

Applied Landscape Ecology
by
Multi-functional Agriculture.



**Comparison study of
'Applied Landscape Ecology' and Permaculture Design.**

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*Dedicated to staff at MZLU, Faculty of Agronomy, Institute of Applied and Landscape Ecology
In wish that some day soon they will experience to have 'Applied' their knowledge about environmental protection,
while enabling multi-functional agriculture.*

Front-page photo demonstrates the need to consider the social, environmental, financial and aesthetic aspects in landscape planning: Optimally the area beyond the forest should serve socially in lines of recreation, education and aesthetics; environmentally through erosion prevention, securing bio-habitat and diversity. Financially the land use should simultaneously optimize the financial income of the property in respect of the latter elements and capacity of the owners and future generations.

Photo (and daughter) by Author.

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1. Introduction to the study and dilemma

“Our cultural bias toward focus on the complexity of details tends to ignore the complexity of relationships. We tend to opt for segregation of elements as a default design strategy for reducing relationship complexity. Any consideration of how they work as parts of an integrated system is based on their nature in isolation.

The purpose of a functional and self-regulating design is to place elements in such a way that each serves the needs and accepts the products of other elements.”

David Holmgren, 2007

1.1 Context

“...Environmental Management at Aalborg University is directed at science and engineering students who are interested in topics related to sustainability and environmental management. The programme is designed to meet these new challenges, by integrating inputs from the social and human sciences into the study of planning and engineering. The focus is on how firms, governments, and other organisations can support sustainable development in an economically efficient and socially acceptable manner. (AAU, 2009).

It is within this context that this study seek to demonstrate “*practical experiences*” of application of environmental management, “*in a real life situation*”, and sketch a “*strategy or plan for environmental management*”, along with “*accessing the consequences of the proposed project*”, as prescribed in the guidelines for 9th semester. (AAU, 2008).

During my internship at Mendel University, department of Applied Landscape Ecology, it became clear that even though the official science of Landscape Ecology started 70 years ago, it has first gained widespread acceptance during the past 35-40 years (Turner et.al, 2001). As an experienced Permaculture designer, I’m aware that this development is simultaneous with the about 35 year old unofficial science of Permaculture and I noticed what appear to be a very high degree of synergy between the two approaches, centrally that both are aimed at creating a balanced sustainable use of the landscape. However, as far as I was able to discover, there have never been any attempts to compare, integrate or align the 1000’s of researchers/executors of the two disciplines ¹.

¹ Based on extensive online search for keywords “Permaculture and Landscape ecology”, as well as personal involvement in the field of permaculture during the past 10 years.

The precondition for both Landscape Ecology and Permaculture is to protect the environment, however *if* in fact they both are quite similar, the lack of cooperation constitutes a serious dilemma in a world of finite resources; in effect this loss of resources harms the global environment.

This report is a humble attempt to make up for this negligence and evaluate how the two approaches to landscape design corresponds or contradicts each other, subsequently; what can they learn from each other and how can they cooperate.

Naturally, both fields; Landscape Ecology (L.E.) and Permaculture (PC.) covers areas far beyond what is realistic to analyze within the framework of this semester report. To help limit the scope, the central comparison is build around a case study of a limited area.

1.2. Problem definition and research question

The peer reviewed paper titled "Creating Nature: Permaculture Management of Agriculture" (Jensen, 2008), published for the Eurorural conference on rural research hosted by the department of Applied and Landscape Ecology at MZLU, outlined the numerous problems and causes related to acceptance of such holistic management by the agriculture authorities. Reality is that it likewise is close to impossible for environmental protection organizations and academia to understand and accept that such multi-functional management as permaculture *includes* environmental protection, as it in fact breaks down the differentiation between "Nature" and "Agriculture". The cooperation during the past 2 years between Dept. of Applied Landscape Ecology at Mendel University and the NGO PermaLot, increasingly illustrated this dilemma of segregation within the Czech academic sphere, which inspired the formulation of the following research question:

Is Permaculture Design a functional approach to implement "Applied Landscape Ecology"?
-Can multi-functional agriculture include environmental protection?

1.3. Report structure

The following chapters are structured around a introduction to Permaculture, which the founder, (Ex-University professor at University of Tasmania) defines as a science of design (Mollison, 2007). Subsequently the science of Applied and Landscape Ecology, (detailing the approach to the science at MZLU), is introduced. Both introductions outline the respective theories and methodology for the case research.

Chapter 3 consists of a case example of a permaculture design for 1 hectare, detailing the process. The case is then related to characteristic elements of “Applied Landscape Ecology”. The conclusion seeks to clarify the similarities and differences of the two approaches. A final chapter of recommendations seek to aid in a future cooperation between the two approaches.

The report also aims to serve as a stepping stone for the 10th semester Master thesis, which will estimate the effect if the permaculture approach to environmental management were implemented on larger scale throughout Bouzovsko, as part of a local resilience plan towards future environmental and social changes caused by depletion of resources.

It should be emphasized that this report predominantly looks *ahead* and place limited emphasis on the historical/geographical issues resulting in the present use of the property and legislation surrounding the use; The area and future plans are suggestions for a particular client and to a large degree independent from such issues. This delimitation is also valid for the description of the approach to Landscape Ecology, which prevail at MZLU; it does briefly outline a cause analysis of ‘Why is it like that’, however the focus is: What can be done internationally to coordinate the two different management approaches (if at all possible).

2. Theories and methods

[One aim of Permaculture is;]“Consciously designed landscapes which mimic the patterns and relationships found in nature while yielding an abundance of food, fiber and energy for provision of local needs”

Holmgren, 2002

“Landscape ecology is not a distinct discipline or simply a branch of ecology, but rather is the synthetic intersection of many related disciplines that focus on the spatial-temporal pattern of the landscape.”

Risser, 1984

Inspired by the internship at Mendel University, Department of Applied and Landscape Ecology, part aim of this study is to compare the approach of permaculture management of agriculture with that of Applied Landscape Ecology; simultaneously the report seek to analyze the differences/ similarities between Landscape Ecology and Permaculture; is it in reality two sides of same coin?

2.1. Introduction to Permaculture

Initially an abbreviation of “Permanent agriculture”, Permaculture is a word coined by Australians Bill Mollison (BM) and David Holmgren (DH) in the late 1970’s, describing a design system for “*creating human settlements that function in harmony with nature. Incorporating traditional knowledge, modern science, and the ecological patterns of the living world, permaculture design is applicable to farms, gardens, organizations, housing developments, towns and villages, or city neighborhoods.*” (Holmgren, 2002)

The founders set up a highly effective educational system through which the concept of permaculture spread rapidly from Australia to be a worldwide movement. PM lectured in at least 800 countries, and the 2-week PC course has been taught to 1000’s of students, as the system is based on a concept of every graduate being able to teach others (with the natural selection that the good teachers will prevail). During the past 10-15 years the term has developed more commonly as an abbreviation of "permanent culture", which caused British permaculture teacher Patrick Whitefield, to define that there are now two strands of permaculture: The original;

focused on edible landscaping resemble their wild counterparts and the more recent; Design permaculture, which applies the designs of natural systems to any management design, ensuring that a sustainable design is achieved based on ecological principles (Whitefield, 2004).

The following passage by BM, winner of the alternative Nobel award and the “Australian of the year” award, serves as a crash introduction to the concept of PC in practice: *“How is your model of education known as the Permaculture Design Course different to mainstream education?”* *“First of all the Permaculture Design Course Curriculum is written down in the Designers Manual. It deals with economics and particular micro-economics. Then it deals with earth-moving and soils. So you are in the discipline of soils there. Then it deals with pattern systems (.....). Then on top of that we have geometrical planning for agricultural production. If you go to the Ag Dept. anywhere in the World and say: ”How do I plant bananas?” and they say “Put it every 15 foot in the square” and if you ignore that and put them in circles 2m across 12 per circle you will get 80 times the yield. Now no agricultural fertilizer will produce that, but if you re-pattern your cropping system you can double, quadruple your yield. You can take it up like bananas, we think we actually got better than 80 times the yield by re-patterning the layouts of your crop. When I plant bananas in a circle, I do a 25 to 50 m. diameter circle and they have powerful resistance to high winds, which is what wrecks the banana production on remote islands. So what we have is a whole lot of different disciplines. No tertiary institute would be willing to teach that because what you’d have, you’d have knives out everywhere. You’d have the economist’s stabbing the geologist’s, stabbing the geographers. There are too many disciplines in that single Permaculture Curriculum and the reason for that is there are too many disciplines necessary for us to run our lives...”* (Mollison, 2003)

Bill Mollison worked as University Professor for years, but it is evident in the above quote, that his virtues and general approach was not easily accepted in the academic world. This may also explain why the established academic society never really caught on to the idea, with the few exceptions of some relief actions after wars and other catastrophes, and smaller isolated states such as post-soviet Cuba that rapidly had to re-invent self-sustainability after the fall of the soviet empire which supplied Cuba with 80% of it’s import. BM published a few other books around the subject, including the 'Designers Manual' in 1988, which to this day constitutes the curriculum for the certification of Permaculture Designers.

"The only ethical decision is to take responsibility for our own existence and that of our children" (Mollison, 1990). This statement explains the unique ethical element to PC, as at its

core it has three fundamental ethics: Earth-Care - People-Care - Fair Share: Beyond the ethics exists a series of guiding principles, however there has never been a clear consensus regarding how many or which principles are the right ones, as the generations of PC teachers developed slightly different ones. DH's book attempts to clarify this issue by building up his latest book around an introduction to 12 central principles:

- 1) *Observe and interact*
- 2) *Design from patterns to details*
- 3) *Catch and store energy*
- 4) *Integrate rather than segregate*
- 5) *Obtain a yield*
- 6) *Use small and slow solutions*
- 7) *Apply self-regulation and accept feedback*
- 8) *Use and value diversity*
- 9) *Use and value renewable resources and services*
- 10) *Use edges and value the marginal*
- 11) *Produce no waste*
- 12) *Creatively use and respond to change*

2.1.1. Permaculture as a sustainable design system

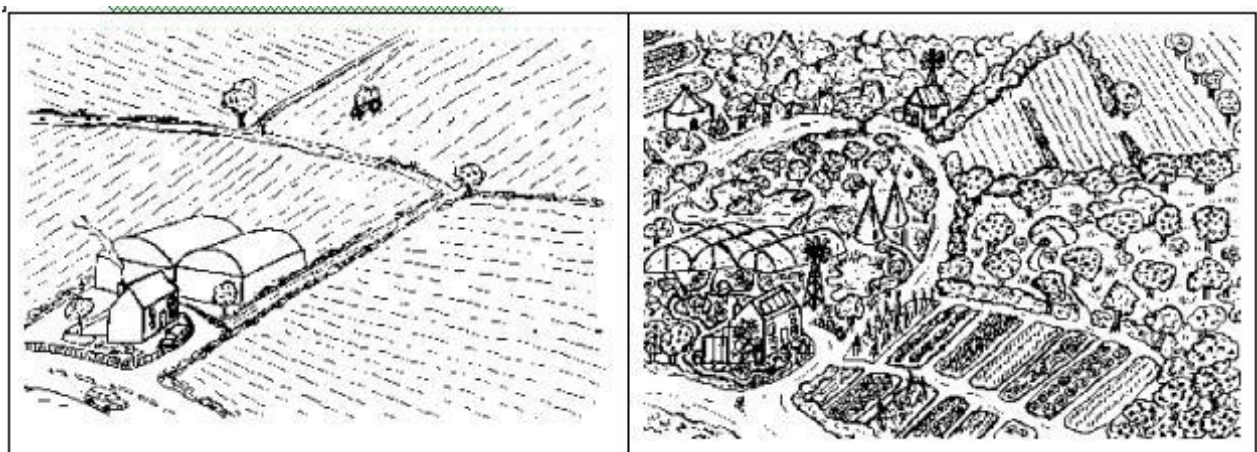
PC has grown from the unknown to a discipline including 1000's of designers, approximately 100 different books in many languages by several authors, and now a few University courses, however it was first in 2002 with the publication of "Permaculture: Principles and Pathways Beyond Sustainability", (Holmgren 2002) that the subject of Permaculture was presented in the format of an University textbook. The book firmly takes the PC concept to a broader frame of reference, away from predominantly talking about land management and practical issues, to dealing with the fundamental underlying principles behind permaculture and the link to resource limits, especially energy peak. David Holmgren (DH) has now developed his career into also being a noteworthy futurist, modeling potential future scenarios. [www.futurescenarios.org]. This development is significant, as in reality the issue of optimizing energy flows always constituted the core element of PC, (initially very inspired by the research of Howard T. Odum), and as the world fossil energy sources are in process of peaking, it appears that PC contains the appropriate design principles for the future.

2.1.2. The permaculture design process

Applied permaculture consists of a design process based upon a client interview and study of the

physical aspects of the area (and adjoining areas), where the design is to be implemented. It's vital that the designer functions as a neutral facilitator/mediator between client and the various external factors that are suggested to be modified and/or implemented. (Whitefield, 2004). In other words; the permaculture designer needs a very diverse knowledge applicable to the specific needs of the client: For the typical job of designing a farming/living landscape the skills are based on nature observation and knowledge about integrated multi-functional agriculture, optimization of energy flows, the clients lifestyle etc. For a job focused on optimizing a University through a permaculture design approach, a PC designer with additional knowledge within organizational structures, creative education, logistics and economy would be best suited.

Concluding the introduction, this quote by Landscape designer Hemenway summarizes the concept very well: *“Permaculture is a broad-scale design system that organizes concepts, principles, techniques, and strategies from many well-established fields into a pattern of mutually supportive relationships. If organic gardening, solar power, agro-forestry, and other disciplines can be thought of as tools, then permaculture is a toolbox in which they can be organized for best use. Permaculture is a meta-discipline, operating at a higher level than that of technique. It has been used to design successful landscapes, houses, villages, businesses, farms, and developments. Permaculture is founded on the belief that if we identify and use the appropriate principles from natural systems, we can finally begin to develop a coherent science of design, something strangely lacking in a species that supposedly designs its environment”* (Hemenway 2001).



*Fig 2.A: A landscape before and after applied Permaculture...
or is it 'Applied Landscape Ecology?'*

2.2 Introduction to Landscape Ecology

Landscape Ecology is a relatively new science, with roots in central and Eastern Europe (Turner et.al, 2001). The term ‘landscape ecology’ was first coined by a German geographer, *Carl Troll*, in 1939 and it gradually gained acceptance as a science throughout Europe during the 50’ies and 60’ies becoming linked with land planning and landscape architecture. However as majority of the research (until early 1980’ies) were written in German, Dutch and Russian, the field of landscape ecology first entered North American literature in the mid 70’ies. (Turner et al. 1989), which caused an internationalization of the science simultaneously with the growing societal awareness for environmental studies. Hence it is generally acknowledged that landscape ecology as a science first became common in the late 1970’ies, with the International Association for Landscape Ecology (IALE), founded in 1982, marking the international recognition of the discipline. (Turner et.al, 1989).

The significance of ‘*Landscape*’ as a measurable scale, (landscape defined as: *an area that is spatially heterogeneous in at least one factor of interest* (Turner et al. 2001) is due to the realization within ecological science in the 80’ies, that the common methods of fractionalizing into quadrate sizes such as m², km² or map gradients, was not appropriate due the general realization that problems and influx to individuals or species were interconnected with events outside of the theoretical confined area. Thus appeared the ‘theory of scale’, which supports that the understanding of landscape dynamics needs to be found through direct study of the landscape. (Turner et al. 2001)

Significant advance of Landscape Ecology is also due to the recent years growth in development of high-tech possibilities to process landscape/habitat data, such as geographic information systems, spatial statistics, remotely sensed satellite images or aerial photography: Troll noted as early as in 1968: “*Aerial photo research is to a great extent landscape ecology, even if it is used, for instance, for archeology or soil science. In reality, it is the consideration of the geographical landscape and of the ecological cause–effect network in the landscape.*” (Turner et al. 2001).

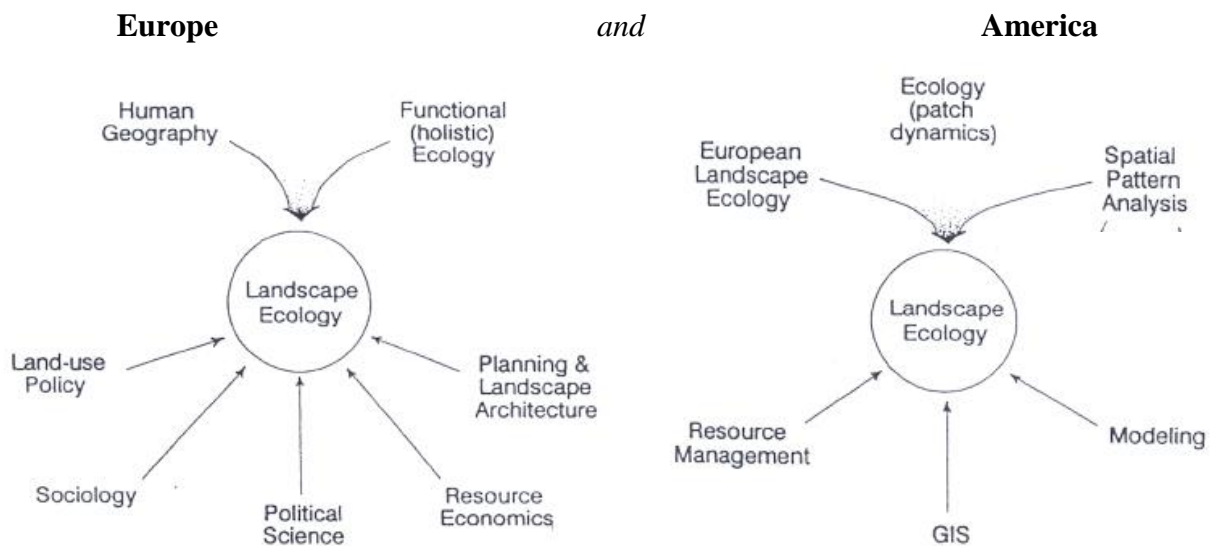
In addition, Landscape Ecology relies on modeling, and a common scientific approach is the “central place theory” (Herbert and Stevens; 1960 / Steger, 1964), which gradually lead to the observation that the sprawl of human activities is comparative to the forage patterns of ants, birds and many other animals.

It should be stated that 2 former chairmen of the IALE, (Wiens in 1992 and Hobbs in 1997)

independently summarized that during each of their 4-year chairmanship period, the discipline was lacking real life experimentation and implementation, as the research predominantly is confined to research institutions. (Wu, Hobbs, 2007)

It is a general understanding that several ‘schools’ of L.E. exists, most notably the European and the American.

Fig 2.B: *Difference of approach to Landscape Ecology in:*



(Wiens, J.A. 1997)

Fig 2.B illustrates how the ‘European School’ has an “emphasis on typology, classification, nomenclature, and mostly is concerned with "built" systems and explicit human applications e.g. "LANDSCAPE ecology"”. In contrast the ‘American school’ “Emphasizes organism-environment relationships without necessarily involving anthropogenic heterogeneity, making it "landscape ECOLOGY" “ (Macintyre, 2008).

When L.E. was 'discovered' in America, it served greatly to familiarize L.E. to the academic sphere, however it also took a direction of its own, and is frequently known for only basing the science on research done in English language, in effect ignoring 35 years of research written in Dutch, German, Russian or any other languages. It is also noteworthy to explain that the European arm is segregated into several approaches, as a result of language and cultural scientific approach: The Dutch approach is different from the Russian, which is different from the German and so forth, resulting in the statement: “*Contemporary landscape ecology is not unified at all... landscape ecology should be regarded as a multidisciplinary, better a trans-disciplinary, science where different views and approaches are involved in a holistic manner.*” (Bastian, 2002)

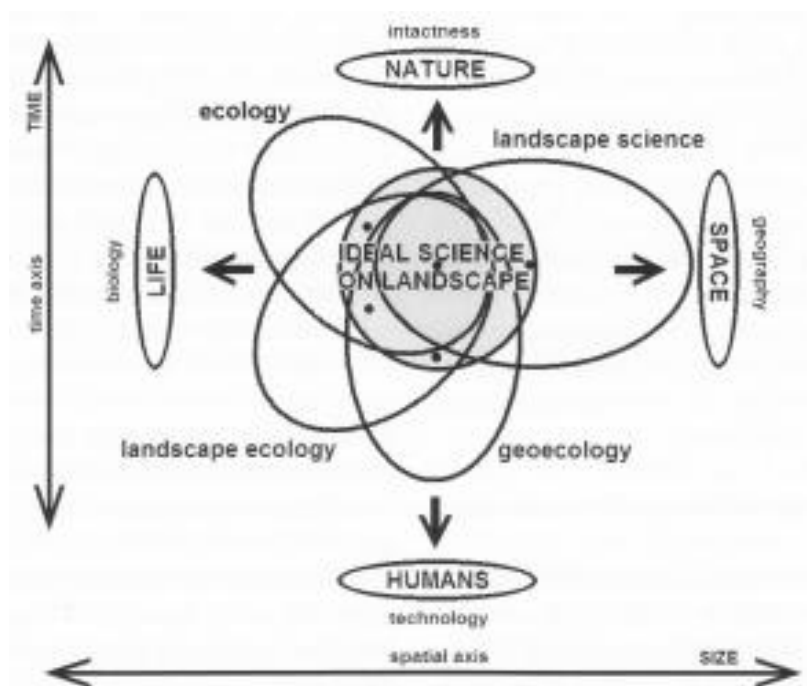
In contrast to this statement it is noteworthy that numerous publications and speeches recommend that Landscape Ecology should be an interdisciplinary science with an “emphasis on the relationship among pattern, process and scale and its focus on broad-scale ecological and environmental issues that necessitates the coupling between biophysical and socioeconomic sciences” (Wu, Hobbs, 2002).

2.2.1. Landscape Ecology as applied at MZLU

The significance of the east European approach to academic research as carried out at MZLU is that it may be categorized as being predominantly in the upper right corner of fig. 2.C.

Landscape Science in other words quite distant from the 'new' American approach, which is more likely to be situated in the lower left corner; *Landscape Ecology*.

Fig. 2.C:



2.2.1.1 Historical background

To understand the situation of the Czech scientific approach to L.E., it is necessary to view it in context of what was officially called 'Scientific Communism', where it was a prestige to be a scientist, however the area of science was very specific to merely 'observation and statistical systemization of observed phenomena': In other words excluding a large range of more

'philosophical' and social ecological issues which is inherent in the 'Western' understanding of the concept of 'Ecology'. (Kohak, 2000). In the recent article “Out of the Woods and into the Lab” (Jehlicka, Smith, 2007), the situation of the Czech Environmental movement and academia is traced back to the late 50’ies. It presents a valid case that the development of Czech environmentalism has its roots in a strange mixture of the American/English woodcraft/scouting tradition, combined with the official rational and scientific perception sanctioned by the socialist regime.

It resulted in a situation where the concept of ecology and environment became embedded in the public conscience as a combination of romantic campfires and field research of tangible matters, to the tune of: *“Many negative ecological phenomena arise primarily from insufficiently substantiated human interferences in nature, which corresponds with the initial phases of the scientific-technological revolution. Problems often occur not due to excessively active human interference in nature, but due to the insufficient human activity...”*, as stated by the director of the Institute of Philosophy and Sociology of the Czechoslovak Academy of Sciences, Radovan Richta in 1973 (Vanek, 1996)

The summary of the article by Jehlicka and Smith, explains how such development enabled the *“environmentalism in Czech to adapt through the socialist times, as well as to the new times which followed after 1989, but that it also meant that it was not suited to “deliver a strategic or systematic critique of either”* (Jehlicka, Smith, 2007).

Their research also found that it is the ‘veterans’ of the above outdoor upbringing, which today occupies a majority of the seats in the agro /environmental faculties.

Outline of ‘Scientific Communism’

The dominance of science and technology in problem solving in Czechoslovak communist society was reflected in all aspects of intellectual life including the curricula at all levels of the educational system,¹⁶ in publishing policy and in research priorities. Starting in the 1970s, environmental studies at the tertiary level of education were taught within university departments and faculties of science and at polytechnics. The limited number of students allowed to enrol on these programmes were required to study a range of highly specialised scientific analytical methods and the (technical) management of protected areas. This model of environmental studies was preserved well into the 1990s.

The scientific/technical worldview was dominant amongst elites on account of the nature of graduate and post-graduate education. Graduates represented only seven per cent of the Czech adult population in the second half of the 1980s, and their educational experiences were remarkably homogeneous. About 80 per cent of university degree holders graduated either from polytechnics or faculties of science (including medicine). This emphasis on scientific and technological solutions to all of society’s problems ensured that from the 1950s onwards at least 90 per cent of university graduates received a highly specialised education at the expense of holistic or interdisciplinary approaches.

From: Out of the Woods and into the Lab: Exploring the Strange Marriage of American Woodcraft and Soviet Ecology in Czech Environmentalism
Petr Jehlička and Joe Smith

2.2.1.2. Perceived present situation

My personal very limited observation of the MZLU approach, found that it is based on rather extrapolating data within the confinements of the University, rather than to attempt to apply it on the real environment. I judge this as the underlying cause for the limited incorporation of the life/human aspects within the field of L.E. as illustrated in fig. 2.B and especially the lack of attempts to initiate it in real life.

Unfortunately there doesn't seem to be any light at the end of the tunnel, as the University approach to education in CR. is very non-progressive. The approach of the MZLU lecturers is a remains from times long gone in Western Europe: Very un-stimulating and the concept of pedagogy is unknown. In addition any graduate student is compelled to follow the examples of the professors, should they have any hope of graduating, securing a PhD. position etc.: In all aspects it serves as a perpetual mobile.

It may be added as a positive aspect that unlike in 1989 where *"expertise was almost exclusively directed to ever better recording and understanding of the process of environmental deterioration rather than to developing policy proposals as to how these trends could be reversed or prevented."* (Jehlicka, Smith, 2007), - the current output from MZLU/ A.L.E. appear to be more in the genre of researching potential solutions, though typically on the microscopic level, not through *Applied* countryside implementations, and rarely aiming at reaching the sphere of the policy makers.

Kolejka and Trnka (2008), further documents this in their recent article seeking to illustrate in fig. 2.D. how humans is at the center of the landscape science/ geosystemic approach, and heralds the increased interest in quantification of problems, computer models and simulations as it leads to a return to some degree of fieldwork, which is lacking in present short-term research.

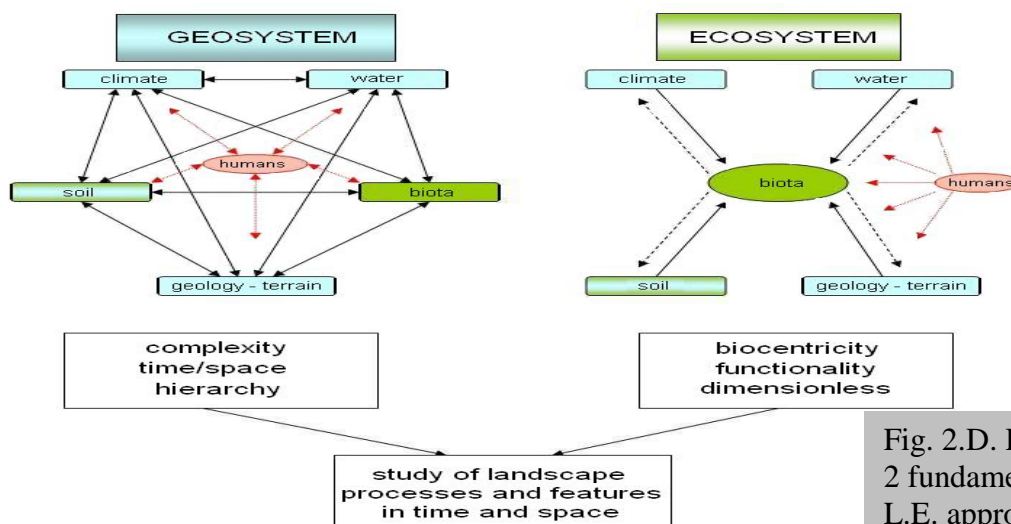


Fig. 2.D. Differences of 2 fundamental different L.E. approaches. Kolejka and Trnka (2008)

Unfortunately the conclusion of their article is merely a stated need for generation of more field data through establishment of a “*geographical long-term field experiment station*”, which appears not to be experimenting at all, as the core function is the above mentioned “*observation and statistical systemization of observed phenomena*”, rather than a progressive approach to rather demonstrate urgent solutions actively contributing to solutions for the present acute crises within environment, food supply, climate and transport...all issues which may very well fall within the specter of Landscape Ecology, whether it is '*multidisciplinary*' or in fact '*trans-disciplinary*'.

2.2.2. L.E. concept of ‘Applied’

Experiences with the “Department for Applied and Landscape Ecology”, often made me consider exactly what is meant with the term ‘Applied’?

The relevant explanations according to the Oxford concise dictionary are as follows:

- a. Put to practical use; practical. Freq. in applied art (also applied arts), applied research, applied science (also applied sciences), applied technology.*
- b. Designating a discipline, or that part of a subject, concerned with the use of specialist or theoretical knowledge in practical or functional contexts, as applied biology, applied chemistry applied economics, applied kinesiology, etc. Also: designating an expert in or practitioner of such a subject. See also Special uses. Freq. opposed to abstract, pure, or theoretical.*

This contrasts strongly with my personal observations at MZLU, however the definition corresponds well with part of the brilliant worded opening speech for the next European I ALE Conference 2009, by Honorary President Prof. em. Zev Naveh: “*Of greatest relevance for us, as landscape ecologists, scientists and professionals [...], is the realization that we have reached a crucial turning point in our relations to nature and to the biological and cultural values and life supporting and enhancing functions of our landscapes [.] We cannot go on following the well-paved and secure road of still prevailing conventional and chiefly outdated mechanistic and reductionist scientific paradigms of linear thinking. These conceptions have lead to the wrong assumption that our only obligation to society and all our merit as “good scientists” is to provide human-detached so-called “objective” scientific information that on its own will not change the reality. We cannot any more be satisfied, filling the scientific journals, books and libraries and the internet with semantic information of fine, peer-reviewed studies*

describing and measuring these landscape changes with the most advanced and sophisticated methods and models, important as these are. Instead, we have to provide meaningful pragmatic - that means – useful information that can help to change reality. We cannot predict the future of our landscapes by simply extrapolating from the past and present into the uncertain future. But we can take part in creating their future by translating our visions and research data into actions, realizing that what we will do today will shape the world tomorrow.” (Naveh, 2008).

Unfortunately the above speech is written for the international L.E. community, illustrating that the lack of ‘Applied’, as in “*Put to practical use*” is not only describing the academia at the MZLU, who might be more prone to reductionistic research as explained above, but that in general it seem that the prevailing approach among the L.E. community is the very theoretical oriented ‘well-paved road’.

2.3 Summery of the two approaches

The introductions serve to demonstrate that both approaches to landscape management include similar influences from observation and mimicking natural systems, along with pattern and mapping. They are also both cross-disciplinary to various extend. The ‘popularization’ of both occurred simultaneously from the late 1970’ies and occurs globally.

Significantly one of the disciplines has been flourishing among academics within the walls of the research institutes, while the other has predominantly spread as a grass-root movement and in the gardens and fields. L.E. follows the western science approach of reduction/deduction and predominantly through modeling. The results get published in scientific journals, and may or may not be implemented. PC observes which natural systems function in practice, combine it with modern knowledge, and the results are implemented in situ, and disseminated through practitioners, users and through various media.

Central differences seem to be:

- PC always aim to optimize the energy flow; ensuring that the implemented systems create an energy profit. This has effect in choice of plants, as plants which bring a usable crop are favored, whether they are local or not. –The same goes for the implementation of land changes such as terraces, swales and ponds.

- That American L.E. approach appears not to be emphasizing the ‘social’ eg: human element in the landscape, which is central for PC

-That the wider world of academia has widely accepted L.E., however PC is still on the sidelines, as it is widely a practical discipline and spreads through too many fields.

-A central difference is that PC as a pre-requisite has the client interview, which is absent in most L.E. methods. In addition the PC approach follows the project to doors with practical implementation and final adjustments.

-Historically PC has been used by private clients, and L.E. more likely to be used by regional planners. Both applications entail limitations.

During the background research of this project I contacted the only three persons I could find which both were PC designers and work in the field of L.E. I asked a few questions about their view of differences and similarities between L.E. and PC. Only one answered, Jono Neiger, who points out how *“They are perspectives and fields that inter-relate with different areas of focus. PC is often the application of knowledge gained through disciplines like LE. We seek to apply and make changes on the ground and may be using LE understanding of edge and patch/corridors to create a community farm-forestry project or design a property with forest garden production patches and corridors of circulation through them to get a high yield of numerous crops. (Neiger, 2008)*

3. Description of the Case Study

“Permaculture is not the landscape, or even the skills of organic gardening, sustainable farming, energy efficient building or eco-village development as such, but it can be used to design, establish, manage and improve these and all other efforts made by individuals, households and communities towards a sustainable future”.

Holmgren, 2004

This chapter introduces an empiric challenge of outlining a strategy for the optimal use of a particular 1-hectare rural area by Bouzov Podoli, Czech Republic, bearing in mind the establishment of a balance between nature protection and socio-economic measures of local communities. -Or as mentioned in terms of ecological economy; a balance of the three types of capital—natural, social and cultural (Farley, 2007). It is done through a permaculture design process and results are utilized to show case similarities and differences between the two different applied environmental countryside management, resulting in final proposals for further co-ordination of the two approaches in general. In addition the case serves to outline a conclusive strategy within environmental management, for a particular area, which constitutes a requirement for the semester curriculum.

3.1. Context of the environmental dilemma used as case study

The Moravian rural region of Bouzovsko consists of 12 small villages united under the larger village of Bouzov, all-together constituting the home of about 1500 people. (Bouzov, 2006)

The concept of 'environmental management' of this forested rural backwards region is symptomatic to many other rural regions, in the fact that the concept is virtually unknown: Any related development is largely depending on state/EU measures and funds along with the personal convictions of the town hall members.

It is obvious to any onlooker that the paradigm stated by the World Commission on Environment and Development in 1987 is not a major concern: *"Humanity has the ability to make development sustainable - to ensure that it meets the needs of the present without compromising the ability of the future generations to meet their own needs"* ...However it is also clear that timing and the Bouzovsko region are ideal for 'damage prevention', as locally the biggest troublesome issues currently relates to large scale conventional monoculture agriculture, a new piggery, a potential new quarry, some issues relating to forestry, domestic heating with coal and

a constant decline in local employment leading to increased long distance (+40km/day) commuting. Another, more distant issue is the proposed Donau-Elbe-Labe canal, which may be approved in parliament during the next year, and which would completely alter the landscape and character of the area. Naturally, this listing excludes the issues such as energy and food production, which predominantly are ‘imported’ from outside the region.

The above presentation, previous analysis of the EU Agro-Enviro measures by author (Jensen, 2007), and the recent Czech publication “Foxes in the vineyard; Causes for stagnation of organic production by Program for Rural Development” (Dittrichova et al, 2008), clarifies that little is done to try to circumvent the negative environmental impact of the farming and forestry, the poor economic situation of this remote countryside, as well as the social infrastructure necessary to change the demography of the area by rejuvenation. The research illustrates that even when circumvention are tried, the mentality of the Czech administrators leaves it virtually impossible to implement within the existing structures.

One exception to this rule, is a development which includes the location for the case study of this report; the gradual development of a homestead joining a forest kindergarten, youth activities, vocational educational courses, eco-tourism, final processing and sale of food products with organic farming. The Jen Sen Homestead [Jen Sen translates to “Only Dream”] originated in 2005 due to a private purchase of 7,5 hectares in Bouzov Podoli, including an old derelict farmhouse. The agriculture is jointly managed by cooperation of 4 different organic farmers and the NGO ‘PermaLot’. The overall management plan aims are in accordance with the three ethics of permaculture: Care of the planet, Care of the People and Fair Share. Such approach naturally

leads to an integration of environmental protection approaches with production of food and services, while aiming of generating more local resources than what is consumed. Unfortunately such ‘round’ management is not easy to confine within the ‘square’ administrative boxes of the Czech bureaucracy.



The following introduction to the area of Bouzov is predominantly from the Human Ecology

project in 2003: “Cider house: - a proposal for a combined food-incubator/nature-school/cold-storage/eco tourism center in the Moravian village Bouzov Svojanov, the 2007 Human Ecology diploma thesis titled “Permaculture in PermaLot: Legal and cultural motivated obstacles to Local Sustainable Development in Czech Republic”. Further more the recent 8th semester report: “Turning Waste Into Gold: An Environmental Management fairytale based on a true story”, examined issues concerning deciding and implementing an environmental sustainable wastewater solution in Bouzovsko, including the problematic non-progressive political/administrative issue of Bouzovsko.

3.1.1. Environmental characteristics of Bouzovsko

Bouzov consists of a rural landscape with about a 40/60% distribution between forests and fields as the aerial photomap on Fig 3.A. clearly shows, The forests are predominantly on the slopes of the hilly landscape that varies between 280 and 425 meter above sea level, and new cultures planted are predominantly non-native deciduous plantations. The profitable hunting business maintains a too large population of deer and wild pigs, which poses a difficulty for surrounding farmers and gardeners.

Following the approach of the previous regime, the fields are relatively large, not intercepted by hedgerows, tree lines etc.: A landscape element further made difficult by the present faulty local administration of the EU agriculture donations. All fields are intensive managed and very limited measures are taken to prevent erosion. The agriculture is 98% managed by one large corporation, a result of changing the nationalized agriculture Co-Op’s into shareholding companies, which gradually has merged. The result in Bouzovsko is that majority of all agriculture is managed by a company 30 km away and virtually all resources are removed from the local area and in reality substituted by fertilizers, insecticide and some low-income seasonal employment.

A recent EU Interreg project “Ilup-Pomoravi” made detailed studies and recommendations for flood preventions, as the Bouzovsko area contribute to flooding of the Morava watershed, however, as there were no financial incentives for implementation, little has changed.

The following description from EU’s initial rural development plan for Czech Republic (“Sapard”), briefly explains the psychological/social obstacles towards new initiatives, as well as explain the decline of the populations in the rural areas:

“Many rural micro-regions are in a great need of renewal of their technical infrastructure, renovation of premises and provision of services. Until some of these basic needs are met it will be difficult to reduce the present rates of rural depopulation and the consequent drift to the cities and expect economic regeneration at the same time. In the past decades, agricultural functions in rural settlements were separated and placed in large agricultural establishments. Farm

buildings inside settlements remained unused. Under the former totalitarian regime, nationalization of land and the development of large-scale collective farming reached the greatest dimensions in the former Czechoslovakia compared within the entire Eastern bloc. Farmers became accustomed to 8-hour working days and an employee-type regime. As a result, ownership relations were broken and thus the relationship to the land changed. The jobs available in agricultural enterprises could not cover the demand for employment in villages. As a result, at present many workers commute to towns and rural population suffers more from unemployment.”

3.1.2 Location, Setting and Delimitation.

The approximately 1 hectare slope that constitutes the subject of the comparison analysis is located to the South of the small village of Bouzov Podoli, Moravia, Czech Republic. It adjoins a newly planted extensive orchard which in effect is designed as alley cropping; this orchard again joins the homestead of the owners, making it a total distance of about 400 meters to the start of the case study area from the garden gate of the managers home. The entire homestead constitutes 7,5 hectares. The allotments exact borders are historically determined, and do not always correspond with landscape elements, however all the hectares South of the homestead are interconnected.

The object of this case study has been reduced to the area from the fenced off alley cropping/pasture orchard to the North, following the ridge marked by fruit trees to the East, down the Southern slope to the mapped border on the South and Western sides, which curves bordering a wetland area. The area is roughly 150 meter long (North-South), and 50 meter wide (East-West), with a slope from East to West, which curves and gradually tapers off towards the North-South.



3.1.3. History, Landforms and Geology

The Bouzovsko region consists of a series of rolling hills, generally varying with 125 meter from valley to peak and the area is managed with about 40% forest and 60% farmland, ranging from pasture, arable land to a total of 50 hectares of intensive orchards. The forest is generally mixed forest, with conifers gaining dominance.

Due to the slope of case study area (20 meters height difference on 50 meters), it is likely that it only has been used for pasture for the past many decades, which may be the cause for the majority of the area to be very dry with poor soil, with moist soil accumulating in the bottom.

The 30 degree of the slope deters tractor plowing, and all in all makes it uncomfortable to drive machinery. The sun typically first reaches the area around 11 am, but there is good sun exposure for the rest of the day. Due to the shape of the valley and the location of the forest to the West, the area can be described as fairly sheltered.

The bottom of the slope functions as a water catchment area from the adjoining fields, leaving it impossible for heavy machinery to cut the grass there due to swamp. Indeed, a small stream appears to the north of the study area, creating the Western border of the homestead.

3.1.4. Climate

The microclimate within the study area is primarily affected by elevation, as well as the moisture of the bottom area. In general temperatures increase and decrease along the 50 m East-West elevation with an approx. 17 °gradient (highest elevation, 400 m, lowest elevation, 380 m).

However, climate varies significantly from year to year. Snow is possible during the winter months of November through March, even April, with up to about 40 cm of snow (but decreasing rapidly in recent years). The summer months of July to October often receive precipitation from heavy thunderstorms. The region receives 625,3 mm of precipitation a year, 1090 amount of sunlight hours/year and a wind factor average of 3,7 m/2 (CZSO, 2007)

3.1.5 Vegetation

Regional grassland vegetation types are well represented throughout the study area. In addition to the grasses on the hill, the area includes elements of wetland-meadow ecosystems. In 2006 a line of 60 old variety fruit trees were planted along the Eastern ridge with 10 meter spacing. It is composed of pear-, cherry-, apple- and plum trees, and also functions as a marker for a path and contours through the landscape.

3.1.6 Land Use History

It is likely that the area at times supported growing of crops such as buckwheat, flax and spelt,

however no documentation is available to support this theory. It is clear that since the widespread use of mechanization, and increase in size of livestock during socialism (1948-1989), it was more effective to use the area for pasture due to the contour. This again has helped determine the vegetation of the area.

The historical outline of the properties indicates that the allotment was kept as a quite large individual property, where the long narrow individually owned 'Humna' -so characteristic to the Czech village culture- were located further from the village, on more flat and fertile land. - Traditionally the 'Humna' served as privately owned small acres for villagers who were not big scale farmers.

Close to the peak of the slope is a central social area: it is the favorite take-off point for the village children when they go sledging down the slope!

3.1.7 Management

Since the nationalizing of the agriculture properties in the 1950'ies, the area was managed by a large agro-conglomerate. This in effect continued after 1989, as the conglomerate got privatized into a share holding company which maintained the management of the mosaic of private allotments, as majority of Czech land owners had become estranged from agriculture through the socialistic society structure and generational changes.

Since 2005 the area has been in ownership of organic farmers, who regained the management rights in autumn of 2006, after which it was submitted for organic certification. The land management is structured through a loose cooperation between 4 organic farmers with the following specialties:

- 1) Petr Vanek: Bio-Dynamic vegetable farming.*
- 2) Petr David; meat sheep and orchard maintenance/sales*
- 3) Karel Stastny; Technical hemp and oil plant production for medicinal and oil production*
- 4) Max a Radka Jensen; Education and eco-tourism, small scale production of final products from food, berries and vegetables; intentions for 2009 is to purchase 2 ponies for recreational and tourism purposes.*

Due to the diverse management skills and available technology, combined with the educational aspect, a unique possibility exists to create and study holistic approaches to income generating agriculture combined with applied landscape ecology and nature preservation.

3.2. Overview of chosen methodology

Fundamental for any PC design is the concept of relative location, as clarified with the 'PC zone system'. Table 3.D. demonstrate how PC can be utilized as a universal design system; in this case adapting the classic example of a homestead to village clusters.

Fig. 3.D
PC Zoning.
by Gori,
2005

Table 1 - Permaculture zone system

Zone	Permaculture zones for homesteads	Permaculture zones for village clusters
Zone 00	The Individual	The People
Zone 0	Home dwelling	Central park and town square
Zone 1	Domestic self sufficiency - pick and pluck plants for daily usage	Social self sufficiency - commercial, public and entertainment facilities
Zone 2	Small domestic stock and an orchard	Human stock and homestead gardens
Zone 3	Crops, forage and stored food	Agricultural allotments
Zone 4	Forestry and pastures	Orchards and passive open space
Zone 5	Natural environment	Natural environment



Fig. 3.E
Overview of zoning of the case study.
The 1 hectare field is within the zone 3 area, however containing some zone 2 functions

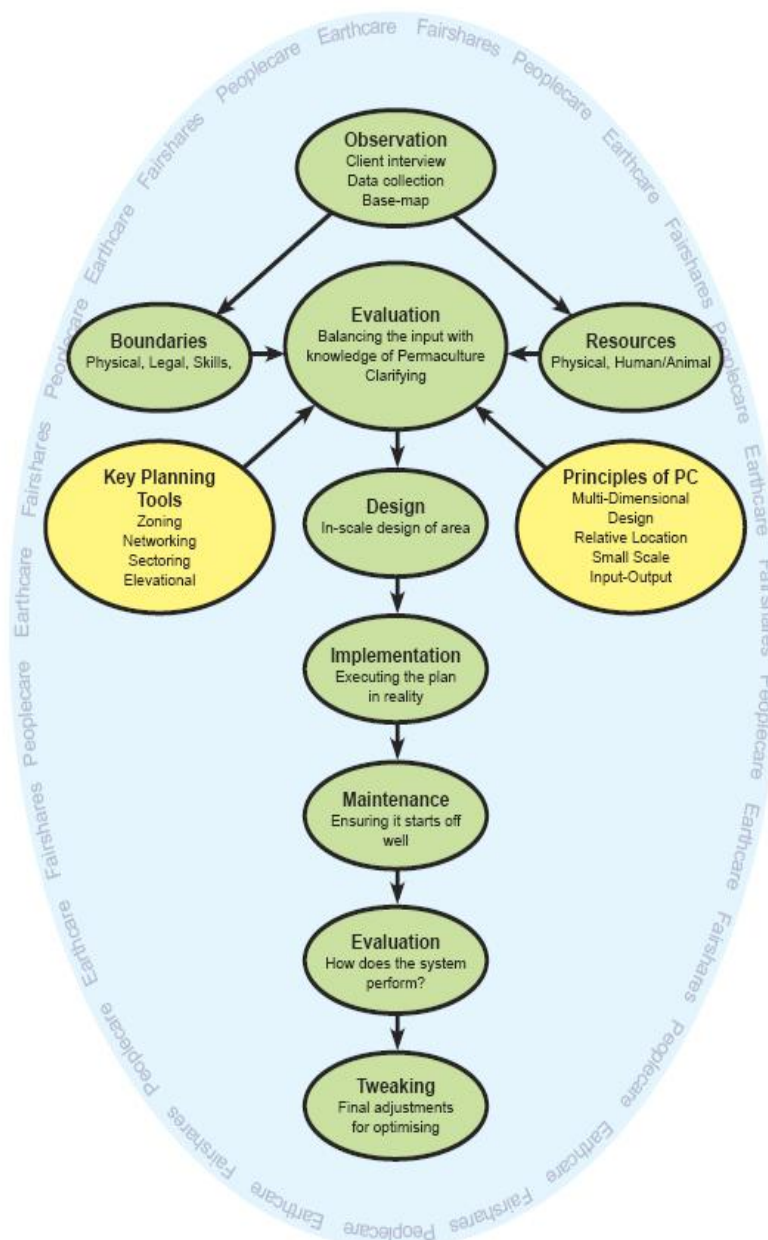
Utilization of the relative location and aimed functions may be through a number of different system approaches, often derived from other related fields: The O'BREDIMET (from Industrial Engineering: *Observation, Boundaries, Resources, Evaluation, Design, Implementation, Maintenance, Evaluation, Tweaking*), the SADIM (from Landscape Architecture: *Survey, Analysis, Design, Implementation and Maintenance*) or the permaculture derived CEAP model - *Collecting site information, Evaluating this information, Applying permaculture principles to this information and to generate a design and Planning a schedule of implementation, maintenance, evaluation and tweaking* (from

www.permaculture.org.uk). It is

up to the individual designers to choose their own approach; the case example in this book is based on the Obredimet approach.

Central for any PC design is an interview with the client/key players. The interview sets out several of the boundaries and resources, along with the aim of the particular design; perhaps the client wants a self-maintained jungle, perhaps an intensively managed garden providing a livelihood for the family? The interview also reveals a number of other boundaries such as financial, neighbors, available skills and other resources, as outlined in the questioner below:

Fig. 3. F Schematic overview of PC OBREDIMET process (by author)



The interview, knowledge of the PC zoning, and extensive reading of maps and historical/geographical/ meteorological / constitute the background knowledge, which then has to be combined with extensive observation of the particular area and surrounding landscapes, all resulting in a design balancing the need of the client and the optimal for the local environment, as the following sub-chapter illustrates.

3.3. PC design for RJV of a 1-hectare sloping meadow by Bouzov Podoli.

Observation:

The location of the area is in the outskirts of zone 2 and in all of zone 3; some is within sight of the homestead, some is beyond the horizon and thus too far to warrant much attention. Soil samples reveal a Ph value of 5 to 6,5 and measurements show a 5 to 17 degree slope. Tests show that water drains rapidly from the poor soil on the hillside, but is retained in the swampy area in the bottom. The landscape surrounding Podoli is dominated by the 30+ hectare mono-culture field to the North of Podoli, likewise by a similar size open mono- culture field on the South-East of Podoli stretching further South. All in all this corner of the agriculture area, surrounding Podoli is the only area that offers a landscape diversity and scenic value, also due to the changing contours. Near the 1 hectare field exists a large old cherry tree, and uphill is two well-established tree lines breaking the neighboring arable field and grassland. These groves bear clear signs of being well used by game and birds, as a resting/transit place.

The client interview reveals that the area should be set up for a low-attention system, preferably including grazing of ponies, and able to secure a long-term crop from nuts and lumber. The client is keen to implement measures for biodiversity, improvement of soil, public use and recreational/demonstration functions. [Please refer to interview in appendix.]

Boundaries: The physical boundaries are as outlined in Chapter 2. In addition a view boundary should be noted; currently the valley offers a good valley view for the village, and any East-West tree row would ruin it. Another boundary is the fact that the hill is used for sledging, which should be respected according to the client interview.

The fact that the client does not own the majority of the wetland below the hill is a significant boundary in creating a serious biotope; the lack of available water is another boundary.

The present users of the hill include deer, hares, foxes, marten and likely the occasional straying wild pigs etc. The effect of their movement and grazing patterns need also to be taken into consideration. In regards to creation of output, the ability to maintain and process any system constitutes other boundaries, with the central prerequisite being that the client prefers a trickle-feed output, compared to a large bumper crop during short time.

Resources: Client states low financial resources for possible landscape alterations, however as clear from the interview, client is able to supply a certain degree of mechanical and person-power. Noteworthy is the availability of an industrial scale earth auger, grass-cutter and hay-collector wagon, as well as storage capacity for hay. A neighbor has ponies and limited pasture, and the client has intentions to get 2 ponies. The client also stated the possibility to host work camps with young people interested in nature protection.

Evaluation: The summery of the above information, along with observation of the field, landscape, maps and other data, points to a design which utilizes a few swales to retain and accumulate water, (Hill, 2000 / Lawton, 2003) while functioning as protective areas for the wildlife, and safe-heavens for species such as tree-frogs migrating to the fruit trees on top of the hill corridors. Any new planting needs to be safeguarded for deer, hares and ponies, and planted on contour, to facilitate view. Facilities for view of sledging kids, (and sunsets) could be appreciated, and fencing must be somewhat seasonal, or easy to open some sections. Ideally a permanent pond will be established as a water hole for the ponies, along with the other positive elements it entails. The area should be able to be self sufficient, only minimum maintained by machinery, and is not recommended for crop growing; this is better done in the further part of zone 3, which is more flat and with better soil conditions. (Official land parameters)
Tree species to be planted must be deep rooted, and able to resist drought, as well as being visually pleasing, preferably with a high quality lumber. Though large scale earthwork may be very applicable for initial PC designs, it is not recommended to make terraces on the slope due to the desire of the client to have a low maintenance/trickle out-put system, which is possible without such irrevocable landscape changes.

Design: Central elements of the design are 2 swales following the contour almost from the start of the S-E corner of the field to the area of the sleighing hill. The lower side of the lowest swale will be planted alternating Chinese tallow tree (*Triadica sebifera*) for beauty, fertilizer and several other functions but centrally nuts for home-production of bio-diesel (Olivier, 2007) and Sugar Maple trees (*Acer saccharum*) for beauty, lumber and sweetener, initially a series of wild thorny shrubs will be planted in the lines, maintaining the swale embankment and providing shelter until out -grown by the trees. The upper swale will be planted with lower trees, such as crab apple, aronia, hazel and elder, interspersed with rosehip, whitethorn, blackberry and other brushes. During planting all trees will be supported by a seed mixture of supportive species. Apart from the swales, a combination of water reservoirs should be created, with the first one

quite shallow and around 10m², situated in the slight valley at the Southeast corner. It is not likely to have water year round, but should generate some amount during snowmelt or serious rainfalls. A larger pond situated on the bottom side of the hill, is likely to retain water all year. It may be long and narrow, confined within the parameters of the allotment, however preferably an agreement with the neighbor is reached and the pond will be able to be 4x the width. Both reservoirs should be accessible to ponies, though other parts of the embankment may be planted with reeds, creating a protective environment for numerous animals, birds and insects. Judging on the amount of water already present in the valley, it is quite safe to assume a bottom layer of clay exists, and the reservoirs can be established without need of artificial liners. To prevent horse damage, all borders should be fenced of with 1 strand of electrical wire powered by a PV panel mounted on the stable. The poles could be a combination of 3 plastic sticks to every 1 wooden posts every 20 meter. The fence should be removed during winter, allowing for wildlife to easily pass through, while resting the grazing area.

As illustrated on the attached map, a few archery targets can easily be seasonally mounted ensuring arrow catchments and diversity of shooting angles and lengths, while ensuring visibility (=safety). A view bench on top of the hill, and a few 'T'-sticks for birds of prey to control the mice, fulfill the design. [Please refer to map of design in appendix.]

Implementation: The swales need to be exactly indicated, after which they can be made by one sideways pass of a plough, or simply dug manually, placing the turf on the downhill side: The swales needn't be larger than 0,5 meter wide x 30 cm deep. The distance between the swales is equal to the expected height of tallest trees, in this case about 20 meter, due to the maple trees. The ponds require mechanical excavation and some planting, as does the swales. The trees planted below the swales also require individual protection; preferably simply by painting with a deer deterrent made from boiled up bones and pitch. The bench should be made as sturdy as possible, to resist weather and vandalism.

Maintenance: Following the grazing of the animals, the field needs to be cut evenly, and remains simply left for mulching; as it is not likely to be of hay quality; hay for winter can be more easily made on the flatter field above the crest of the hill and in the orchard to the South. The lower line of trees needs to be trimmed to achieve tall straight stems for lumber. Maple syrup may be tapped during spring, and various fruits and nuts may be picked from July to November. The crop can be used in the various final products produced for sale at the homestead, though the nuts are intended for pressing into bio-diesel; as a minimum it will cover the consumption required to maintain the field, and likely a fair amount more. The pond would

need some initial follow-up to ensure a successful establishment, but afterwards would only require cutting of the reeds every 5 years; preferably when the pond is frozen.

Evaluation, Tweaking: These points should first be applied after a year or so after implementing the design, and has been omitted in this demonstration of the design system.

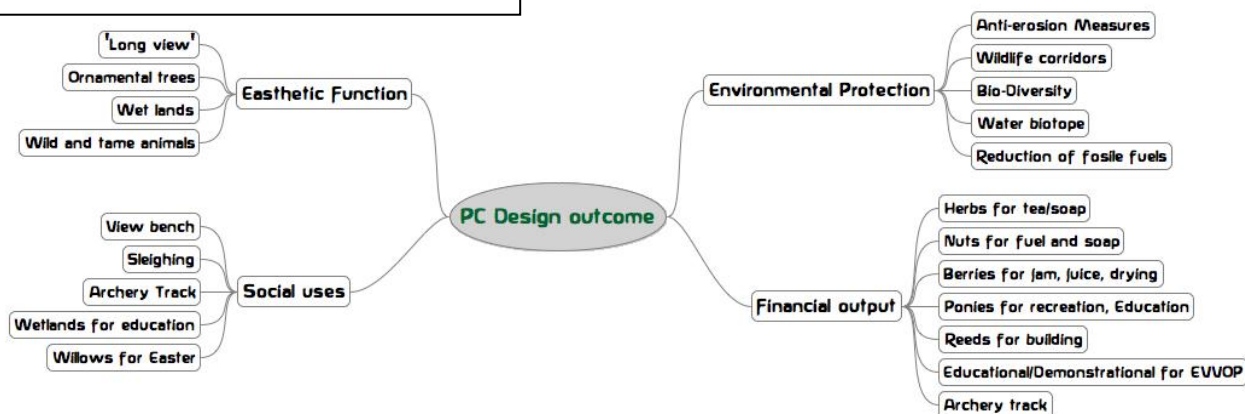
3.3.1. Summery of design

“It is not the number of diverse things in a design that leads to stability, it is the number of beneficial connections between these components” (Mollison, 1988).

The suggested design integrates the current research about production of high-energy crops (Olivier, 2007), the newest research within alley cropping, and silvopasture (UMCA, 2007) and adheres to the indigenous small multi-functional farming models that repeatedly have proven that inverse size-yield relationship is in favor of such systems (Ünal, 2008). Centrally it mimics the landscape mosaic of the area, copies natural systems hence conserving energy while respecting the 3 ethical rules of PC.

In brief the permaculture approach achieves at generating the following multi-functional outcomes of the land in question:

Fig. 3.G. Output of proposed system



The multitude of outcome is what characterizes permaculture, as it is a design system working on multiple levels. Significantly the diversity of outcome secures the resilience of a system, while demonstrating that environmental protection actually serves to secure more output; not to limit the area to merely being a natural reserve. Ideally this opens up for more acceptances by land owners who would feel estranged to loosing income due to environmental considerations. In regards to energy planning, all PC designs emphasize a minimum input of embodied energy, and a maximum energy production out of a system (Holmgren, 2004 /Mollison, 2008). In the design above, the initial energy input is minimal, represented by some terrain work, flexible

fencing and fauna brought into the site. Once established the system is 80% self-maintained, only requiring annually slashing of the grasses that were unfit for ponies, maintenance of fences and gathering of profit: Berries, fruit, nuts, new horses, game and so forth. The Chinese tallow tree is considered an invasive species, however it promotes through it's root, and this will be controlled by the effect of the ponies and the annual slashing. This particular area could have been designed to create much larger yield, but was limited by the requirements of the client, due to current lack of processing resources and local market.

The irony of the plan is that it is very difficult to have it accepted by the various administrative bodies in case the client wants agriculture donations:

The following issues arises: From 2009, the planned area would only be able to be categorized as an extensive orchard if min. 200 fruit trees/hectare are planted (up from 50 trees/hectare) even so this would only cover the land up to 6 meter to the side of an uninterrupted line of trees) (Olomouc Agro. Agency, 2008). In addition the establishment of an orchard is considered a long lasting landscape change and require a building permit (which includes statements from around 15 offices, such as gas, electricity, phone, environmental etc.). If the client instead opts to only call it a pasture, (and only gain ¼ of the orchard subsidies) the trees would eventually cause this small donation to dwindle: Any area covered by a tree crown of more than 25m diameter has to reduced from the area applicable for subsidies (Never mind the fact that the animals will spend a large part of their time in the shade of the tree!). As for the wetland areas it constitutes a dead-loss: The possibilities to obtain funding to make the wetland through the sources under Ministry of Agriculture are virtually bureaucratically unobtainable for the ordinary farmer, (Jensen, 2007 / Dittrichova et al, 2008) and once it is a wetland, the area would have to be removed from agriculture area, causing further loss of agro- subsidies.

The organic certification authorities require all plants and seeds to be certified, which severely limits the possibilities for natural succession: In reality this means that any bush or seed sown through wind or bird-droppings, have to be eliminated from the area.

In the eyes of the Czech Union of Nature Preservation, CSOP, the area is not applicable for consideration for any of their programs as long as it is agricultural land, and so forth this has been the viewpoint of some of the academics at Dept. of Applied and Landscape Ecology: The project is not interesting as it is not 'Environmental Conservation'. (Knotek, 2008)

All in all currently the best option for sustainable management is to simply do it without trying to fit it in the bureaucratic systems, unfortunately this also means foregoing organic certification, which makes such approach not likely to be widely implemented: In other words the

administrative systems, including nature protection agencies, academia and organic certification rules support the continuation of unsustainable agriculture practices. (Further outlined by Dittrichova et al, 2008)

3.4 Comparison of design with intentions of Applied Landscape Ecology.

It seem to be a paradox that despite the many years of research within L.E., there doesn't seem to exist a few easily applied models to compare with. Turner et. al.'s L.E. textbook states it very clearly: "...there are no "cook book" approaches for identifying the optimal arrangement. Landscape ecology contributes principles and techniques for considering how to arrange human structures spatially and identify potential ecological implications of alternative arrangements."

On the contrary Duerksen conceived a set of 'Operational Principles' where a majority of them directly discards the scientific theory, and directly recommends to 'learn by doing'; in actuality this is the approach of Permaculture, where many of the techniques are adaptation from various indigenous peoples, approaches which has withstood the test of time.

- Principle 1: *Be willing to use rules of thumb based on scientific findings that may some day prove to be false.*
- Principle 2: *Understand that complex environmental problems do not have a single, scientific solution founded on "truth."*
- Principle 3: *Begin all conservation plans with clearly stated, specific goals for wildlife protection.*
- Principle 4: *Insist that the analysis used for setting conservation priorities can be understood by everyone who is affected by it.*
- Principle 5: *Realize that all models are wrong, but some are useful.*
- Principle 6: *Make plans adaptive by evaluating the consequences of actions. Learn by doing.*
- Principle 7: *Seize opportunities to enhance wildlife habitat by intelligent design of developments.*
(Duerksen et al.,1997)

What seems to be more central to the world of Landscape Ecology is an international continuous developed terminology, suitable for conveying the academic research. The following table is an attempt of utilizing this to justify the PC design. The central L.E. terms are in bold, the definition in italics, followed by an attempt to relate it to the PC design.

Configuration: *Specific arrangement of spatial elements; often used synonymously with spatial structure or patch structure.*

This would describe the simple act of placement of the 2 swales across the slope

Connectivity: *Spatial continuity of a habitat or cover type across a landscape.*

The tree lines connect the wetland with the hill top, protecting the habitat, while allowing for a connected grass habitat along the slope.

Corridor: *Relatively narrow strip of a particular type that differs from the areas adjacent on both sides.*

This would again classify the tree lines of the PC design

Cover type: *Category within a classification scheme defined by the user that distinguishes among the different habitats, ecosystems, or vegetation types on a landscape.*

The basic cover used in the design is the existing grasses, which are well suited for grazing animals

Edge: *Portion of an ecosystem or cover type near its perimeter and within which environmental conditions may differ from interior locations in the ecosystem; also used as a measure of the length of adjacency between cover types on a landscape.*

It is a central element of any PC design to maximize the edge effect, as it is the most dynamic zone within any design. In this particular design it is done through creating many different long elements, which are best suited for the sloped hill.

Fragmentation: *Fragmentation: Breaking up of a habitat or cover type into smaller, disconnected parcels.*

To some extent this is assured by the interchanging elements of the design. While the cover surrounds the tree-lines, it is essential that the grazing animals are able to maintain the fragmentation of the Tallow tree, as it otherwise is an invasive species.

Heterogeneity: *Quality or state of consisting of dissimilar elements, as with mixed habitats or cover types occurring on a landscape; opposite of homogeneity, in which elements are the same.*

Another PC element is to achieve diversity, which partly is done in view of crops, but also through 'stacking', utilizing the various levels of the slope and swales. A full-fledged permaculture design of this slope would be much richer; this particular design is limited by the wishes of the client.

Landscape: *Area that is spatially heterogeneous in at least one factor of interest.*

The tree lines mimic some of the existing lines in the area, each of them are different, while being homogenous in height and shape of crown. The designed elements will in due time blend in well in the landscape and appear as a cultured village-side landscape.

Matrix: *Background cover type in a landscape, characterized by extensive cover and high connectivity; not all landscapes have a definable matrix.*

The matrix on the given area is the grasses which extends on the surrounding hectares.

Patch: *Surface area that differs from its surroundings in nature or appearance.*

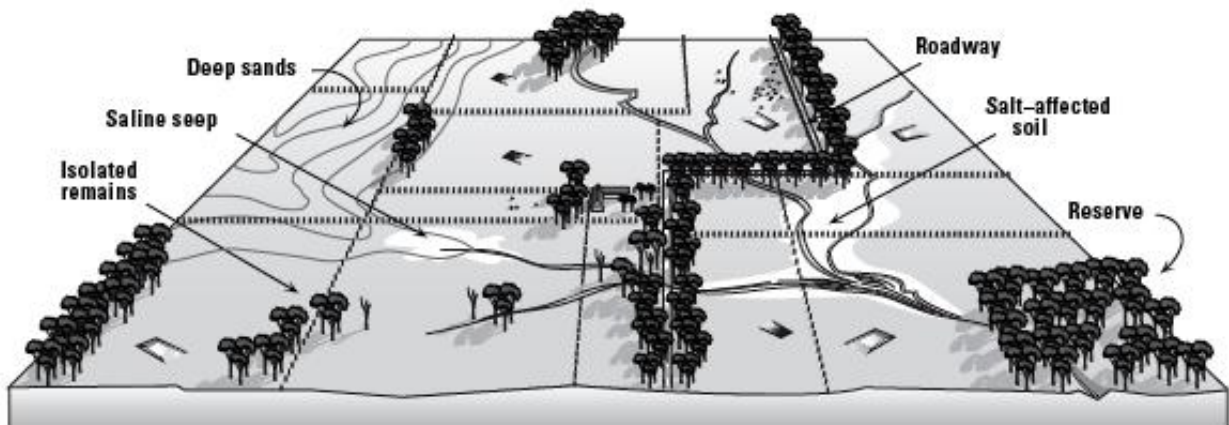
All of the various planted elements of the PC design can be described as a patch.

Scale: *Spatial or temporal dimension of an object or process, characterized by both grain and extent.*

The elements are kept in scale to ensure a transparency from the village through the landscape.

Adapted from Forman, 1995.

Turners very recognized textbook of L.E., uses the following 2 images to depict applied L.E. in Australia. It is clear to any PC designer that virtually all the elements are part of the average PC ‘toolbox’, which brings to the question who came first with the ideas? -The real answer is likely that in this case there is nothing new under the sun; the lower landscape is quite how a landscape would have looked before the ‘industrial revolution’, (apart from such cases where damaging non-native animals were introduced, such as rabbits in Australia).



(a)

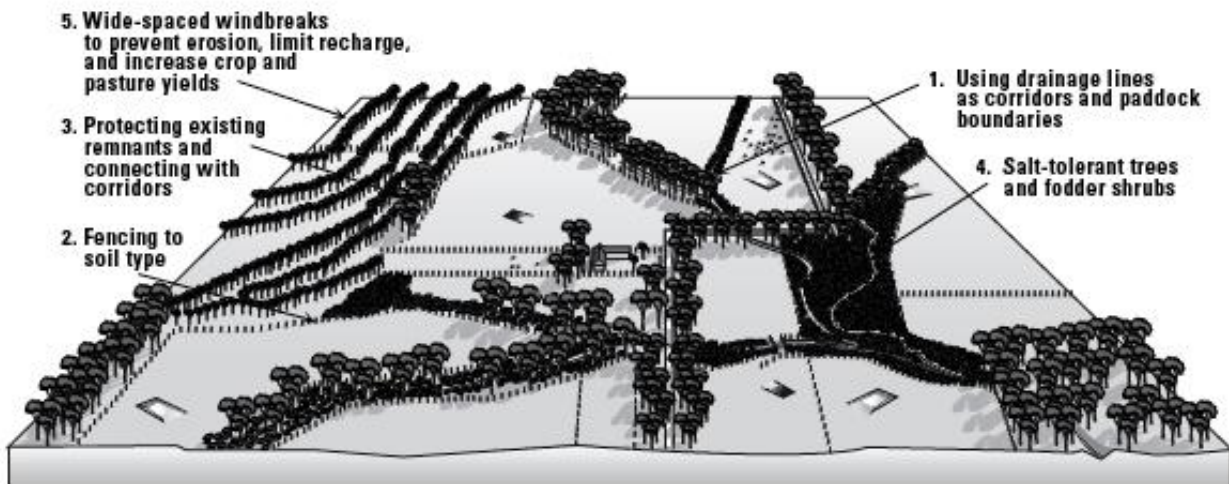
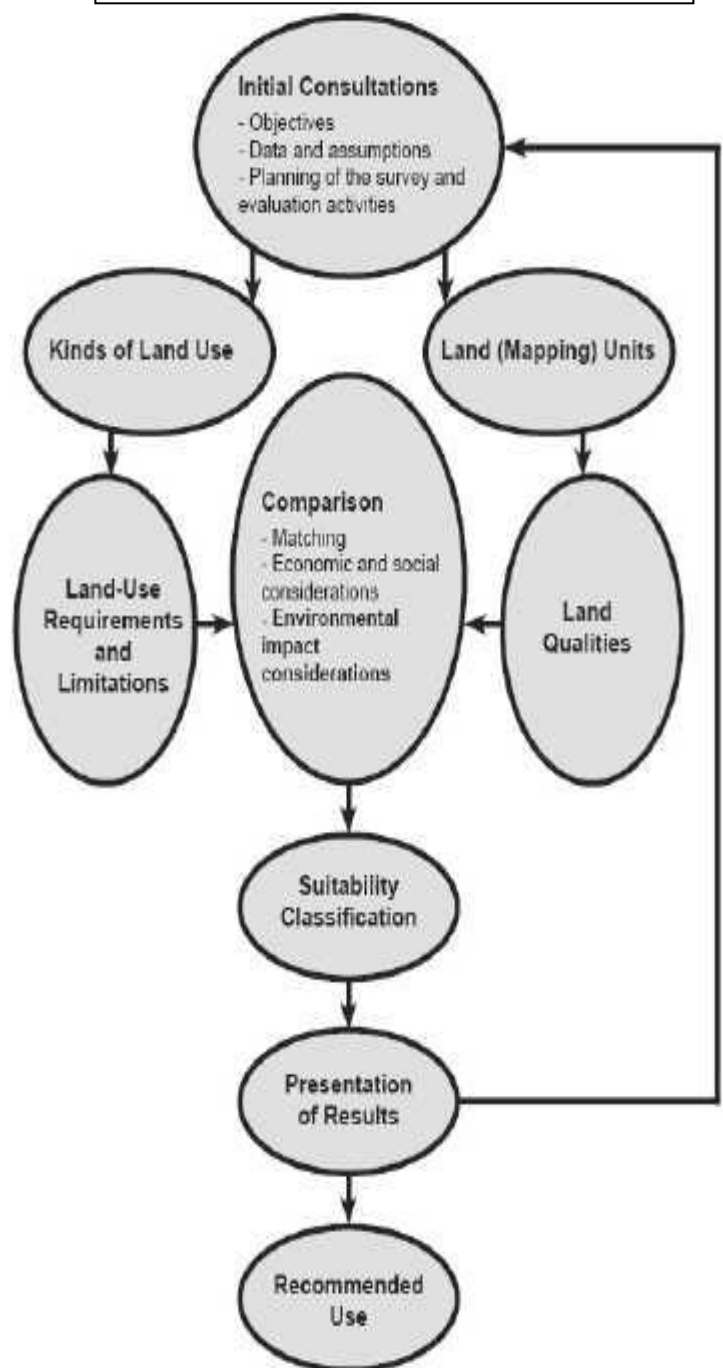


Fig. 3.H Restoration plan, Adapted from Lefroy et al., 1991.

The question regarding ‘copyright’ of approach especially arises when the concepts claimed to be conceived by Lambeck, regarding the use of “focal or umbrella species”, to support other species in landscape restoration (Lambeck, 1997). Fact is that PC since the early start has been working with the concept of establishing supportive ‘guilds’, based on copying such natural supportive species. Sepp Holzer of Austria, one of Europe’s most reknown PC farmers has been using this approach for the past 40 years with great success: Every fruit tree he plants are surrounded with what he calls it’s ‘plant-family’, which will nurture the tree, while attracting/repeling insects, birds etc..

Fig 3.I Schematic overview of L.E. Process by Zonneveld 1995

Another approach to applying the science of L.E is the one depicted by Zonneveld, which seem to be unique within L.E. literature due to the fact that it includes the ‘Initial Consultations’, (presumably with stake holders), and as such mirrors the client interview of the PC design process. It seems clear that the process to a remarkable extend resembles the OBRIEMET process utilized in the PC design, apart from the lack of the practical part: It is noteworthy that the process is a 100% analytical office approach, not including any of the implementation issues, and as such none of the ‘Operational Principles described above, which defines the main difference between such L.E. design approach and that of a PC designer.



3.4.1 Chapter conclusion:

I have not been able to find any evidence that there are landscape elements in the case story PC design that can not also be categorized as ‘Applied L.E.’.

It does appear that a L.E. approach would not have been as integrated; have weighed such creative emphasis on producing a wide variety of crops and functions such as the archery course, etc., despite the mentioning of parameters such as “Economic and Social considerations”. I estimate that the cause of such omissions is that such issues are does not have much awareness within the given faculties, especially as issues such as future oil supplies, and local economy are more suited for geology/ethnology, economic, and social scholars, and that the prevailing background of L.E. planners are within biology/ecology/geography.

It seems clear that the spheres of PC and L.E. rather than being complimentary, are hugely overlapping, and that they could benefit from working closer together, especially as the academic world state a need for more practical experiments and hands on education.

4. Conclusion

... we have to respond, together with all those dealing with sustainable land use planning and development to the demands of the emergent global information society by taking an active role in steering this transition towards such an all embracing, radical change, a revolution for sustainable healthy and attractive global landscapes.

Zev Naveh

4.1: Is Permaculture Design a functional approach to implement “Applied Landscape Ecology”?

It should be clear from the used illustrations as well as the case story, that this is highly possible. This is further illustrated by the following paragraph from personal correspondence with Doc. Zev Naveh.: *“I am very convinced of its [PC] great value for practical landscape ecology, land use and management of this important, advanced and comprehensive way of life and organic farming. It is an important step towards the sustainability revolution and deserves much more attention by us. (Naveh, 2008)”*

In contrast to the research question, this paper actually raises the question “Is Applied Landscape Ecology” researching results of permaculture approaches”?

To this extend, another statement of Zev Naveh: *“In my opinion, PC is a very advanced, holistic land use system, using scientific principles which have much in common with LE ... It would be very worthwhile that landscape ecologists will get acquainted with PC”* . goes well along with the statement of Juno Neiger who clarified *“They are perspectives and fields that inter-relate with different areas of focus”*.

As illustrated one apparent central difference of PC focus of high yield, in balance with maximized energy flows, which seem to have little emphasis among the L.E. practitioners, whom in return seem to favor ability to laboratory analyze elements, -especially so in the ex-Socialist Central East European academic sphere.

4.2: Can multi-functional agriculture include environmental protection?

The saying by permaculturist Geoff Lawton *“You can solve all the worlds problems in a garden”* was exemplified here to use a strategy for applied Environmental Management upon 1 hectare of marginal land to *“apply the theoretical insights and methodological knowledge obtained during ...7th and 8th semester in a real life situation in different institutional and*

cultural contexts” as outlined by the study plan for the 9th semester of Environmental Management.

The PC plan is a fraction of a larger plan encompassing the whole homestead, numerous micro industries and educational initiatives, which in effect have a ripple effect to the wider community. This is achieved by whole system planning, continual reduction of reliance on external input such as fuel, energy, and other resources, while optimizing the resource out-put of the properties and local area. In contrary to the effect of an oil field, a quarry or mono-culture agri-business, the PC approach manages to enhance the local environment, (and aesthetic beauty) while doing so, by creating a series of biosphere islands intercepted by pastures. As the yield of the total system outbalances the input of energy, there is no competition necessary with the non-human elements; they rather support each other to create the optimal balance.

This is largely achieved through adaptation of a technology *planning* approach from abroad, not from a particular country or civilization, but from a composition of well researched techniques ranging from the native peoples of the jungles (species inter-cropping), the oil nut production of Louisiana, syrup production of Canada, wetlands effect in landscapes (everywhere!), eco-tourism in Europe and the swale system developed in Australia. These diverse techniques are arranged together in a pattern, which mimic natural and cultural landscapes of Czech Republic, while adhering to theories of ecological economy (Farley. 2008). The overall system results in a very high-energy production, as each system is supportive to another, rather than contemporary situation where conventional *“agriculture seems woefully inefficient with excess consumption of under-priced resources (fuel, fertilizer, pesticide) and massive losses of soil and water-borne pollutants”* (Reith, Guidry, 2002), as published in Journal of Environmental Management.

Furthermore the proposed strategy is able to be executed without any direct need for public institutional involvement, which as demonstrated in the 8th semester project “Waste to Gold” (Jensen, 2008) was deemed likely to be non-progressive and unlikely to support such endeavors; it will also only effect the existing official documentation for the site marginally (organic certified pasture).

The issue of cultural preconditions has been omitted from this project, partly as a the market of the products predominantly will be found among the 150.000 annual visitors to the nearby castle, which represents a cultural diversity beyond the local area, and partly as this is the aim for the

upcoming Master Thesis of 2009: The effect of applying permaculture planning to the larger area of Bouzovsko; analyzing the approach, possibilities and effect of including local residents in such an effort for a transition to a more sustainable future.

5. Recommendations

The only logical solution of the environmental dilemma constituted by the lack of cooperation between the two independent disciplines, is to meet and learn from each other, the sooner the better.

The Permaculture designers could learn some of the science behind what is implemented, and would be able to learn how to plan for larger watersheds.

The Landscape Ecology academics could learn what it means to implement designs in reality, how to include a maximum of disciplines in order to maximize energy.

An ideal opportunity is at the next IALE conference during summer of 2009, as it occurs only 40. min drive from Europe's best example of applied permaculture as farm management: The Holzer's "Krameterhof". A tour there could inspire all the participants to contact their national permaculture designers, and arrange courses for applied permaculture in connection to the faculties. –As permaculture design also should be applied to the educational approach, the academia has possibility to learn more than just the landscape ecology.

Vice versa for the Permaculture designers; They should approach the universities and try to establish cooperation, perhaps through mutual consultancy of plans and designs, through attending lectures, or simply by studying some of the publicized textbooks.

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Appendix 1) Permaculture Client interview

Design Questionnaire Check List

Note: not every item will be relevant in every design.

Basics

Vision
Tenure etc

Client answers:

Wants

Present outputs

What to keep

View

Produce for home use

What to get rid of
Order of priority

*The 'desert' effect
Slow with limited financial investment
Not anything which require frequent visits, extensive work etc.*

Edible produce:

Kinds of fruit,
vegetables, poultry etc
Quantities required of each

Can be fruits, nuts, berries, perennial herbs, etc which can be integrated in our present production. Final products will be sold in our shop and regionally.

Consider storage & preserving

Other, eg water,
firewood, electricity,
animal feed

I don't believe we can generate energy from the place. It produced 5 big round bales of energy in '07; would be nice that it keep making some grass/hay

Produce for sale

Income required

We aim for self-sufficiency, (and hopefully creating 2 ½ time positions) through our activities with forest kindergarten, courses and agro-products/tourism. Anything to support this overall aim is appreciated

Existing plans, if any

We plan to get a pony, and have a couple of ponies from the neighbors. They should all be able to graze on the area, as well as on other areas.

Other outputs

Beauty

Preferences

As much as possible! ...But in a natural 'wild' way, something which fits in the landscape: No manicured park here!

Viewpoints:

The valley provides our only Southern view; it should remain.

Windows

Lawn/patio

From outside

Can be viewed from all of those, as well as by ½ the village

-Which means we can keep an eye on the ponies!

Play

The hill is used by all the kids in the village for sledging, and we welcome any other play there. We even made a sleight jump for the sledges!

	Numbers	<i>As it is out of our privacy area, it's for all the about 50 kids in the village between 0 and 18. Our forest kindergarten can have max. 11 kids.</i>
	Ages	
	Interests	
	Wildlife	<i>Yes, the more the better, as long as they can't destroy trees, bushes and other elements.</i>
	Meditation space	<i>Might be a nice element</i>
	Education	<i>Ideally a sign displaying the various functions would be placed on the trail on top of the hill</i>
<i>Any other wants</i>		<i>We plan to make a series of archery targets for a 'Field&Track' archery course.</i>
<i>Priorities</i>	Order of priority	<i>Ideally the 'slow starters' (trees etc) will be planted already during spring '09. Other elements can follow gradually as money, time, needs, allows</i>
	Any disagreements	<i>Ideally the neighbouring agro-business will include part of their wetland area so we can make a larger lake, however when we last asked them, they were not interested.</i>
Resources		
<i>Time</i>	For implementation	<i>We are busy building our house, and have many other hectares to take care of. Best is if the work has an educational element and can be done as weekend courses.</i>
	For maintenance:	<i>Best if it's within 1 weekend a year, not including harvest, or dealing with horse related issues.</i>
	Amount	<i>Sporadic describes our efforts best</i>
	Pattern	
	Health	<i>Still going strong...</i>
<i>Skills</i>	Domestic level	<i>We are able at doing most agriculture and processing work, though it is not issues which we have most flair for.</i>
	Professional level	<i>Ideally we'll be able to delegate it to some of our partners, or future employees</i>
<i>Money</i>		
	Amount	<i>About 25.000 czk</i>
	Pattern	<i>When agro donation comes in; likely during summer</i>
	Equipment	<i>We have a small 36hp tractor, 1,3m grasscutter, raking tool, earth auger and haywaggon. In additional we have many hand tools, and our partners have complementary machines and tools, including an oil press for making bio-diesel, which we hope to start making</i>

		<i>soon for our tractor and veteran Land Rover.</i>
		<i>We have a certified commercial kitchen, fruit dryer an industrial mobile juicery and a small organic shop</i>
<i>Any other resources</i>		<i>We frequently host youth work-camps, and are able to host around 35 people in our camp. Hope to make accommodation for eco-tourism and/or up to 18 students.</i>
<i>Off-site</i>		
	Local	<i>We coordinate with a few other organic farmers and there's 150.000 visitors annually visiting the nearby shop; majority drives through our village.</i>
	National	<i>Our web page is well visited and we're part of a few national organic farm networks: Once eco-tourism is a reality we'll join that network too.</i>

General:

What do you particularly like about the site?

The view it gives, that it is free from civilization, but yet close. That it gives dynamics to the countryside by it being sloped.

What do you particularly dislike about it?

Maintenance, as well that it is not generating anything, and that the run-off is not utilized.

Which aspects do you most want to keep as they are?

The dynamics and natural feel

Is there anything you particularly want to get rid of?

...eh; waste of water?

What would you most like to see change?

Include some swales to catch the run off and educate the general public.

For people already working or living on the site:

What things about it work best?

The view...+it provides some hay (though not impressive as it's quite dry, and the bales rolled down into the wetland!)

What things work least well?

Rolling bales in combination with water gathering in the bottom!

Are there any things which might work better if moved within the site?

Yep; either move the water back up, or simply arrange for it to move slower downhill!

 Questioner by Patrick Whitefield, "The Earth care Manual", Permanent Publications. 2004.
 Note that Whitefield declares his approach to permaculture as being limited to garden and landscapes.

Appendix 2) Overview of Clients land South of Homestead



Area in green is the 1 hectare sloped field.

The field on the other side of the tree line is used for production of hay, the lower fields are all certified extensive orchards: One is utilized as alleycropping, another may eventually be used as a primitive caravan parking area. The long skinny line is also orchard and has a continuous foot path from the homestead towards the adjacent village with the castle, Property to right is more intensely managed areas and has sheep pastures. The Homestead is in the top right corner of the image.

Appendix 3) Illustration of suggested PC design for the 1 hectare sloped field.

Pond within the property line (best if expanded)

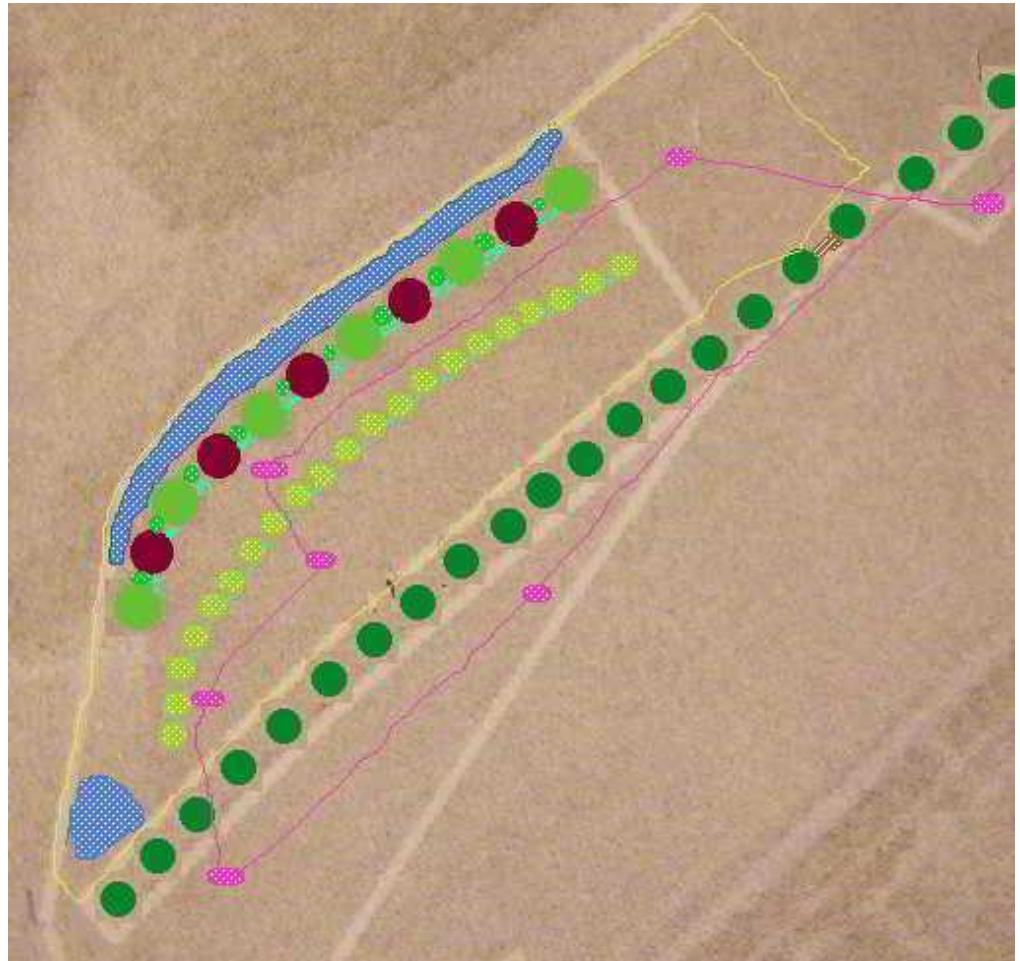
Line of CTT and maple trees with hazel under story, planted under a swale

Line of lower trees on swale halfway on slope.

Field is crossed by archery trail (marked in purple)

An electrical fence surround the field to keep the ponies in (marked in yellow)

Small seasonal water catchment



The long straight line of fruit-trees is already established, and a footpath flanks it on the flat side. A bench with an information poster will be placed at the peak of the hill, near the center for sledging.

The design will generate a nice private area between the two lines where the tall tree line starts, towards the left, above the water catchments. This would be a good area for meditation, perhaps camping a few nights etc.