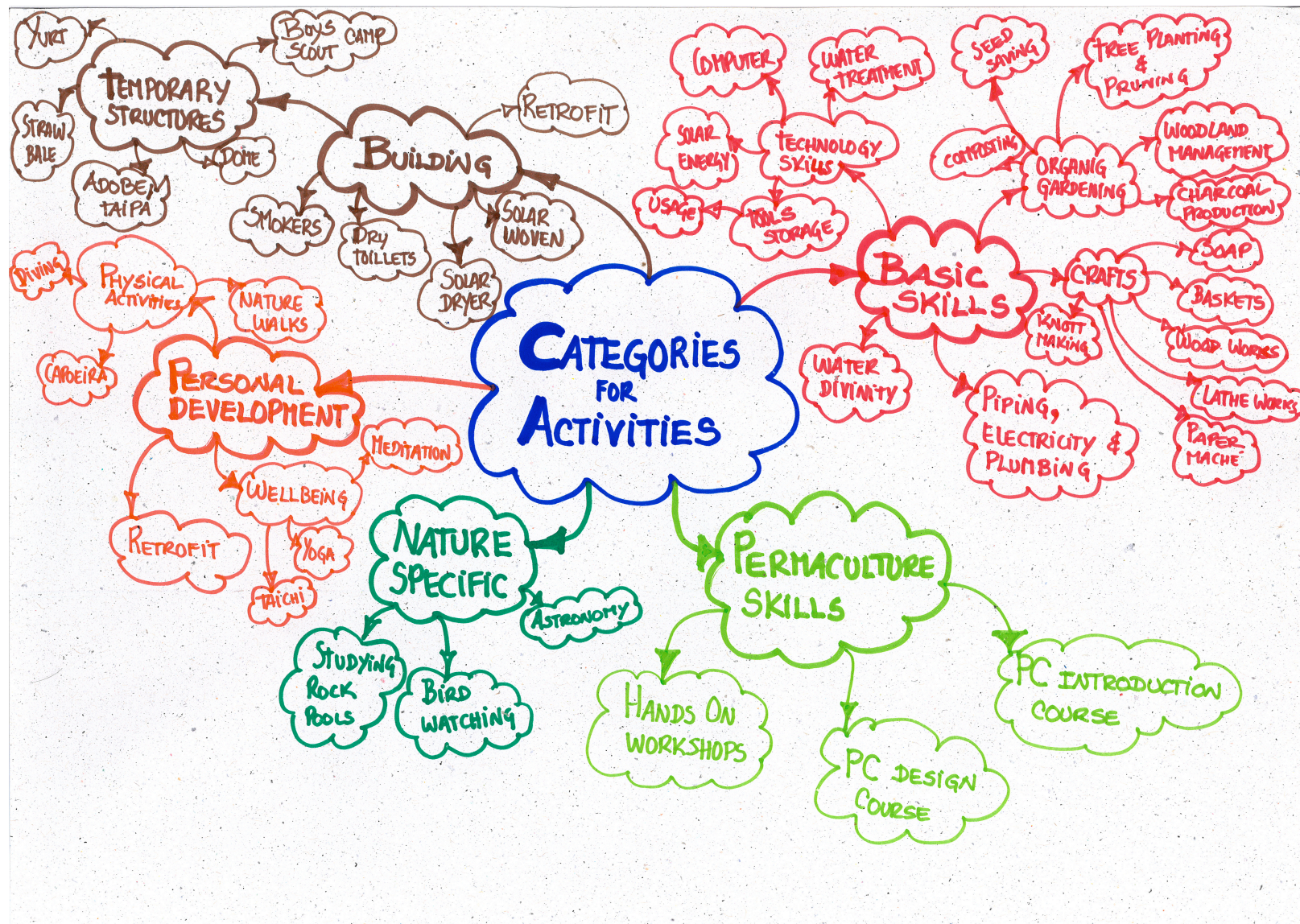
Lesley Martin

© Perma-D, 2007



Table of Contents

Activities and Strategies for Implementation	2
Shading Structures	4
Edible Landscape and Temporary Structures	7
"Terra das Crianças"	10
Soil Management Strategies	13
Energy Options	16
Water Management Strategies	23



STRATEGY: MAXIMIZE USAGE OF EXISTING STRUCTURES WITH ALL YEAR ROUND ACTIVITIES										IMPLEMENTATION	
ACTIVITIES	PLACE I or S or O			STRUCTURES INVOLVED	SPACE NEEDED PLACE	PERM-D	RESIDENTIAL SC C	NO DAYS	TIME OF THE YEAR	KEY	
PROJECTO NOVAS DESCOBERTAS SUMMER CAMPS	x	x	x	A, B, C, D	1, 2, 3, 6, 12	x		15	JUL/AUG	STRUCTURES • A → SOLAR SHOWER • B → CAMP KITCHEN • C → COVERED AREA CAMP SITE • D → ACTIVITY SPACE CAMP SITE • E → ANIMAL SHED BED • F → OLD FARM HOUSES • G → HOUSE	
PC INTRODUCTION COURSE	x	x	x	A, B, C, D, G	1, 2, 4, 5, 6, 7 8, 9, (10), 11, 12	x	x	2	NOV (WEEKEND) & ANYTIME		
TEMPORARY STRUCTURE BUILDING	x	x	x	A, B, C, F, G	1, 2, 4, 3	x	x	2-10	JUN - STRAWBALE FEB / APR SEP / NOV	PLACEMENT • 1 → CAMP SITE EAST • 2 → CAMP SITE • 3 → CAMP SITE SOUTH • 4 → WOODLAND • 5 → HERON • 6 → BEACH • 7 → TERRA DAS CRIANÇAS • 8 → FOREST GARDEN • 9 → FOREST / ETAP AREA • 10 → EDIBLE LANDSCAPE • 11 → WILDERNESS (WETLANDS) • 12 → OUTSIDE ...	
RETROFITTING THE HOUSE & HANDS ON WORKSHOPS	x	x	x	A, B, C, D, G	2, 8, 9, 10	x	x	2	ANYTIME AFTER GETTING HABITATION LICENSE		
WOODLAND PLANTING TREES			x	A, B, C	2, 4, 8, 9	x	x	1-5	NOV/FEB	PLACE • I → INDOOR • O → OUTDOOR • S → SHELTERED RESIDENTIAL • SC → SHED // C → GARDEN	
BIRD WATCHING TOURISM			x	A, B, C	1, 2, 3, 4, 11, 12	x	x	1-15	SEP/NOV FEB/MAR		
SCOUTS CAMP SITE	x	x		A, B, D	3, 4, 6, 7, 8, 9, (10), 11, 12	x		15	ANYTIME		
COMPOSTING			x	B, C, G	2, 4, 5, 7, 8, 9, 10	-	-		ALL YEAR		

VDL Shading Structures

Shading is a fundamental element for any outside space as it provides a minimum shelter and moderates temperatures for people, growing plants and animals.

In VDL the shade requirements for some of the places considered, have to be achieved by means of artificial structures while the proposed planted trees are not big enough to accomplish that task on their own.

The way to produce shade in any environment is either by means of light or heavy structures, removable or fixed, synthetic or organic, artistic or not, recycled or built from new materials etc.

In Perma-D we think that the light, recycled, artistic, organic and removable approach would be the best to provide the shade lacking on the campsite. Whenever possible, structures should be simple to build by anyone with the appropriate gear, tools and skills.

The artistic approach for shading could be introduced as Land Art. For reference on simple yet effective shading that may have any shape:



A Dome made out of metal electric conduit and covered with shading net



A star shape shade made out of poles, rope and shading net



Another simple solution for shading and sheltering from sun and moisture. Made out of wood poles, shading net and ropes.



The mounting of a quasi square shading structure from scratch possible in only two hours including explanations of how to...



Another dome with shading net to provide protection from the sun.



Using only 8 poles, ropes and shading net



A tunnel shaped structure made out of ropes, wood poles and shading net

Other shading structures can be executed using other materials such as "Canas" which are materials available on site.

The usage of shading structures for water catchment as well could be devised to comply to multiple functionality principle and furthermore to increase the amount of water available for human and/or plant use.

Simon Velez and Shoei Yoh and other bamboo architects

http://bambus.rwth-aachen.de/eng/reports/modern_architecture/referat.html

Some links of interest

<http://www.geocities.com/potatotrap/tech/bluetarp.htm#tensegrity>

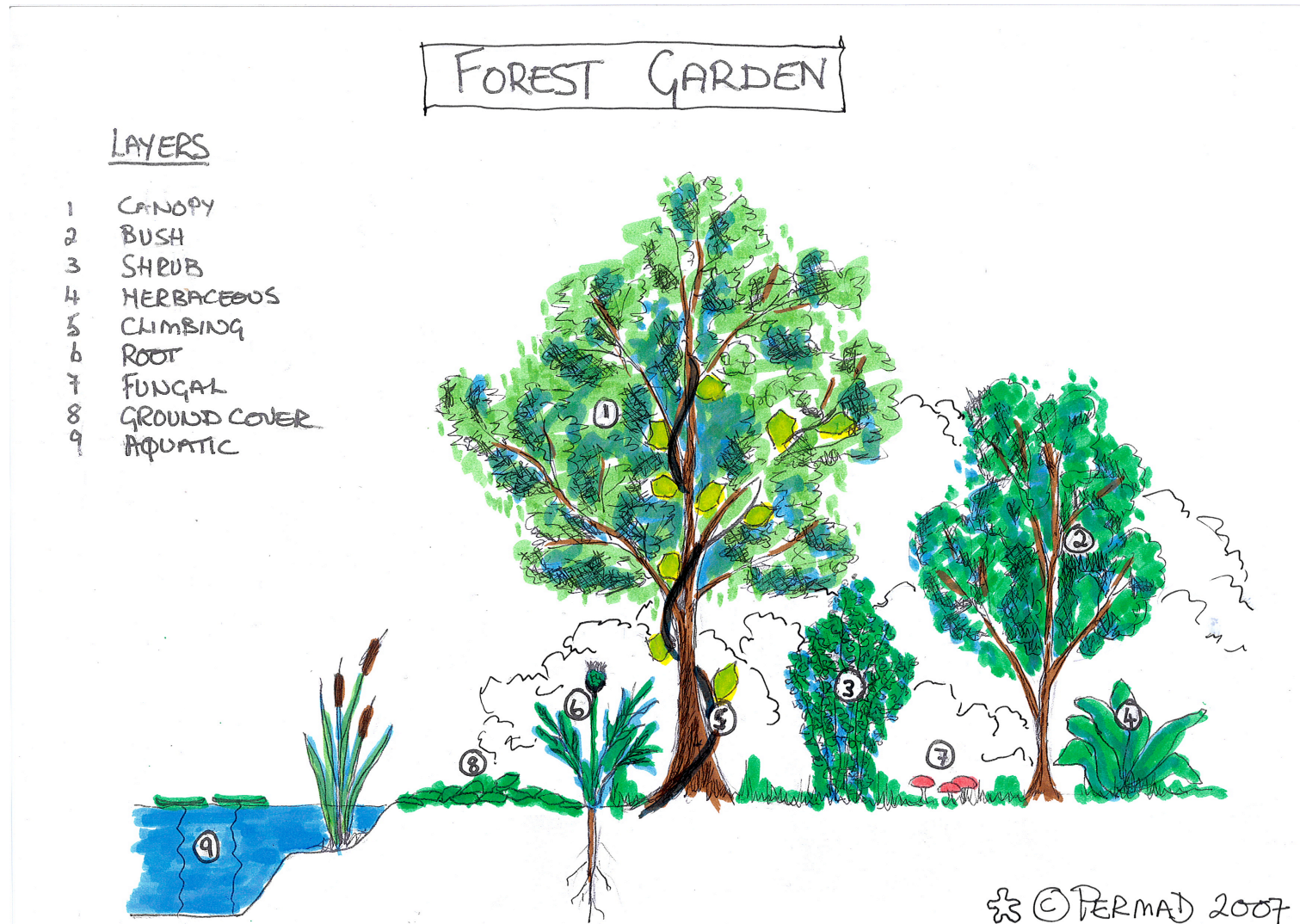
cardboard domes

<http://www.monkeyc.org/dome/>

Rain proof geodesic domes

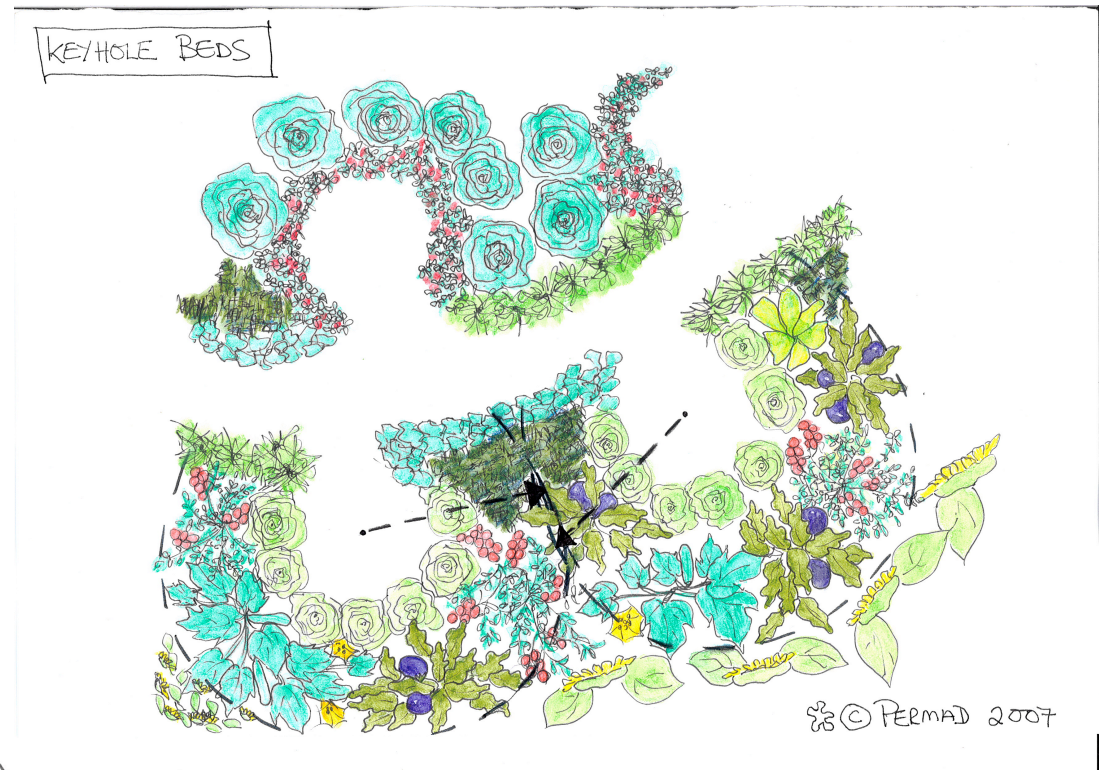
<http://graphics.stanford.edu/~munzner/dome/>

Edible Landscape and Temporary Structures

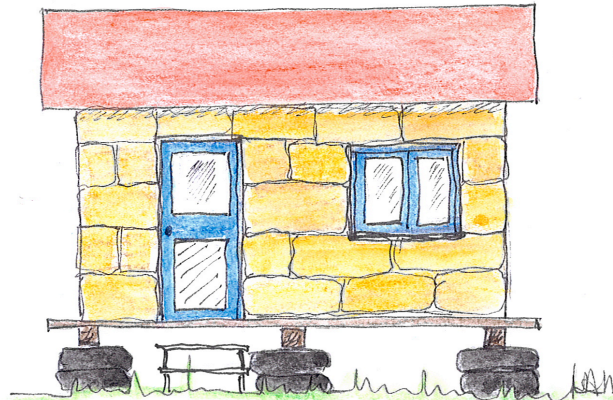
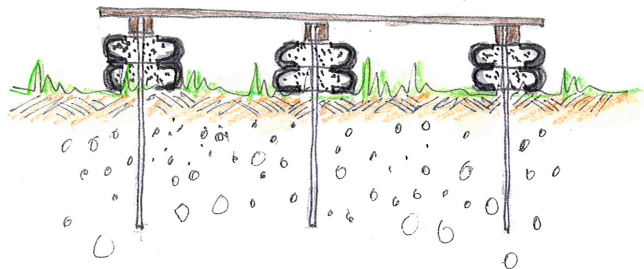
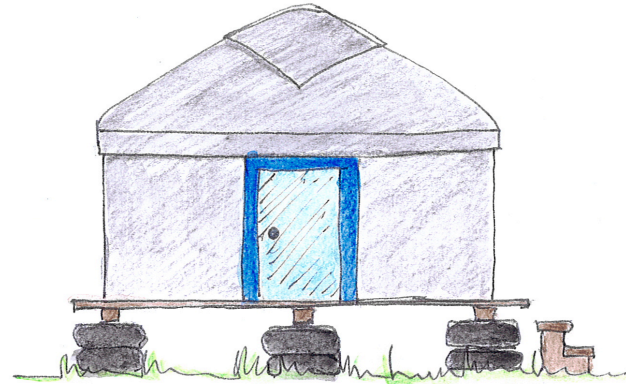
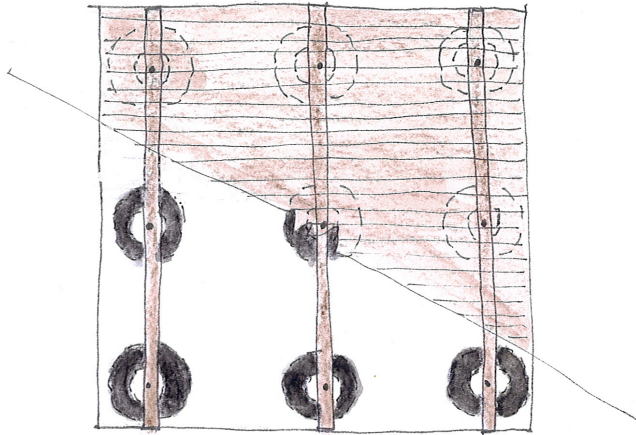


Refers to VDL Outline Design Report - Outline Proposal - House and Proposed Visitor Centre and Surroundings

Raised beds that can be used by
wheelchair users and keyhole garden



TEMPORARY STRUCTURES



© PERMAD 2007

"Terra das Crianças"

"Terra das Crianças" (Land of Children) program was born in Peru as "Tierra de los Niños" under the association of ANIA.

<http://www.mundodeania.org>

The Perma-D idea is to embrace the vision already in place by promoting and establishing one such area as "Terra das Crianças" on the land of Quinta do Vale da Lama.

With that project in place, VDL would be promoting the commitment of the childrens to the environment so that they would become more aware of the responsibility they inherit towards their lives, the natural environment and sustainability. Furthermore the project will promote self-esteem, initiative, creativity, consciousness, community awareness, companionship and love.

The aim of this project is to grant children the opportunity of becoming more involved and take responsibility for their decisions on what happens to their environment and their lives by endowing them with the "ownership" of a portion of this planet.

The VDL integrated project in which "Terra das Crianças" is included would therefore promote one more way of building bridges and cementing community relations.

For more details on "Land of Children" program visit the above mentioned website under the tab programs.

For the VDL "Land of Children" to join this global initiative by ANIA, some requirements have to be fulfilled before being considered as one TINI (in Spanish Tierra de los Niños):

- The plot of land should have a minimum area of one square meter.
- The piece of land has to be officially handed over to the children.
- The children must be the main and voluntary actors of the programme, according to their skills and culture.
- The activities developed in the piece of land have to promote life and diversity, truth and love.
- There must be one adult at least, to defend and promote the rights of the children in their piece of land.

The inspiration to create an Association as ANIA was based on the experience of Joaquín Leguía Orezzaoli.

"He found a refuge in the 800m² abandoned garden that was separated from his house by a wall; this place gave him security and affection. There was no square meter on which he didn't crawl; there was no plant or burrow he didn't know. As a child, just like many other children, he experienced the divorce of his parents and that space offered him a hideaway when he needed it, as well as a tree in which to climb and touch the sky when he wanted to fly. From up there, he could see a natural world that extended towards infinity just behind the walls surrounding his garden.

When he was 9 years, he travelled to the jungle for the first time and when he saw the huge Amazon green rug from his window in the plane, he said: "Wow, what a garden!" He recalled feeling a great joy and utter peace. Until the time he turned 12, he spent each one of his holidays in Yarinacocha, a spot in the Peruvian Amazon, experiencing a great number of adventures in the forests nearby, sharing with a small group of Shipibo children.

A year later, his mother told him that the "land plot" (the way his garden was referred to) was going to be turned into a cement surface for sport activities. Only a few months later, the trees and the grass were already history. Then the years passed until one

day he realized that the jungle in which he had travelled across as a child was also disappearing as a result of the agricultural and urban expansion.

Fortunately, the spirit of his garden and of that cut-down jungle lives in him, giving him the strength and freedom to care for all the life and diversity that inhabit this world. This is the experience that inspired Joaquín to create ANIA, with the goal of raising our awareness about the fact that this world is the exact reflection of our hearts; it is the same earth that forms the ground of both of them, it is the same air and water that circulate through both of them. This is the concept of unity in which we think education should be channelled, and in which poverty and environmental degradation should be dealt with in order to change the destiny of humankind."

According to the mission of this Association, they are committed to:

"Promote socially responsible values and practices among children. We develop initiatives that favour the active involvement of boys and girls in the improvement of their environment through a participatory and inclusive methodology based on motivation, creation of safe and healthy spaces, orientation and acknowledgement."

Therefore their vision is:

"Boys and girls nurturing life with joy, love and magic as they grow in harmony with their environment."

As a program under the umbrella of the ANIA association the first "Terra das Crianças" in Portugal was created on August 2006 in Casa da Ribeira next to the town of Tábua during the "Vida Verde 2006" event that was held there. In fact it was the first "Terra das Crianças" ever created in Europe.

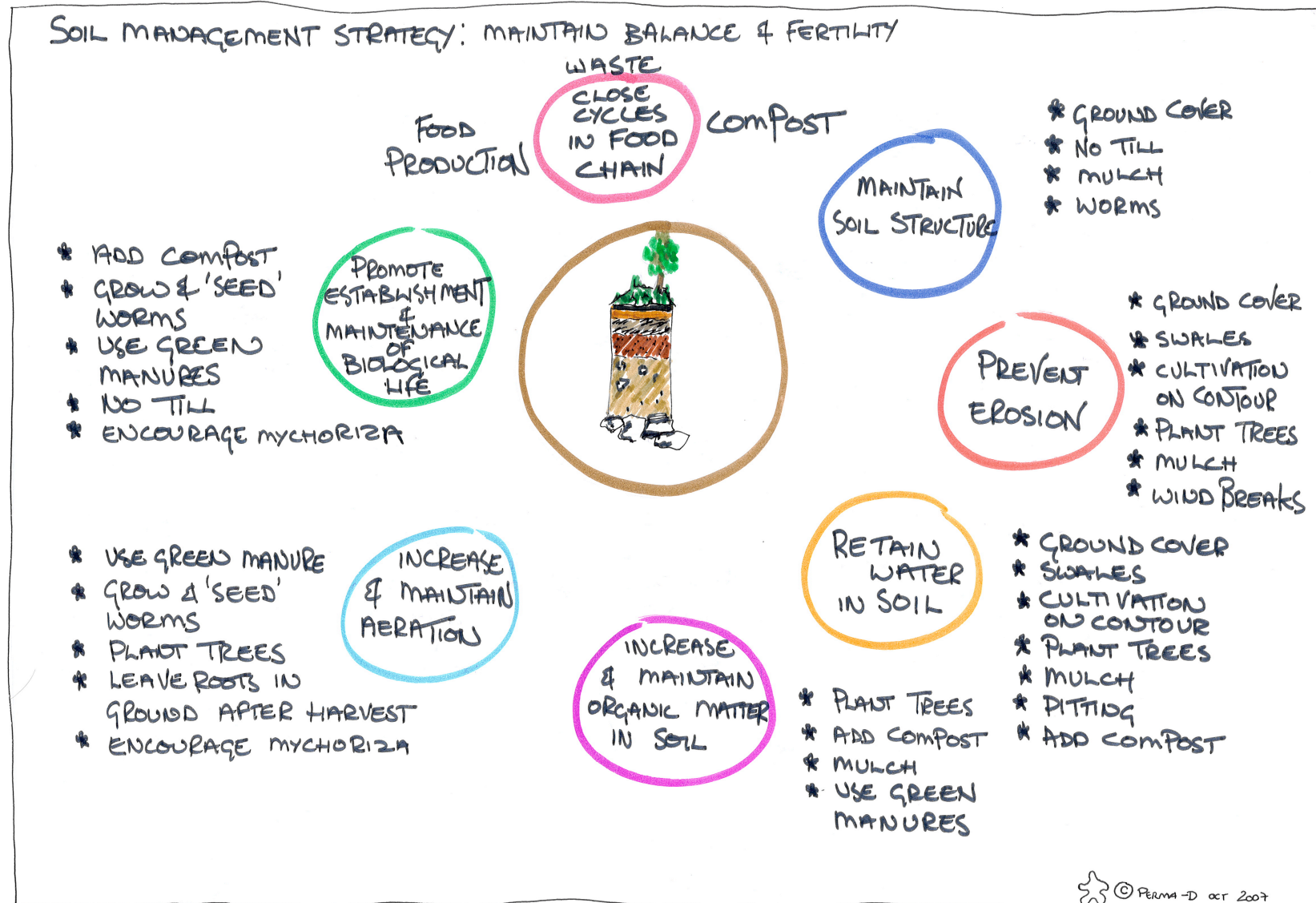
Tiago Rouxinol and Ana Rute were the pioneers of this project, having had the extraordinary experience of being in Peru at the time that the first land was handed over to the children of the town of Boca Amigo. They inspired the attendees of "Vida Verde" by showing a presentation on their own experience in Peru, and because of that "Terra da Águia Branca" was born.

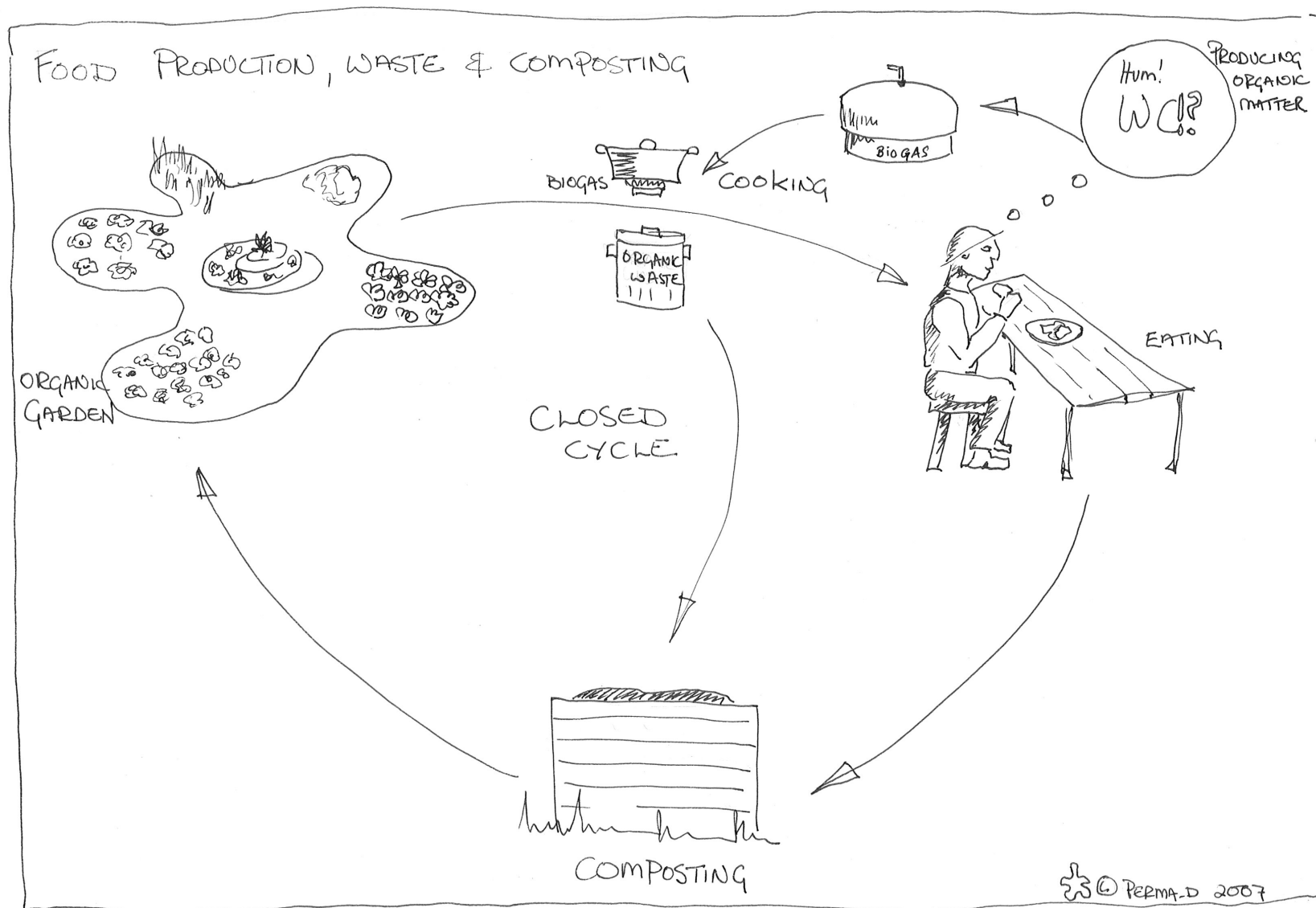




For some facts about Terra da Água Branca em Tábua see:

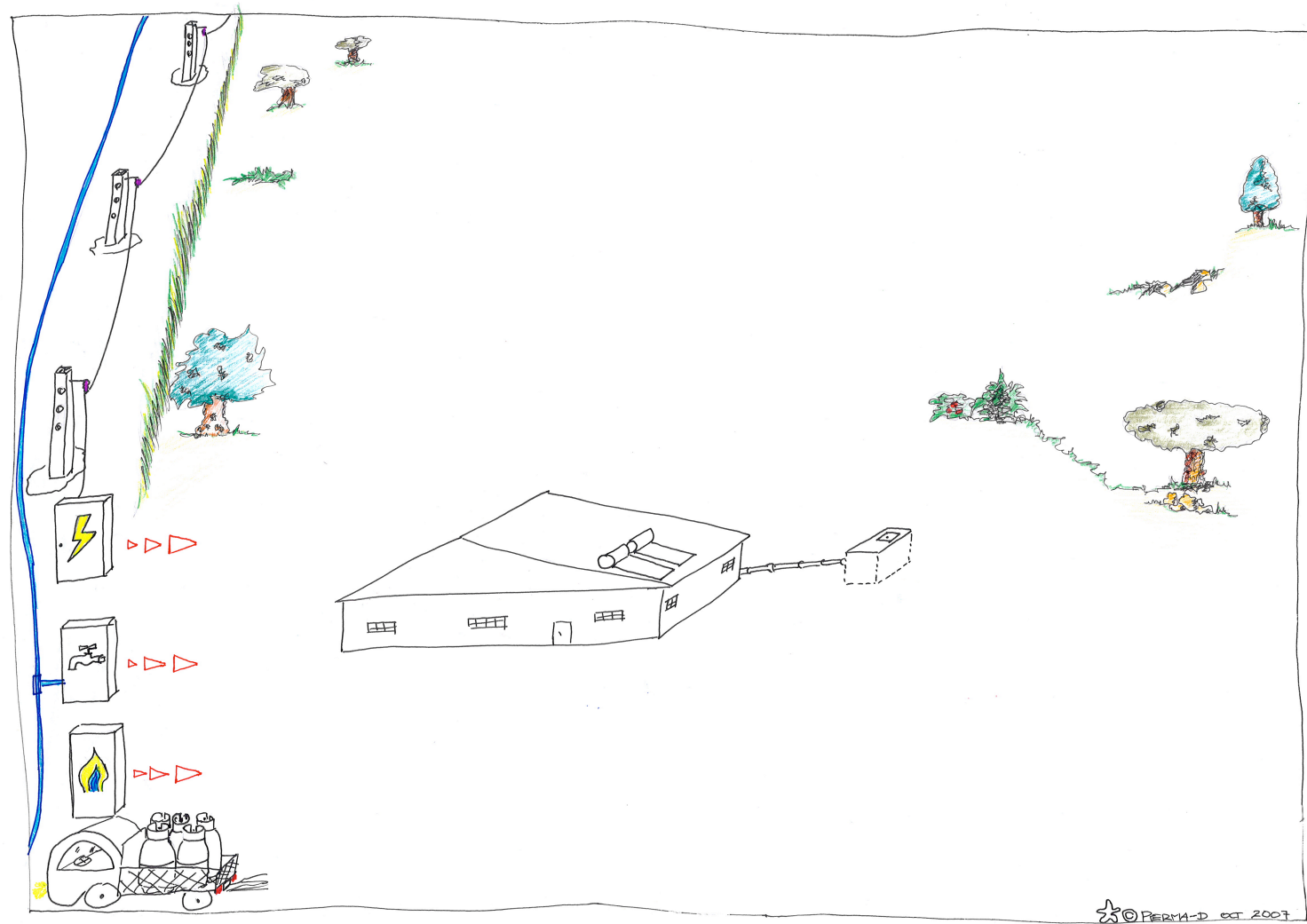
www.casadaribeira.no.sapo.pt/aguia_branca.html



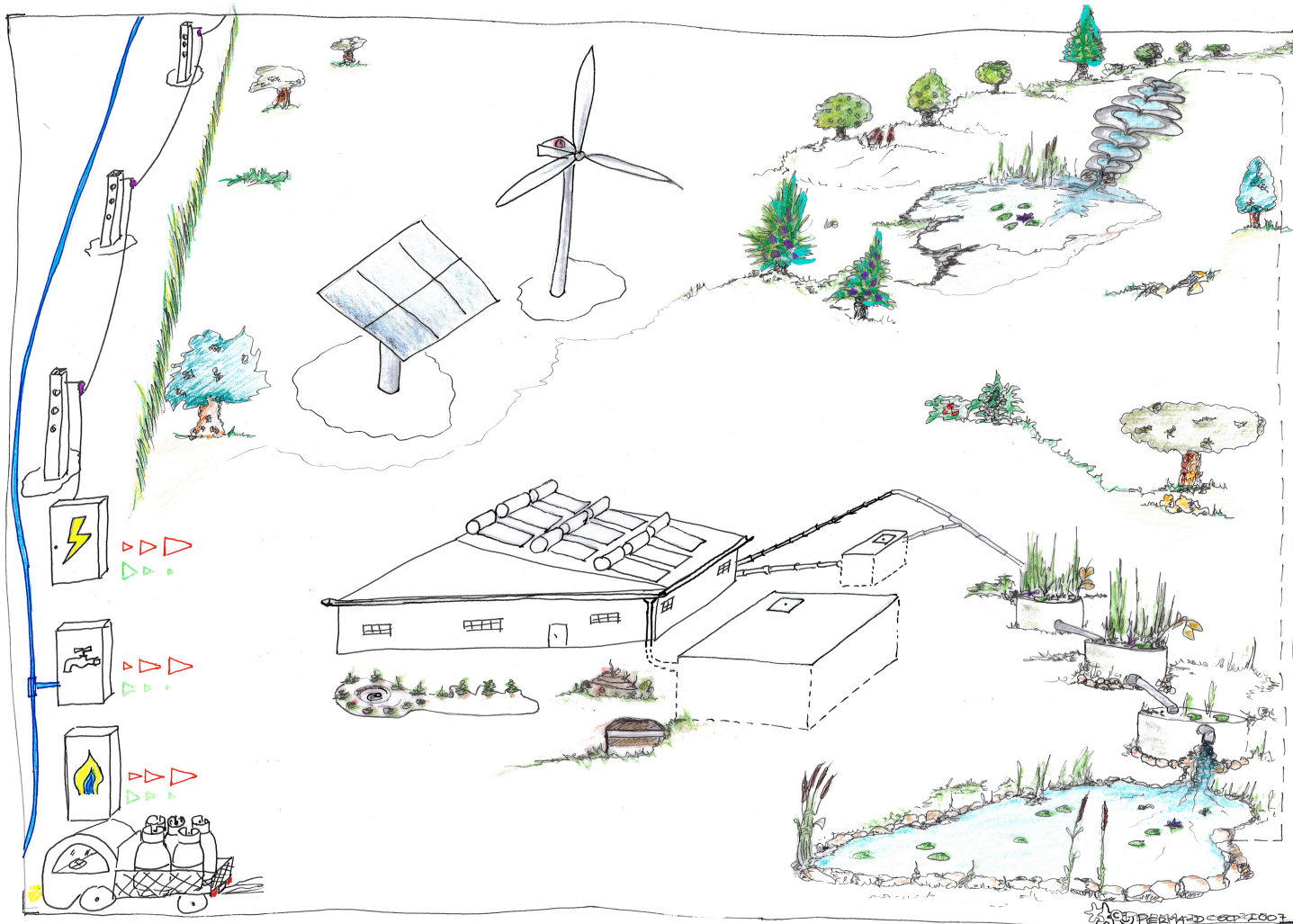




**Existing Energy and Water situation:
Mainly External inputs.**



Refers to VDL Outline Design Report - Outline Proposal - Closing Cycles

Future preferred situation:

Refers to VDL Outline Design Report - Outline Proposal - Closing Cycles

VDL Outline Design Energy Options

“The cheapest energy is always the one we do not need”

General

In the VDL Permaculture outline design project, Perma-D envisioned a series of possibilities to be addressed as both closing cycles, business possibilities and most important diminishing dependence on Energy issues within the property as whole.

Perma-D encourages people to learn how to consume less, maintaining levels of comfort and dignity.

By that we mean learning how to conserve energy by means of passive technology, proper management strategies and usage of biological resources instead of fossil fuels.

As it is, VDL already has some infrastructures in place for electricity distribution and gas for domestic use.

As the main house is about to be built and some of the systems will be incorporated having in mind the infrastructure already in place it is a Perma-D concern that some retrofit should be done in a later stage in order to overcome dependence from external sources and most of all dependence from fossil fuels (both in direct and indirect form).

Through the use of energy production on site the total amount of energy consumed from the grid can be reduced or leveled although total costs, combined with the benefit of becoming less dependent, could be maintained or reduced.

<http://www.cientificosaficionados.com/energia%20solar/solarhaven.htm>

<http://re-energy.ca/>

<http://www.azsolarcenter.com/arizona/tours/2006/html.html>

Wind, Solar, Tide, Hydro, Waste, Wood Remains, Human Waste, Animal Waste and other produce are all ingredients that may provide the possibility of closing cycles within VDL and at the same time provide Energy for consumption within VDL, perhaps neighbours and with the changing legislation to feed in to the grid some or all of the production on VDL site.

Another idea is to broaden the sources of energy on site to maintain flexibility, this would include the grid as well.

Most of the small to medium energy production equipment for on site production are well developed both in technology and availability therefore should be the first to be addressed as major possibilities.

Heat, Electricity and Gas are all forms of energy that can be produced in VDL.

Wind and Solar Electricity Power Generation

Wind and Solar power for electricity production is a growing business and even funded by the EU countries to overcome some Europe's important dependence on fossil fuels. As such, the Portuguese government is about to change the rules to give the general public access to a slice of that growing business. Though that possibility has been there since 2001, the regulations have now been suspended until new regulations are published, which should happen early 2008.

<http://www.dgge.pt/>

For the time being it may be advisable to establish objectives on this particular subject only when new regulations are issued. (in three to four months time). However if the goal is to be independent from the grid then planning for that outcome could start now.



Restaurant Castelejo next to Vila do Bispo is completely off-grid



A complete system for off-grid supply of a touristic rural house in Aljezur



A hybrid system for off-grid production

In the mean time, estimation on costs based on actual consumptions in the camp site would be valuable.

Meanwhile some interesting areas on alternative energy production can be explored not only for educational and recreational purposes, but also for future connection with the Centre for Change.

One of the leading companies in Portugal on Alternative Energy production is:

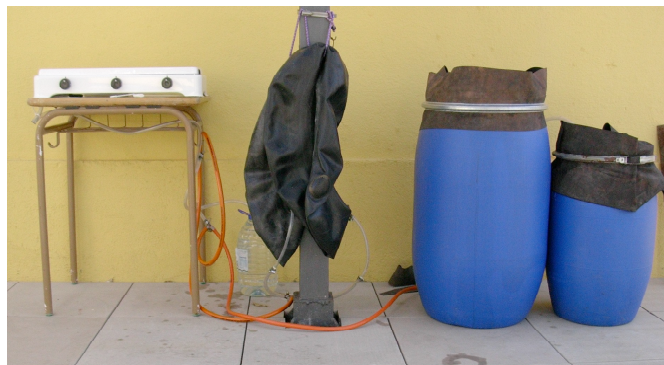
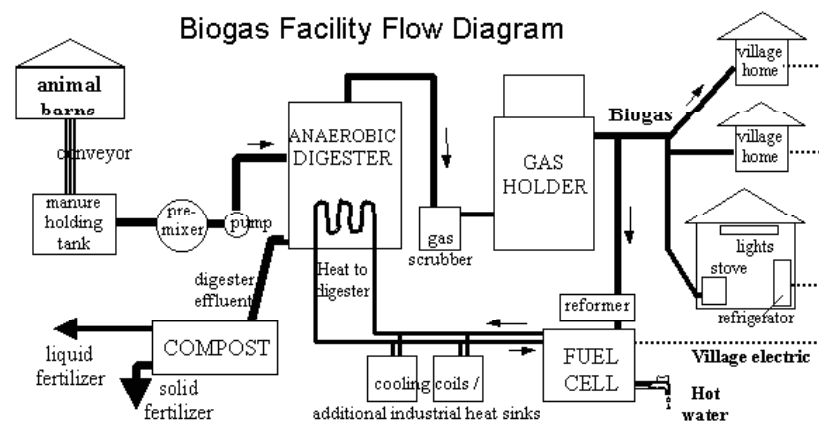
<http://www.ffsolar.com/index.html>

A reference site would be:

<http://www.homepower.com/>

Gas

The use of local production of gas for domestic use is a real possibility but requires some not so user friendly or DIY options, but nevertheless it is a good choice for the usage of some organic material VDL will have in the future.



A demonstration kitchen working from a bio-digester using barrels and an inner tube as the gas holder.

Refers to VDL Outline Design Report - Outline Proposal - Closing Cycles

http://www.telefonica.net/web2/obiogas/cuina_biogas.jpg

<http://www.ch4ventures.com/>

In the meantime the use of a propane tank instead of the big gas bottles would bring down the overall price on the gas per litre. Flexibility could be at risk here but the final price can be significantly different. Since we are talking LPG...

<http://www.bp.com/modularhome.do?categoryId=4040>

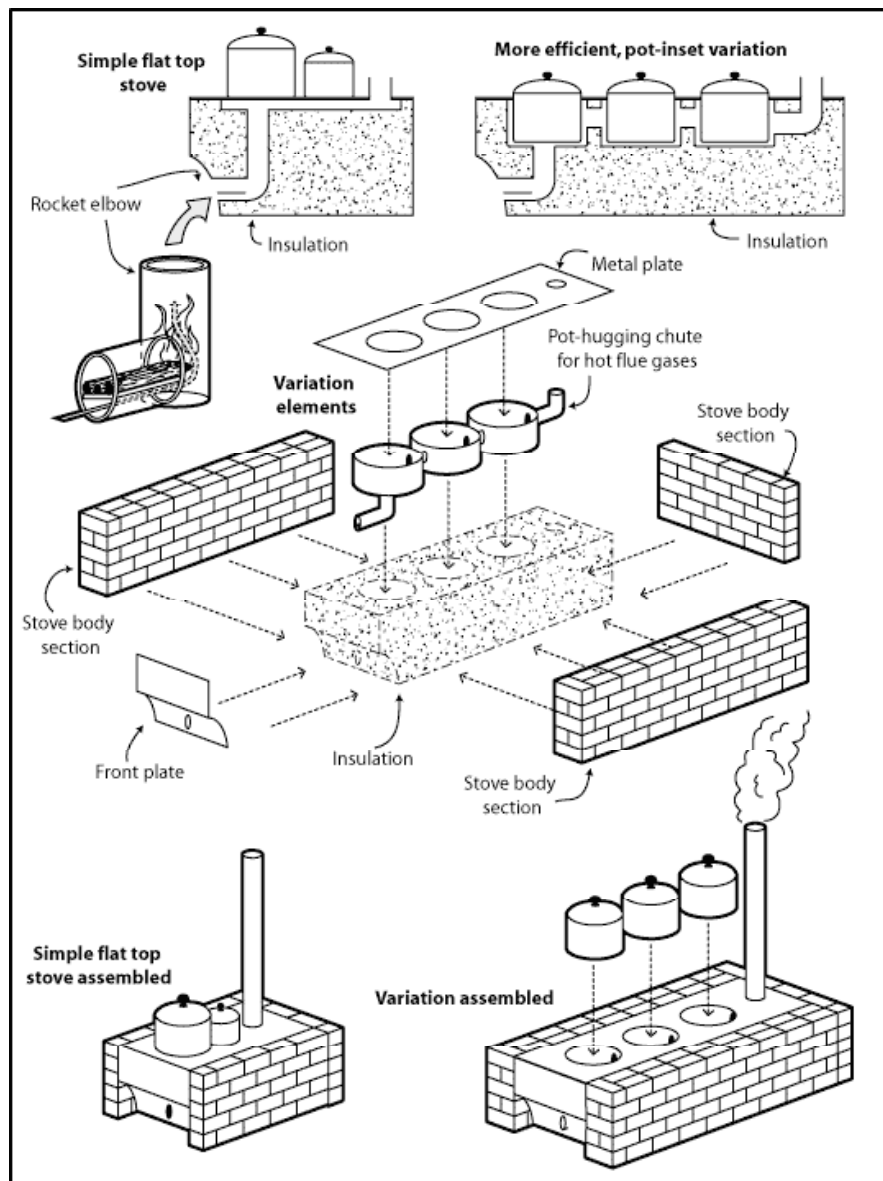
<http://www.galpenenergia.com/Galp+Energia/Portugues/Produtos+e+Servicos/em+casa/gas+a+granel/gas+granel.htm>

Heat Storage

Passive ways to store heat are becoming more and more available as these technologies are very simple yet requiring knowledge and planning.

The use of reservoirs of water to be heated by the sun during the summer and deliver that heat to homes during the winter time are becoming more accessible, reliable and a good investment.

Another way to store heat for domestic use is by using the regular stove approach but at the same time to use a big thermal mass. The use of a special stove is a must as less wood is burned through the use of a Rocket Stove developed by Aprovecho.org



This shows the implementation of a rocket stove in a domestic kitchen.

Examples of some of these simple yet usable technologies are to be seen:

<http://www.aprovecho.org/>

<http://www.greenbuildingpress.co.uk/>

<http://www.homepower.com/>

Hot Water Generation

This is the most cost effective way of spending less money and resources by using solar power to collect sun rays to produce hot water ready for domestic use.

This a technology already in place in VDL but some new options should be explored before any new investment is made (especially in the new house).

For the comparison of similar technologies:

http://www.conergy.com.au/Desktopdefault.aspx/tabid-492/767_read-5231

Interesting new ideas

Here are two examples of other energy saving strategies that might prove very popular on the camp site.



A pedal driven washing/dryer machine

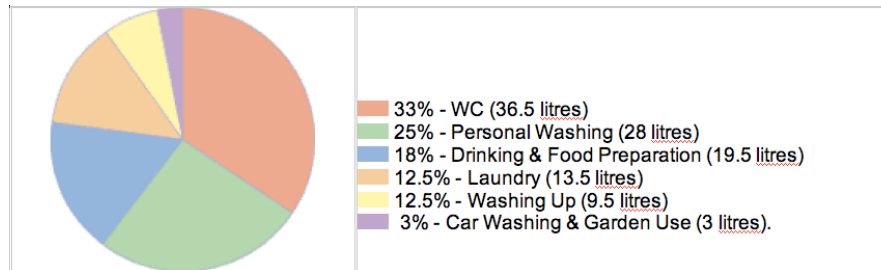
Power production on-site could be as this, for immediate use or for storage by means of "Pedal-A-Watt". The rear wheel of a cycle can be fixed into this holder to converge pedal power into electric power:

<http://www.econvergence.net/electro.htm>



VDL Water Management Strategies

Life on planet Earth is based on water. For example, the following pie chart indicates water consumption per person per day in developed countries:



Water is a primary resource to be carefully considered when designing and planning Permacultural projects. Water strategy considers an overall view of this resource management as to functions, needs, usage and distribution analysis.

Water can enter the productive system as rain, flooding water, soil water, and air moisture. VDL general strategy should be to reduce consumption, recycle and re-use water as a resource.

The precepts are:

- Promote water collection and storage;
- Promote water infiltration in the soil;
- Cover site land surface with 15% of water;
- Store water next to the usage places;
- Recycle used water;
- Close cycles;
- Prevent risk of flooding.

These precepts shall be implemented through operational techniques described in this annex.

Water Catchment

Rainwater Collection

Several systems for rain water harvesting are available in the market but the simple gutter is proved to be the best, though hidden techniques are becoming more and more used. Actual implementation in the drawing stage should be considered as they are structural dependent.

<http://academic.evergreen.edu/g/grossmaz/PALMBAJP/>



<http://www.solarhaven.org/WaterStorage.htm>



A not so elegant solution for water collection, but effective though.

A buried system for VDL with water tanks placed in different locations could be established, or they could be placed together in one area as part of another system such as house terracing and shade. Solutions like the one below could be adopted as they are disguised structures in the land.



Roof Water Harvesting Tank
built from local stones

<http://www.cta.int/partners/rsda/project.htm>

Refers to VDL Outline Design Report - Outline Proposal - Closing Cycles

Fog Water Collection

Another technique that possibly could provide extra water input to VDL, due to its sea proximity and estuary location, is fog water collection. This consideration has to be reassessed in next phases of the project.

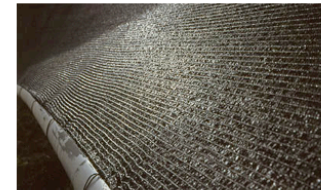
Fog collection is based on ancient simple tradition whereby the leaves of trees and plants trap droplets from coastal clouds to be harvested. Hence, thirsty yet resourceful people, using rudimentary mud walls or dried gourds, collected water droplets that rolled off trees after periods of fog to store and distribute.

Standard Fog Collector

Standard Fog Collectors (SFC) are used during feasibility studies to assess the magnitude and reliability of the fog water source.

They are made of an aluminum frame which supports a 1m² polypropylene plastic mesh panel and collection trough.

SFCs are placed in various locations in a village for a one year data collection period.



The Benefits of Fog Water Collection

- System is passive, requiring no energy input to operate;
- Multiple uses for water, including drinking, irrigation and reforestation;
- Reduces the burden of carrying water from distant, erratic sources;
- In many locations fog water is as (or more) abundant as rain water, the available supply is only limited by the number of fog collectors one chooses to install in a given area;
- Easy to construct, and system is easily expandable;
- Atmospheric fog water is clean and abundant.

How Does the Technology Work?

Most technologies employed today mimic the function of trees and other natural features, using large polypropylene mesh nets, erected on ridge lines to intersect moving fog that is being carried by the wind. Fog is composed of millions of drops of water. Water droplets in fog impact the mesh, trickle into a collection trough, and the water is then stored in a series of tanks for use at local taps.

For small communities, based fog water collection schemes are capable of producing between 2,000 and 5,000 litres of water in 24 hours, and can provide enough fresh water for storage and use through the dry months of the year.

Alongside rain-water harvesting, fog water collection has emerged as an innovative and highly suitable technology for hill and ridge communities without access to traditional sources. Still largely in a state of development, much remains to be explored concerning its further development and application. The climatic conditions and social context exist, though initial experiences warn us to be critical and thorough as we go forward. (<http://www.sciam.com/>).



Standard Fog Collector

Refers to VDL Outline Design Report - Outline Proposal - Closing Cycles

Grey and Black Water Systems

Grey Water

Grey water is waste water generated by household processes such as washing dishes, laundry and bathing (Wikipedia). Grey water is distinct from waste water that has been contaminated with human waste, which is known as black water (www.dec.state.ak.us/water/cruise_ships/glossary.htm).


Responding to Client requirement priorities, the proposed system for VDL, at this phase of the project, is a horizontal one, connected to the house sewage system for grey water and to the septic tank overflow. Nevertheless, proposition should be made to extend design to the Camp site facilities.

In VDL, grey water shall be treated in a closed cycle system comprising the following elements:

- A reedbed system;
- A storage pond for recycled water;
- A solar water pump;
- A second pond combined with flowforms;
- Piping between elements.

Reedbed system

Construction of the reedbed system is simple and operation and maintenance are easy and inexpensive. Results are comparable to the best conventional treatment systems.

<p>There can be vertical and horizontal systems:</p> <ul style="list-style-type: none"> • Horizontal reedbeds should be approximately 0.6m deep, require approximately 5m³ volume of water output per person, total area being approximately 1m² per person, installed after the septic tank, followed then by a standard percolation area.; • Vertical reedbeds require a fall of at least 1.5m and a volume of between 1 and 2m³ per person 	<p><u>Phragmites</u></p> 
--	---

In a horizontal system the direction of flow is horizontally across the bed. Consequently, the bed is filled with water unlike the situation with vertical reedbeds, which are free draining. Materials that can be used to build the bed: Gravel, soil, gravel/soil mixes and gravel/soil/organic fibre are all possibilities.

The most commonly used mixture of plants to be in reedbeds are phragmites. They form a thick root-mass, which transports oxygen from the atmosphere to the root zone and so aids microbial digestion. A complex microbial population then develops, which competes with and eliminates human pathogens, removing organic nutrients. This biological filter also removes particulate solids, dissolved organics and heavy metals.

Apart from reducing the Biological Oxygen Demand (BOD) of the effluent, horizontal reedbeds are particularly useful in converting nitrates into nitrogen gas, which completes the N-Cycle.

The advantages of reedbed systems are:

- Quality: Reedbeds can achieve high quality of the effluent. They can effectively remove all suspended solids from wastewater.
- Living systems: Reedbeds are a living systems working in harmony with the environment. They blend visually with the

natural landscape, becoming another natural element of the landscape.

- Reliability: Reedbeds are extremely durable and provide a most reliable, long-term solution to wastewater and sewage treatment.
- Water protection: They are very effective in preventing faecal contamination from reaching wells, reservoirs and surface waters, protecting drinking-water sources and public health.
- Low maintenance: Reedbeds are low-maintenance. The beauty of the reedbed is that it matures with time and essentially looks after itself. As with any system, though, solids removal must be carried out on a regular basis.
- Cost effective: Reedbed systems are very competitively lower priced when compared to other treatment systems currently available.
- Natural: Reedbeds are a natural, environmentally friendly means of biologically filtering wastewater.

Source of list: © 2003 Ark Nursery, Ltd. T/A Ecoflo.ie (<http://www.ecoflow.ie/>)

Flowforms

The function of flowforms is to oxygenate water through movement. Because they are beautiful sculptures, they satisfy the eye and improve the aesthetic in landscape areas. In VDL, flowforms are located in the second pond area, receiving water pumped from the first storage pond, located at the end of the reed bed system, hence, oxygenating water that shall supply this second pond.

Black water

Black water is water contaminated with human waste. Under various national and international standards, black water must be treated before being discharged into the water table (www.dec.state.ak.us/water/cruise_ships/glossary.htm).

Black water is treated in a closed cycle system comprising the following elements:

- A septic tank;
- A net to catch solid waste;
- An overflow to the Grey water treatment system.

This system should be retrofitted at later stages of the project.

Water Management Priorities

The water management strategy for VDL stresses the need to rethink usage of water, reducing its consumption, not polluting, to recycle and re-use it whenever possible, to respect and maintain the water cycle natural pattern. Priorities are, at this stage of the project:

House:

- To build the rain water harvesting system.
- To build the grey water treatment system.
- To retrofit the black water treatment system in order to connect it with the grey water treatment system.

Camp site:

- To retrofit the existing water management system.
- The use of VDL water resources for purposes other than human use is more or less addressed on the proposed land water management.

For human use, the available VDL water resources are yet to be proved enough or of adequate quality throughout the whole year.

Because of this and because the overall VDL present situation is based on public supply, Perma-D envisions a situation in which

the harvesting of rain water for human use may and should be considered as a major investment for obvious reasons.

The benefit provided by such an investment is so important that it should be considered as much as possible a major priority.

The proposed construction of a series or one big "cisterna" next to the new house represents some 100 - 150 m³ calculated from the area of the roof and the amount of normal annual rain fall.

An equivalent proportional amount could be collected from the roofs already in place in the Camp Site as well as any other future structures and this should be an automatic consideration in the water strategy as a whole. In this way thousands of liters can be captured and kept in a closed cycle.

