

Programme

Wednesday 14th

Public lectures:

- 9.15 *Environmental aesthetics*
Professor Allen Carlson, University of Alberta, Canada
- 10.15 *Assessing the potential of museum outreach projects to contribute to environmental management*
Professor Frank Vanclay, University of Tasmania, Australia
- 11.15 *Lunch*
- 12.15 Keynote: *The problem of culture and social life in the paradigm of urban planning- reflections on the development in the Helsinki region*
Docent Matti Kortteinen, STAKES, Finland
- 13.15 *Utilitas as a criterion for appreciating historical buildings*
M.Sc. Arch Miia Perkkiö, Department of Architecture
- 13.45 *Coffee*
- 14.15 *Analysis of sequential spaces, a case study*
Ph.D. (Doctor of Technology in Architecture) Despina Sfakiotaki, Department of Architecture
- 14.45 *Rural community of Nellim as a stage for land use discourses*
M.Sc. Mari Riipinen, Department of Geography

Thursday 15th

- 9.15 Keynote: *Contemporary Aesthetics of Nature and the Requirements of Environmentalism*
Professor Allen Carlson, University of Alberta, Canada
- 10.15 Keynote: *Climate-driven changes in the terrestrial and aquatic ecosystems of the Arctic*
Professor Atte Korhola, University of Helsinki, Finland
- 11.15 *Lunch*
- 12.15 *Environmental impacts on water quality and lake sediments of the Mustavaara mine, Taivalkoski N-Finland*
M.Sc. Olli-Pekka Siira, Department of Geosciences
- 12.45 *The migration and adsorption of contaminants in soil*
M.Sc. Tech. Minna Koivula, water and environmental engineering laboratory
- 13.15 *Potentiality of sustainable non-wood pulping*
M.Sc. Tech. Paula Paananen, Department of Process and Environmental Engineering, Univ Oulu
- 13.45 *Coffee*
- 14.15 *The meaning of home-place and the concept of space in Finnish land-use planning*
MS.c. Aila Ryhänen, Department of Geography
- 14.45 *Structural formation, existence and integrity of rural villages– an international comparative study*
MS.c. Tech. Emilia Ihatsu, Department of Architecture
- 15.15-16 *Poster session (presentations of the Ph.D. students)*

Friday 16th

- 9.15 Keynote: *Environmental discourses in urban planning research*
Dr Kristina Nilsson, Swedish University of Agricultural Science, Sweden
- 10.15 Keynote: *Social impact assessment (SIA)*
Professor Frank Vanclay, University of Tasmania, Australia
- 11.15 *Closing of the seminar*

Poster session:

Water quality changes in the peat-based artificial lake Kuruneva

M.Sc (Tech.) A. Heikkinen Department of Process
and Environmental Engineering, Univ Oulu

Different water basins yield different results from the past environment, paleoecological sequences from a tarn-couple in Riisitunturi Uplands

Phil.Lic. Antti Huttunen, Department of Biology, Univ Oulu

The impact of tourism and reindeer herding on vegetation in Saariselkä, Finnish Lapland: a pollen analytical study of a high resolution peat profile.

M.Sc. Satu Räsänen, Department of Geography, Univ Oulu

Water quality and effects on loading from an artificial lake on a cut-away peatland in the first five years, Hirvineva in Liminka N-Finland

M.Sc. Olli-Pekka Siira, Department of Geography, Univ Oulu

The effects of recreational horse riding on vegetation in protected areas

M.Sc. Anne Törn, Department of Biology, Univ Oulu

Keynotes

Abstracts

CONTEMPORARY AESTHETICS OF NATURE AND THE REQUIREMENTS OF ENVIRONMENTALISM

Allen Carlson

University of Alberta, Canada

ABSTRACT

The aesthetic experience of nature has traditionally been an important factor in grounding various environmental movements, especially involving the preservation of natural environments. However, after its zenith in the eighteenth and nineteenth centuries, serious consideration of the aesthetics of nature went into decline, leaving in its wake a mode of aesthetic appreciation of nature that many contemporary environmentalists have found problematic. Such appreciation has been faulted as anthropocentric, scenery-focused, and in general trivial and subjective. In contrast, the requirements of contemporary environmentalism call for a mode of aesthetic appreciation of nature that is acentric and eco-focused as well as serious and objective. Over the last 30 years, renewed philosophical interest in the aesthetics of nature has spawned a number of different accounts of aesthetic appreciation of natural environments. Very roughly, these accounts can be classified as either cognitive or non-cognitive. Accounts of the latter type help to address the charges that aesthetic appreciation of nature is essentially anthropocentric and scenery-focused, while those of the former type address these concerns as well as the charge that such appreciation is in general trivial and subjective. The cognitive accounts thereby attempt to more fully satisfy the requirements of environmentalism.

CLIMATE-DRIVEN CHANGES IN THE TERRESTRIAL AND AQUATIC ECOSYSTEMS OF THE ARCTIC

A. Korhola

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ABSTRACT

Average annual temperatures in the Arctic have increased by approximately double the increase in global average temperatures during the past 150 years. The direct impacts of global warming include higher temperatures, sea-level rise, melting of sea ice and glaciers, increased precipitation in some areas and drought in others. Indirect social, environmental, economic and health impacts will follow, including increased death and serious illness in poor communities, decreased crop yields, heat stress in livestock and wildlife, and damage to coastal ecosystems, forests, drinking water, fisheries, buildings and other resources needed for subsistence.

The reasons why climate changes get amplified in the Arctic are many. Rising temperatures melt snow and ice and expose more open water and bare ground each summer: these darker surfaces reflect 75 per cent less heat away from the planet's surface and this means further warming, which melts more ice and snow, which reflects less heat, and so on. In addition, the atmosphere is thinner at the Earth's poles, and rising greenhouse gas levels therefore have a more immediate impact on surface temperatures.

During the past several decades, the Arctic has warmed at an alarming rate: in Alaska and north-west Canada, average winter temperatures are up by more than 3°C. This warming trend has had a devastating impact on Arctic ecosystems, including sea ice, permafrost, forests and tundra. Warming has contributed to increases in lake temperatures and open water duration, permafrost thawing, shrub and tree expansion, increased stress on plant and animal populations and the melting of glaciers and sea ice. Research has revealed decreases in both sea ice extent and cover. In summer, across the Arctic, the average extent of sea-ice cover is 15 per cent less than three decades ago. More than two million square kilometres of highly reflective sea ice have been lost, an area eight times the size of the UK.

Various Arctic wildlife populations already have been forced to adapt to changes in their habitats. For example, the retreat of sea ice has reduced the platform that seals and walrus traditionally use to rest between searches for fish and mussels. Caribou are falling through once solid sea ice. Polar bears live on sea ice while hunting their prey and reductions in sea ice due to warming have resulted in shorter feeding periods and decreased accessibility to the seals that they hunt. Arctic lakes have undergone dramatic ecological change in the past 150 years: changes in the community composition of

freshwater algae, water fleas and insect larvae in the majority of lakes reflect the impact of warming (Fig. 1). At the same time, some lakes have totally disappeared from the landscape due to increased evaporation and permafrost melting. The sudden draining could alter entire continental ecosystems, affecting birds and other wildlife that depend on the waterways,

Climate change in the Arctic is expected to affect other parts of the world. The melting of ice masses in the Arctic could contribute significantly to global sea-level rise, and the addition of that fresh water to the salty oceans could change global ocean circulation patterns. Arctic tundra also stores huge amounts of carbon, which could be released to the atmosphere during a thaw, further enhancing the greenhouse effect and global warming.

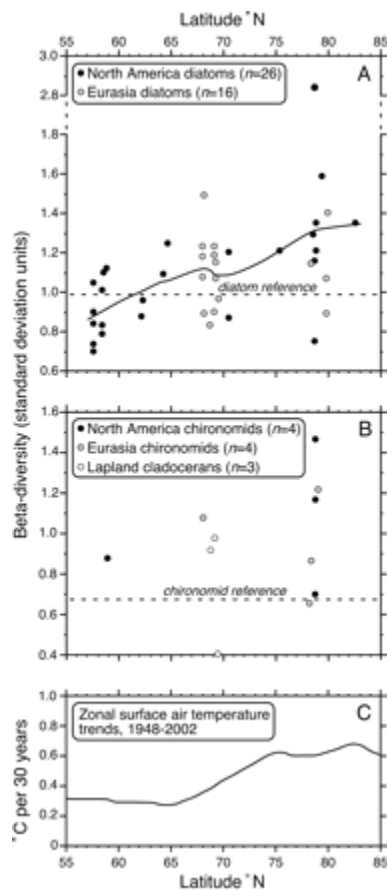


Fig. 1. Trends in beta-diversity of aquatic organisms and surface air temperature across northern latitudes. Latitudinal distribution of increases in beta-diversity values for diatom (A) and invertebrate (B) fossil groups. Horizontal dashed lines indicate mean values obtained from temperate reference lakes. The fitted line in A was obtained by using Loess smoothing with a span of 0.35. (C) Latitudinal warming trend based on zonally averaged monthly mean surface air temperatures from the National Centers for Environmental Prediction/National Center for Atmospheric Research reanalysis for the 1948–2002 interval, which clearly illustrates polar amplification of climate warming (Smol et al. 2005).

Reference

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A MISMATCH:

URBAN PLANNING AND THE CULTURE OF HOUSING IN THE HELSINKI REGION

Matti Kortteinen

STAKES, Finland

ABSTRACT

Traditionally, urban planning - at least in the Helsinki Region - has been focused on the design of the technical-functional structures of cities but, at the same time, motivated by social and, more recently, ecological imperatives. One of the main aims is to prevent the disintegration of the urban structure: dense, high-rise urban constructions along the main public transport lines have been preferred.

Viewed from a sociological perspective this discourse in urban planning seems, however, to be lacking a concept of popular culture, i.e. of the cultural determination of people's thinking (see e.g. Kortteinen 1982 and 2005): people make private but culturally determined choices concerning the housing options available on the markets, and this, again, guides the formation of the urban structure.

According to a representative survey conducted in the region in 2002 (N=10 425), quite a homogenous culture of housing seems to prevail within the population: about 80% of the respondents prefer low-rise detached housing, peacefulness and being close to nature, regardless of their social position or level of education. The mismatch with the tradition of urban planning is obvious.

The tension between these two structures is aggravated by the new conditions of metropolitan growth. (1) The birth of a multi-municipal metropolity (and the resulting inter-municipal competition), (2) the growth of people's wealth in relation to house-prices (and the new options available in the housing market) and (3) new growth of the socio-economic divides among the population in the region (and the resulting feelings of insecurity in the dense high-rise areas) - all this contributes to the new wave of suburbanisation, i.e. in the better-off taking flight to the growing suburban belt. (Kortteinen - Tuominen - Vaattovaara 2005.)

As a result, the tradition of planning - despite its social and ecological aims - seems to be contributing to the growing wave of suburbanisation, and, accordingly, producing the very results it aims to prevent.

According to Raine Mäntysalo (2005) none of the urban planning paradigms after the Second World War seems to find a place for the cultural determination of people's thinking, or for the housing demand based on it. With no underlying concept the culture of housing (and of the housing demand), the planning apparatus has difficulties in interpreting or dealing with the situation. As a conclusion, some sort of reassessment of the ways of thinking in urban planning would probably be needed.

ENVIRONMENTAL DISCOURSES IN URBAN PLANNING RESEARCH

Nilsson Kristina

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ABSTRACT

A main challenge facing spatial planning today is sustainable development, in official documents defined as ecological, social and economic sustainability. In a power perspective these three dimensions can be characterised as competing discourses. Another challenge facing local authority planners is how to work in open processes with a growing number of actors and stakeholders. Altogether this provides a very complex context for local authority spatial planning and its professional planners.

The presentation is based on an investigation of how political and societal activities on European, national and local levels are influencing local authority spatial planning processes. The main research questions were how political visions and objectives regarding sustainable development are managed in local authority spatial planning? And how can the growing number of actors and stakeholders with a wide range of knowledge, interests and values be managed in such complex planning contexts?

Two case studies in Sweden have provided the empirical material. Qualitative research methods have been used in the investigation, semi-structured interviews with the main actors, document studies and observations. The result of the study was an understanding of some the elements and connections in the complex situation facing the local authority planning administrations. The findings are described in terms of competing policy discourses, each of which is related to and managed in different local planning directions. Why some discourses are stronger than others is discussed. Also identified in the study are the problems involved in how the local planning administrations and the planners manage this complexity. These problems are interpreted and formulated as different types of dilemmas related to wider planning issues.

SOCIAL IMPACT ASSESSMENT

Prof Frank Vanclay

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ABSTRACT

Social Impact Assessment (SIA) is a form of Environmental Impact Assessment (EIA) that looks at the human issues associated with the interactions and conflicts between humans and the environment. Because social impacts are directly related to environmental change, and in response to environmental change humans change their behaviour resulting in second-order environmental change, SIA is intimately connected to EIA. Therefore, SIA has to be seen as part of a multidisciplinary problematic. While the field of SIA has been established for over 30 years internationally, it is a fledging discipline in some jurisdictions. This presentation will highlight the key learnings and limitations of SIA. The perspective given will be contemporary, defining SIA as including the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment. The objective of SIA is to ensure that development maximises the benefits and minimises the costs of development, especially those costs borne by the community and often not adequately taken into account by decision-makers, regulatory authorities and developers. By identifying impacts in advance: (1) better decisions can be made about which projects should proceed and how they should proceed; and (2) mitigation measures can be implemented to minimise the harm from a specific project or project-related activity. SIA is more than a technique or tool, it is a philosophy about development and democracy that promotes empowerment and advocates capacity building. SIA considers the pathologies of development (i.e. harmful impacts), the goals of development (such as poverty alleviation or gender equity), and the processes of development (e.g. participation, capacity building).

Oral presentations

Papers

STRUCTURAL FORMATION, EXISTENCE AND INTEGRITY OF RURAL VILLAGES – AN INTERNATIONAL COMPARATIVE STUDY

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ABSTRACT

The research deals with the issues concerning the built environment in rural villages, the physical structure, typomorphology and integrity, as well as the village image and local identity. The expected outcome is to find ways within planning and land use, how to maintain the valuable built heritage that is still left in rural villages while the built environment has become increasingly heterogeneous. One aim of the research is to define the deficiencies in land use procedures, and especially focus on scrutinizing the methods of analysis of the built environment and develop the general tools of analysis in land use planning.

INTRODUCTION

The problems and challenges of today's rural areas are complex, mainly due to the globalisation processes going on all over Europe. From the point of view of the built environment, the main issues are firstly related to the polarization of areas in the national and provincial level. This has led to the deprivation of the deep countryside and centralization of city areas which is still going on. Secondly, on the level of physical structure, this development has on the other hand created scattered urban structure in city regions that are growing fast. Similarly, the remote districts that are losing population suffer also from disintegration of communal structure, when many of the houses and farms are left empty. The consequences of disintegration are related, as well as physical forms of communal structures, to the increase of the costs of commuting and infrastructure, which is untenable, both from the economical and ecological point of view. This development leads also to problems with the visual image of the environment, and disappearance of the built cultural heritage.

The background phenomena creating various challenges also for the physical environment are not similar in different countries in Europe, but the manifestations in built form are however much the same. Rural areas close to local growth centres are turning into suburbs, areas that are neither urban nor rural. The current trends of urbanisation are manifested in the built environment for example through prefabricated element houses with little connection to the local building tradition. At the same time the traditional village structure has begun to deteriorate. Re-integration has been considered as one of the most important goals of communal development also by the Ministry of the Environment in Finland, and there has been seen a clear need to develop the existing means of land use guidance. The objective of this study is to scrutinize the integrity of village structures, tolerance towards change and the factors that produce the quality of the environment. Moreover, my aim is to study the defects of guidance in

our land-use planning system and develop concrete devices for re-integration and especially concentrate on their suitability to village surroundings.

Globalization can be both a possibility and a threat to rural areas. Regions that enable social identification are very important for the development of characteristic local cultures and regional identity, but on the other hand total isolation from international development is also undesirable. What have been proposed as a solution, are development actions of joint operations, where local actors create direct contacts to European level without the hierarchical subordination to the central state level. There are plenty of examples of specialized cooperation of small rural communities in Europe, and in the region of Northern Ostrobothnia the second international cooperation project, called "Heritage at Risk in Rural Europe" by the University of Oulu, Department of Architecture, is a considerable model of the hoped European-cooperation. An international perspective offers a different scale for research of locality, and it gives a possibility to compare the universality of problems; similarly it is possible to study how things have been resolved elsewhere and what we can learn from the practices used. The hypothesis is that the local characteristics and the essence of the village are the basic elements of the environmental quality which can consequently be transformed into attraction factors for the possible rural tourism. Maintenance of the existing built environment can therefore be considered as a point of departure for the development of villages, and historical layers as a rightful part of the village image and new building as a device of infill and re-integration. It is crucial that the villages are able to preserve their built heritage as a living tradition, in a situation where permanence has disappeared and the standardizing pressures of the mainstream culture are prevailing.

RESEARCH OBJECTIVES

My doctoral thesis will deal with the issues concerning the built environment in rural villages, the physical structure, typomorphology and its integrity, as well as the village image and local identity. The research focuses on scrutinizing the village entity mainly from the standpoint of existential character, physical structure and its integrity. The formulation of the research problems is related to the deterioration of the village structure and thereby to the village image. The hypothesis is that with the newer layers of development the spatial and landscape structures of the traditional rural villages have begun to deteriorate. The research problem is related to the deficiencies in the capability of the methods of environmental analysis to identify the essential aspects of the built environment and landscape – there is a need to develop tools in rural environmental guidance, in aspiration to reinforce and support the re-integration and revitalization of the built village environment, and similarly strengthen the factors forming local characteristics, identity and image of the villages.

Structure

The structural order of a village, typomorphology, is inevitably in correlation to the context. It can be understood as a generative order resulted by various causalities. Structures evolve, remain and scatter; by nature the structures are dynamic processes, although the outcome is comparatively static. Likewise it can be defined as organization, coordination and disposition of simple elements. (Bohm&Peat 1992) A village can be comprehended either as a totality, a document of the historical development process, or as a physical and spatial object. The physical structure is always a result of changes; development is by nature incremental, disorganized (coincidental) and accumulated. The growth of the traditional village has been essentially incremental, which means that it has been formed slowly, through small additions and changes to the existing structure. By abstracting and categorising the structural form it is possible to outline the natural directions of growth and get a grasp of the historical formation process. This is quite elementary as a point of departure for land-use planning, which would in a best case safeguard the continuity of the natural formation process.

Existence

Existential philosophy and in particular phenomenology have been used in quite many studies associated with architectural philosophy. It is an approach through which it is possible to form interpretations about the human-environment relationship in its most profound levels, related to our Being-in-the-world. For Martin Heidegger, considered to be the most influential existential phenomenologist, existence, when speaking about human Beings, equals to dwelling. But like any entities, it can be said that villages have also their unique existence. Ludwig Wittgenstein speaks about to levels in architecture, Essence and Appearance, which can be understood as elements of the whole existence. We can consider essence as equal to tradition or origin; essence is the deep structure, which cannot be changed, and appearance is its superficial manifestation. If we make an analogy to a village, it means that the identity, more or less actualized, that ought to be preserved and supported lies at the ontological level. In an ideal situation the outer appearance equals with the inner content, but it is quite easy with negligent or irresponsible actions to alienate the entity from its essence. (e.g. with poor planning). Similarly, it is possible to strengthen the village entity through understanding of its existence.

Integrity

When speaking about the integrity of a village I refer to its degree of entirety, harmony and undividedness. It can mean integrity of a single building, or an entire village. In addition to the physical structure, village image can also be observed from the point of view of integrity. What happens to the integrity of a traditional village when new elements are added from the outside? The built environment has become increasingly heterogeneous due to pressures of mainstream trends in building and other phenomena related to globalisation. It seems that some built environments are more persistent towards alteration than others; especially the Finnish traditional environment is quite sensitive to change, while a Central European village seems able to absorb new layers more easily. New development does not adjust to local circumstances in the same way that the traditional building has been able to adapt through the ages. The question is, in what degree we can replace the substance of a village structure, until it becomes something else than it was, perhaps just a piece of scenery or coulisse.

THEORETICAL PERSPECTIVES AND METHODOLOGY

As its methodological standpoints, the research will comprise descriptive, hermeneutical and normative approaches. Through the descriptive viewpoint the local and the European frames of reference are brought to observation as a context for the village and its characteristics. Obviously we cannot be satisfied with bare explanation on how the world is, so the phenomena that are recognised through descriptive approach, are interpreted and understood within the hermeneutical reflection; through metaphysics, making abstractions and conceptualising the world, it is possible to get nearer to a theory which would be at the same time general enough to enable free creativity, but also precise enough to be able to preindicate forthcoming development. And in order to make theory useful in practice, it ought to be possible to derive normative aspects deductively from the abstract model, in the form of recommendations or methods. Then again it should not be just an attempt to create an abstract model, based on the regularities observed from the world, and give ready-made solutions, like many of the architectural theories have done in the past. Over-emphasized normativity became manifested especially in modernism, which had no interest whatsoever in how the world actually is. (Hillier 1996) Since then the more analytical approach has gained support, and to this my research also attempts to give a contribution.

Towards synthesis

Finding or establishing a good theory of architecture is challenging, mainly because of its demands of being creative and analytical at the same time. Analytical theories are usually comprehended as scientific, positivistic theories, and their competence is measured based on how exactly they can describe reality. In art however, the function of theories is to create possibilities for different variations and forms of manifestation. In architecture, besides the artistic content, there is a need for a predictive aspect as well, concerning for example needs of living or the formation process of a community. (Hillier 1996) This means that an architectural theory needs to be at the same time analytical, to clarify the point of departures, which is the existing environment, creative to be able to give possibilities, and normative to generate order and also to be able to include local social knowledge. In other words, an architectural theory should give the frame of reference on how the world *is*, *can be* and *should be*.

The theoretical content of my research is formulated from the approach of three philosophies of science, which constitute the starting points for the analysis of the built environment. These are existential phenomenology, structuralistic architectural theories and architectural psychology. Different theories emphasise clearly different sectors of the environment, at the expense of the others; like for example, space configuration (e.g. Hillier), visual appearance and environmental psychology (e.g. Lynch), landscape structure (e.g. Rautamäki) or single buildings (historical inventories). Good examples in researching the material reality are the different methods of environmental analysis, which are focused on “enlighten” aspects relevant in that particular case in hand. Depending on the perspective taken, the built environment can be understood for example as *a place*, *physical structure* or *visual affordance*. The objective of this study is that besides architectural theory, the research will take advantage of the theoretical angle of complementary disciplines by applicable parts. All of the theories mentioned above have their advantages and disadvantages:

Phenomenological place experience gives information from the environment through senses (sense-data) and bodily apprehension. According to Edmund Husserl, the *Lebenswelt* forms a basis for all knowing and scientific defining; it is the foundation of our knowledge of reality. (Husserl 1948). The information, or knowledge, gained is interpreted subjectively and in most cases subconscious. That is why it cannot be subjected to concept analysis. For Heidegger, phenomenology is merely a method to investigate the deep structure of experience. Sheer sense-data is not adequate enough to give the required information for the basis of planning recommendations; conceptual analysis with a theoretical foundation is also needed. But in its entirety built environment and in particular architecture cannot be reduced neither into a mere conceptual analysis; something is always “left over”. Problems with measurable and non-measurable features, namely qualitative aspects, are always related to the complexity of it.

As for the structuralistic perspective, the main problem has been the difficulties of applying it to the level of methodology, although it functions well as a theory. A structuralistic viewpoint is related to systems theories, through which the spatial-temporal events are observed. The main question is, whether we can build a model based on systems with abstract principles, like for example on language.

The third viewpoint, related to environmental psychology, has to do with the human-environment – relationship as a cognitive occurrence. The focus of research is on the visual manifestation of the built environment, the appearance. In most cases the methods of analysis have relied on this perspective, but used alone it can remain one-sided and superficial.

However, an approach can be taken, were we think of these as aspects, or viewpoints, of a single totality which is formed of particles. The particles constitute the totality and give it its identity. This also means that the entity itself is not any substance above its constitutional parts. These components have themselves also a structure of an entity or totality, and so on. From the standpoint of research, the relevancy of the standpoints lies on the praxis; it can focus on that entity, which is essential in the

context of a particular case. (Juntunen&Mehtonen1977). Moreover, it is the context of planning practice where the planner has to synthesize the approaches of analysis anyway. But how could research aid the planner in order to give coherence to this synthesis?

On creativity and architectural theories

What I would like to work on in my research, is the concept of creativity in science. This is an approach that David Bohm has dealt with in his writings. He sees the possibilities which philosophy, and in general, creative thinking, can give to science, and vice versa. He criticises paradigms as being restrictive and fragmentary; instead the world should be comprehended as an undivided entity, which is constantly under a process of change, like our knowledge of it. Laying the theoretical grounds of research on perspectives, which at the first glance may seem incommensurable, is challenging; in addition to that, the objective is to find a receipt from the “methodological cookbook” in order to link the theory to the level of praxis and actually utilize it in the planning process. Constituting the theory on both philosophy and science is in great deal a consequence of the complexity of the theoretical understanding of architecture; science can give a picture from reality, which is inescapably partial and analytical. However, experiencing architecture is accordingly inevitably holistic and intuitive. In other words, we cannot control the complexity of a situational experience scientifically. (Hillier 1996).

According to Bohm, sole paradigms (in many cases seen as cosmologies) are limited in their capacity to describe or conceptualise reality. Compared to the world view of the Middle Ages, the modern world is fragmented; every field of research has become more categorised than ever. There is a need for an overall frame of reference, to which single a field of research would be in relation to. A certain kind of openness within diversity, a background, could replace the monolithic unanimity of a paradigm; not however in the sense of ultimate relativism or constructivism, but in a way that researchers could be free from the unconscious consensus which restrains creativity in thinking. Through creative thinking it is possible to bring together parallel approaches, which we have become accustomed to reckon incommensurable. Researchers willingly presume that there can be one theory at a time, which is correct to describe a phenomenon, and they are keen to hold on old viewpoints, at least until the next scientific revolution. But actually there is not any good reason, why parallel theories could not offer alternative, but evenly correct descriptions of the same phenomenon or its features. (Bohm & Peat 1992) Rather the fact is that for example in the case of environmental analysis methods, different approaches have fragmented to treat environment one-sidedly. As a matter of fact they do not have to be incommensurable, but complementary to each other. One practical example of this could be the consensus between theoretical and empirical chemistry; researchers have nowadays acknowledged that both are able to produce exactly the same results, independent of one another. One way to approach the concept of creativity is through metaphors, which according to Bohm enable us to make creative findings in science. Time *is* Space; certainly the most famous metaphor. A philosophical example is given by Jean-Paul Sartre, by declaring that Essence *is* Past. Metaphors are certainly an interesting subject for further research, and they could perhaps be a solution to ease the theoretical complexity of architectural theories – a bridge between science and philosophy.

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THE ADSORPTION AND MIGRATION OF CONTAMINANTS IN SOILS

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ABSTRACT

In this research the migration and sorption of various contaminants in different kinds of constructed soil barriers is studied. The aim of the study is to discover new materials and structural solutions for the bottom layers of landfills for toxic waste and contaminated soil. Also basic knowledge about producing and utilizing the migration parameters and the sorption and migration of contaminants in Finnish soils and conditions is created. The materials in this study are reactive, easily compactable soils, like clays and peats and the contaminants used are heavy metals, organic compounds and for example contaminants included in ashes. The migration and sorption parameters are determined with column, diffusion and batch type tests. The Parameters will be utilized in designing landfill structures, remediation of contaminated soils and creating migration models for contaminants in different kinds of structures.

INTRODUCTION

The purpose of this research is to explore the migration and sorption of contaminants, particularly heavy metals in various constructed soil barriers, like the bottom layers of hazardous waste landfill's and in different soils, like peat and clay. Special attention will be paid to the northern conditions and Finnish soils. Because of the new legislation, like the EU directive of landfills (99/31/EC) and the EU directive on the management of waste from the extractive industries (COM(2003)319) which is being prepared, there is requirement on new material and construction solutions for landfills. The present legislation only presupposes certain maximum water conductivity from the bottom layers of landfill's, but the migration of contaminants can also be minimized by using reactive materials in the bottom layers. Also the conventional materials used in landfill construction, like clay, can have great adsorption capacity and thus the designing of the structures could be specified by paying regard to the sorption properties of the materials.

The aim of the study is to discover new materials and structural solutions for the bottom layers of landfills for toxic waste and contaminated soil. New basic knowledge of producing and utilizing the migration parameters is also created in this study, because the subject hasn't been studied much in Finland or elsewhere. The results of this study can also be utilized in the remediation of contaminated soils, and the results will be used to develop some new methods for example the remediation methods for soil contaminated with lead. The migration of the contaminants in different structures will also be modelled with programs like CTRAN.

THE MIGRATION OF CONTAMINANTS THROUGH SOIL

Contaminants migrate in soil normally with three different mechanisms: advection, dispersion and diffusion. The migration can also be slowed down by adsorption. In advective movement the contaminant moves passively with water the same speed the water does. Dispersion means the mechanical mixing and spreading of the contaminant caused by pores in soil and diffusion means mixing and movement of the contaminant because of the concentration gradient. In compact soils the diffusion can be very notable migration mechanism, because the advection in that case will be slow.

Adsorption, also the restraining of the contaminant, can happen through various mechanisms, like surface adsorption or ion exchange. Many materials traditionally used in hydraulic barrier layers, like clay, adsorb contaminants very well and that's why their adsorption capacity should be taken into consideration when dimensioning the structures.

Besides the medium, also environmental conditions, like temperature, pH and electric conductivity of the fluid affect the migration. Naturally also the properties of the contaminant, like solubility in water affect its movement in soil. This research concentrates on producing diffusion and adsorption parameters for various soils and contaminants and their combinations in different conditions.

THE RESEARCH METHODS AND MATERIALS

The soils used in this study will be reactive, compactable materials, which are commonly used in soil structures, like peats and clays. As for the contaminants, most stress in this study is put on heavy metals, but also organic contaminants and compounds found in ashes, like sulphates and chlorides will be studied. All the used contaminants are commonly found in contaminated soils and industrial and mining wastes. The diffusion and adsorption in soil are studied in different kinds of conditions, so their effects on the processes can be solved.

The diffusion of the contaminants through soil is studied with equipment specially designed for this study. The basic idea of the equipment is similar to the one used in the study of T.Itakura et al. (2003). The diffusion equipment in that study consisted of two water containers and a soil sample that was compressed between porous plates. Some changes have however been made to the equipment so it would better meet the requirements of this research.

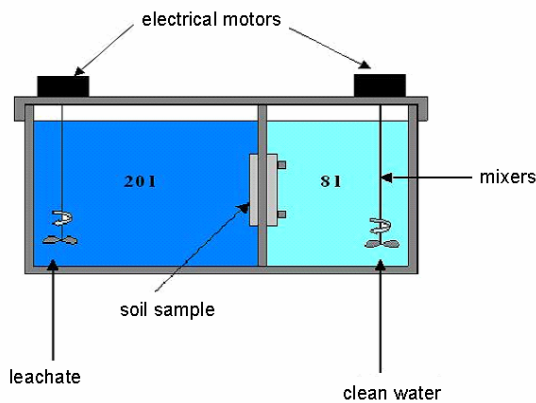


Fig.1. The principle drawing of the diffusion equipment

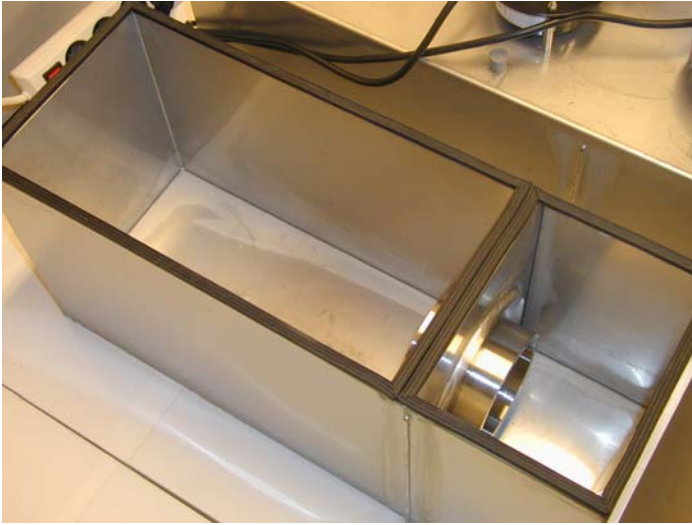


Fig. 2. The inside of the diffusion equipment

Both water tanks of the equipment have a mixer that rotates very slowly, so there will be no streams that influence the diffusion. They keep the water mixed, so that the contaminant concentration in the water mass is even, when the samples are taken. The mixers work with small electric motors. The tank including the contaminant was built bigger than the clean water tank so the research conditions would be similar to those in landfill, where there are large amounts of contaminants and their concentration doesn't decrease. The volume of the bigger tank is 20 litres and the smaller tank 8 litres (fig. 1). The water level in both tanks is even, so there is no pressure gradient and the contaminants can only move by diffusion.

All the parts of the equipment have been made of acid proof steel, so that they could resist strong contaminants and the adsorption to the equipment surfaces would be minimal. On the edges under the equipment's lid there is packing to prevent vaporisation (fig. 2). Also the soil cylinder is fastened so tightly that the contaminants can only go from one tank to the other through the soil sample. 5 ml water samples are taken from both tanks weekly to follow the concentrations.

Adsorption is studied in two ways, with batch type test developed by ASTM and EPA and a column test developed for this study. In the batch type study a soil sample is shaken in a bottle containing contaminated water. After the shaking the concentration of the contaminant is analysed from the water and the adsorbed amount is calculated from the results. The method describes the adsorption of contaminants in uncompacted soil, but it doesn't give straight knowledge about the adsorption properties of an undisturbed sample. (ASTM, 1989)

The adsorption test made in column corresponds much better the real conditions than the batch type test, because the flow of the contaminant through the sample is similar to real situation. In the column test the contaminated water is pumped through the compacted soil sample with constant flow as big as its hydraulic conductivity. The contaminant is fed so long that the sample can adsorb the contaminant no more (fig 3). The concentration of the contaminant solution is known.

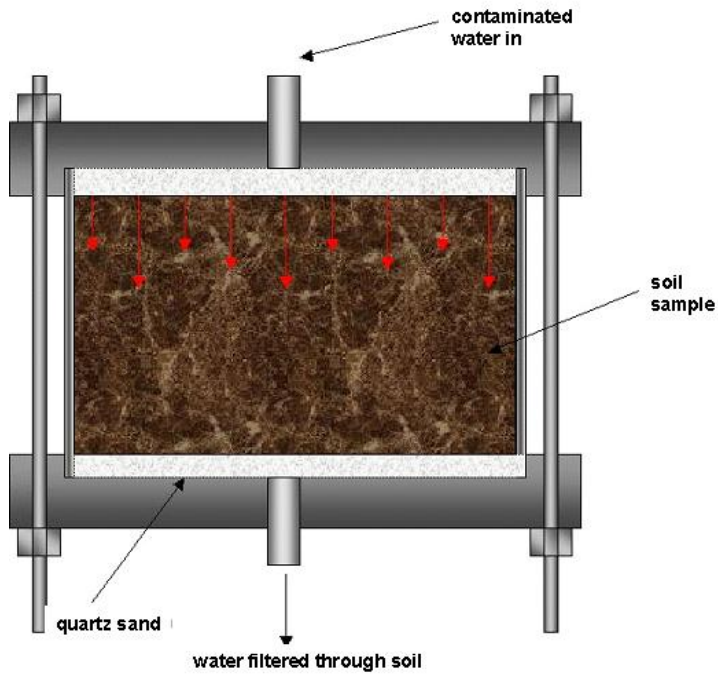


Fig. 3. The principle drawing of the adsorption column test



Fig. 4. The column test in progress

The columns are made of acid proof steel (fig. 4). A membrane filter and about 0,5 cm quartz sand is put on the bottom of the column and also on top of the sample to ensure even spreading of the water. The samples are consolidated into the desired density before the test. The contaminant fluid is pumped

into the columns with Gilson Minipuls3 -pump, which has acid and chemical proof tubes. Before the contaminant fluid is pumped, the samples are saturated with distilled water. The soil samples are 5 cm thick and their diameter is 10 cm.

To determine the diffusion and adsorption coefficients, the results are processed with the long used POLLUTE 6.3.5 -program, developed by R.K. Rowe (T. Itakura *et al.*, 2003). Both the diffusion and the adsorption are taken into consideration in the calculation. Once the migration parameters have been determined, they will be utilized in creating different kinds of migration models with modelling programs like CTRAN and SEEP.

PRACTICAL APPLICATIONS

The migration and adsorption parameters produced in this study can be put in practice in several different places. Some of the most important objects are the bottom layers of landfills. The design of the bottom layers - especially the hydraulic barrier layer - can be focused very much, when the behaviour of the contaminants in the layer is known. On the other hand the material of the layer can also be selected so that it adsorbs best the contaminants found in the landfill in question. That way the landfills can be built not only to be more cost efficient, but also safer and more environmental friendly.

The migration and adsorption parameters can also be utilized for example in the designing of reactive walls. As with the bottom layers, also the material for reactive walls should be selected so, that it adsorbs best the contaminants in question. Also very common materials can be very reactive towards some contaminants - for example peat adsorbs heavy metals very strongly.

The migration parameters can also be utilized in modelling. When the adsorption properties of the material are known, the migration of contaminants in different kinds of structures and even with long time frames can be very accurately modelled with various modelling programs. Thus the designing of soil structures can be focused even more. Also the possibilities to utilize the parameters in the remediation of contaminated soils are studied.

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POTENTIALITY OF SUSTAINABLE NON-WOOD PULPING

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ABSTRACT

Pulping of non-wood fibres, such as straws and reeds, is of major significance in areas with scarce forest resources. The predominant non-wood pulping areas are located in Asia, the most important of them being densely populated China and India. In these countries, heavy growth of paper consumption is expected due to their rapid economic and demographic development. In order to meet the need for paper, Asian countries have increased transcontinental import of market pulp, fibre and recovered paper as well as established plantations, simultaneously leaving plenty of lignocellulosic agricultural residues under-utilised. The major technological obstacles to non-wood pulping result from severe difficulties in chemical recovery. In consequence, the prevalent alkali non-wood pulping technologies have caused overwhelming environmental pollution. New technologies are needed to achieve sustainable non-wood pulping.

INTRODUCTION

Worldwide pulp production increased by 25 % during the years 1993-2003, of which 70 % was due to the increasing production of recovered fibre (Figure 1). In China, over 84 % of domestic virgin pulp production utilized non-wood fibres in 2003. The corresponding proportion of total pulp and board production was 30 %, being approximately half of that in 1990 (Zhong 2004). The growth of production derives from the marked increase of paper consumption in emerging markets, such as India, China, Middle East and Eastern Europe. This increase is due to the rapid economic and demographic development, nevertheless, depending on the promotion of political stability in these areas (Bergroth et al. 2005). Currently, the per capita annual paper consumption rates in China, India, the whole world and the western world are 34 kg, 5.5 kg, 52 kg and ca. 200 kg, respectively (Zhong 2004, Jain et al. 2005).

In order to meet their 6-8 % rise in paper consumption, China and India have increased their imports of pulpwood, secondary fibre and market pulp (Oinonen 2002, Jain et al. 2005). The net trade in industrial raw wood has required the establishment of new plantations (Simula 2002). Moreover, it has been reported that a 6-8 % average annual increase in wastepaper imports is expected in the near future in

China, while the target in domestic wastepaper recycling will increase to 35-38 % by 2010 (Zhong 2004).

NON-WOOD FIBRES AS PULPING RAW MATERIAL

Globally, more than 2.5 billion tons of non-wood material is available annually, of which approximately 1 % is being currently utilised (Atchison 1996, Rousu 2003). Agricultural residues account for 73 % of worldwide non-wood pulping, whereas naturally growing plants, such as reed and bamboo, constitute 18 % of the pulping capacity. The rest of non-wood pulp production utilizes mainly industrial crops. Agricultural residues consist of wheat straw, rice straw and sugar cane bagasse. Long-fibre non-wood species, such as jute, hemp, kenaf and flax, are classified as industrial crops (Paavilainen 1998).

The pulp and paper-making properties of non-wood materials depend on their morphological, fine-structural and chemical properties as well as on the correct selection of pulping and bleaching conditions (Paavilainen 1998, Rousu 2003). The decisive characteristics of non-wood materials are their high concentrations of silica and ash. In the current alkaline pulping processes, silica dissolves into the cooking liquors during delignification, significantly disabling the recovery of chemicals from the black liquor (BL). Discharge of untreated BLs has caused enormous environmental pollution in watercourses. Simultaneously, energy has been lost in the form of dissolved organic matter.

Nevertheless, the indispensability of non-wood fibres as pulping raw material is concrete in areas with insufficient wood resources. The rapid development and growth of population have led to heavy deforestation in Southeast Asia. Forests have been cleared at an annual rate of 2.3 million hectares (Kim Phat et al. 2004), while only a minority are used for industrial purposes. Moreover, the cutting of native forests has caused erosion and flooding.

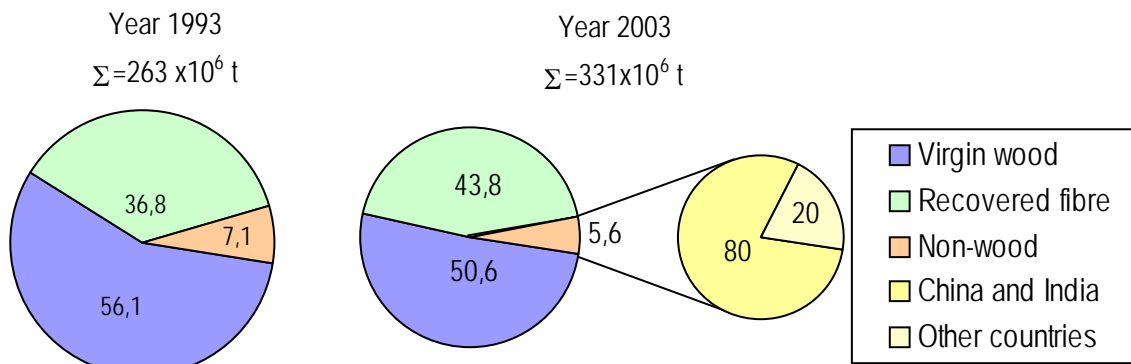


Fig. 1. Worldwide virgin and recovered fibre input percentages in pulping and the predominant production of non-wood fibre in Asia (FAOSTAT 2005, Atchison 1996, Paavilainen 2000).

ENVIRONMENTAL AND ECONOMIC CONCERNS RELATED TO CURRENT NON-WOOD PULPING AND CHEMICAL RECOVERY PROCESSES

Besides being due to technological difficulties, inadequate chemical recovery and environmental care are also due to the small average size of non-wood pulping mills. Most mills do not exceed an annual capacity of 20 000 air-dry tons of pulp (ADt) (Paavilainen 1998). The majority of small-scale non-wood pulping mills have been producing pulp mainly for low-grade products with outdated machinery and merely for local or regional demand, thus remaining uncompetitive on the global market (Jain et al. 2005). In China, 60 % of domestic paper and paperboard production consists of low-grade products, while the demand for high-grade products is expected to rise much more rapidly (Cao 2000). Yet, with suitable pulping process and equipment, straw and reed pulps are competitive with hardwood pulps in quality and feasible for use in high-grade paper products (Paavilainen 2000). Generally, investment in environmental quality has been economical only in larger mills (Paavilainen 1998, Covey et al. 2005). Due to raw material logistics, however, non-wood mills cannot equal the capacity of the largest up-to-date wood pulping mills (Edelmann et al. 2000). Solutions for establishing cost-economic raw material logistics have included the integration of pulp mills with wheat or sugar mills.

In both China and India, the shift from a planned, closed economy towards open markets and, finally, membership in the World Trade Organization (WTO) has tremendously changed the production policies of paper industry (Jain et al. 2005, Cao 2000). Along with product quality and customer satisfaction, the significance of environmental issues has been increasingly recognized. In 2001, it was reported that, out of the 111 registered agricultural residue pulping mills in India, only six had installed a chemical recovery unit, while the rest were discharging BLs without adequate external treatment (Gupta et al. 2001). In China, approximately 85 % of pulping effluents were discharged untreated at the end of the 1990's (Cao 2000), and only the largest mills had a chemical recovery unit or an effluent treatment system (Edelmann et al. 2000). Since that time, over 4000 small, inefficient and highly polluting non-wood pulping mills have been closed (Zhong 2000). In compensation for the lost capacity, the pulping of secondary fibres has substantially increased (Cao 2000).

In recent years, significant technological progress has been made in the enhancement of alkali delignification, black liquor de-silication and chemical recovery technologies (Edelmann et al. 2000, Feng and Alén 2001, Jain et al. 2000, Kulkarni et al. 1999, Myrén 1998, Gupta et al. 2001, Saroha et al. 2003, *see* Paananen et al. 2005). However, this development has not been able to provide a profound and cost-efficient solution to the silica problem (Zhong 2004). In comparison to wood-based pulping, silica removal remains an add-on process, which burdens the competitiveness of alkaline non-wood pulping (Covey et al. 2005).

In addition, completely new pulping processes based on delignification by organic solvents have been developed. The following solvents have been used: formic acid, peroxyformic acid, acetic acid, ethanol, methanol, acetone, etc. (Jiménez et al. 2002, Kham et al. 2005, Ligeró et al. 2005, Rousu et al. 2002, Shatalov & Pereira 2005, Sun et al. 2004). In acidic cooking, dissolution of silicates is hindered, and chemicals can be recovered by thermal separation. Currently, the design of the first commercial-scale organosolv pulping mill with the Chempolis[®] process is complete (Anttila et al. 2005). The Chempolis[®] process involves delignification by naturally sulphur-free solution of formic acid and water, completely chlorine-free (TCF) bleaching and energy self-sufficient recovery of chemicals and water, which results in eco-efficient production of high-grade pulp and paper (Anttila et al. 2005).

DISCUSSION

The potentiality of sustainable non-wood pulping is closely related to several important issues: the balance between fibre supply and demand, avoidance of deforestation and overseas transportation of raw material, utilization of agricultural residues and successful technological development of pulping processes (Table 1). In general, non-wood materials are abundantly available worldwide. They have a high growth rate and adaptability to various soil types. By utilizing straw material, the eco-efficiency of agriculture could be increased. Moreover, especially Europe has struggled with over-production of food crops, and farmers are encouraged to grow non-food crops (Chaudhuri 1995). In the Nordic countries, too, the changes brought about by the European Union and intensified agriculture have diminished the number of farms. Cultivation of non-wood fibres could promote the sources of livelihood in the sparsely populated rural areas and also help centrally located farms to remain active.

Table 1. Positive inherent characteristics and difficulties of the current state of non-wood fibres and pulping as evaluated with respect to sustainability.

Inherent characteristics of non-wood pulping with respect to sustainability	Difficulties in current non-wood pulping with respect to sustainability
<ul style="list-style-type: none"> - Renewable and abundant raw material with a high growth rate and adaptability to various soil types - More eco-efficient agriculture due to agro-residue processing - Less pressure for <ul style="list-style-type: none"> o Deforestation o Cutting of rain forests and old-growth forests o Establishment of plantations - Possibilities for <ul style="list-style-type: none"> o Pulp- and paper-making from local fibres o Alternative forms of agriculture especially in Europe - Prerequisite being extensive technological development 	<ul style="list-style-type: none"> - Difficulties in the chemical recovery of pulping liquors derived from alkaline processes, resulting in <ul style="list-style-type: none"> o Energy and material losses o Inadequate recycling of chemicals o High chemical oxygen demand (COD) loading due to the discharge of dissolved material o Use of fossil energy sources containing sulphur - Use of chlorine-containing chemicals - Impaired cost effectiveness due to add-on silica removal processes - Problematic raw material logistics if not integrated with e.g. a wheat or sugar mill

Currently, the production of biomass crops for the generation of bio-energy and the production of biofuels, such as biogas or bio-ethanol, are gaining extensive global attention. The European Union has included in its energy and climate policies a targeted bio-energy level of 10 % out of the total energy supply in 2010, which implies a substantial growth compared to the share of 4 % in 1999 (Faaij 2004). Concerted actions to promote the utilization of agricultural residues for pulp and paper production could be profitable and also well justified if derived from the principles of European waste management legislation, which clearly points out the aim of using waste primarily as material and secondarily as a source of energy (EEC 1975). Moreover, pulping processes usually involve combustion of the non-fibrous part of the biomass for energy co-generation.

Increased non-wood pulping would facilitate the pulping of local, renewable fibre materials and reduce the demand for overseas transportation of large quantities of unprocessed raw materials. Furthermore, it would help to diminish the dependence of the developing Asian countries on imported resources. There is a pressing demand for new fibre resources in several parts of the world. China has already banned all timber felling in native forests (Cao 2000). In India, plantations account for half of the forest area, and

paper industry is prohibited to use the national forest reserves (Jain et al. 2005). Globally, the cutting of tropical rain forests and northern old-growth forests is deemed undesirable by both paper industry and environmentalists.

The bottleneck of sustainable non-wood pulping has been the alkaline pulping technologies and the obsolete machinery. Despite intensive research and development of alkaline pulping, new technologies are needed to reliably overcome the problems due to the chemical composition of non-woods. Outside investments are required in order to modernize and enlarge the scale of operations and simultaneously to raise the environmental and total quality of products (Jain et al. 2005). In conclusion, the inherent attributes of non-wood fibres, including their local and temporal availability as well as their renewable nature, are significant factors in favour of sustainable pulp production.

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UTILITAS AS A CRITERION FOR APPRECIATING HISTORICAL BUILDINGS

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ABSTRACT

Respecting historical buildings, preserving them as well as considering them as “a basis” for future environment and townscape is a normal phenomenon today. The different aspects of architecture, its purpose and the criteria for evaluating historical buildings often contradict each other, especially when the old function has become obsolete and to survive building has to be re-used. Specifying the role of architecture and its meaning in relationship to the preservation of historical buildings are essential prerequisites as well as considerations of authenticity.

INTRODUCTION

The new functions of an historical building to be preserved and the related problems are an ever topical issue. The older the building, the less likely it is still used for its original purpose. Even when the original function is retained, there is nearly always a need to improve the technical infrastructure. In order for a building to be preserved, it should be in continuous use. There are very few buildings that continue to exist regardless of whether or not they are used. In Finland, for example, the medieval churches and castles are part of the cultural heritage entitled to unconditional preservation.

Utilitas – usefulness, functionality – seems to be a necessity even for historical buildings. Still it has appeared to be painful to find satisfactory solutions when deciding new uses for historical buildings as well as appreciating them. Specialists on preservation of built heritage are used to using criteria like ‘stylistic integrity’, ‘historically or cultural-historically valuable’ when evaluating historical environments, often forgetting the wholeness of architecture including functional aspects as well. Aesthetic and historical facts have been accentuated also by modern conservation concepts and practices.

The questions arisen are ethical like ‘is it acceptable to re-use historical buildings’ or ‘does a historical building lose its value when the original function is changed into a new one’. When discussing *utilitas* as a criterion for appreciating historical buildings, one of the key questions is the concept of authenticity. Authenticity should be considered as a main aspect both when evaluating historical buildings and when restoring them.

THE TASK OF ARCHITECTURE AND UTILITAS

Vitruvius’ trichotomy *firmitas, utilitas, venustas* – written more than two millennia ago - is still present in architecture manifesting its essence. *Venustas*, esthetics, and *firmitas*, solidity or durability, are just as central as *utilitas*, the functional aspects of use and utilization. In restoration, *utilitas* represents all functional factors, including re-use (Carbonara 1997).

These three qualities are always present in architecture, though their manifestations and details have varied in different styles and periods. Also the order of their appearance has changed throughout history. Likewise the ways in which function and its relation to the other elements of architecture have been understood and implemented in practice have varied.

In architecture the main task is to respond to human needs. The idea of the priority of function and rationality in architecture arose with modernism. Functionality is one of the most central issues advocated by modern architecture. Although the Modern Movement was basically motivated by rationality and belief in scientific analysis, architecture was also to be aesthetic. Humans have a longing for beauty, which is a consequence of geometric basic forms and functional relevance, claimed Le Corbusier, crystallizing his thoughts saying, that “when a thing responds to a need it is beautiful” (Le Corbusier 1960). In architecture, the function of the building is a response to the ultimate question of architecture and buildings: why does a building exist? The building is primarily a shelter for functions. It meets human needs.

Attitudes and goals are also implicit in the word “functionalism”. However, already in the 18th century for Carlo Lodoli (1690-1761) - a Venetian Franciscan friar and professor of architecture – the right function and the representation were the two scientific objects of architecture. Without truth, un-analogical and separated from function there is no beauty in architecture (Memmo 1786).

Due to functionality architecture differs from other forms of art. It has been stated for example by Hans Georg Gadamer. According to Gadamer, a work of architecture extends beyond itself in two ways (Gadamer 1989). At the same time the architect’s plan is defined by its purpose to serve a certain way of life as well as by its context and architectural circumstances. A successful building fulfils its purpose and integrates well into context bringing something new to the spatial dimensions. “Through this dual ordering the building presents a true increase of being: it is a work of art”, says Gadamer. “For being a work of art the building has to represent the solution of an architectural problem” (Gadamer 1989). Gadamer also underlines the importance of the original situation and the intentions of the ‘building problem’ when the original purpose has been altered. Gadamer’s philosophical aspect includes the true meaning of architecture both as a work of art and as an object meant to ease people’s life: “Where the original intention becomes completely unrecognisable, or its unity is destroyed by too many subsequent alterations, then the building itself becomes incomprehensible. Appreciating architecture cannot be based only on aesthetic criteria. “A building is never only a work of art. Its purpose, through which it belongs in the content of life, cannot be separated from it without its losing some of its reality. If it has become merely an object of aesthetic consciousness, then it has merely a shadowy reality and lives a distorted life only in the degenerate form of a tourist attraction or a subject for photography”. Buildings, even the historical ones, need a function – in many cases different from the original one - to be architecture.

THE AUTHENTICITY OF ARCHITECTURE AND *UTILITAS*

Authenticity is often accompanied by the demands imposed by materials and building technologies. Local traditions and materials as well as existing context lay behind the works of regionalists’ in the early 1970’s. Global problems and catastrophes are today’s reality. As far as sustainability is concerned, it is essential that we attempt to reduce the amount of energy utilizing energy saving

architectural solutions, materials and constructions. Applied to present day both the Lodolian demand for rationality and Gadamer's demand for necessity and integration into context provide the means for examining these aspects. Building which according to its purpose serves users and society, improving its environment and integrating into it, can be called authentic. What will happen when the original function is changed into a new one, does the building lose its authenticity?

The concept of authenticity in architecture should be extended to accepting and recognizing the passing of time and adapting the buildings to new situations. It is not necessary and right to define the authenticity of an historical building by basing it only on its past. In addition to the history of the building and its context, authenticity is sincerity towards its origins, intentions and function. Is the authenticity of architectural design at risk when the original function is altered? The need to adapt the new function to the existing building is one of the most crucial and most difficult tasks in view of architectural preservation. Still, being the main task of architecture, wouldn't it be even wrong not to do so?

PRESERVING HISTORICAL BUILDINGS AND *UTILITAS*

The problem of re-using historical buildings is not of recent origin. Eugène Emmanuel Viollet-le-Duc (1814-1879) pointed out that satisfactory use of the building is a prerequisite for its preservation (Carbonara 1997). Belgian Louis Cloquet (1849-1920) – likewise the Italian Gustavo Giovannoni (1873-1947) - divided monuments into living and dead ones, using functionality as a criterion (Carbonara 1997). Giovannoni also commented on the re-use of monuments as follows: “If the new use of a building is in harmony with its original use and does not threaten to alter it, to hide its forms or to destroy it, the re-use is welcome ... to ensure the preservation of the monument” (Giovannoni 1931). The only way to guarantee the preservation of monuments and significant buildings was to make them functional and to arouse local people's interest and attraction towards them. According to Alois Riegl's (1858-1905) theory of value, use value (*Gebrauchswert*) is one of the present-day values (*Gegenwartswert*) satisfying contemporary physical needs. In order for a building to remain in use, it must be taken care of and maintained, which often also necessitates changes.

The Venice Charter of 1964 was the first declaration to take a stand on the potential re-use of historical buildings. It is said in its fifth article: “The conservation of monuments is always facilitated by making use of them for some socially useful purpose. Such use is therefore desirable, but it must not change the layout or decoration of the building. It is within these limits only that modifications demanded by change of function should be envisaged and may be permitted”. The Amsterdam Declaration of 1975 on the European Architectural Heritage invited attention to more complex phenomena, such as the impact of changes of function on the environment. In 1985 in Granada (Convention for the Protection of the Architectural Heritage of Europe) it was pointed out that the modification of old buildings for new uses is acceptable in certain cases. Such modification should acknowledge the needs of modern life, and the restoration should be done with respect for the architectural and historical qualities of the building.

It is generally acceptable to re-use a building if its old function has become obsolete. While choosing the new function, it is important to respect the nature and special qualities of the building. According to conservation philosophies economic utility, age or uniqueness cannot be the sole criteria for decisions concerning the fate of a building. Even a relatively new design of cultural-historical and artistic value deserves to be protected. We can thank Italian Cesare Brandi (1906-1988) for this critical

attitude towards monuments and their conservation. Brandi also pointed out that the function of a building, which consists of the individual and communal human needs applied to the building and its environment, differentiates architectural heritage from other manifestations of art (Brandi 1977). For Brandi conservation does not, however, mean that the building is made functional or its functionality is restored. According to conservation theories changes related to re-use and the content of *utilitas* are merely one aspect of conservation, but never the primary or crucial one (Carbonara 1997).

UTILITAS AS A CRITERION FOR APPRECIATING RE-USED HISTORICAL BUILDINGS

Function largely determines the language of form and the allocation of space in a building. Hence, the central role of function is one of the key attributes of architecture. The exterior of a building tells many things about its interior and functions; function is reflected both in signs and in the form and materials. In the Bauhaus school in Dessau, for example, each of the different functions is placed in a different part of the building. A similar hierarchy is obvious in old industrial buildings and areas. The different stages of a process are often discernible even in a town plan. The Sunila industrial area designed by Alvar Aalto is a good example. At Sunila, the industrial wood-processing complex is located next to a large residential area with services for the workers.

In many cases it is easy to understand the conflict between the re-defined function of a building and the architect's original intention. In the worst cases the new use inevitably alters not only the original functions of space allocation and mass layout, but also the relation of the building to its context. Of great importance, when re-using historical buildings and giving them new meanings, is not to destroy the original intentions.

Buildings and environments, regardless of their age, need to enable and support human life and respond to human needs. The continued presence of human activity helps a building to be preserved. On the other hand, we also need to anticipate changing needs in the future. The new use should be compatible with the existing structural elements in their current condition. For this to be possible, the central feature of architecture and its primary task to serve human beings should be recognized.

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RURAL COMMUNITY OF NELLIM AS A STAGE FOR LAND USE DISCOURSES

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ABSTRACT

Local land use is confronted by national and global interests and values. This is evident in the remote communities in Finnish Lapland. In the state level the national decision makers and politicians set institutional practices by which people have to act and by which they can use the land in a certain area. Many of these decisions are linked to global level ideologies and agreements. The values of local people aren't always content in the non-local decision making. However the consequences of non-local politics, economics, land use justification and environmental problems are situated in local contexts and experienced locally by local people. Land use has received an important role in communities' survival in the northern part of Finland in Lapland. Sometimes local communities try to get their perspectives noticed in non-local decision making. However there are often competing discourses on the land use justification within peripheral communities.

INTRODUCTION

Land use is controlled by local, national and global processes, politics and discourses. In each scale there are different ways to justify certain type on land use. On national level the legislation on land use and building, nature conservation, environmental impact assessment, roads and the use of waters etc. are regulating the actions people in Finland. These laws are affected for example by the Rio de Janeiro agreement on sustainable development, the Kyoto protocol on greenhouse gas emissions or EU directives. On local level land use is regulated by the legislation mentioned but also by local peoples' shared or differing perspective on what is justified. Land use has received important role in peripheral communities where the local livelihoods are dependent on the surrounding environment. Examples on these kinds of communities can be found in the northernmost Finland where main land users are forestry, nature conservation, reindeer herding and tourism. However the land use of northernmost Finland has its meaning also to national and global actors.

The perspectives on land use may be conflicting in different levels. Global actors may see the significance of the local nature as part of the global environment whereas local people perceive land use essential for their livelihoods. Manifestations of these different kinds of perspectives can be interpreted as requirements on justified use of the environment (Lehtinen 2003). The symbolic meanings given to the surrounding physical environment have great importance on local peoples' perspective on justified land use. Research on land use and on the justification on land use can be linked into the research on human-environment relationship.

In this study human environment relationship is discussed within a northern local community of Nellim in Finland. The study shows how local perspective on land use and on its justification is manifested in local land use discourses. The main research question is who has the right to decide on land use and why? In this study the discourses presented are actually ways to justify land use in the village of Nellim. Conflicts between these discourses within the community are also discussed. In

addition the linkages of these local discourses to the discourses on non-local (national and global) level will be explained. This is a study on one local community, but it contributes to understanding how peripheral local communities are coping in the contemporary global world. The importance of Arctic local communities is significant, since they are maintaining ties to traditions and in the economy of the region (see Aarsæther *et. al.* 2004: 139). Therefore before deepening into the local land use discourses in Nellim one should briefly consider the theoretical foundations of contemporary local communities and the formation of discourses.

DISCOURSES IN CONTEMPORARY LOCAL COMMUNITIES

Local communities as a place, localities or local identities have been studied in geography for decades. In rural studies and in community research geographers have been interested in social development processes and their outcomes since the 1970's. As a critic for positivism researchers wanted to understand the nature of rural communities as part of larger societal development (Paasi 1991a: 228). During 1980's research of local communities were in the core of the *locality* discussion (e.g. Smith 1987; Cooke 1989; Duncan 1989; Massey 1991). Special interests were in the definition of locality as well as in their economics and politics (see Harloe *et. al.* 1990; Vartiainen 1992).

Community is often understood as defining local social relationships that are outside the family or home but more intimate than anonymous institutions (Crow & Allan 1994: 1–2). In cultural geography local communities are usually researched as regions or areas that are shaped in the minds of the local people (Paasi 1991b: 301-302). However defining a community as a regional unity may be problematic. Where and how to draw the borders around a community? Local social relationships vary territorially within the community. Who then has the right to define the boundaries? Even if the geographical borders of a community are difficult or impossible to be draw, usually community can be seen as a phenomenon that is attached to a location. Shared local identity is the foundation for local communities and for their cohesion. Relph (1976:34) has highlighted that in the relationship between community and place each reinforces the other and in this relationship landscape is an expression of communally held beliefs and values and interpersonal beliefs. Also Agnew's (1987) definitions on location, locale and 'sense of place' are important when considering the foundations of local community. Local communities are located somewhere, they have material settings for social relations and people inside the community give subjective and emotional meaning to the place.

However local identity and the existence of communities' place attachment have been contested. For example Massey (1994) argues that identifying place with community is a misidentification. She points out that community may exist without being in the same place and places housing single communities (in sense of coherent social groups) are rare. One should also note that Relph (1976) states that place in deeper sense need not have any fixed location (Creswell 2004). Yet there are many critical and feminist geographers that have seen spatiality as part of identity formation where especially the politics of the place play an important role (see Paasi 2003 sit. Keith & Pile 1993; Rose 1995; Watts 1996; Pile and Keith 1997; McDowell 1999).

Identity formation is a social process and identities are always formed in relation to *others* (matters and people). In other words identity building is mainly defining how *we* differ from *others* (see Hall 1999). According to Castells (2004) identities are constructed by history, geography, biology, institutions, common memory, personal fantasies, power mechanisms and religious experiences. Each individual or social grouping arranges and processes these building blocks and their meanings in their social relationships and by their cultural background (Castells 2004:7). These social relationships and cultures are attached to social and spatial structures and social relations are always spatial (Harvey 1996). Also local identity is formed by these socio-spatial relationships. Local identity gets its unique formation, because of the meanings that are given and attached to a place (e.g. Harvey 1996). Local

surroundings as such do not produce certain type of behavior or produce certain type of identity (Castells 2004: 63-64), but the meanings that are given for example to a lake or a forest that surrounds the community define local identity. Meanings and experiences that are related to certain place form part of collective territorial (local) identities and shared traditions. These become part of individual's spatial history and therefore part of his/her identity.

However community cannot be seen as a harmonious unity, since it is formed by heterogenic social groupings that have different interests concerning the location (Urry 1990). These so called interest groups may also cause tensions within a community. Community with its social groupings, networks and possible tensions shape the thoughts and behavioral patterns of the people that belong to the community. Nevertheless people who live in one location do not have identical experience of the locality. In contemporary world the foundations of communities are not only local since the global mobility of information, people and things are present in each locality. However for example Harvey (1996) stresses that the significance of place has increased because of the time-space compression. Place, locality or the physical surroundings of a local community have increasingly important role to the local people. Because local people have multiple experiences of the world and have given multiple meanings to local surroundings, there are simultaneously "competing" discourses on land use on one local community.

The local discourses, that will be discussed shortly, are representations on the local level understanding on the reality of land use. These discourses indicate how power on land use is spread and used but how it is also questioned in the community. Discourses are ways to think, talk about and present a topic or a target (Hall 1999). Discourses are one kind of "common beliefs" on a topic. They include certain rules or rather norms on how a topic should be discussed (Foucault 1982). Discourses change in time and place and they are ways to understand reality in certain time. Local land use discourses in Nellim are ways to justify certain type of land use within that contemporary peripheral community. However these discourses are not formed in vacuum on local level. Discourses are affected by non- local institutions, structures and ideologies.

LAND USE JUSTIFICATION IN LOCAL DISCOURSES IN NELLIM

The empirical part of this study was carried out in the village of Nellim, which is situated in the northernmost Finland in Upper Lapland. Nellim, village of about 200 inhabitants, lies in the end of a road close to Russian border and there is about 40 kilometers to the closest center Ivalo. The village was originally settled by Inari Saami population and after the World War II the Skolt Saami people were settled from Russia (former parts of Finland) to the region. Both of these indigenous cultures and their livelihoods (reindeer herding, fishing, hunting and gathering) are connected with the nature and the use of the environment. Many of the ("other") Finnish people have moved to village in the beginning of 1900's when driving of timber to Norway was initiated. Some of the most recent residents have moved to the village because of the surrounding natural environment. As in arctic communities in general also in Nellim many residents associate good life with the maintenance of traditional hunting, gathering and herding practices (see Young & Einarsson 2004:16).

Nellim has a long history with multiple use of land and still main livelihoods (forestry, reindeer herding and tourism) are closely connected with nature and land use. In addition large wilderness and protected areas are situated close to the village. There are ongoing local, national and global conflicting interests on the local environment. Most part the land and the forests have been administered by a state-owned company Finnish Forests and Park Services (Metsähallitus). The land ownership between the state and the indigenous people is still unresolved in the area and Finland hasn't signed the ILO convention No: 169. In 2005 the land use discussion heated in Nellim, when non-governmental organization Greenpeace based its Forest Rescue Station in the nearby forests. Greenpeace's aim was

to protect old forests in order to protect the winter pastures for the use of the traditional livelihood of reindeer husbandry.

In Nellim, many people have interest in the land and therefore they wanted to give their opinion on how it should be managed or used and who should be the ones to decide on it. The local perspective on land use is mainly based on 35 semi-structured interviews made in the village during summer 2003, fall 2004, and spring 2005. Based on the interviews local land use discourses were named *tradition*, *modern use of the environment*, *conservation* and *adaptation* (table 1). Each of these discourses is linked to global ideologies and state level structures.

Table 1. The formation of local land use discourses in Nellim

	TRADITION	MODERN USE OF ENVIRONMENT	PROTECTION	ADAPTATION (COPING)
IDEOLOGY	Respect of the traditions <i>People live with the nature</i>	Modern society <i>By using natural resources economic benefits are gained</i>	Sustainable development <i>Future generations have a right to enjoy the nature as well.</i>	Neo-liberalism <i>Nature is global property and a mean to achieve economic growth.</i>
STRUCTURES	MAF** Acts on Reindeer Husbandry, Natural Source of Livelihood and Skolt Sámi <i>Legislation secures the existence of traditional livelihoods</i>	MAF**, ME*** FFPS* as a state-owned company <i>Natural resources need to bear profit for the owner and resources owned by the government have economic influence.</i>	ME*** Legislation <i>National legislation needs to be bound to global environmental thought.</i>	MAF, ME EEDC**** (Acts on funding livelihoods, EU –project funding) <i>Use of nature is justified by subsidizing short term projects and certain livelihoods.</i>
LOCAL MANIFESTATIONS	Traditional livelihoods Local cultures <i>Reindeer herding, fishing, picking berries and mushrooms are still meaningful livelihoods and part of the local life style.</i>	Forestry Timber men <i>The employment in forestry has diminished in Nellim and therefore there are conflict related to forestry.</i>	Conservation areas Wilderness areas <i>“Untouched” nature has a significant meaning for local people, but it is not important that the areas are officially preserved.</i>	Local hotel and catering services and Local cultures as tourist attraction Road plan <i>Tourism is a future livelihood that brings prosperity and it is a coping strategy in global world.</i>
NON-LOCAL MANIFESTATIONS	National and international NGO’s Saami parliament Indigenous people’s rights <i>Indigenous people are global actors.</i>	FFPS* as a state-owned company Transnational forestry companies <i>Local forests are a resource in global forestry industry.</i>	FFPS* National and international NGO’s <i>The sensitive northern nature gives the first signs of example of global warming.</i>	Tourism and tourists Development aims of the municipality <i>Untouched nature, indigenous cultures and north are selling points in global tourism industry.</i>

*FFPS = Finnish Forest and Park Services; **MAF =Ministry of Agriculture and Forestry; ***ME = Ministry of Environment, ****EEDC = Employment and Economic Development Centre

In *tradition discourse* local people talk about the use of the environment in a sense that people should live *with* the nature like they have done in history. This discourse strengthens the idea that people are part of nature and they cannot or should not abuse it. The uses of land are often rooted in

distinctive traditions and belief systems extending back many generations. The traditional livelihoods and indigenous cultures can easily be linked to this discourse. However, one must notice that these cultures are highly adaptable and resilient and thus well-equipped for integrating change. As Csonka & Schweitzer (2004:64) suggest, *the concept of traditions should be seen as a dynamic one: traditions do not and should not hinder development*. Globalization has its effects on local and indigenous cultures, but often the symbolic value of the traditions is stronger. Even if new customs are adapted the value of traditions stays resilient. In Nellim almost all of the local people wanted to present the community as a place with long history and tradition. When asked to describe the village they always remembered to point out that Nellim is a village of three cultures.

The discourse on *modern use of the environment* started when felling of trees begun gradually in the beginning of 1900's. Forestry got stronger when timber was driven to Norway and finally sawmills started up in Nellim. For a long time the manpower in Nellim produced raw materials for the needs of industrialized world. Therefore forestry has had an important role as a livelihood in the village for decades. People moved to Nellim because there were jobs available in forestry. Now they and their children have lived in Nellim for a long time. Forestry still plays an important role as a livelihood in the area. Yet as the forestry has been mechanized, fewer and fewer people are receiving salary from it. In Nellim there are only a few practicing woodsmen left. Nevertheless this discourse is manifested also by the actions and discussion of former woodsmen and by the families and children that still live in the village. In addition discourse on the modern use on environment has a strong support from the governmental structures. Finnish Forest and Park Services (FFPS) administrates most of the land in the area. Forestry is still considered as an important and justified land user in the local discourses. However there are many who think that local people should have more power on discussing and deciding on when, where and how much of forestry is acceptable. When felling of the trees starts to affect other livelihoods (e.g. reindeer herding and tourism) or local people's recreation possibilities, often then the local land use discussion intensifies. There have been many occasions when local people have tried affect to FFPS's decisions on loggings. In these cases local FFPS's points out that the decisions on felling quotas are made by Finnish government.

Conservation discourse could be described as quite silent one in the local community. However the foundations of conservation and wilderness areas are based on global ideas and these areas are often part of global discussion. Many times the area or Lapland is represented as a place of "untouched" nature for example for tourists. Of course there are also local people who want to keep alive the local discussion on nature conservation. There have been occasions already in 1980's when local people used their social networks and worked together with non-local actors in their attempts to preserve the local forests. During 2005 this conservation discourse has been linked into the traditional use of the environment especially in the actions of Greenpeace. However I would stress that usually in local discourses conservation and traditions are kept a part. Conservation is often seen as the aims of the non-local actors who want to come and tell the local people how to live their lives and how to behave in the nature. Local people on the other hand often stress that they have such a long traditions and knowledge on using the environment that there should not be rules and regulations put upon them. Local people feel that they have the right to continue to use the environment freely since they are the ones that live there and have their livelihoods connected to nature.

Adaptation discourse is seen here as ways to cope or find coping strategies in contemporary world. Local people are looking for ways to manage the changes in the land use politics. Adapting is also a way to keep the village alive. During the interviews people often mentioned tourism as a strategy to cope with the changes and challenges of globalization that are affecting the village. Tourism is seen as a possibility to have employment and income and also to have people still living in the village. People who strengthen this discourse have ideas on how reindeer herding or fishing and other uses of the

environment should and could be connected to tourism. Many local people mentioned also that by building a road to Norway would attract more tourists and possibly also residents to the village. Tourism is indeed a global activity and it could/would attract many people from far away places. However tourists or people as visitors in the nature are not seen as a threat. On contrary many local people feel that tourism business could use their expertise on the nature so they could show the best parts of the environment. People in this discourse were more prepared and able to handle possible changes. In this discourse and within tourism local people saw ways to strengthen local social networks and local social capital by working together. This willingness to work together was manifested for example on Christmas 2004, when hundreds of British tourists per day visited the village. Tourist entrepreneur in the village did not have recourses to handles all the tourists. With a small financial contribution to village committee he got many people from the village to help him with dressing and undressing the tourists for the snowmobile tour. In the interviews people told proudly how they worked together to present the village to outsiders.

These discourses described above are typologies or ways to categorize the discussion on land use in village. However one must note that these categories are not trying to present that each person in Nellim could select a discourse where they belong. As mentioned above many of the discourses are connected with each other. It is important to take to account that the power within the discourses is not evenly distributed. When Greenpeace's actions created a conflict in Nellim, the discourse on modern use of the environment was strengthened substantially. The governmental structures in the form of Finnish Forest and Park Services were strengthening this local discourse. However on global level the traditions or conservation discourse has been stronger. This could be seen for example in local district court's and UN's opposite decisions on continuing loggings. While local court decided that loggings could be continued, UN stressed that the loggings should be stopped until the dispute between reindeer herding and Finnish Forest and Park Services is resolved.

CONCLUSION

In the local land use discourses the justification or judgment of land use actions are manifested from local to global scale. Resource uses in the peripheral village of Nellim are dynamic and increasingly shaped by interactions with the global economy including distant governments, corporations and non-governmental organizations. In addition Finnish legislation has directed the livelihoods and land use in Nellim. As presented here the local land use discourses and land use justification is connected to the hegemonic discourses. However local discourses also get unique forms which are based on the local symbolic meanings on the physical environment and on local identity. Decisions on land use require a political discussion whether the decisions are global agreements, national legislation or local norms. Environment is always controlled by human values.

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THE MEANING OF HOME-PLACE AND THE CONCEPT OF SPACE IN FINNISH LAND-USE PLANNING

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ABSTRACT

When the Finnish Land Use and Building Act was renewed in 2000, one of the main aims was to improve participatory processes in planning and give the citizen more influence on their living environment. Home is connected to land-use planning through the activity of dwelling. But what is the idea of home that the dwellers of four study areas in Northern Finland have? How do these ideas of home-place relate to the ideas of space that the renewed Land Use and Building Act reflects? What can the interplay of the ideas mean from the point of view of citizen participation? The preliminary findings of my PhD study suggest that some details of the Act may impede participation.

INTRODUCTION

This is a study of Finnish land use planning, home and power. The questions of power are crucial in participatory processes of planning, and power is connected to knowledge and language (Flyvbjerg 1991, 2004; Forester 1989; Häikiö 2005). Whose knowledge and what kind of knowledge is appreciated – do the ideas of place of the legislation meet the citizens' ideas? Als, Booher and Innes (2002) suggest that in order to co-operate, the actors need to view power as networked “power to”, not as something to fight for (also Taylor 1998). As power and knowledge are intimately related, the knowledge of all the actors needs to be valued, but the authorities still seem to value professional positivist knowledge over other forms of knowledge (Morcol 2001).

Traditionally, the planners are used to rely on their own visions and on knowledge that can be verified according to criteria accepted in planning (Sandercock 1998), and in this process citizens' knowledge is often overlooked. It causes participatory problems also in Finnish land-use planning (Niemenmaa 2005; Peltonen & Villanen 2004; Puustinen 2004; Staffans 2004). The legislation forms a frame for the planners' work, and even though the new Land Use and Building Act (MRL 132/1999; hereby referred to as the Act) aims at strengthening citizen participation, Mäkelä (2000) argues that some details of the Act are counterproductive to participation. The knowledge/language-gap is studied with the concept of space/place/home.

METHOD

I scrutinize the materials with the help of Critical Discourse Analysis (=CDA). CDA pays attention to discursive and socio-cultural practices as well as to texts addressing the workings of power. Texts build and change social identities, social relationships and knowledge systems (Fairclough 1997). Discourse analysis lends ideas from various corners of human science (Slembrouck 1998-2004), and I am not committed to any one theory of DA.

Materials and questions

Healey (1997) divides the planning infrastructure into “soft” and “hard”. The laws with the rest of the judicial and political environment form the hard infrastructure, and the soft infrastructure consists of

contextual practices where the actual participation takes place. In this study the Act belongs to the hard infrastructure of planning. What is the idea of space the Act reflects? To whom does the Act give power? What kind of an idea of power does the Act reflect?

Strictly speaking, home material (details to be asked from the writer) falls outside both categories. It consists of surveys and interviews that are run within the research project EkoSuKaT- Ecoefficiency in Growing and Diminishing Residential Areas during 2004-2005 in Northern Finland. What does home as dwelling mean? What is the idea of space/place in the home material?

Then I compare the materials: What do the ideas of home of the residents and the ideas of space of the Act have in common and how do they differ? Is the dwelling or the everyday living environment the right justification for citizen participation?

Critical discourse analysis: dialectics of Foucault and Fairclough

I combine post-structuralistic cultural CDA drawing mainly on Foucault (1972, 1980a, 1980b) and critical linguistic DA drawing mainly on Fairclough (1989, 1992, 1977, 2005). Foucault guides me to take a look into the whole frame of planning as a socio-cultural historical process and the actor-structure-dialectics, and Fairclough offers guidelines for linguistic analysis. In my study their writings form a dialectical relationship where one idea is reflected upon another in a constantly revolving process. I make reassessments and reinterpretations of my ideas and I let theories to be affected by the findings. I don't call my method "grounded" in the sense that all the ideas would emerge from the material. A researcher can never be a tabula rasa.

The idea of constructivistic knowledge works in the field of planning according to Lehtovuori (2005) as "challenge of competing and conflicting constructions of knowledge". Discourses represent and produce those constructions. A group of relations permits or excludes a certain number of statements within a discourse, partially closing the discourse and making it possible for new openings (Foucault 1972). Knowledge constitutes of groups of beliefs that are given a status of truth. We can assess the meaning or relevance of representations, relationships or identities in power relationships without assessing the truthfulness of the idea in question (Fairclough 1997).

Foucault (1972) defines discourses as social practices that systematically form the objects of which they speak. Fairclough (1997) defines discourse as the language that represents a certain social practice from a certain point of view. Discourses belong to the field of knowledge and the formation of knowledge, and he considers (2005) that discourses figure in non-linguistic practices. To Foucault (1980a) discourses are irreducible to the language. Nevertheless, language is the main reference of discourse (or at least the one that is easiest to mediate) and knowledge is to a big extending represented linguistically. A discourse may be in relation of analogy, opposition or complementarity with other discourses and the discursive constellation where the discourse belongs to should be addressed (Foucault 1972).

A discourse is formulated by and addressed to someone (including the one who presents it), it comes about in particular circumstances and it is imbued with representations. It is made of successive elements and it must be analysed in its temporal context, but there is no uniform model of temporalisation. Instead, there are transformations at different levels of successions. The people within the same discursive practice can make contrary choices and the subject can have different positions and functions in the diversity of discourse (Foucault 1972).

HOME-PLACE

Home can refer to non-spatial ideas, but in this study it refers to dwelling. I chose to talk about planning-related issues through the concept of home because planning as a social and institutional

practice has its own language that is not familiar to most non-planners. The home is a window to the everyday and it visualises laypersons' views, in this case in the planning context.

Home means a deep sense of attachment towards a certain place compared to what other place attachments have less meaning. It is the starting point from where we direct ourselves and take the world into our possession (Relph 1976). Home is the main spatial reference point of everyday life to most people and it is touched by land use planning. In planning, home is considered too flux and too personal to be talked about, and as such it is a metaphor for the ineligible.

Multidimensional Place

Home applies to places of varying size or type with complex and interrelated meanings. The home-expressions vary between cultures and individuals but the emotional bond exists. The notion of centrality can be applied to home as refuge, freedom, possession, shelter and security. Another focus comes from home as identity: family, community, rootedness, memory and nostalgia (Porteous & Smith 2001). Somerville (1992) classifies home with seven signifiers, presented by shelter, hearth, heart, privacy, roots, abode and paradise. They relate to feelings of security, respectively: physical, physiological, emotional, territorial, ontological, spatial and spiritual. All these notions are present in the survey material; to one respondent home consists of "the bed, the internet and the childhood memories around me". It is simultaneously the private haven and the main point of connection to community, and the word "own" was mentioned practically in every survey answer in some form. Blunt & Varley (2004) describe home: "As a space of belonging and alienation, intimacy and violence, desire and fear, the home is invested with meanings, emotions, experiences and relationships that lie at the heart of human life". The negative elements are missing from my material, and I interpret that the concept of home itself is purely positive. The negative elements that for instance Blunt and Varley (2004) mention make the place less home. They can coincide within the abode a person refers to as home, but they don't make the home, vice versa. In this sense, the home of this study is conceptually different from the home of the geographers who study for instance domestic violence.

Home is a relational and multi-dimensional place. It is a process where the meanings change and experiences are re-interpreted. It is of memories and of the future expectations, a focal point of continuity as well as of ephemeral experiences. It is a continuum: a place can be more or less home and the dwelling is not always home. Places that feel more home are sometimes elsewhere. Most respondents also have at least one other place that feels home, often the childhood home or the holiday residence. Home has also physical and functional qualities that link it to the knowledge base of modern planning; it is also about quadrature meters and the size of the lot. It is difficult to outline its boundaries because home-place consists of many places with flux borders and it exists within other places, and emotional proximity seems more important than physical proximity.

The primary choice between residences for home-place is characterized by "rational" judgement (price, distance from work, size etc.), but the final choice is often based on something subconscious. Fullilove (1999) suggests that attachment to a place often depends on something a person can't quite tell, often something that bears resemblance to childhood. Horelli-Kukkonen (2003) agrees, and continues that making or restructuring the home is working on the individual and socio-cultural identity. It supports the mission in life and the social status. Tuan (1974) sees the physical characteristics and traits as important for the sense of home. Home is a state of mind that connects to physical world and also a site that calls up the home state of mind.

Home in planning

Homes can not be planned, but there are important issues to consider. In order to have good places the planners need to listen to residents. A place needs certain qualities to become a home. The services

(infrastructure, connections, schools etc.) were given high priority, and deterioration of the physical surroundings was stated as something that could make the place less home. Home has the quality of change as well as the quality of stability, and changes of the environment aren't inconvenient if they are seen favourable by the residents. If not, moving away is a solution as home can be built elsewhere.

THE LAND USE AND BUILDING ACT

The Act is the main delimitator (for the concept, see Foucault 1972) of participation because it defines the actors, responsibilities and the limits of actions. One main aim of the Act is "to ensure that everyone has the right to participate in the preparation process (...) that expertise is comprehensive and that there is open provision of information on matters being processed" (MRL Ch. 1, sec. 1). Generally, the Act is considered serviceable (Maankäyttö... 2005). Especially the participation and assessment scheme (section 63) is considered an improvement to the interactivity of the process.

However, there are still some mixed messages of the importance of citizens' participation. The Act defines citizen participants on functional basis: "The landowners in the area and those on whose living, working or other conditions the plan may have a substantial impact" (Ch.1, section 6; Ch. 8, section 62). In the light of the home material this functional bond is not enough. The emotional bond should be taken into consideration, and this might also enhance participation. Mäkelä (2000) argues that there is even some deterioration in the citizens' rights to participate in comparison with the old law, e.g. before, the members of the municipality had better possibilities to express their opinion.

The citizen are to a big extend seen as objects of information, not as equal participants. According to the Act, the planners organize the participation process, and the procedure of citizen appeal is very complicated. Interested parties can propose negotiations to the local environment centre about the participation and assessment scheme, and only if the scheme is clearly inadequate, negotiations to change the scheme are arranged with the planners (Ch 8, section 64; Mäkelä 2000). Also, it is stated that "the interested parties must have the opportunity to obtain information" but the planners' responsibility to respond is not stated. Also, the public have "opinions" whereas it can be interpreted that the planners have "knowledge", which is considered more reliable than mere opinions.

Also, it was easy to get citizens to talk about home, but when I introduced myself as wanting to talk about planning, the answer usually was "no" because the persons didn't feel themselves capable of talking about *planning* of their own everyday environment. It shows that the planning language is unfamiliar and has an exclusionary effect. At the same time, the issues of good environment were easy to discuss in "home-language".

The Act's spaces are abstract and functional, but the dwelling spaces of the citizens have more dimensions. All in all, the concept of space of the Act does not recognize the emotional aspect of space/place which is important for the users of the places. By not recognising the dimensions of the everyday places the Act centralizes power to the planner: it gives privilege to expert knowledge and expert language. The Act has a centralized idea of power and even in expressing that everybody should be able to affect his/her living environment, the power discourse of the Act may inhibit from seeing power as networked and from seeing citizens' knowledge being of equal value.

CONCLUSIONS

The concept of home as a place reveals that there are important elements missing in the concept of space of planning, most notably the valuation of personal experiences of non-planners and the emotional aspects of spaces. The planning language has an exclusionary effect that works through

immanent, normalizing power (concept of Foucault 180b): people restrict themselves from things they feel they don't understand.

The concept of space of the Act does not fully support citizen participation because it favours expert knowledge and thereby centralises power to planners. The Act does not see power as networked. Power remains centralized even though there is the aim for better participation. In these circumstances, the citizens can be seen to loose, but also planning itself is a loser when it can't use the local knowledge of the citizen. By seeing the citizens as allies and power as networked, planning can act with them, and when there are conflicts and disagreements, they can also be seen as productive. There is a possibility to interpret that *other conditions* in the Act could include emotional bonds to places, which could lead into better participation. Seeing the multi-dimensionality of spaces leads to appreciation of different knowledge of the participants and better participation.

Changing ideas of space changes ideas of knowledge and power which changes practices – and vice versa. Home has technical and economic elements that go hand in hand with expert knowledge, and planning needs to be open to everybody's knowledge. New understandings can lead into new practices.

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ENVIRONMENTAL IMPACTS ON WATER QUALITY AND LAKE SEDIMENTS OF THE MUSTAVAARA MINE, TAIVALKOSKI NORTHERN FINLAND.

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ABSTRACT

This study deals with the quality of water and sediment of the lakes near the Mustavaara mine. The copper and vanadium concentrations of Lake Kynsijärvi water exceeded the Acute Toxicity Limit during the operating period of the mine. In the sediment of Lake Kynsijärvi, copper, nickel, and lead concentrations exceeded the Toxicity Reference Value; chromium, zinc, cadmium and arsenic concentrations exceeded the Lowest Effective Level. In the sediment of Lake Kynsijärvi, Mg, Cs, Ti, Ni, K, Cu, Na, V, Al, Cr, Ag, and Co concentrations were significantly higher than in the reference Lake Kuusijärvi. This data shows there is an obvious risk of harmful effects of the mining activities for the biota of the lake. Further paleolimnological study is needed in order to get more precise picture on ecological impacts. The Environmental Impact Assessment practices should consider also social impacts.

INTRODUCTION

The mining industry has drastic effects on both the economical and ecological environment of the influence area. Ore is a non-renewable resource. The mining industry has usually a positive influence on the economic life of the area but can also cause severe environmental damage. This study deals mainly with natural scientific facts based on chemical analyzes of water and sediment. Especially, heavy element concentration was observed. The social impacts can be discussed later.

Rautaruukki Ltd Mustavaara mine in Taivalkoski in northern Finland, was established in 1973. Practically, the production was in full capacity since 1979. Main product was vanadium pent oxide. The production ceased down in 1985. About 13 million tons of ore was quarried during the operation period.

Results of this study could be used when planning new mining industry. Environmental Impact Assessment (EIA) legislation has been tightened considerably since the 1970's.

METHODS

The possible ecological impacts of mining activities to the water ecosystem were studied by chemical analyses of both water and sediment samples.

Previously monitored materials of Ylitolonen et.al. (1983), Myllymaa and Aalto (1988), and Siira (1998), were used in this study. The reference material was also obtained from database of the Finnish Environment Institute. The water analyses were performed in the laboratories of the North Ostrobothnia Regional Environment Centre by the SFS standard methods. Total 33 parameters were analyzed: temperature, turbidity, suspended matter, electric conductivity, pH, alkalinity, colour, COD;

concentrations of oxygen, total N, NO₃, NO₂, total P, Fe, Cl, SO₄, S, SiO₂, organic C, Na, K, Mg, Al, Cd, Cu, Ni, Mn, Ti, Zn, Ni, Cu, V and Hg.

The sediment material was obtained in 1998 from the Lake Kuusijärvi and Lake Kynsijärvi. Drawing a parallel between Lake Kynsijärvi and Lake Kuusijärvi: Lake Kynsijärvi lies in lower course and it was assumed to be affected by the mine; whereas Lake Kuusijärvi lies in upper course, and thought not to be affected by the mine. Sediment samples were collected in the deepest parts of the two lakes studied, in order to get as undisturbed samples as possible. Special Limnos sampler was used in the field work.

Total 31 parameters were analysed: sediment colour, pH, red ox potential, electric conductivity; concentrations of C, N, S, P, Fe, Mn, Al, Cu, Ni, Zn, Cd, Ti, Pb, Cs, Mo, As, Sb, Ba, Ag, Bi, Co, Cr, W, Na, K, Ca and Mg. In the field sediment colour, pH, red ox potential and electric conductivity were measured; which later adjusted in the laboratory of Oulu University (Bothnian Bay Research Station). The phosphorus concentration was analysed in North Ostrobothnia Regional Environment Centre by applied standard method (ISO/DIS 11464; Handbook 622, 601-610). All the other sediment chemical analyses were performed in the laboratories of the Finnish Environment Institute by ICP-MS method.

In comparison between Lake Kynsijärvi and Lake Kuusijärvi, the differences of sediment element concentrations were analysed statistically with Student's t-test using PAST programme (Hammer 2005).

RESULTS

It was observed in Lake Kostonjärvi, which is located further down on lower course of the drainage area, increasing concentrations of Cu, V, Na, SO₄, N, since the mine established and production started from 1976 (Sutela and Siira 2005).

Table 1. Maximum element concentrations (µg/l) in water of the two lakes, measured during 1976-1987 (Myllymaa and Aalto 1988; Ylitolonen et.al. 1983).

unit µg/l	N	P	Na	Fe	V	Cu	Ni	Zn	SO ₄
Lake Kuusijärvi	500	28	5500	1200	< 10	23	> 5	13	38000
Lake Kynsijärvi	7100	24	82500	17000	360	290	34	32	280000

Table 2. Maximum element concentrations (µg/l) in water of the two lakes, measured during 1992-1998 (Siira 1998).

unit µg/l	N	P	Na	Fe	V	Cu	Ni	Zn	SO ₄
Lake Kuusijärvi	1200	14	1900	21700	2	1	<1	<10	4200
Lake Kynsijärvi	1600	23	2300	23900	47	2	<1	<10	2900

Tables 1 and 2 describe the situation during and after the operating period of the mine. Table 2 shows decreased maximum concentrations of N, Na, V, Cu, Ni, Zn and SO₄ in Lake Kynsijärvi after about ten years since the mine was closed.

In comparison between the recent data (Siira 1998) from Lake Kynsijärvi and Lake Kuusijärvi no remarkable differences were observed with any of the water quality parameters measured. Most recent data (Sutela and Siira 2005) shows that in Kostonjärvi, Na, SO₄, V, and Cu concentrations has returned to the same level as before the mining activities started.

Flowing waters can disturb sedimentation which was noticed in previous studies of Myllymaa and Aalto (1988), but we got quite undisturbed samples in 1998. Mud layer was 44 cm thick in Lake Kuusijärvi and 14 cm thick in Lake Kynsijärvi.

Table 3. Statistics of the chemical analyses on Lake Kuusijärvi and Lake Kynsijärvi sediments (Siira 1998). Mean concentrations mg/kg of the elements in the sediments of Lake Kuusijärvi (n=44) and Lake Kynsijärvi (n=14). Relation of the means of element concentrations of the two lakes. Results of the Student's t-test: t and p values.

Element	Symbol	Lake Kuusijärvi (n=44) mg/kg	Lake Kynsijärvi (n=14) mg/kg	Kynsijärvi/ Kuusijärvi	t-Value (DF=56)	P(eq)- Value
Magnesium	Mg	2720,9	4594,3	1,6885	-19,303	<0,00001
Caesium	Cs	21,666	30,121	1,3902	-17,765	<0,00001
Titanium	Ti	497,68	1076,2	2,1624	-17,280	<0,00001
Nickel	Ni	13,970	21,914	1,5686	-11,923	<0,00001
Potassium	K	730,34	1095,0	1,4993	-10,539	<0,00001
Copper	Cu	14,780	50,129	3,3917	-9,719	<0,00001
Sodium	Na	193,07	348,57	1,8054	-9,405	<0,00001
Vanadium	V	53,227	1521,5	28,585	-9,238	<0,00001
Aluminium	Al	10670	12890	1,2081	-7,030	<0,00001
Chromium	Cr	30,393	35,879	1,1805	-6,604	<0,00001
Silver	Ag	0,10614	0,15357	1,4469	-6,471	<0,00001
Cobalt	Co	13,661	16,679	1,2209	-5,056	<0,00001
Sulphur	S	2105,1	2939,4	1,3963	-3,679	0,00053
Calcium	Ca	2950,7	3846,4	1,3036	-2,082	0,04192
Barium	Ba	107,52	115,14	1,0709	-1,540	0,12928
Antimony	Sb	0,03000	0,04290	1,4300	-1,387	0,17085
Bismuth	Bi	0,19318	0,22286	1,1536	-1,357	0,18039
Iron	Fe	19950	23570	1,1815	-0,643	0,52261
Arsenic	As	4,6577	4,8314	1,0373	-0,388	0,69956
Phosphorus	P	1420,5	1442,9	1,0158	-0,368	0,71437
Lead	Pb	26,298	25,486	0,9691	0,094	0,92576
Manganese	Mn	1325,3	1319,6	0,9957	0,053	0,95829
Tungsten	W	0,07477	0,07286	0,9745	0,339	0,73583
Cadmium	Cd	0,60750	0,45357	0,7466	1,313	0,19446
Zinc	Zn	116,82	104,21	0,8921	2,098	0,04041
Molybdenum	Mo	3,0120	2,4814	0,8238	4,990	<0,00001
Nitrogen	N	10126	7275,1	0,7185	14,405	<0,00001
Carbon	C	109430	79511	0,7266	23,212	<0,00001

Compared with Lake Kuusijärvi, the sediments of Lake Kynsijärvi contained significantly higher concentrations of the following elements: magnesium, caesium, titanium, nickel, potassium, copper, sodium, vanadium, aluminium, chromium, silver and cobalt. The mean value of vanadium concentrations of the Lake Kynsijärvi sediment was about 28 times higher than in the sediment of Lake Kuusijärvi.

On the contrary, in the reference Lake Kuusijärvi statistically significantly higher concentrations of molybdenum, nitrogen and carbon than in Lake Kynsijärvi, were observed.

DISCUSSION

Ecosystem risk rating

Table 4. The concentrations of elements ($\mu\text{g/l}$) in the water of Lake Kynsijärvi in comparison with the toxic limit values described by the environmental authorities of Canada and USA (Parametrix 2001, ERD 1999), and with the reference values in natural lakes of North Sweden (Sedin 2002).

Element units $\mu\text{g/l}$	Kynsijärvi maximum content	Acute Toxicity AT (Parametrix 2001)	Toxicity Reference Values TRV (ERD 1999)	Reference Values (<u>Sedin</u> 2002)
V	360	310	20	0,1
Zn	32	120	120	1
Cu	290	14	6,54	0,3
Ni	34	470	87,71	0,2

Lake Kynsijärvi water vanadium content exceeded the Acute Toxicity Limit (ATL) during the operating period and was over the Toxicity Reference Values (TRV) even ten years after closing down the mine. Also copper content was over the ATL and the TRV during the operation but ten years after it was under the toxicity limits.

Table 5. The concentration of elements (mg/kg) in the sediment of Lake Kynsijärvi in comparison with the toxic limit values described by the environmental authorities of Canada and USA (Parametrix 2001, ERD 1999), and with the reference values in natural lakes of North Sweden (Sedin 2002).

Element mg/kg	Lake Kynsijärvi maximum content	Toxicity Reference Values TRV (ERD 1999)	Lowest Effective Level LEL (Parametrix 2001)	Reference Values (<u>Sedin</u> 2002)
Co	20,7			15
Sb	0,11	2		
As	6,5	8,2	6	8
Cd	0,61	1,2	0,60	0,3
Cr	40,6	81	26	15
Cu	88,8	34	16	15
Pb	60,5	46,7	31	5
Ni	27,2	20,9	16	10
Zn	124	150	120	100
V	2498			20

Maximum concentrations of copper, nickel and lead in the sediment of Lake Kynsijärvi exceeded the TRV; chromium, zinc, cadmium and arsenic concentrations exceeded the LEL but not the TRV. Maximum vanadium concentration in the sediment of Lake Kynsijärvi was about 125 times greater than the reference value of Swedish natural lakes (Sedin 2002). Although vanadium is not considered as a harmful element and there are no defined toxic limits, for instance, it can cause in humans intestinal cramps and diarrhea following sub chronic oral exposures (Opresko, 1991).

The sediment of Lake Kynsijärvi was obviously contaminated by the mine. That discloses obvious risk of harmful effects for the biota of the lake. Same feature of increased concentrations of vanadium and lead can be seen also on a smaller scale in the sediment of the reference Lake Kuusijärvi. That could be due to air base contamination or diffusion of the elements through Lake Unilampi.

Further studies

Did the mining activities cause any changes to the water ecosystem and biota? In order to get more precise picture of the development of the lake ecosystem and possible changes in it, the sediments containing remains of past biota should be studied thoroughly. Based on the chemical data and biological evidence we can try to reconstruct the past ecosystem of the lake. For instance, in the sediment of Lake Kuusijärvi, there were remarkably higher concentrations of Mo, N and C, which indicates that Lake Kuusijärvi was previously more humic and more eutrophic than Lake Kynsijärvi; but nowadays they both are in the same humic and trophic level. In Finland there are no defined limit values for toxic element contents. In this study, quite a large variety of elements were analysed. It could be interesting to apprise if there are any relationship between the species of planctonic biota and the particular element concentrations.

Legislation

Act on Mining (Kaivoslaki, 1965) was prevailing in Finland when the Mustavaara mine was established. After that time, Act on Environmental Impact Assessment (Laki ympäristövaikutusten arviointimenettelystä, 1994) has been drawn up and Nature Conservation Act (Luonnonsuojelulaki, 1996) has been reformed, which in some cases rules over the Act on Mining. Nowadays, as a member of EU, Finland is committed also to the Framework Directive in the field of water policy (Vesipolitiikan puitesäädös, 2000).

Human - environment encounter

In addition to the contamination of surface waters, mining activities with occasionally explosions and air base dust might have caused harm to the local people who lived near Mustavaara mine. Mining activities employed about 300 persons during the building the factory and operating the mine. Nowadays unemployment in Taivalkoski is higher (October 2005: 19,9 %) than in those mining days (1975: 3,1 %) and is the highest among the communities of Oulu Region (Ministry of Labour, 2005). Social impacts should be considered in the EIA practice, for a mine, without doubt, has a great influence on the economic life of the community.

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Papers

Poster presentations

WATER QUALITY CHANGES IN THE PEAT-BASED ARTIFICIAL LAKE KURUNNEVA

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ABSTRACT

Lake Kurunneva is a 46 ha artificial lake created in June 1997 on an area of cutaway peatland. To prevent a possible increase in acidity due to contact with the underlying mineral soil, a layer of approximately 0.2 m of peat was left at the bottom of the lake. The project has included a long-term monitoring of water quality and discharge at the inflow and outflow of the lake, since the summer of 1997 until the summer of 2003. The inflowing water has high levels of organic matter, nutrients and suspended solids. The results indicate that the lake acts like a wetland retaining suspended solids and nutrients from the river water.

INTRODUCTION

Peat production in Finland began in the mid 1970s and can continue for approximately 15-20 years at any one site (Väyrynen & Heikkinen, 2000). Possible options for re-use of the harvested areas are forestry, agriculture and construction of lakes and wetlands. Turveruukki Oy began peat extraction in the Kurunneva area in 1977 and during 1995-1997 the 46 ha artificial Lake Kurunneva was constructed on a part of the harvested area.

The construction of the Lake Kurunneva was a national pilot project of the reuse of harvested peat mining areas and was carried out by Turveruukki Oy, North Ostrobothnia Regional Environment Centre, The County of Rantsila and local hunting and fishing societies. The purpose of the project was to build a suitable area for birds and recreation on harvested peatland.

The objective was to find out the suitable thickness of peat layer for lake formation. It was assumed that if the peat layer was too thin, acid sulphide sediments from the prehistoric Litorina Sea could be revealed. Conversely, if the peat layer left at the bottom was too thick, it could rise to the surface. It was also assumed that the nitrogen levels in the lake water could increase and that the peat left at the bottom of the lake could cause an increase in biological oxygen consumption.

The project has also included the monitoring of water quality and material balances in the area. The aim of water monitoring was to assess the changes in material balances in the lake following its construction. The water quality and discharge of the Lake Kurunneva were monitored continuously since the summer of 1997 until the summer of 2003.

MATERIALS AND METHODS

Study Area

The artificial Lake Kurunneva is located in the boreal region of northern Finland in the local government area of Rantsila. Inflowing water comes from the River Siikajoki via the Kurunkanava channel and the waters from the lake flow into the River Siikajoki. The inflowing water is loaded with nutrients derived from agriculture, forestry and peat production areas. Peat production in the Kurunneva peatland began in 1977 and its peak covered about 400 ha. The artificial lake was constructed between 1995-1997 in the northern part of the area released from peat production. Lake

Kurunneva has an area of 46 ha, an average depth of approximately 1.1 m and water volume of about 300 000m³.

Lake Kurunneva shoreline has vegetated partially naturally and partially by vegetation transplanting experiments, t.ex. birch (*Betula pendula*) has been transferred to the shoreline from nearby areas. Meadows and game crop land have been established at the areas nearby shoreline by planting rye (*Secale cereale*). By the years the Lake Kurunneva has turned to look more of a natural lake. Shoreline and islands have been covered by vegetation.

The lake area has attracted several bird species including swans (*Cygnus Cygnus*), goldeneyes (*Bucephala clangula*), teals (*Anas crecca*) and various species of waders.

Water quality

Water samples were taken from inflowing and outflowing waters at least once a month from June 1997 to February 2001. In 2001-2003 samples were taken in summer at least once a month. About 100 samples were analysed to determine O₂, suspended solids (SS), electrical conductivity, pH, colour, chemical oxygen demand (COD_{Mn}) total organic carbon (TOC), total N, NH₄-N, NO₃-N, total P, PO₄-P and total Fe using standard methods employed by the water authorities (National Board of Waters, 1981). Water discharges were monitored continuously from the inlet of the lake with a Telog meter and from the outlet of the lake using a graphic water level recorder.

RESULTS AND DISCUSSION

The quality of inflowing and outflowing waters during the monitoring period (Heikkinen & Väyrynen, 2004) is presented in the Table 1. The results have been compared using t-test. Figures of SS, total N and total P have been presented from the period June 1997 to February 2001 as the samples have been taken on this period regularly. Only the concentrations of the inflowing and outflowing waters have been presented in this paper. It was not possible to estimate the exact material balances of the lake, because in winter 1999 an overflow dam was built near the outflow dam. The outflowing discharges were monitored only at the outflow dam.

The incoming water of the Kurunkanava channel is yellow-brown coloured due to high concentrations of organic matter and Fe, as are most streams and rivers draining peatlands. According to the average concentrations of tot. P and tot.N (58 µg l⁻¹ and 1010 µg l⁻¹, respectively) the water is highly eutrophic (Heinimaa et al, 1998).

The average O₂ concentration in the inflowing water was 9.2 mg l⁻¹ (Table 1). In the outflowing water it was lower, 8.9 mg l⁻¹. This is probably mainly because of the water in the outflow of the lake is warmer than in the inflow of the lake, especially in summer. Fish have been shown to live in the lake and there has not also been a noticed fish death. This indicates that there has not been oxygen depletion in the lake during this study.

pH in the water was at the neutral level during the monitoring period and the average pH value was 6.48 in the inflowing water and 6.49 in the outflowing water.

The average concentration of SS has been reduced in the lake statistically significantly (Table 1, Fig. 1). The main reason for the reduction is probably sedimentation of the solid particles in the lake.

The total organic matter concentration has mainly decreased in spring and summer, but increased in winter. There are two main processes affecting the behavior of organic matter in the lake: sedimentation of suspended organic matter and leaching of dissolved organic matter from the peat layer of the lake. The role of SS sedimentation is probably high during the spring flood season, and the role of organic matter leaching from the bottom peat layer is probably highest in summer. However, there has been increase in TOC and COD_{Mn} concentrations also in winter. The reason for this increase is not yet known. One possible reason could be the increase in dissolved organic

matter concentration with the increase in Fe concentration, caused by oxygen depletion. Possibilities for this geochemical process should be, however, studied further.

Fe concentration has decreased in the lake (Table 1). This is probably caused by sedimentation of Fe with SS and high molecular weight humic substances. There has been, however, also periodical increase in Fe concentration in the lake in winter (Figure 3). This is probably due to zones of oxygen depletion in the lake bottom, because Fe dissolves only in anoxic conditions.

Tot. N concentration has been a little bit higher in the outflowing water compared to the inflowing water of the lake (Table 1). The main probable reason for this is that the N concentration in the water increases as a result of the decomposition of the peat layer in the lake bottom. This decomposition process produces dissolved organic N and inorganic N in the lake water. On the other hand, the concentrations of inorganic N, NH₄-N and NO₃-N, have decreased in the lake. The main reason for this is probably the process of nitrification-denitrification. The role of this process is highest in summer, when the water temperature is over 10 °C. In the process NO₃-N is reduced to N₂ and/or N₂O by bacteria in anoxic conditions. It can be supposed that there are anoxic micro environments in the bottom sediment of the lake even in the situations, when the sediment itself would not be anoxic. Inorganic N is also retained by the vegetation of the lake.

Tot. P and PO₄-P concentrations have been reduced in the lake. This is probably caused by sedimentation of P with SS and high molecular weight humic substances. PO₄-P may also be retained by the algae and macrophytes of the lake, retained by the peat layer of the lake bottom, when there is Fe in this layer, and adsorbed by humic substances in the lake water.

Table 1. Average water quality in the artificial Lake Kurunneva in the period 30.6.1997-6.10.2003.

Variable	<u>In flowing water</u>			<u>Outflowing water</u>			The significance of the difference by T-test
	x	s	n	x	s	n	
Oxygen (%)	78	12	101	80	10	101	
Oxygen (mg l ⁻¹)	9,2	1,9	101	8,9	1,8	101	*
Suspended solids (mg l ⁻¹)	13,4	15,6	106	7,9	8,1	106	**
COD _{Mn} (mg l ⁻¹)	29,2	10,1	107	31,6	8,8	107	*
TOC (mg l ⁻¹)	23,5	6,6	99	25,1	6,7	99	*
Fe (µg l ⁻¹)	6800	3200	106	5100	2300	106	***
Total N (µg l ⁻¹)	1010	280	106	1090	300	106	o
NH ₄ -N (µg l ⁻¹)	100	66	105	70	74	105	***
NO ₃ -N	220	110	104	160	120	104	***
Total Phosphorus (µg l ⁻¹)	58,3	23,2	106	45,5	15,1	106	***
PO ₄ -P (µg l ⁻¹)	33,3	16,5	106	16,6	12,1	106	***

x = average, s = standard deviation, n=the number of samples taken

The significance of the difference by T-test, p: 0,1>p>0,05, p=o; 0,05>p>0,01, p=*; 0,01>p>0,001, p=**; p<0,001, p=***

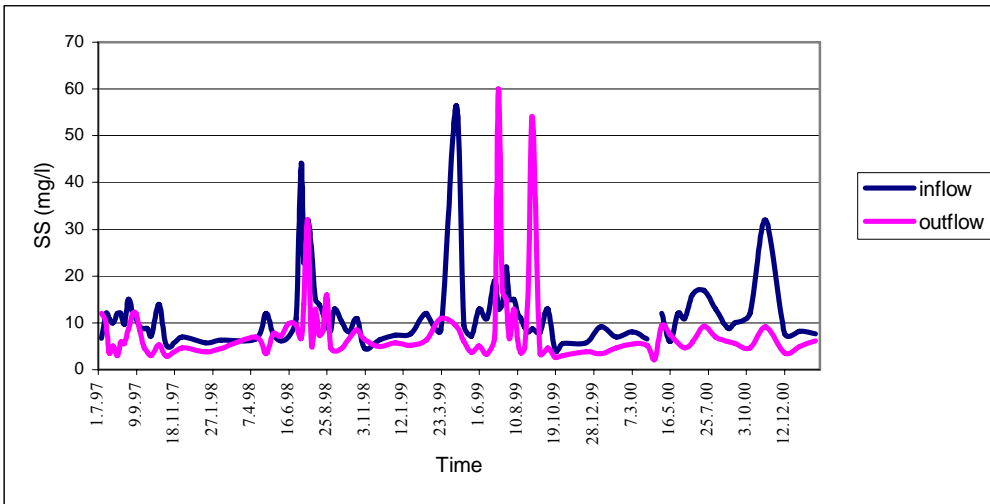


Fig. 1. The suspended solid concentration in the Lake Kurruneva.

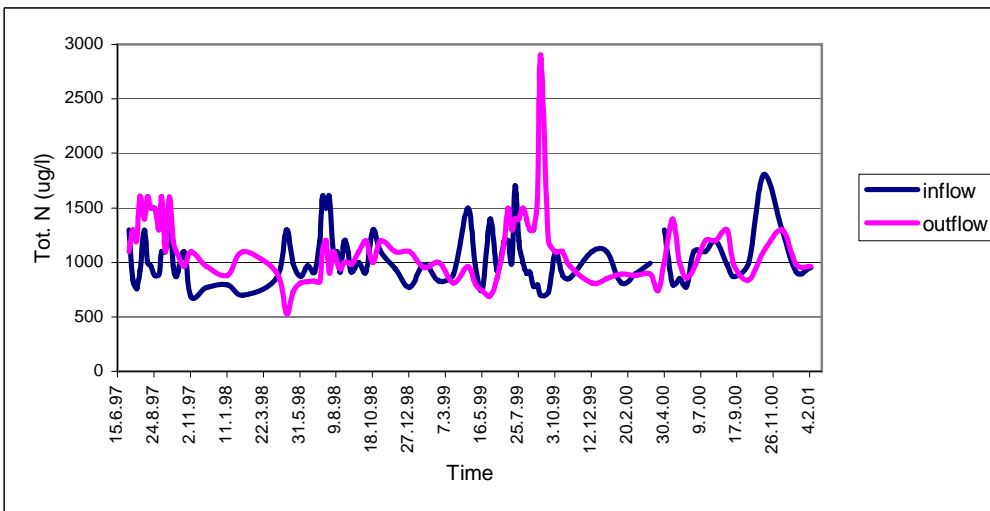


Fig. 2. Concentration of tot. N in the Lake Kurruneva.

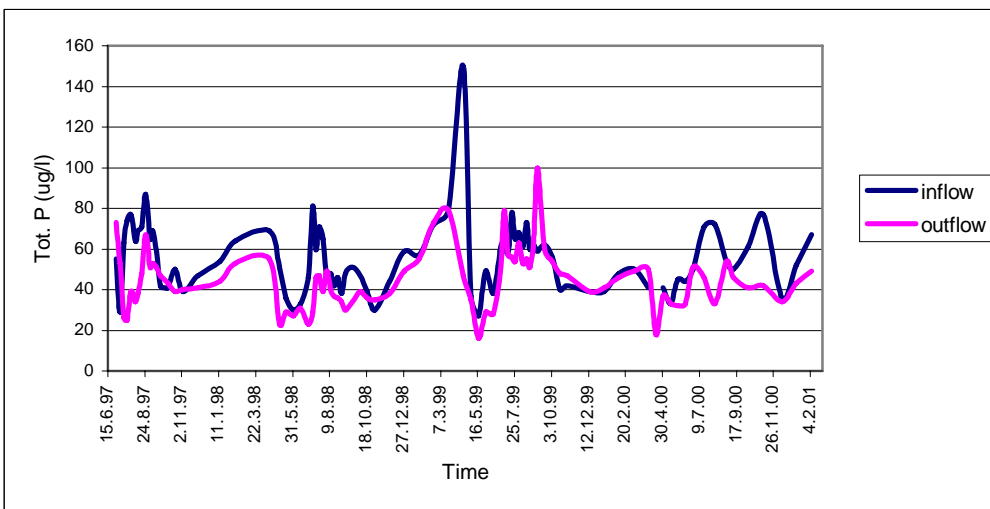


Fig. 3. Concentration of tot. P in the Lake Kurruneva.

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THE EFFECTS OF RECREATIONAL HORSE RIDING ON VEGETATION IN PROTECTED AREAS

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ABSTRACT

We investigated influences of horse riding on vegetation by experimental and monitoring studies at Oulanka National Park, north-eastern Finland. In the experimental study, preliminary results show that horse trampling decreased the total shoot density, shoot density of natural shrubs, and decreased the shoot density of species introduced by horse manure. However, horse trampling increased the shoot density of sown shrubs. Addition of horse manure increased the total shoot density and densities of every studied plant groups in interaction with horse trampling. Addition of horse manure increased the shoot density of sown shrubs in treatments without horse trampling. The shoot density of shrubs followed by addition of seed of shrubs increased significantly despite of horse trampling treatments. In addition, according to the preliminary results horse riding increased the amount of exotic species, changed the plant species composition and poses a serious risk for the original biodiversity of vegetation in protected areas.

INTRODUCTION

Recreational horse riding started in Finland in the 1940s when army and entrepreneurs arranged leisure activities. First companies started in the 1970s arranging the toll riding experiences for tourists. The boom of recreational horse riding started in later 1990s (Teirikko 2005). According to Finnish everyman's right system horse riding is allowed in private action in private lands and in private roads.

The effects of recreational horse riding are diverse: for example trampling causes loss of vegetation height and cover and degradation of existing trail network, horse manure fertilizes the soil and inflicts changes in plant species composition and causes introduction of weeds (see Newsome, P. et al. 2002). Impacts of horse riding differ depending on e.g. the intensity of usage (Bratton et al. 1977) and the different vegetation and soil types (e. g. Bell and Bliss 1973, Dale and Weaver 1974, Bratton et al 1977).

A significant impact of horse riding is the introduction of exotic and invasive species to nature. This is important to perceive especially in protected areas. The main question with exotic species is their influence on native vegetation. Exotic species are often better competitors for available substrates and resources than native species (e. g. Meekings and McCarthy 1999, Davis et al. 2000). It has been suggested that a tenth of exotic species will settle down in the area and tenth will become intensively invasive (Williamson 1996). E. g. Mooney and Drake (1986) have reported that besides the invaders impact on communities, they may reduce heterogeneity and biological diversity of nature.

Only a few quantitative studies have been conducted about the impact of recreational horse riding on northern environments. There is a need for quantitative information on the impacts of horse riding on nature for planning and managing of the areas use. The aim of this study is to determine the impacts of horse riding on vulnerable nature in protected areas in northern Finland.

MATERIAL AND METHODS

Study area

Experimental study was carried out at Oulanka National Park, Kuusamo, Finland in 1999-2003. Recreational horse riding at Oulanka National Park is directed to separate and determined trails and horses should only eat the plants material gathered in Oulanka National Park (Metsähallitus 2004). However, intensive recreational horse riding has lead to intense degradation of this area and concern about the risk of exotic species for original biodiversity has become real. It has not yet been possible to gather complete information on the number of people going in for recreational horse riding in Oulanka National Park.

Experimental design

Circular study plots of 0.5 m in diameter were placed in the area of *Empetrum-Myrtillus* -forest site type on pre-selected sites of similar vegetation, five replicates per treatment, 3-5 m apart. Study was full-factorial with three factors: 1) removal of humus layer, imitating trails trampled by horse, 2) addition of seeds of 25 berries per species (*Vaccinium myrtillus*, *Vaccinium vitis-idaea* and *Empetrum nigrum*), and 3) addition of horse manure. All factors had an untreated control level.

We counted the number of shoots of each species: (1) just after treatment (middle of june 2002), and (2) one year after the treatment (middle of june 2003).

Monitoring study

We measured the horse impacts on vegetation in three horse resting areas: Nurminiemi, Harrihauta and Jyrävä in Oulanka National Park, Kuusamo. The plant species analysis and cover analysis of vegetation were done in 2002. The study plots of 0.15 m in diameter, 5 m apart were placed in four lines, 5 m apart. One line was reset to intact forest as control and three another were placed to area under horse pressure. The number of replicates was dependent on the size of horse resting area (N = 18-48).

DATA ANALYSIS

Experimental study

Plant species were pooled into three plant groups; shrubs (shoots spread vegetatively from areas natural species), natural seedlings (seedlings from natural species of the area), shrubs seedlings (sown seeds of shrubs) and manure seedlings (seedlings from horse manure). The data were analysed separately for each group using the repeated measures ANOVAR, in which the sampling time was used as within-factor and horse trampling, seed addition, and manure addition as between-factors. Because of significant impacts of horse trampling (disturbance) treatments in every plant group, further statistical testing was done separately for undisturbed and disturbed plots. Logarithm transformation or ranked values were used in the analyses to ensure the homoscedasticity of data. When the data did not directly satisfy the Mauchly's condition required for univariate testing in the repeated measures ANOVAR, the Huynh-Feldt -adjusted *F* values were used. The analyses were carried out using SPSS 12 for Windows (SPSS Inc. 2003).

Monitoring studies

Plant species were pooled into six lifeforms; evergreen dwarf shrubs, deciduous dwarf shrubs, graminoids, herbs, bryophytes and lichens. The vegetation data were analysed separately for each variables using the one-way ANOVA. Logarithm transformation or ranked values were used in the analyses to ensure the homoscedasticity of data. The analyses were carried out using SPSS 12 for Windows (SPSS Inc. 2003).

PRELIMINARY RESULTS

Experimental study

Horse trampling treatment decreased the total shoot density ($P < 0.001$), the shoot densities of natural shrubs ($P < 0.001$) and seedlings from horse manure ($P < 0.001$) (Fig. 1). Horse trampling increased the density of sown shrub seedlings ($P = 0.001$) (Fig. 1).

Addition of horse manure had an increasing impact to the total shoot density ($P < 0.001$) in horse trampling treatments and the shoot densities of introduced species from horse manure ($P < 0.001$) in treatments without horse trampling (Fig. 1). Addition of horse manure had a negative impact to the shoot density of natural shrubs ($P < 0.001$) and introduced species from horse manure ($P = 0.001$) in horse trampling treatments (Fig. 1). Addition of horse manure decreased significantly the shoot density of sown shrubs in treatments without horse trampling ($P = 0.033$, Fig. 1).

Increasing the shoot density of sown shrubs was significant followed by addition of seeds of in both treatments with horse trampling ($P < 0.001$) and without horse trampling ($P = 0.033$) (Fig. 1).

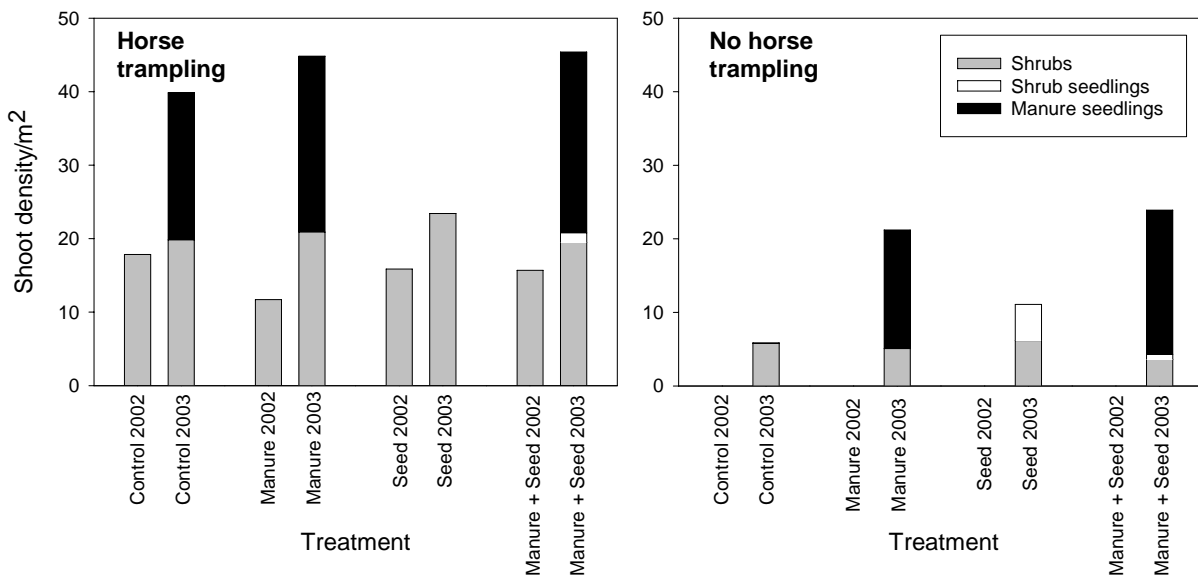


Fig. 1. The shoot density/m² of plant groups in different treatments imitating the recreational horse riding impacts. Treatments: Horse trampling = removal of humus layer, imitate horse trampling, Manure = addition of horse manure, and Seed = addition of seeds of shrubs. Plant groups: Shrubs = natural shrub species, Shrub seedlings = sown shrubs species (*Vaccinium myrtillus*, *V. vitis-idaea* and *Empetrum nigrum*), and Manure seedlings = plant seedlings from horse manure (N = 20-40).

Monitoring study

There was difference between horse resting areas in the cover of plant life forms. However, horse riding had negative impact only on the cover of bryophytes in horse resting areas relative to the surrounding forest. In Harrihauta the total cover of plants was decreased significantly due to horse impacts.

Horse resting in the region of Oulanka National Park has induced a spreading of many fast-growing grasses and forbs to nature which deviate from original flora of an area (Fig. 2), for example; *Stellaria media*, *Cerastium fontanum*, *Rumex longifolius*, *R. acetosa*, *R. acetosella*, *Galium boreale*, *Hieracium sp.*, *Ranunculus repens*, *Taraxacum sp.* and *Descurainia sophia*. Horse resting also affected negatively to the total cover of plants ($P = 0.012$) and bryophytes ($P = 0.047$).



Fig. 2. Impact of horse resting to *Empetrum-Myrtillus* -forest site type vegetation. Horse resting has changed the plant species composition by induced grasses and forbs to protected area.

DISCUSSION

Our study shows that the density of graminoids is higher by impact of horse riding. The results support also the earlier studies (Adkison and Jackson 1996). Benninger-Truax et al. (1992) have found that the number of exotic species increased in trails made by horses compared to forest interior. Differences between trails and forest interiors could be due for example to trails' lower soil moisture (Liddle 1975), higher soil density (e.g. Weaver and Dale 1978) and greater trampling pressure (Dale and Weaver 1974).

The high amount of germinable seeds of native and exotic species reappeared in horse manure, e.g. *Poa* sp., *Stellaria media*, *Rumex* sp., *Cerastium fontanum*, *Ranunculus repens*, *Taraxacum* sp. and *Trifolium repens* were found in both experimental and monitoring study. A large number of species found in studies were originate from horse manure and were not found in areas free from horse impacts. Campbell and Gibson (2001) also found for example *Trifolium repens* spreading via horse manure and it has also represented that *T. repens* may not be establishing without germinating from horse manure. Some species from horse manure may have the ability to germinate also *in situ*. Many exotic species from horse manure may need the new growing substrate produced by horse trampling to germinate. On the other hand trampling by horse could cause erosion and soil compaction and prevent the germination of species (Campbell and Gibson 2001).

One of the main goals of protected areas is to preserve the original biodiversity of the area. It is very important to reduce the number of invading and exotic species in protected areas. Horses spreads many viable seeds with manure and manure is good growing substrate, especially in eroded areas. There is a need of long-term data of the impacts of horse riding on vegetation in protected areas. It is not yet known whether the new species can establish in the area or whether the changes are reversible and can be negated by e.g. the reduction of recreational horse riding in the area. Our further studies and analysis will bring light to the long-term impacts of the horse in the area.

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