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SEMIOTIC DIMENSION OF ECOLOGICAL DESIGN:
THE CASE OF TARTU LOODUSMAJA

Master Thesis

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I have written the Master Thesis myself, independently. All of the other authors' texts, main viewpoints and all data from other resources have been referred to.

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Introduction

The significant part of contemporary environmental critique is dedicated to the issues of production (building, making) which causes not only the resource misuse, waste and exhaustion of ecosystems, but also the negative attitude in its users because of unclear, monotonous or impersonal design. Besides, such kind of production (particularly, space creation) causes the sort of detachment of the contemporary city dwellers from nature and the decrease of the sensibility to environmental signals (Van der Ryn and Cowan 2007; Orr 2002).

Ecologically responsible design is considered to be a solution for such problems: besides saving resources and reducing waste, this tradition pays special attention to both material and immaterial/symbolical human needs. Ecological planning takes into account the specificity of human perception of environment and provides the information about nature and its processes through different techniques; generally, it tends to establish a sort of connection between people and environment (Orr 2002). This aspect makes ecological design an interesting object for a semiotic research.

In order to build such kind of research one particular project will be analysed as an example of ecological design. The building of (and the activities which are conducted in) the Loodusmaja, the school of environmental education which is situated in Tartu, Estonia, will be discussed as a semiotic issue. In this case the techniques of ecological design were inventively applied to create the specific place with the distinct appearance and functions: the surrounding area, the interior and the educational equipment were designed to represent nature and to be used in the teaching of biology, chemistry, ecology etc.

The aim of the current research is to analyse how ecological design tends to connect

contemporary urban dwellers with living nature and local environment. In order to develop the methodological support for the study, the questions will be answered in the following order. First, the general question concerning the human/nature connection will be discussed in the system of the semiotic understanding of the man/environment relationships. Second will be the attempt to analyse how ecological design initiates the situation of human/nature interaction. Third, the specificity of the language that is used to deliver information in this sort of communication will be discussed. The study includes the analysis of human perception of the design features, therefore the multidisciplinary approach could be applied: the semiotic study of the informational processes between humans and nature could be supported with the methodology of the studies on ecological design (ecological architecture) and phenomenology. The interpretation of environmental signals which the elements of ecological design tend to deliver could be studied through the discussion on the reactions and expressed attitudes of the users.

The notion of design can be defined as the „intentional shaping of matter, energy and process to meet a perceived need or desire“, and through materials and strategies it connects nature and culture, being a purposeful human creative activity towards the material world (Van der Ryn and Cowan 2007: 24). The strategy of planning and making things is connected with the way according to which people treat environment and work with the available materials (Ingold 2013). Especially, architecture as the making of human dwelling within the particular environment is connected with the tradition of the human/nature relationships and with the comprehension of human place in the world (Minai 1984: 182; Berleant 2002: 22). The man/nature dialogue is the basis of architecture, and the particular disadvantages of modern architecture are discussed within the environmental critique which speaks about the causes and consequences of the disconnection between contemporary urban dwellers and nature (Kemsley 2012: 133; Minai 1984: 27).

The problems which are caused by this disconnection are named characteristic for the

modern epoch of industrialization and globalization. On the one hand, there is obviously less of the immediate necessity in the local small scale production because of the wide availability of mass manufactured goods; in this case, the direct immediate connection with local environment and the deep knowledge of local natural processes become less crucial for survival. On the other hand, in this situation the sensitivity to the environmental processes might decrease. Besides, contemporary city dwellers start to misinterpret and even fear living nature because they were born/immigrate/occur in the rapidly changing urbanised environment (Libermann 2007: 47). Analysing this situation, ecological critique highlights the connection between the preservation of the initial landscape and the preservation of local traditional culture (Arntzen 2002: 27). It insists on saving environmental diversity and complexity because of the numerous immaterial aspects of nature which are important for human living in the particular area (Arntzen 2002: 43).

Globalisation and generalisation of design strategies lead to the misfit/miscalibration of technological solutions because of the failure on the scale level (Moran 2006: 94; Alexander 1971: 69; Orr 2002: 14). The dynamism with which some modern technologies appear does not let them be successfully spread and locally adapted, because the proper adaptation requires both precise calibration and careful adjustment (Orr 2002: 68).

Another negative aspect of contemporary manufacturing is the orientation towards the quantitative parameters: disregarding the specificity of the place and of the local cultural context, it prefers the mechanistic multiplication of monotonous standard forms. As a result, "the poverty of the industrial imagination" is reflected in unclear design which could be perceived negatively by the users: for instance, the sort of architecture which lacks specificity or diversity of spatial patterns causes the sense of disorientation (Van der Ryn and Cowan 2007: 25; Lozano 1992: 397).

Besides the sense of disorientation, contemporary urbanised environment might cause the sense of mistrust: the initial, authentic environment which people perceived as familiar and trustful is being destroyed or replaced with the objects which are inauthentic for this region

(standard concrete buildings, shopping centres, artificial landscapes etc.). As a reaction, people try to reconstruct the lost environmental characteristics through the imitation or reconstructions of the appearance (Dovey 2000: 33). But the authentic characteristics of environment could not be mechanistically replicated, for the authenticity is not a visual feature; it is a sense which evolves in people through the interrelation and engagement, which takes time and personal involvement. For instance, the demand for the presence of natural materials such as stone or wood in the living space is still noticeable in the contemporary consumers. The possibilities to be cut, carved, painted or acquire patina (the signs of time, the signs of usage) are inseparable features of this materials, as well as the particular smell and texture. This combination of features makes, for instance, wood preferable as a familiar, reliable, authentic, comfortable material (Dovey 2000: 44). But contemporary designers imitate the appearance of wood by the artificial substances (for example, plastics) which do not possess these additional (non-visual) qualities, and the users recognise the interiors or buildings as "inauthentic" because of the domination of the fake appearances (Dovey 2000: 36). As a result, the substitution of natural materials with unnatural ones leads to the decrease of subconscious trust towards environment, and thus to the difficulties in the human/environment interaction.

To summarise, it can be noticed that contemporary architecture disregards the specificity of human perception of environment and appears unable to find the proper solution for the actual human needs. Semiotics says that modern architecture lacks the communicative orientation (Eco 1997: 174). In other words, architecture fails to structure the environmental information properly, to be intuitively understandable for the users, to bear the special symbolic value. Generally, modern architecture disregards the human communicative experience towards environment (Minai 1984: 173).

One of the possible solutions for the above mentioned problems is the wise application to ecological design: having been invented as a complex of technologies to minimize the negative environmental impact of production, it developed to the tradition of making with

respect to both essential human needs and nature (with the whole diversity of its processes). It appeared as the extension of the ecological philosophy of the 1970-1980s which analysed the negative impact of modern unsustainable manufacture and tended to reconsider the human approaches to nature (Arntzen 2002: 28). In that time the authors of architecture theory and design started to pay particular attention to the complexity of environmental features and processes which should be taken into account while planning and building (HcHang 1971).

In the works which is dedicated to ecodesign in the 21th century David Orr speaks about ecological design as a way to connect people with their environment, with living nature and landscape. He discussed the causes of contemporary mass production and names the modern culture a culture of the "fast knowledge", within which technologies appear too quickly to be carefully incorporated into practice (Orr 2002: 36-37). Contemporary mass culture disregards the local experience of solution finding, and this leads to the problems of the miscalibration of treat and the misuse of resources (Orr 2002: 38).

Sim Van der Ryn and Stuart Cowan, the modern specialists in sustainable planning, discuss the design principles by which the negative impact on environment could be decreased (Van der Ryn and Cowan 2007). They emphasize the need to design in a way „that honours the complexity and diversity of life itself“ (Van der Ryn and Cowan 2007: x) and enumerate five principles of ecological design, which could be briefly described as following: ecological design looks for the local solutions (which "grow from place"), pays attention to natural processes and interrelations, connects ecological accounting and technology, makes nature constantly visible in the modern urban environment, and creates the objects which could be personalised, adjusted and recycled (Van der Ryn and Cowan 2007). Architecture, being the most common case of the ecological design application, tends to fulfil these principles while conveying information to the users.

Architecture was studied according to the different models of communication which were created within the linguistic and structural studies in the 1970-1980s. For example, Donald

Preziosi in *Architecture, language and meaning* (1979) applies to Roman Jakobson's model of communication to study how architecture sends messages through the specific channels. Asghar Minai pays attention to the tight connection between architecture and human experience and emphasizes that architecture connects people with nature. In the work *Architecture as environmental communication* (1984) he also highlights the problem of meaning loss which is characteristic for the contemporary standardised manner of building. The issues of human experience are also mentioned in the semiotic studies of architecture: people experience architecture as the non-verbal communication and perceive the built structures as the meaningful units (Rapoport 1990, Eco 1997).

The relationships between humans and environment in general and between humans and dwelling in particular became also the theme for the phenomenological discussion (Merleau-Ponty 1945; Heidegger 1977). Besides, the poetics of space that calls for human attention was studied as the element of human action within environment (Bachelard 1969). Within the phenomenological theory perception is described as the interpretation of environmental signs, and both physical and mental aspects of this process are taken into account (Merleau-Ponty 2012 (1945): 35). Also, phenomenological aspects of ecological problems started to be discussed widely within environmental critique (Brown and Toadvine 2003).

Semiotics continues the tradition of speaking about architecture in the communicative sense (Eco 1997). Umberto Eco emphasises that the task of semiotics is to understand the communicative aspects of functions, to read the codified messages which architecture sends (Eco 1997: 174). Also, ecological semiotics studies the connection of ecology and semiotics (Nöth 1998), whereas human cultural activities could be studied in the tight connection with ecosystems (Maran and Kull 2014). Ecosemiotics tends to overcome the nature/culture dichotomy and discusses the connection of human cultural practices with the perception and comprehension of living nature. Besides, the interpretation of landscape features by the linguistic means of a structural analysis can be considered as an

ecosemiotic method as well (Lindström *et al.* 2013: 98-99). The specificity of ecosemiotics is that this branch of sign studies pays special attention to the issues of scale finding, locality and immediate contact with the particular environment (Maran 2002; Windsor 2004). Ecological semiotics combines several approaches, taking into account the data from biology, ecology and environmental studies – for instance, it concerns the perception and the differentiation of environmental features, or affordances, by living organisms (Gibson 1986).

1. Methodological considerations: connection, context, communication

1.1. Establishing connection through design

The main specificity of ecological design which makes it a suitable object for a semiotic research is the tendency to connect people with nature, to expand their awareness within environment, and to calibrate human behaviour with ecology (Orr 2002: 31-32). This calibration means the correspondence not only in the practical sense, when the problems of waste or resource exhaustion are avoided by the wise management; besides, ecodesign helps humans fit better to environment, to orientate in space, to recognise nature. Therefore the communicative approach might be fruitful in this case; semiotics pays special attention to the processes of interaction between a subject and environment. This interaction can be described in the following way: „the characteristics of both the environment and the organism merge in the subject’s interpretative activity - semiosis“(Maran 2014: 82). A communicative process reveals the specificity of human interpretative activity towards environment, and it becomes possible to follow which aspects of environment are more important for those who perceive them, and the specificity of the grasping of information that is characteristic for the observed objects can be noticed.

The interaction with any type of environment could be studied as a semiotic process, but the case of the Tartu Loodusmaja is specific because the spatial organisation of this place was supposed to provide the particular environmental experience: the studies on biology and ecology are conducted in the place which contains the numerous examples of living nature and created with the usage of natural materials. The design of the building tends to

represent living nature and to keep some natural elements available for the direct immediate contact. In other words, the building was planned to provide the possibility for the children's interpretative activity towards nature. This interpretative activity can be considered the basement on which ecological design attempts to connect human with environment.

The contact between the visitors of the Tartu Loodusmaja and nature can be described applying the linguistic terms introduced by Roman Jakobson within his theory of communication. In every communicative situation there is a sender who has the goal to convey information to a receiver. The situation of communication takes place in a context, a situation that can influence the interaction. In order to convey information, or send a message, the proper channel should be used, and in the process of contact the encoded messages are delivered to a receiver (Jakobson 1987: 66). In the case of the Loodusmaja the designers tended to create the circumstances within which children can have an opportunity to perceive nature – or, rather, receive the signals which environment sends as encoded in shapes, colours and other forms. The elements of ecological design which let the visitors receive these signals serve as channels to convey information: the design of the school building represents nature and exposes the pieces of nature purposefully uncovered to be met by the students. Children come to the centre to learn about plants and animals, and they learn to be attentive to the signals which nature sends. This situation of learning becomes the context within which the visitors receive information. In other words, on the territory of the Loodusmaja people are surrounded by different forms of nature, and tend to perceive the messages which nature sends. This evolves the visitors in the sensual engagement with environment, when natural elements and pieces of living nature evoke interest and attention: thus, the contact can be established. Therefore, in order to support the connection between the visitors and nature, the school building must create the learning environment which calls for action or participation, evokes interest and attention.

Among these elements the creation of a context and the providing of a channel to receive

the environmental messages appear important for the current study: the tendency to establish the connection is fulfilled by the means of design strategies, so the representation of nature and making it available for interpretation could be studied as communicative issues. The ways of providing the context and the types of messages which the technological means tend to convey will be discussed further.

1.2. The initiation of the contact

The notion of context is discussed within semiotic tradition as an important aspect of communication: it can influence the process of communication and alter a message (Maran 2007: 271-272). In the case of the Loodusmaja the space of the environmental education school provides the context for the interpretation of signals which nature sends. Although there cannot be the two-sided communication with non-living objects, the interpretation of environmental signals still presupposes the existence of the context in which it takes place. In the chosen case the whole space of the school, including the surrounding landscape, is included in the context of human/nature relationships. Stepping into the surrounding park, a visitor already appears in the situation when he/she cannot avoid receiving the signals from nature.

During the construction of the Loodusmaja the specificity of the surrounding landscape was taken into account, which means that the affordances of the particular land were distinguished and used to create the ecologically sustainable architectural object with the minimum of energy consumption and waste. The members of the architecture company did not have any ecosemiotic theories in mind, but their strategy can be described as the proper reading of natural information that the landscape contains (for the detailed description of their intentions see Annex 1; the particular important principles will be named within the discussion with the reference to the correspondence with the member of the company).

Landscape itself, as the primary human environment, is considered as a sign system, where signs are meaningful units, which combine signifier/signified and let landscape be perceived as a text, as a meaningful object (Lindström et al. 2013: 98-99). In the tradition of the Tartu-Moscow semiotic school, text is widely understood as the sequence of meanings, and landscape can be also read as a text, as a sequence of significant units (Lindström et al. 2013; Spirn 1998: 24). Landscapes were first human texts to read (Spirn 1998: 15), and the tradition of building is tightly connected with the distinguishing of the

important landscape properties. In this sense ecological design tends to read the landscape text carefully, to gather the maximum of information and to use it to create the living spaces which will support the natural sequence of meaning. Moreover, the surrounding landscape becomes an object to be studied in the Loodusmaja case: natural environment performs as a stage, a background for communication, a source of information and illustrations. In linguistic terms that are chosen for the discussion, landscape becomes the context for the interpretative activity, and also it becomes the source of messages for those who move within it.

Phenomenological tradition says that, in general, the world always remains a place of significations for living beings: it is the constant source of information (Merleau-Ponty 2012: 453). As semiotic tradition emphasises, living beings are inseparable from their environment, and the placement in environment is crucial to study the interpretative activity (semiosis) (Maran 2002: 71). The difference which is provided by environmental stimuli is crucial: one learns about oneself and the world through attention to the signals that it sends to our sense organs, and the diversity and novelty of these signals is crucial for human capacity to orientate in environment (Ingold 2013: 1; Lozano 1992: 398-402). The difference of shapes and textures makes the environment more distinct to perceive, and this kind of messages is obligatory for the wholeness of the impression. Everyday practices demand human perceptive channels to be open constantly, in order to receive the meaningful signals from the environment and coordinate the behaviour according to them (Appleton 1992: 27). It means that human perception should be trained to grasp the difference and the slightest changes in the surroundings. Ecological education, while teaching about nature and its processes, in fact, develops the ability for the detection of the differences and processes. In the Loodusmaja the design techniques are applied to leave nature and natural materials uncovered and available for the sensual engagement, so the diversity of signals supports the complex perception of the school environment.

The phenomenological tradition states also that perception naturally awakens attention

(Merleau-Ponty 2012: 29), the notion that is crucial for the current discussion. Ecological design tries to call attention in various ways. And in the case of the school of environmental studies it is the attention to nature and its processes, the attention to the authentic environment, the attention to the initial ecological balance is supported by the design features of the building. The particular design techniques will be discussed further, but here the education of attention should be mentioned. It is conducted through the careful movement in the surrounding environment with paying special attention to its characteristics and processes, and this "knowing through movement" is one of the most ancient ways of learning (Ingold 2013: 1).

Studying the connection of movement and perception, phenomenological tradition also says that the bodily spatiality is situational, not positional, what means that the sensual engagement with environmental signals is directly fulfilled through movement (Berleant 1992: 89; Merleau-Ponty 2012: 102). Movement causes the mobilisation of all senses, and perception becomes an interpretation of the signs which are provided by environment when we move through it (Merleau-Ponty 2012: 35). That means that self-awareness also depends on movement, through which the body is felt. So the providing the possibility for free movement could be the important aspect in the design process if there is a need to influence human perception, conveying the messages through the design techniques. Within the space of the Tartu Loodusmaja the possibility to move freely supports the communicative context, because the visitor is involved in the constant sensual interaction with natural elements while moving inside the building.

The discussion on the human/building interaction can be supported with the discussion on meaning which the built environment provides to people. Phenomenological tradition says that meaning is probably the most important dimension of a place (Rapoport 1990: 26). So the meaning of the spatial organisation becomes the crucial factor in the human/environment communication. In the case of the Loodusmaja the school space has the meaning of a "nature house", which means the presence and representation of nature,

the "atmosphere" of nature, the authentic environmental experience of nature, and the possibility to stay and move within nature. These types of meaning become the messages which the architecture of the building tends to convey.

1.3. The process of communication: the types of messages

In the chosen case of the Tartu Loodusmaja ecological design organises the human/nature contact through the medium of architecture, and communicational specificity of architecture should be taken into consideration. The visitors will always perceive the information which architectural forms convey to them (Kemsley and Platt 2012: 133), therefore, every style is created to influence human perception, and the clear, distinguishable design can send the messages much more successfully than the unspecified, monotonous design.

The function of ecological design is to speak to a human about nature, and, in the context of the current work, the design principles might be analysed as being applied to deliver the messages. The design strategies which are distinguished by Van der Ryn and Cowan (2007) call the particular attention, because these principles have communicative aspects:

- a) technical solutions should "grow from place" which means taking into account the local specificity, both in the sense of resources and cultural context;
- b) ecological accounting should inform design, what means that the life circles of local nature and the possibility for recycling are important;
- c) designing with nature, which means following natural processes, patterns, etc.;
- d) everyone can be a designer: that means the cultivation of design intelligence and the creation of the objects which should be adjustable and convenient;
- e) making nature visible in contemporary urban environment.

Such principles as the interpretation of locality, the possibility for the creative engagement, and the representation of nature and its processes were chosen for the current discussion as far as they possess the distinct communicative aspects: the issues of interpretation, representation, and contact.

The dynamic aspects of nature which are taken into account and represented in ecological

design were distinguished as a separate type of messages, while the representation of synchronic aspects (the current stage of development together, the diversity of shapes and colours) were taken as the second type of information. This distinction was made according to the types of interpretative processes which take place in this particular school: the dynamic processes of seasonal changes and the life circles of plants and animals are studied during the academic period (these changes are discussed in classes and ecological design provides the possibility to watch these dynamic processes). But the constant presence of the diversity of living nature forms and various pictorial representations of nature call for special attention as the synchronic aspect. Also, the need for the authenticity/naturalness and the following of the natural interrelations were taken from the work by David Orr who discusses the human/nature connection through design (Orr 2002). This combined classification could be incorporated in the chosen model of the human/nature interaction, and the following will be the detailed discussion of the messages which are conveyed through the channels of design features.

1.3.1. Making nature visible: the dynamic processes

The specialists of ecological design say that to integrate ecology and design means to reflect natural interconnections, in the sense of interrelations and causes (Van der Ryn and Cowan 2007: ix-x). Ecological design takes into account the seasonal changes and the dynamic specificity of the landscape; also it represents the diachronic view on nature and its processes. The messages could be of such kinds: the seasonal changes in plants, such as blooming in spring or changing colour in autumn and bringing fruit; the life circles of animals, including the periods of activity and hibernation; the changes in natural materials through usage and ageing; the availability of resources according to the season etc. In nature, they are encoded in colours and shapes, in presence or absence of elements.

Taking these processes into account helps the designers to create a sustainable building which could be integrated in the local ecosystem and could become almost self-sufficient if the affordances of the particular climatic zone and landscape are interpreted wisely (Van der Ryn and Cowan 2007: x). It demands taking into account how the local nature changes throughout the year, and this type of environmental awareness can be also taught to the students of environmental education. In a semiotic sense, the information on diversity, interconnectedness and dynamism should be learnt from the place and taught further to those who visit the centre. Therefore, the messages concerning processes should be delivered in the forms which afford perceiving changes and causality. The visibility of processes, the reconstruction of natural interconnections and the opportunity for spending time (necessary to notice and follow the processes) can be named as the channels to convey information. The context for these messages to be received is the time of classes and free activities which can be conducted in the building throughout the year: the visitors have free access to most of the school territory, and some design features of the Loodusmaja provide the possibility to explore the natural processes directly.

1.3.2. Making nature visible: the synchronic aspects

Another task of ecological design that could be considered as a synchronic dimension of the previous type is “making nature visible” or available for visual perception in the urbanized world (Van der Ryn and Cowan 2007: 4). This means the constant presence of natural elements in the environment: from the usage of the wide variety of uncovered natural materials to the possibility to deliver as many representations of nature as possible. These messages are also primarily visual, but the distinction of them is connected rather with the recognition of the formal characteristics of biodiversity than the following of the processes. The information about species, such as colours and shapes, sizes and structures,

can be learnt when visually represented in the education environment. The visual messages are probably the most important for the recognition of the species, because the visual channel of perception is known to be dominant in the system of human senses. Therefore illustrations might effectively support the studies on plants and animals, and ecological design tends to provide such illustrations by the depiction and exposition of nature elements. In the case of the Tartu Loodusmaja leaving the natural materials uncovered and situating the pieces of nature around the building supports the creation of the specific "green" environment.

1.3.3. Authenticity

In the tight connection with the mentioned kinds of messages is another type of meaning which ecodesign tends to convey: it is the sense of authenticity, "rawness", "naturalness" that is important for human perception of environment. Ecological design purposefully leaves the materials uncovered and the landscape minimally changed to provide the sense of reality, authenticity, reliability. Applying to both visual and tactile perception, ecological design provides the authenticity of aesthetic experience through the directness of the human/environment interaction (Berleant 2002: 20). Environmental aesthetics is, in other words, more than a visual quality, and the purposeful choice of natural materials and initial landscapes provides the uniqueness of environmental experience (Arntzen 2002: 46). So, the various signals such as smell of surface texture speak about the authenticity of natural elements, and ecodesign tends to convey as many such signals as possible. As far as materials evoke associations and possess the particular meaning in human culture, the ability to work with them directly supports the sense of authenticity. For instance, as it was already mentioned, the part of meaning of wood is the possibilities to be cut, carved, painted, to acquire patina etc. (Dovey 2000: 44). These aspects of meaning support the

perception of wood as a reliable, familiar (traditional) material. And the intuitive knowledge of this possibility provides the deeper connection with objects and places.

In the case of the Loodusmaja, wood applied as much as possible and purposefully left unpainted, raw, "unhidden". The smell of wood and the tactile characteristics of this material support the perception of the wooden interiors of the school as "authentically wooden": the visitors can check the objects which possess the visual characteristics of wood and find that the equipment, furniture and walls are undoubtedly made from the real wood, that this is not the plastic which imitates wooden surface. This feature makes the building of the Loodusmaja specific: the visitors perceive the appearance of the material, but the interior possesses surprisingly much wood which calls for attention; they examine the surfaces to make sure that the wood is real and thus appear engaged in multisensory perception of the objects. This complex impression which combines the visual, tactile and other characteristics of natural objects (or the objects which are made of natural materials) will be called "authenticity" in the current work. It can be added here, that "authentic" objects call the users for the deeper sensual engagement.

1.3.4. Locality

The next type of information which ecological design represents consists of the messages about locality. Locality presupposes that semiotic structures cannot be separated from the environment (Maran 2014); the development of the self-awareness in time and space is impossible without the sensual engagement with environment. The techniques of ecological design follow the similar principle: the planning of a sustainable building is impossible without the deep comprehension of the landscape and resource specificity of the particular place. The technical solutions must "grow from place", from the unique cultural and physical characteristics of the territory (Van der Ryn and Cowan 2007: 3). The

cultural aspect here concerns the traditional way of resource usage which lets the affordances to be exploited wisely and without exhaustion. In other words, reading landscape requires local knowledge (Spirn 1998: 4), and in this sense ecological design is also specific for its connection with the previously existing traditions of environmental treat and solution finding. The advantage of local culture in comparison with global culture is exactly the tight immediate connection with the surrounding environment (Maran 2002: 76), and ecodesign tends to find the safest solutions for the particular place. In the case of the Loodusmaja the local climatic and landscape specificity were taken into account to create the ecologically sustainable building; in other words, the environmental signals were interpreted to find a local solution. At the same time, local environment becomes the source of illustrations and the material for interpretation in the course of ecological education. This aspect is partially connected with the representation of nature and natural processes, because the easiest way to represent nature is to reveal the locally available pieces of nature. Also, the usage of local materials and techniques supports the sense of authenticity of the objects, because the users can learn how the things are created from the resources which can be found in the close proximity.

1.3.5. "Everyone is a designer"

The issues of making and creative involvement are important within the tradition of ecological design as well: it creates the objects which can be personalised, adjusted, customised, remade and reused. Ecological design underlines such possibilities through the usage of raw natural materials and clear and plain forms which call for action and engagement. Also, ecodesign permeates variety of usage and re-purpose, that makes it attractive for creative comprehension. Since meaning is achieved through personalization, changing, adjustment (Rapoport 1990: 21), not only the project must take into account the

user's needs, but all the elements must be changeable and adjustable (Rapoport 1990: 23). This type of information can be perceived rather as the call for interaction, of creative comprehension. The authenticity ("naturalness", "openness") of uncovered materials provides the ideas of how materials can be used: in the case of in the Loodusmaja many objects are constructed from wood, and the inventive usage of this material is demonstrated to the visitors. The design features themselves become the channel to convey the messages about the usage of natural materials. Then, the interior objects of the school are multifunctional: the spatial organisation as well as the appearance of the rooms and halls can be adjusted according to the actual needs of the students. It can be supposed that the school building will "grow" and develop as a living organism itself, because the applied principles of ecological design make it engaged in the life processes of the surrounding landscape and ready to experience the changes and adjustments.

1.4. The Tartu Loodusmaja: the sustainable design of a "house-in-the-woods"

1.4.1. The overview of the research object

The object of the current research is the centre of environmental education, the building of the school and the surrounding park which was planned as a part of educational space and possesses the elements of ecological design as well. The activities which take place inside and around this building will be discussed, since the purpose of the current work is to follow how the design features of the school serve to establish the connection between the visitors and nature.

The building of the Tartu Loodusmaja was planned purposefully for the school where children can learn about nature and ecology. Even the name of the institution (which existed previously in other buildings), *Loodusmaja*, means Nature house in Estonian language, which indicates the specificity of this place. The orientation on the particular activities and the representation of particular themes were the leading principles of the planning. The designers consulted with the teachers from the existing centre of environmental education who were the immediate clients of the architecture company. The architects tended to create the space in which visitors can interact with nature in different ways (see Annex 1). The inventive usage of local materials such as wood let the designers create the complex of diverse structures and textures which call for attention and support the environmental education: the techniques of ecological design were applied to provide

the constant presence of nature and to represent its elements (see Annex 1). But the representation of nature and natural processes possesses not only visual character in this place. Instead, the techniques of ecological design apply to all the senses of visitors, and the environmental messages conveyed by such design complete each other to create the complex impression.

The Loodusmaja is situated in the old part of Tartu, on the edge of the Karlova district which is known among the local dwellers for its well-preserved wooden buildings in which people still live. The construction of the school is inserted in the hill and surrounded by the park with a garden and playgrounds. The Loodusmaja building has an Y-shape (three rays/wings which are spread sideward) and situated in a manner which lets the solar energy be maximally used. There are two floors in the building: the first one contains an entrance, a hall, an information desk, one large conference room and three classrooms. One is dedicated to stones, the second to handicraft and the third to plants and the studies on sun energy. The second floor also has a hall, a library, several classrooms (Animal room, Creativity room and others) and the teachers' cabinets. Also there is a kitchen with transparent walls and a small terrace under the ceiling with swirl stairs leading there (see Annex 3: Figure 1, 2).

One part of the building is dedicated to a greenhouse (a winter garden, a botanical garden) that has an entrance from the first floor and rises gradually to the level of the second floor: there is a possibility to get from the first floor to the second floor by stairs which are situated in the garden. Another way to reach the upper floor is the massive wooden stairs which are situated in the core of the building. There is also an elevator in the building; but during the observations it was noticed that mostly visitors prefer the wooden stairs or the way through the greenhouse. The botanical garden is available for visiting any time, and most of the rooms have glass doors or even whole glass walls, through which let observe what takes place inside and distinguish the specificity of the room (see Annex 3: Figure 3). Although some of the rooms are decorated in a particular way and have their names written

on the cardboard plates (Animal room, Creativity room), they can be used for various purposes.

1.4.2. The used methods and observations

In order to understand how the ecological design of the Tartu Loodusmaja fulfills the function of connection, the processes of interaction between the visitors and nature should be discussed. The semiotic engagement with environment presupposes the reaction towards the environmental stimuli: therefore the information about human movement and perception was collected through observation in the building and around the house. The purpose of the observation was to follow the processes of interaction between the visitors and nature, in which the design features of the school area may serve as the channels to convey the natural signals to the people or to represent natural elements. The series of observations was conducted from the end of September, 2014 to the March, 2015. This wide period of time was chosen to notice some significant aspects: for example, how the design can be perceived by the students who come here for the first time in the beginning of the school year and face the ecologically planned space as something new. Their immediate reaction and direct expression of attitude are valuable sources of information concerning how people perceive the specificity of the school. The reaction of adults was predictably more reserved, but the sense of interest which some features of school evoked in them was noticed as well.

First it was planned to observe only how the students use the equipment and the specificity of the classrooms during lessons, but then the free, extracurricular usage of the school spaces called the specific attention. It was noticed that the visitors of the Loodusmaja spend the significant amount of time around the building itself exploring the educational equipment and the specificity of the school interior design. Their reactions on the affordances which ecological design of the Loodusmaja provides appeared more expressive and immediate than they can be during the class activities. Moreover, the equipment which is situated around the building and the specificity of such places as the playgrounds or the greenhouse called even more attention in visitors than the classrooms

themselves. So the observations on both types of activities (during lessons and during free time spent in the school) were combined to notice how the design of the Loodusmaja is exploited during the interpretation of nature. The main types of messages which were taken as the key types of information that ecological design provides (will be described further) were noticed to be perceived by visitors during the communicative situations which happened within the mentioned areas. The situations of the contact and sensual involvement illustrate how ecological design conveys information, and in most of the situations the contact included receiving several messages at once.

In total, it were around 15 hours spent in observations inside the building and around it in the park, separated to the shorter or longer periods of time, according to the weather conditions and presence/absence of subjects to be observed during free activities. Besides, several classes on Animal class, the course on animal and nature knowing for the younger school children were visited to notice the immediate reaction of children to what they perceive in the building. Also, some class activities were observed in the greenhouse and partially in other classrooms. Then, the behaviour of students before and after classes was observed, because it included the dialogues with classmates and parents concerning what they saw and did. Besides, some cases of adult/child communication were observed throughout the building, when parents or elder children show or explain the information on nature to the younger children.

The immediate reaction of children and adults, the clear expression of their emotions and attitudes (particularly, the reactions of attention which were evoked by interest and curiosity) was the main aspect of fixation. Such observations of communicative experience within the environment are the significant feature of qualitative research - particularly, of phenomenological study which allows human experience to be comprehended deeper. Physical settings, participants, their immediate activities in the context of a situation become the key details in this part of observation: an observer must take into account (Merriam 2014: 117-120). The immediate observation helps to understand human activities

in particular context which influences their behaviour (Moustakas 1994). The general methodology of the phenomenological researches could be applied in many cases of semiotic studies, because it provides the information on the interpretative behaviour. The analysis of the directly expressed attitudes and purposeful actions towards the studied objects can help to understand their communicative value, or, in the case of the current research, the success in the establishing the of human/nature connection. Although some outputs of ecological education, such as the development of ecological awareness, are problematic to be fixed, the immediate reactions and the active semiotic engagement are possible to follow.

The collected observation were organised in the chronological order, and the relevant details were fixed: dates, places, participants, a context of the situation and the events which took place. These observations were analysed according to the chosen model of human interpretation of nature through design features, and the specificity of design features as communicative channels was discussed.

2. The messages of ecological design

The specificity of ecological design is in the ability to call attention in users - and, as a result, to call for contact, for interaction, for participation. The moment of interest evoking becomes crucial when education of attention towards environmental signals is performed. In the Loodusmaja, the attention towards nature appears while the visitors move through the school of the park freely: it might be stated that ecological design of the Tartu Loodusmaja is inventively applied to create the specific place within which the visitors can communicate directly with nature and learn about its diversity and processes through the various representations.

2.1. The diachronic view on nature and its processes

2.1.1. The usage of glass as a channel for visual messages about natural processes

The significant amount of the messages that ecological design delivers concern natural interconnections and processes. For instance, such design technique as the inventive usage of glass calls for special attention in the case of the Tartu Loodusmaja because it serves as a communicative channel to perceive natural processes and interconnections. Glass is variously used in ecological design to provide the maximum of natural lighting, which lets save energy by the usage of the natural renewable resources; and transparency appears the

key feature of this material as a channel, or a medium, to provide the visibility of causes and relations. In the Tartu Loodusmaja, the numerous glass windows of different sizes and the transparent glass walls and doors of some rooms and halls give the possibility to watch the processes which happen around the building and inside of it. Glass as a channel for this visual information on nature is highly important for the semiotic research of the Loodusmaja: the transparency of glass visually connects the processes outside and inside, unites the spaces of the interior, while serving as a formal border between its parts. Glass acts as the communicative means between the parts of the interior and makes the building almost transparent from one side to another. The main entrance of the building consists of glass almost completely, and the side wall of the conference room, the part of the hall wall, one wall of the corridor which leads to the Stone room and the part of the Stone room are transparent. Therefore, being inside the hall of the first floor, a visitor has the possibility see the surrounding landscape (the part of a hill, the trees and pathways of the park and the part of the street) and watch the dynamic processes which take place outside (see Annex 3: Figure 4). Also, the transparency of the walls serves to convey messages about the movement of other people in the building, so, in addition to human/nature interaction, the transparency of glass supports also the communication between people. As it will be described further, this possibility for communication acts as a positive factor in the evoking of the interest towards the building and attract people to visit it. Besides, the openness of the space and the visibility of what takes place in the surrounding area could distract the attention of the students during the lessons. But this particular disadvantage could be overcome if a teacher purposefully uses the visibility of the glass to forward the pupils' attention to the natural processes in the surrounding landscape: then the dynamic processes could become rather the illustration for the discussion on the specificity of the living nature, and one such instance could be described here.

The conference room which is situated on the first floor of the building possesses such spacious glass walls which allow seeing the surrounding landscape and the dynamic

processes in it. This room is used for lectures, classes on nature and exhibitions, because it provides much space and natural light. Another interesting feature of this room is that it can change the appearance, because the wall which separates it into two parts is movable, so it is possible to arrange it according to the preferences: without the central wall, it forms one space that has two opposite transparent walls, so the visitors can be surrounded with the landscape which is visible from both sides of the room.

During one lesson of the Animal class (the course on nature knowing for the younger school children) the specificity of this room was used to demonstrate the landscape changes which occur according to the season (see Annex 2: 15.10.2014). In this particular case it was the specificity of autumn: the surrounding outside was in the period when leaves turn yellow and red, and the strong autumn wind caused the impressive colourful leaf fall. In this case the teacher spoke about the life of trees (described how high they grow and move on wind), and children were copying the movements of her arms, when she showed how the wind shakes the tree branches. In this moment the strong wind blew outside, and, although children could not feel the current of wind, they were able to see the abrupt movement of real trees, as if the landscape itself supported their knowledge of how such natural processes happen. The children looked through the glass walls and copied the waving of tree branches, so that the visual presence of the nature processes was "inserted" in the children's activity. After the play had finished, the children were still looking at the trees and even came closer to continue watching the leaf fall, until the teacher called them for the next exercise. The reaction of children could be interpreted as the interest to the dynamic natural processes which call for attention and are achievable through the glass medium of the room walls. The attention towards the dynamic changes in landscape became the starting point for discussion in that particular lesson, and the transparency of walls became a channel to perceive the corresponding environmental signals. The choice of the topics for classes could be made according to the information available for illustration, so the usage of seasonal changes or seasonal natural materials supports the

education on nature themes. The context of a lesson influences the perception on the environment: children seek to learn something new, and their perception is directed towards the objects which are shown to them and which they see within the educational space.

During that particular class, the landscape became also the background for the play with seasonal seeds which were rolled through a tube by the teacher, and the children picked the seeds and discussed species (see Annex 2: 10.15.2014). Some of the seed rolled to the opposite side of the room, where the transparent glass wall starts, and children stopped for a while near the glass to look outside to the park or the passers-by, and then returned to the group of classmates and the teacher. This moment of stopping and looking outside signifies the moment of attention towards the outer world that is visible constantly, not only in the moments when a teacher points on them (see Annex 2: 15.10.2014). Occasionally the passers-by (pupils or their parents) appeared near the glass wall of the conference room and looked inside, paying attention to the activities which take place inside the school. Some of the children noticed them and waived hands or even called them inside. In this particular case the attention towards the surrounding environment was spontaneous, but noticing the outer processes which happen while they visit the class connects the pupils with the rest of the world, while during the classes in regular school children are mostly restricted in their movements, so that it is forbidden to pay attention on what takes place on the streets. It was noticed that these moments of paying attention on something except the lesson do not interrupt the learning process: rather, they serve as necessary short breaks to keep students active and connected with the dynamic natural processes. Besides, before and after the class these moments of interest towards what is visible through the walls took place and children discussed what they saw outside and point on the classmates coming to the school. The environmental education on natural processes and interconnections presupposes the elements of spontaneity, when the discussed object is not a pictorial representation, but rather a dynamic process. In this sense the presence of living nature

supports the learning with illustrations, while, for instance, the lessons on mathematics might require the different spatial organisation.

2.1.2. The glass walls of the greenhouse

The opposite (to the entrance) part of the first floor of the building possesses the glass wall of the greenhouse which is spread to the high of the second floor, so that it is possible to look above the garden from the wooden stairs which are situated in the core of the building. The living processes in tropic plants and animals can be watched here: the greenhouse provides the possibility to perceive with flora and fauna otherwise hardly reachable in this climatic zone. The greenhouse has three walls and a cellar which are made completely of glass to receive the maximum of sun energy which is necessary for the plants which live in sunny regions; but the glass walls make the garden visible from outside for the passers-by and let compare the inner exotic landscape of the greenhouse with the outer local landscape that changes through seasons. The fourth wall becomes the part of the corridor of the second floor, and this corridor is a sort of a balcony from where the greenhouse can be observed.

The difference between the changeable local landscape and the green richness of exotic garden is obvious most of all in autumn, winter and spring periods, when the natural processes are distinct and recognisable. The visitors of the greenhouse pay attention to the differences between constantly hot and humid climate of indoors and the changeable nature of outdoors (see Annex 2: 03.12.2014). Thus, children, who react on the unusual objects immediately, notice the difference between the tropical "jungles" and the winter landscape of the surrounding area. Parents and teachers discuss the specificity of the tropical environment in contrast with the local environment that significantly changes according to a season, and thus the awareness of different types of natural processes can be formed in

the students. The visitors can notice the difference in the speed of changes in exotic and local plants, and the degree of these changes, so the contrast between inner and outer varies according to the season. In this sense the technologies that provide the possibility to reconstruct any type of climate with the minimal of resource usage can serve the educational purposes: the education of attention towards the specificity of exotic nature, towards the contrasts and similarities in the landscapes.

The greenhouse provides also the non-visual environmental signals, such as temperature, humidity or smell which are characteristic for the processes in tropical environment. For instance, the drops of condensate water which fall on the visitors make them also look up to see how these drops are formed without rain but because of humidity: in contrast, the active seasonal processes in the surrounding environment, such as rain or leaf fall, speak about the dynamic character of real natural processes. Although the glass walls of the greenhouse provide the visual information about the surrounding landscape, the inner space of this part of the school makes the visitors perceive the whole complex of sensations while passing through the garden (see Annex 2: 13.10.2014, 19.11.2014, 03.12.2014). The processes which take place in the exotic environment can be evaluated in the whole complexity: literary, the visitors can find themselves in the reconstructed jungles.

2.1.3. The greenhouse: the life circles of exotic species

As far as the microclimate of tropical and subtropical areas is reconstructed in the greenhouse, exotic plants are able to conduct their life circles and expose the noticeable changes such as blooming (orchids, cacti) or bearing fruit (lemon, tangerine). The greenhouse is planned in such a manner that a visitor must follow the zigzag pathway which is made of natural materials and climb the stairs to cross the garden, and plants are

situated to be maximally visible from all around beside the track. The availability of the plants to be reviewed in details is supported here with the possibility to be smelled or touched (see Annex 2: 13.10.2014). Then, the plates with the description of some exotic plants are established in the garden, so that the visitors pay attention to it and stop to read the description of such plants as lemon, avocado or ginger (see Annex 2: 13.10.2014). These plants evoke the special interest because in the current climatic zone they do not grow in wild, but their edible fruit such as lemons or avocado are well known as the imported goods. Also, other exotic plants that grow there have smaller plates with their names, so the education on the tropical biodiversity can be conducted any time when a person moves through the garden. Besides, exotic turtles which dwell in the pond here call for attention in the visitors, and the interests which they evoke become the leading force which makes visitors enter the greenhouse (see Annex 2: 19.11.2014). The life circles of these exotic animals can be studied immediately during the lessons, and the behaviour of the turtle can be interpreted during the observation through the glass wall of the pond or around the pond, from above, from the upper layer of the garden.

The spatial organisation of the greenhouse provides the possibility to watch the diachronic processes in the exotic nature inside the school building: The dynamic processes can be perceived in the immediate proximity at any time of the year, independently of the outside weather conditions. This makes the greenhouse a comfortable base for observations on the diachronic aspects of nature. The openness of the processes engages the visitors in the sensual contact, and the possibility to notice and watch seasonal changes becomes important in the context of environmental education.

2.1.4. The surrounding park as the place to experience nature processes

The garden around the building can be considered as the extension of the school, and some principles of ecological design were applied there also. The park that surrounds the Loodusmaja possesses the diversity of landscape patterns and vegetation, and this space can be used for educational purposes as well. During the excursions for the new pupils of the Animal class (see Annex 2: 29.09.2014) the teacher shows them various local plants and speaks about the specificity of every one of them: the seasonal changes, the distinctive features etc. During the excursion children follow the pathways and tracks which are created from natural materials such as stone or wood, and here the different possibilities to explore the park space are provided: several tracks made of natural materials lead to the next place, and from different tracks the different view on seasonal changes can be experienced. This feature is not specific for the park of the Loodusmaja, for every park might have such elements, but in the context of environmental education which is conducted in the centre the park becomes the source of immediate illustrations for the classes on nature learning. The availability of the living nature is not only aesthetic element here: the local biodiversity is serves as the additional school equipment.

Further the park turns to the urban landscape, but the territory of the Loodusmaja is purposefully kept as a park with the areas of living nature wide enough to conduct the outdoor education. For instance, the trees which grow in the park have the particular sorts of fruit and different form of leaves, so the natural diversity of changeable forms can be studied in this environment. Such elements as bed flowers, wooden benches or wooden playgrounds are installed in the park to mediate human experience of the landscape: children can watch how the nature changes if they play around the building or sit on the benches under the apple trees with their parents, or discover how flowers and fruits appear and ripe on plants in the yards and bed flowers (see Annex 2: 29.09.2014). The terraces and pathways call for the action, and during the period of observation the active interest

from children and adult passers-by was noticed. In the autumn season people pick apples and acorns, sit on wooden benches, move through the gardens with attention to the uncovered nature and its processes. A winter season brings the possibility to sleigh from the hill sides. And the appearance of the "house-in-the-woods" corresponds to the landscape design of this area. The wood that covers the walls of the Tartu Loodusmaja is purposefully left unpainted, and, as any natural material, it will change through time, illustrating how the natural processes of wood ageing happen. Although these elements can be met in any other areas, the pieces of living nature and objects made of natural materials were planned to create the specific educational environment, where semiotic engagement with nature takes place during classes or through the leisure activity.

The life circles of animals can be studied in the park as well, since birds visit the gardens for seeds: it can be noticed and studied from the school windows, from pathways and playgrounds (see Annex 2: 16.10.2014). But the specific case of ecological design that is dedicated to animals is the reconstruction of a beaver lodge made of wooden sticks which is situated in one corner of the park together with the wooden playground and the plate which describes the specificity of a beaver's life circle and its way of building a nest (see Annex 2: 29.09.2014, 16.10.2014). On the excursion of the Animal class the teacher speaks about the beaver and shows the pupils this wooden dwelling, and children enter it with curiosity because the size of the construction affords such possibilities. Besides the classes, children were noticed to spend time on the playground around the reconstructed beaver's lodge, touching it and getting inside, and reading the text on the plate. This example shows how ecological design can represent the elements of nature, that is, the dwelling of an animal, in a way that children can experience it immediately. This is not the visual representation of the particular living being, although the picture of a beaver is situated on the plate, but the reconstructed piece of the natural environment of an animal, that can be inspected and comprehended through the tactile sensations. Then, through time, the lodge will change its appearance and even might be destroyed by nature forces, the

surface of the sticks will alter.

To summarise, the communication with dynamic processes in local and exotic nature is provided in the different parts of the Loodusmaja territory. The visibility of seasonal changes, the sensations of temperature or smell, the illustration of natural interconnections become the themes to discuss with pupils, for whom multisensory experience becomes crucial for the thorough understanding of environment. Paying attention towards the picturesque places or noticing the random movements of living creatures the visitors get the initial information about nature. The availability of living processes and natural interconnections to perceive makes ecological design a relevant medium to convey this type of information. The interpretation of nature is supported here with the creation of space or organisation of a particular point which calls attention and participation: the dynamism of the processes can be studied through visual signals which the visitors get being protected with the glass of the building or the diversity of the signals if they enter the artificial environment of the greenhouse or explore the park.

2.2. The synchronic aspects of nature

2.2.1. Natural materials

The constant presence of natural materials calls for attention in the appearance of the Loodusmaja. The façade and the significant part of the interior are made of the uncovered, unpainted wood of different colours and textures in different combinations. Through the correspondence with the architect from the Karisma Architecture Company it was found out that the designers had a purpose to leave the initial appearance of materials visible to create the impression of the modest "house-in-woods". This presupposes that the house

should look as if it is itself a part of nature, of surrounding landscape. The appearance of the building was supposed to provide the associations concerning its purpose (Nature house), in contrast with the unclearly designed architecture that lacks individuality (see Annex 1). Indeed, the house differs from the surrounding urban standardised architecture that starts to dominate in this part of the town. Resembling rather the wooden houses of the old part of the town (although being quite modern in construction), the Tartu Loodusmaja provides the contact with nature even by the way it appears, being surrounded by living nature and made of natural uncovered materials. The school house is inserted in the hill (it looks partly disappearing in the hill side) and is surrounded with a park that separates it from the street, so that it remains quite hidden. The architects planned to create the house that will not dominate over the surrounding landscape, but rather interact with it (see Annex 1). So the sign processes between an object and environment could be concerned as the distinctive feature of the building. The interior of the Loodusmaja is also specific for the significant presence of natural wood, which is also remained uncovered to provide the deeper sensual experience of the natural material. Wood is inventively used in different combinations (as panels, pressed shavings, blocks, planking, boards etc.) to fill the school space with the visual information about natural materials. The building also possesses the big amounts of glass and, certainly, the elements of concrete and metal, but the visual presence of wood becomes the main specificity of its appearance.

2.2.2. Constant visual presence of nature through the glass walls and windows

Being inside the school, a visitor can notice the hill sides, numerous trees and flower beds which surround the building through the channel of the transparent glass walls and spacious windows and due to the specific spatial organisation of the interior. This constant presence of nature creates the special environment that becomes the background, the stage,

the source of illustrations for the education on nature and ecology (see Annex 2: 15.10.2014). In other words, the learning about nature (which is the main purpose of the school) is provided and supported in the place which reflects and exposes the visual characteristics of nature. Not only the way how living creatures move outside or the landscape dynamically changes can be noticed, but also how the surrounding landscape looks from the different points of the building, from windows which are situated on the different high, through the glass walls and doors which give the opportunity to see the landscape quite close (see Annex 3: Figure 2, 4, 6, 12). The glass walls and numerous windows here serve as screens or frames for the elements of nature. The time which can be spent in the contemplation of the natural beauty is limited only by the working hours of the school. Besides, the visibility of nature is used purposefully during the classes.

The conference room of the first floor can fulfil the functions of a classroom, and its undecorated walls are occasionally used to place images. For instance, the exhibition which took place in October 2014 was dedicated to one particular exotically looking bird (kingfisher) (see Annex 2: 15.10.2014), and various hand painted pictures were representing the colourful animal. The plates and single paintings were situated at the eye level and the spacious room looked as a gallery. At the same time the room was used for a lesson concerning knowing of animals and living nature. Although the class was dedicated not to this bird, the pupils who visited the Animal class were interested in the exposition and between exercises they explored the exhibition. The background for the photos was the surrounding landscape, well visible through the glass walls of the room. So nature which surrounds the building becomes the stylistically corresponding background for the art which is dedicated to living beings. Also the visibility of landscape is used during classes as the source of illustrative material (see Annex 2: 15.10.2014), be it the dynamic processes which call attention or the passive presence of greenery that is represented through the medium of glass. Making nature visible serves to evoke interest in visitors, and they pay attention, come to see better, then stay next and get the pieces of information

about nature.

2.2.3. The appearance of the greenhouse

The bright tropical greenery of the winter garden produces the significant contrast with the plain wooden walls of the school, and visitors who enter the building and come closer to the information desk notice it almost immediately. The greenhouse of the Loodusmaja has the well distinguishable appearance of tropical jungles: it possesses several levels of greenery, from the low plants with wide leaves to the lianas that are spread along the glass walls up to the glass ceiling. Ecological technologies let the designers recreate the humid and warm climate of tropical areas, and glass walls provide the maximum of solar energy to make the building self-sufficient in the sense of resource consumption. So the sun and the big piece of the sky are also visible in this garden through the glass ceiling. The pathway made of wooden hexagons and concrete stairs leads the visitors from the entrance on the first floor to the level of the second floor, where the greenhouse is connected by the corridor with several other rooms. The track has a zigzag shape and rises gradually, so that the visitors have to pass by all the plants which grow there to cross the garden. The variety of forms and colour of tropical plants call for attention in the visitors, and children and their parents spend time looking at and taking photos of the bright exotic vegetation (see Annex 2: 13.10.2014, 19.11.2014, 03.12.2014, 18.02.2015). The plants are different in shapes, colours and type of fruit, so the visual messages of biodiversity and tropical richness of flora can be learnt in this area. Parents show the colourful unusual plants to their children, reading aloud the names of herbs or bushes that are provided on the small plates (see Annex 2: 19.11.2014). Several plants which are famous for their fruit being consumed (such as ginger or lemon) are equipped with the detailed descriptions and the pictures of their distinguishable fruits, so the visitors can see the exotic plants as they grow

in nature (see Annex 2: 13.10.2014). The pathways and the positions of plants are organised inventively, with taking into account the attention that the greenery may call in children and adults: it is possible to come quite close to every plant and see it from different sides, from below and above. Some parts of the path are spread sideward which lets visitors find oneself under the hanging lianas or slightly far in the depth of bushes. The children's curiosity is taken into account here, for they tend to examine the hidden parts of what they see around: in the greenhouse it is possible without hurting the plants which grow thick and tall. Some plants spread their stalks and leaves sideward so that they can almost cover the wooden track: this teaches the visitors to find a way among greenery and be attentive to the ground that they have under their feet (see Annex 2: 13.10.2014). This could be especially important for the smallest children who learn to walk and climb stairs: the specific "green" environment which affords the diversity of surfaces and shapes can be considered convenient for the education of attention.

Another advantage of the greenhouse is that the time that can be spent in this space in observations or nature explorations is almost unlimited: it has free entrance, and some people are noticed to come to the Loodusmaja only to spend time in the garden (see Annex 2: 13.10.2014). Also, the parents who bring their children to the lessons are noticed to visit the garden to smell the flowers or wander among plants (see Annex 2: 19.11.2014). For the adults this place becomes the recreation area where they can discuss nature with their children and teach them to be aware of wild nature in safe and calm atmosphere. Also, the difference between what is better known and less known can be studied here, because some of the exposed exotic plants can be found growing in flats or in winter gardens: in the Loodusmaja they are collected in one place and provided with name tags to be distinguished and recognised. Then, children who have classes on the second floor, in the classrooms which have the exit towards the greenhouse, are noticed to return to the first floor purposefully through the garden to look once more on colourful plants (see Annex 2: 15.10.2014).

In these cases the visitors look around the garden with the unhidden interest and perceive what this artificial environment can afford them. The "jungles", as children call them, experience seasonal changes, and look slightly different when exotic plants are in bloom. The previous chapter discussed the visibility of dynamic processes in the artificial environment of the greenhouse, but even the seasonal changes in plants demand time to be explored carefully for educational purposes - and the ecological design of the greenhouse provides such affordances, preserving the diversity of exotic colours and shapes to be available any time. For example, if children have art classes on the themes of nature, then the interior of the greenhouse serves as the stable source of the objects for depiction. Children receive the opportunity to spend as much time as necessary looking at the plants and memorising their colours and shapes to be then depicted. The pictures which they make are exposed on the walls of corridor that is formed with the wall of the greenhouse and other rooms' walls. As in other rooms, the plain undecorated walls serve as background for the art dedicated to nature. Similar exhibitions on animals or plants take place from time to time in the different parts of the building, and quite many of them also work as illustrative, or educational materials for those who visit the school (see Annex 3: Figure 4).

2.2.4. Living nature around the building

The living plants are also situated in different points around the building. Besides the time spent in classes in the studies of plants or animals, children and parents can contact with the different forms of vegetation simply being inside the Loodusmaja, in corridors and halls. Pots and boxes in which the plants grow are made of natural materials such as wood and appear as the extension of the wooden design of the interior. Then, all the interior plants are transportable and movable, so during the period of observation the appearance of inner spaces is noticed to change several times: plants are moved around the building to

create the green spots in different points of the building, and the visitors can contact with living nature while they spend time in playgrounds or waiting for children or moving along the corridors. Also, the pots with living plants are spread on the shelves behind the glass walls of the rooms and are well visible from outside (from the corridor) (see Annex 3: Figure 5, 7). Besides, small pots with young plants are exposed in the greenhouse for sale, but they can also be used for educational purposes

The constant visual presence of living plants and natural environment is the peculiar feature of the Tartu Loodusmaja building. The inventive usage of wood, the creation of the colourful appearance of the greenhouse, and the constant presence of plants and animals in the classrooms create the specificity of the school. The visual messages concerning colours and shapes become the valuable sources of information about the diversity of the local and exotic nature and serve as educational material in the development of ecological awareness.

2.2.5. The pictorial representations of nature

Also the paintings and installations, made by adults or children themselves, fill the classrooms and corridors. These depictions of plants and animals are quite often made from natural or recyclable materials and represent nature as the particular people perceive it. Also, children create fine art with the usage of the local natural materials during creativity lessons, and the results of their work are also exhibited in classrooms, to inspire and to call attention of the new students. So the students have an opportunity to create pieces of design themselves, to represent what they see in the school. In this way ecological design, providing the possibility to experience the biodiversity while being inside the building (the variety of forms and colours in the greenhouse, the different views from windows and glass walls), offers the space for representations also. This aspect could

be important for the development of ecological awareness: when the diversity of life can be experienced immediately and becomes the object to recognise, compare, notice and depict, then the orientation in the biodiversity is enhanced in pupils. Children are taught to be attentive to the specificity of different plants and animals, and their knowledge is reflected in their art works.

2.3. Authenticity

2.3.1. The uncovered wood of the interior and façade

The building of the Loodusmaja calls for attention with its unpainted, uncovered wooden façade, and almost all the interiors possess the significant amount of uncovered wood also. Its strong and distinct smell fills the halls and classrooms and can be considered as a specific feature of this building. Also, during the dialogues with the staff members who work on the first floor on the information desk, it was found out that the coming people, especially the new visitors, often express their delight towards the overwhelming smell of wood, of new wooden house. This characteristic of a natural material provides the complete impression, speaks about the reality of the substance, and makes the visitors interested in the inventive design of the centre (see Annex 3: Figure 2, 4, 7, 8, 11). In comparison with the contemporary materials that imitate the appearance of wood in some modern interiors of public spaces, the real wood that is used inventively during the construction of the Loodusmaja evokes no doubts in its authenticity. During the period of observation it was noticed how children, whose reaction is immediate and well distinguishable, sniff the air when they first appear inside, touch the massive wooden stair while climbing on the second floor, move and pull equipment and even scratch it to check the naturalness of wood (see Annex 2: 29.12.2014).

During the correspondence with the architect who planned this building it was known that the designers tried to leave as much of uncovered wood as possible, to let it change its appearance through time - to darken, to be covered with scratches and other signs of time, as it happens with true wooden houses in which people live (see Annex 1). Around the building and inside of it the traces of usage are noticed on the wooden surfaces such as

scratches, the holes from nails, etc. Through the time of observations these signs increased in number that is natural for the object which is used constantly and variously. Thus even the interior of the building may serve as a channel to convey the information about the initial characteristics of the natural materials. The openness, the visibility and availability for the tactile contacts also makes the uncovered raw materials the source of the information about the connection between natural resources and the objects which can be created from them according to the properties of the materials.

2.3.2. The natural materials of the equipment

The connection between natural materials and objects which can be made from them is also represented on the informational plates which represent the resource usage or recycling, so the visitors have the possibility to follow the connection between resources and final objects which surround them in everyday life. For example, the plate with the descriptions of materials which were used during the construction of the Loodusmaja possesses the attached samples such as concrete or wood, and the design of this information plate allows the pieces to be touched by children. And indeed, the possibility to touch or scratch involves the curious children in the tactile contact with materials (see Annex 2: 15.10.2014). The pupils learn to recognise the elements around not only according to the appearance, but also how they are felt with hands, how they can be used and further recycled. One particular example of recycling was provided by the construction of the play house made of cardboard packages of a familiar juice brand, and children were attracted by the design - they explored how the house is built, how the cardboard juice boxes are put together as bricks. By touching and pushing the construction the children discovered that it is not so firm and stable as wooden objects and can be broken because of the fragility of cardboard (see Annex 2: 03.03.2015). Such objects convey the messages of

the tactile properties of materials - the stability and diversity of wooden surfaces, the flexibility of cardboard that can be played with, the roughness of concrete. Besides, the idea of making and recycling is developed through the immediate illustration, and the possibility for the direct sensual engagement supports the detection of the reliability of the materials.

2.3.3. The multisensory experience of the greenhouse

In the greenhouse the smells, humidity, the sounds of condensate drops, the presence of real growing plants supports the complex perception of the environment. Children variously use the garden for plays: hide under spacious leaves of tropical plants, play Indians as if they are in really tropical jungles etc. (see Annex 2: 19.11.2014, 03.12.2014, 18.02.2015) The diversity of exotic plants calls for participation in visitors of the Loodusmaja: they are noticed not only looking at the unusual plants, but also touching them carefully and smelling. Although the greenhouse is organised clearly and treated neatly, plants are let to grow freely and spread their parts sideward. The wooden track which goes through the garden has the points where there is possible to step aside in the depth of plants, and this spatial organisation provides the possibility for immediate contact with real nature. Also, some spacious plants with wide leaves are situated in such a way that a visitor is forced to go under them (see Annex 3: Figure 3). And children use these plants to hide under, which evokes delight and interest. This possibility to experience greenery from different points, including the necessity to manipulate with own body to pass the greenhouse supports the learning of specificity of real plants which do not grow in this climatic zone as a rule.

2.3.4. The immediate tactile contact with plants outside the building

On the territory of Tartu Loodusmaja children can be engaged directly in the contact with living plants in the gardens which surround the building. The possibility to watch the dynamic processes in nature can be considered supporting authenticity of environmental experience. During the excursions or classes within the surrounding park children have the possibility to touch the real plants that grow in the diverse landscape (see Annex 2: 29.09.2014). If a lesson takes place in autumn, when plants change, then the tactile contact becomes the support for distinguishing of species: the pupils pick leaves, acorns, twigs and berries while the teacher explains the difference among trees. During the classes on the open air children are not much restricted in their movement, and everything what calls their attention, be it natural objects such as trees or leaves or artificial such as wooden or stone tracks, can be touched, looked at from different sides (see Annex 3: Figure 5). Leaving the living nature accessible for the direct interaction makes the landscape planning of the park an example of ecological design that speaks about nature to its users.

To summarise, it could be said that the multisensory experience and the understanding of how things are made of natural/non-natural materials is provided in the Loodusmaja through the medium of ecological design. Ecological design tends to leave materials and processes unhidden, so this gives the sense of authenticity and reliability. In other words, such dimensions as smell and surface texture play role of messages which both natural and artificial environment can send. The Loodusmaja provides the possibility to explore the difference between natural and artificial in objects and spaces that could be grasped with all senses, not only vision.

2.4. The information about locality

2.4.1. Local plants

Local plants can be studied in the immediate proximity on the territory of the school, for it possesses the spacious garden around. The trees which grow in this region, such as birches and rowans, oaks and apple trees, are discussed by teachers and parents with children who visit the Loodusmaja, for all these local species have distinct features such as types of berries or the shape of leaves (see Annex 2: 29.09.2014, 16.10.2014). Then, the garden with apple trees is quite typical pattern of landscape treatment in this area, so that visitors have a possibility to communicate with living nature of a garden being in the public place. The local sort of apple trees is grown there and the distinct feature of these plants is bright apples which remain on the curved fungi-covered branches when leaves fell. The tourists are noticed taking photo of them in an autumn day, when the contrast between the bare branches and big apples was noticeable. The people were speaking English and spent around half an hour on a wooden bench in the apple garden, discussing the local yards with apple trees (see Annex 2:16.10.2014). The representation of local tradition in garden making then, flowerbeds and gardens with local edible plants are situated in the sunniest parts of the park, and it is possible to study how these profitable species must be treated to bring fruits. The messages about local vegetation are sent through both leaving the old trees uncut and growing the local plants in gardens: in contrast with the exotic flora of the inner greenhouse, these plants, both "domestic" and wild, change their appearance distinctly through year. The study of local seasonal changes which is most obvious in plants can be studies here, but also children whose families do not possess private garden can learn how the edible plants or flowers lead their life circles. This type of message is connected with the representing of natural processes, but in this garden the specificity of

typical for this climate plants can be studied particularly. The open spaces which are reachable for children become the educational spaces also, and visitors learn how to distinguish and treat the resources of this particular area.

2.4.2. Local resources

The usage of local resources became the fundamental principle in the planning of the Loodusmaja, so the building became almost self-sufficient in the sense of resource usage: the maximum of sunlight is used with the help of glass walls and spacious windows; rainwater is collected and the system of recycling is introduced to minimize waste. The impact of garbage on locality is represented in the numerous information plates which are situated around the building, and visitors are let to know more about the local resources and their usage (see Annex 2: 15.10.2014). These information plates call attention with their brightness, and visitors can learn about recycling technologies while being inside the building.

2.5. "Everyone is a designer"

2.5.1. The possibility to move and adjust the equipment

The configuration of the rooms' interior can be changed and adjusted according to the immediate necessity of the educational process: every room has the pieces of transportable furniture which can be situated according to the type of the lesson or the number of pupils. But also the equipment of halls and playgrounds is movable. For instance, the seats made of cut wooden trunks with belts call for special attention: they are spread around the building and can be moved according to the need. Several such seats are always placed around the halls near the points where exhibitions take place; children can move them to reach information plates or pictures. The handmade seats are stable and convenient, and their unusual appearance calls for attention in visitors, for example, it was noticed how children, especially the smallest, pull them around the halls to reach shelves or pictures. This handmade equipment is not only possible to move around the school to organise the space, but also provides the idea how such things can be made from the available local materials. So the usage of natural materials for making the mobile furniture becomes the clear message of ecological design. Besides, inside the school the Craft room exists where the pupils can learn how to produce different objects from natural materials, so the awareness on how things can be designed and made can be developed in children here as well. The most part of other equipment, such as bookshelves or tables is also made of wood, and their construction is also quite plain and convenient: the natural material is not hidden here, and it is possible to see the construction of furniture clear (see Annex 3: Figure 5, 7, 8, 11).

2.5.2. The arrangement of the plants around the building

The greenhouse of the Loodusmaja also possesses the elements which are moved or organised purposefully, so that the appearance of the garden can change. The pots with plants are moved to the different places according to the need in humidity of sunlight, so the visitors can see exotic plants closer or far and learn their specificity of light requirements and life circles. Also the pots with plants are moved around the building: the glass walls of the classrooms can serve as displays for these plants, so that the visual presence of living nature (that was discussed in previous chapters) can be provided with the arrangement of flowers around the building. As a result, this possibility to provide the educational space with greenery supports the creation of "green" place where the visitors can communicate with nature directly - look at local and exotic plants from different points when they are reachable around the building; touch the plants and move the pots if necessary, ask parents or teacher about this or that plant during the movement inside the school, before or after the classes.

2.5.3. The creativity which is supported by nature

The numerous cases of nature representation made by the students are situated around the school building: drawing and painting, sculptures and installations. They do not only represent the animals or plants which are discussed in classes or can be found in the local environment, but also inspire children for further creativity. The exposed paintings or fine art made of natural materials also calls for attention in the visitors, and children can learn how to use local natural materials in making them. For instance, on one lesson of Animal class the teacher taught the pupils how to make prints with painted tree leaves. This kind of activity is possible to conduct in every school, but the specificity of the Loodusmaja is that

it is situated within the park full of trees: in this case, the material for such creativity can be gathered immediately inside the school space (park). Gathering leaves or acorns leads the children to explore the garden, and then to communicate with local nature. So ecological design calls for participation, and the creative activities can be inspired with what the school space can provide (see Annex 2: 15.10.2014).

Ecological design makes attempts to inspire the creativity and attention to the locally available resources by providing the space where the communication with materials can be conveyed. The communication with locally grown plants can be also added here, because children are able to treat vegetables and flowers in the gardens which surround the school, and learn not only how things are constructed, but also how the natural things are grown.

Conclusion

The current study has an aim to understand how ecological design establishes the connection between humans and nature, so the issues of providing of the communicative context, establishing contact and sending messages through the design techniques were taken into account. In order to comprehend these aspects of human/nature communication, the series of observations was conducted in the Tartu Loodusmaja, the centre of environmental education. The immediate reaction of children and adults, and the way they use the park, rooms and equipment was observed inside and outside the building. It was noticed that the design features of the Tartu Loodusmaja call for attention in the users, evoke curiosity in children, inspire the sensual engagement and call for action. The education on nature and its processes is conducted during the movement through the building: while a group of children follows the teacher during classes, or while children play in the halls or the greenhouse, or while parents lead their children around the building and show them pieces of nature or pictures. All this activities develop the attention towards the specificity of local and exotic nature, teach to notice the changes in the environment and supports the ecological awareness in visitors. Besides, children learn how to calibrate their behaviour towards nature to avoid recourse exaction, to recycle waste, to move carefully within nature. All these aspects were taken into account in the analysis of communicative specificity of ecological design.

The five types of messages (nature and its processes, authenticity, locality and creativity) which were chosen to illustrate the advantages of ecological design were described with the examples of human behaviour, their reaction and actions. This approach which takes

into account the specificity of human perception, notices the specificity of movement and environmental experience occurred to be fruitful: the study of human/environment interaction cannot be conducted without the observing of human attitudes and reactions.

Semiotic approach, studying ecological systems as communicative systems, researches the communicative character of human action towards the resources and landscape. In the case when the subject/environment interaction is studied as sending and receiving messages, the people's reaction can be studied as responses towards the elements of environment. Ecological design tends to organise the living space in such a way that the visitors are able to read the messages which environment sends to them directly and immediately. The study discussed five types of the messages: the representation of, separately, dynamic and static aspects of nature, of locality and authenticity, and of the possibility of creative involvement. These types of information which ecological design provides could be considered as the types of environmental communication, and be applied in the further discussions on man/nature interaction. Even if, for instance, glass walls or windows provide only visual signals about environment, this type of information remains crucial for the education of attention. The messages which nature sends, such as textures or smells, sounds or dynamicity, are conveyed to the visitors of the school in such a way that people can spend time perceiving them in a protected place with diversity of structures and appearances. The availability of the greenhouse, rooms and park, the numerous information plates and educational materials which are spread around the building make education easier and more entertaining, which inspires children to move within nature with interest and attention. These features of ecological design make it a relevant technology to create educational spaces dedicated to nature or ecology.

The issues of education through movement and education of attention remain crucial in the system of school education. The attention and interest which such open and diverse spaces evoke could be used as the main tasks for the creation of educational spaces. The knowledge about processes and elements might be conveyed through the medium which

calls attention and participation, provides the possibility for non-restricted contact and inspires the creative comprehension of the learned material.

The main result is the comprehension of ecological design as the means to provide and support human/environment communication. To achieve this result the analysis of environmental messages was conducted, and the distinguishing of these messages could be also seen as the result of methodological explorations in human/nature interactions. At the same time, the educational effect of ecological design remains difficult to evaluate in any quantitative measurements. Ecological education is a long-term process, and the development of environmental awareness could be probably measured through the changes in the behaviour. However, some stages of its development could be noticed through the observation on educational processes. In the case of the current research ecological design supports ecological education by providing the possibilities to communicate with nature, and the interpretative activity of the visitors can be studied as evidence of success of some educational strategies which are supported with technological solutions.

The results of the study could be beneficial for the theory of environmental architecture, because the communicative orientation of architecture was analysed and illustrated. The Loodusmaja centre, being the successful example of such way of building, can be taken as a sample for further ecological planning. Besides, the communicative specificity of the activities which take part during the environmental education can be taken into account in the development of ecological education. The application to the technological solutions which support educational processes can be also followed in the case of the Loodusmaja, so the theory of design can be also provided with the discussion of form/function correspondence. Ecological semiotics can be also supported with the research of this kind, for the human/environment interaction can be discussed also through the comprehension of technological and educational strategies. Therefore the possible direction of the research can be followed in the sphere of ecological education that can be considered as the education of the attention to environmental messages/signals. During the current research it

was noticed how environmental education tends to develop the ability to distinguish the environmental specificity, to calibrate one's behaviour and find a careful sustainable treatment to locally available resources. Ecological design plays the role of channel to convey information that supports this learning, but ecological education itself can become the area of ecosemiotic study. The development of awareness towards environment could be studied as a semiotic phenomenon, as a communicative process, because the direct communication with plants and living beings provides the necessary information which can be perceived with all senses and incorporated in human spatial self-awareness. The results of these communicative studies, as well as the results of this particular study on the perception of design features could be also included in the development of educational strategies, because such kinds of discussion describes the successive strategies in learning and training.

Ökoloogilise disaini semiootiline mõõde Tartu Loodusmaja näitel

Summary.

Käesolev magistritöö käsitleb ökoloogilise disaini eripärasid inimese ja looduse vahelises suhtes. Kaasaegses arhitektuuris puudub kommunikatiivne eripära, see eirab inimese keskkonnavalaseid kogemusi ja avaldab negatiivset mõju elusloodusele. Ökoloogiline disain püüab neid probleeme lahendada, võttes arvesse konkreetse koha ja kultuurilise konteksti eripärasid.

Ökoloogilise disaini kõige huvitavam omadus on selle püüdlus ühendada linnaelanikke loodusega. Selleks pakub ökodisain kontakti loodusega, viimast eksponeerides ja sellele tähelepanu juhtides. Ökoloogilise disain kasutab ka kohalikke ressursse ja arvestab konkreetse piirkonna loodusoludega. Töö eesmärgiks on näidata, kuidas projekteerimise tehnikate abil saab luua sidet inimeste ja looduse vahele. Roman Jakobsoni suhtlemisfunktsioonide mudeli elemente on kasutatud ühes ökoloogilise disaini funktsioonide kirjeldustega, et luua ühtset mudelit, mille kohaselt ökoloogiline disain ühendab inimest ja loodust.

Uurimisobjektiks on valitud keskkonnahariduskool Tartu Loodusmaja. Selle hoone külastajatele tajusid uuriti erinevate vaatluste käigus: kuidas nad reageerisid hoone iseärasustele, milline oli nende loodusele suunatud tegevus kooli territooriumil ja milline oli nende emotsionaalne tagasiside küsitlusele. Loodusmaja disain on kanal, mille kaudu edastada infot looduse ja looduslike protsesside kohta ning kaasata inimesi aistingulisse suhtlemisse. Kui inimesed liiguvad hoones ringi, köidavad looduselemendid ja looduslikud materjalid nende tähelepanu. Tähelepanu koondamise aluseks oli ettekujutus keskkonna signaalidest, mis juhatavad suhtlema looduselementide ja elava loodusega. Keskkonna tõlgenduse aluseks polnud ainult visuaalne informatsioon, vaid kaasatud olid kõik meeled, mis tulevad mängu, kui inimesed tunnetavad looduslikke materjale ja tükikesi

elusloodusest. Inimeste ja keskkonna vahelisi protsesse uuriti semiootiliste nähtustena, kuna nad sisaldavad tajusignaale ning viimaste tõlgendamist – vastusena looduse representatsioonidele ja otsesele kontaktile looduskeskkonnaga. Selle uurimistöö tulemusi saab kasutada nii ökoloogiliste hoonete ehitusteooriana kui ka keskkonnahariduse teooriana, kuna käesoleva töö teemaks on just nimelt inimeste loodustaju kontaktis loodust esitavate ja esindavate disainielementidega.

Reference

- Alexander, Christopher. 1971. *Notes on the synthesis of form*. Cambridge: Harvard University Press.
- Appleton, Jay. 1992. Prospects and refuges revised. In: *Environmental aesthetics: theory, research, and applications* / Jack L. Nasar (ed.). Cambridge: Cambridge University Press. 27-44.
- Arntzen, Sven. 2002. Cultural Landscape and Approaches to Nature – Ecophilosophical Perspectives. In: *Koht ja paik/ place and location II*. Virve Sarapik, Kadri Tüür, Mari Laanemets (eds.). Tallinn. 27–49.
- Berleant, Arnold. 1992. Aesthetic perception in environmental design. In: *Environmental aesthetics: theory, research, and applications*/Jack L. Nasar (ed.). Cambridge: Cambridge University Press.
- Berleant, Arnold. 2002. Notes for a cultural aesthetics. In: *Koht ja paik/ place and location II*. Virve Sarapik, Kadri Tüür, Mari Laanemets (eds.). Tallinn. 19–25.
- Brown, Charles and Ted Toadvine. 2003. Eco-phenomenology: an introduction. In: *Eco-phenomenology: back to the earth itself*. Charles S. Brown and Ted Toadvine (eds.). Albany (N.Y.): State University of New York Press.
- Dovey, Kim. 2000. The quest for authenticity and the replication of environmental meaning. In: David Seamon and Robert Mugerauer (eds.) *Dwelling, place and environment: towards a phenomenology of person and world*. Malabar: Krieger. 33-50.
- Eco, Umberto. 1997. Function and sign: the semiotics of architecture. In: *Rethinking architecture: a reader in cultural theory*/ Neil Leach (ed.). London and New York: Routledge.
- Heidegger, Martin. 1977. *Basic writings*. London: Routledge
- Hoffmeyer, Jesper. 2008. *Biosemiotics: an examination into the signs of life and the life of signs*. Scranton; London: University of Scranton Press.

- Ingold, Tim. 2002. *Perception of environment: essays on livelihood, dwelling and skill*. London; New York: Routledge.
- Ingold, Tim. 2013. *Making*. London; New York: Routledge.
- Gibson, James J. 1986. *The ecological approach to visual perception*. Hillsdale, (N.J.): Lawrence Erlbaum.
- Kemsley, Roderick and Christopher Platt. 2012. *Dwelling with architecture*. London; New York: Routledge.
- Land, Joh. 1992. Symbolic aesthetics in architecture: towards a research agenda. In: *Environmental aesthetics: theory, research, and applications*. / Jack L. Nasar (ed.). Cambridge [etc.]: Cambridge University Press. 11-26.
- Libermann, Kenneth. 2007. An inquiry into the incorporeal relations between human and the earth. In: *Merleau-Ponty and environmental philosophy: dwelling on the landscapes of thought* / Suzanne L Cataldi and William S. Hamrick (eds.). Albany: State University of New York Press.
- Lindström, Kati, Hannes Palang, Kalevi Kull. 2013. Semiotics of landscape. In: *The Routledge companion to landscape studies* / Peter Howard, Ian Thompson, Emma Waterton (eds.) London; New York: Routledge.
- Lozano, Edmundo E. 1992. Visual needs in urban environments and physical planning. In: *Environmental aesthetics: theory, research, and applications* / Jack L. Nasar (ed.). Cambridge [etc.] : Cambridge University Press. 395-421.
- Maran, Timo. 2002. Ecossemiotic Basis of Locality. In: *Koht ja paik/ place and location II*. Virve Sarapik, Kadri Tüür, Mari Laanemets (eds.). Tallinn.
- Maran, Timo. 2007. Towards an integrated methodology of ecossemiotics: The concept of nature-text. *Sign Systems Studies*. 35.1/2 269-294.
- Maran, Timo. 2014. Place and sign. Locality as a foundational concept for Ecossemiotics. In: *Re-imagining nature: environmental humanities and ecossemiotics* / Alfred Kentigern

- Siewers (ed.) Lanham: Bucknell University Press.
- Merleau-Ponty. Maurice. 2012. *Phenomenology of perception*. London; New York: Routledge.
- Merriam, Sharan. 2014. *Qualitative Research: A Guide to Design and Implementation*. Jossey-Bass: San-Francisco.
- Minai, Asghar Talaye. 1984. *Architecture as environmental communication*. Berlin [etc.]: Mouton.
- Moran, Emilio F. 2006. *People and nature. An introduction to human ecological relations*. Oxford [etc.]: Blackwell.
- Orr, David W. 2002. *The nature of design. Ecology, culture, and human intention*. Oxford [etc.]: Oxford University Press.
- Rapoport, Amos. 1990. *The meaning of the built environment. A nonverbal communication approach*. Tucson: The university of Arizona press.
- Bachelard, Gaston. 1969. *The poetics of space*. Boston: Beacon press.
- Ryn, Sim Van der, Stuart Cowan. 2007. *Ecological design*. Washington (D.C.): Island Press.
- Spirn, Anne Whiston. 1998. *The language of landscape*. New Haven and London: Yale University press.
- Windsor, Luke W. 2004. An ecological approach to semiotics. *Journal for the theory of social behaviour*. 34: 2. 179-198.

Annex 1.

The correspondence with Martin Kinks, the architect of Karisma company

The fragments of the e-mail correspondence with Martin Kinks, Karisma architect (published with permission, orthography and punctuation are saved).

Answering the questions about the specificity of the school design:

"- we decided that considering the purpose of the building we don't want to plan a city-like building with main facade to the street but rather a park-house (house-in-the-woods) that is surrounded from each direction with park.

- considering the location (on top of a hill) the idea was that the building should not be obtrusive ("look at me, I'm a star") but to step back and blend in to the park environment

- that was why the house is also partially under ground, to make the building smaller (lower, less visible stories) and less "important" in the park

- the shape of the building (Y-shape) creates little spaces for activities outdoor near the building, it also offers views to different directions and maximizes the use of natural light (sun).

also we had the idea that if there are children visiting a lot then the navigation inside the house should be made intuitive and easy. all the internal life circles around the central atrium or staircase where you can see in all directions inside the house. when entering the house then the first thing you see is the greenhouse - what pretty much leaves no doubts what's the building all about. you don't ask umm what kind of building is this, or what purpose the house serves (i hope so at least). it should be obvious.

- we didn't have any specific design in mind (scandinavian or local wooden building)

- the aim was that the house should reflect the activities that are taking place inside. reflect the people who are using the house. we worked together with Tartu Keskkonnahariduse Keskus a lot and that was also a catalyst for some solutions and ideas. we met almost all the teachers and they had also the opportunity to speak up their opinion. at some point we

communicated almost on everyday basis with the the Loodusmaja people. so we had a pretty good picture of what they are looking for and expecting from a new the Loodusmaja. so in general - cooperation and working together with the client was one of the key points. ofcourse before all that was the architectural competition and they choosed our proposal - so in the beginning first was our idea what was developed further considering the specific needs of the client. its actually not so artsy work but rather of an interprete / manager / architect :) kind of job to put it all together.

- materials: like You said. bare, raw and honest. if its wood than it should look like wood. but wood offers so many possibilites so we used it with different textures and form but with same colour and feeling. the main idea was that we should use as much wood as possile. because its local, "green" and looks and feels nice. so all the walls that are not in contact with direct earth are made of wood inside out. and almost all the wood is (southern) estonian origin. The DOLD panels that you see inside are made in Viljandi of estonian wood, the glue-laminated timber beams and posts in greenhouse are made in Põlva from local wood etc .

Only the facade wood is not estonian because its not possible to buy estonian larch timber. the facade wood is not treated with chemicals, only to eaven out the color differences in the beginning is was covered with $\text{FeSO}_4 \times 7\text{H}_2\text{O}$ (raudvitriol in estonian). so the wood is changing its color in time and aging (we hope beautifully..). the aging process is important beacause nothing is the same year after year. if something ages with dignity than its beautiful to look at and it has some weight to it (patina if can say so to wood). also if you are teaching about nature than one of base point is the everlasting change, so we thought that we sould use natural materials that also change a bit.

most of the furniture is our design and made locally (again working with the client and considering also their needs).

one aspect that was also important was energy effiency. i dont know what is the reality there today but the walls ceiling were heavily insulated to prevent heat loss and oear

heating in the summer (no need for cooling). we worked together with Tallinna Tehnikaülikool to make the building as good as it was possible under the circumstances then (budget etc).

The additional questions to the architect:

Can you say, that the Loodusmaja combines modern features (like design and technologies) with traditional one (wooden house, the house inserted in hill, environmental studies school which is well-known in Tartu)?

Did you plan the park at the same time as the building? And who planned the playground with the wooden dwelling?

Was it something, some ideas, which you did not manage to actualize for technical or other reasons?

The answers from Martin Kinks:

I would not say so because it is pretty traditional house considering how it was designed and built. What is maybe a bit different is the working hours that went into the project.

We worked with many people on the project. I counted that altogether there was 15 different people involved in the design process. When designing a "regular" house then a 1500m² house would maybe be designed with 5 people (1-2 architects, 1 construction engineer, 1-2 HVAC engineers, 1-2 electrical engineers). And then we had also a decent construction company what is important.

And we did site supervision what is also important (active participation in the building process).

Yes. All park buildings are also designed by us.

The house was in the beginning one storey higher. Due to fixed budget we had to "take one storey off". It was not a bad thing actually :) the building is simpler and smaller.

Also we redesigned the building multiple times. If you look at the competition work _

HYPERLINK "http://www.tartu.ee/data/LILLE10_OKOMAJA.html" \t "_blank"
_http://www.tartu.ee/data/LILLE10_OKOMAJA.html_ then you see it is a little more complex than it is today.

But I personally think that simpler is better.

The use of "modern technology" was also cut down big time.

I would like to see that the house is more intelligent. Today we have cars that drive themselves and smartphones that have huge computing power etc.

We only have sunlight protection in the south directed facade (electrically operated outer "curtains"). We did plan that in the classes also. The curtains would ideally operate automatically considering the room temperature, daytime, weather (cloudy - sunny) etc.

In the greenhouse we also planned electrically operated internal curtains that would regulate the climate. Budget once again.

The separate rooms could be operated also more by electronics and sensors (for example CO₂ sensors - if the air in the classroom contains too much CO₂ then the electronics would increase the ventilation and bring the CO₂ levels down). Lights could be operated by sensors that measure actual light on your table and adjust the power accordingly.

If the systems are built and used correctly then it saves energy but the microclimate in the building would be better.

Then you could actually say that it combines modern features with traditional ones.

Annex 2. The observations

- 1) time
- 2) location
- 3) participants
- 4) context
- 5) content

29.09.2014

- 1) 29.09.2014. 16.00 - 18.00.
- 2) The park around the building.
- 3) Several children of age around 7-8 years old who came for the Animal class; the teacher.
- 4) The weather is mild and sunny, children are active and curious. The teacher showed the surrounding park of The Tartu Loodusmaja to the children the diversity of plants in the park. They cross the playground with beaver lodge, follow the tracks made of wood and stone and look at the garden and trees.
- 5) The teacher picks different leaves from the ground and asks the children to name the sort of a tree. Then she leads them through the park, and children have the possibility to follow different, stone or wooden, pathways and pick the colourful leaves and acorns, apples and twigs. The children climb the hill and explore the garden. The teacher leads the group of children around the building to demonstrate the apple and oak trees which are growing there as inseparable part of the school environment. The teacher shows a big old oak that is preserved in the park and picks the acorns. Children walk around and pick acorns too. Then the children see the pumpkins that are grown at the edge of the hill, and distinguish the autumn specificity of plants, wild or domestic - to bring fruit. The children look interested in learning how plants grow and they move around the park territory with

curiosity. Children look inside the building and see other people moving in it, they are interested in the greenhouse which is visible through the glass walls. They showed to each other whom they saw inside the building and waved hands to the children and teachers whom they saw inside it. The glass walls of the greenhouse called for special attentions: several children run to it and looked inside on the exotic plants and children who were walking inside.

On the playground the copy of the beaver lodge made of wooden sticks is situated, and teacher also speaks about it and lets children get inside the lodge. Children explore the wooden house and ask the teacher who lives here, and she shows them the picture of the beaver on the information plate nearby and describes how this animal lives in wild nature.

13.10.2014

1) 13.10.2014, 15.00-16.00.

2) The greenhouse.

3) Two teenage boys around 10-12 years old pass the garden, playing Indians; one young woman taking photos of exotic plants.

4) The children play in the garden before after the class. The woman with a professional camera slowly moves through the garden taking photos of the tropical plants.

5) The boys run through the garden and notice lianas and various cacti. They meet the plate with the picture of lemon. One of them says: "Look, here the lemon grows", and looks at the plant with interest from different sides. "But where are lemons?" asks he, searching for the fruit. Then they start to read the table with the description and distinguish when the plant brings fruits. Then they find other plates with the descriptions of the familiar plants such as aloe or ginger. After examining of the plates they continue to hide and seek in the garden and notice how drops of condensate fall from the ceiling: they try to find the way from where the drops fall and examine all the walls and the construction of the greenhouse. After a while one of them sweated and suggested leaving the "jungles", because it is too

hot for him here.

All the time while they run around the woman attentively looks at the plants, writes down their names, touches the spacious leaves and smells the flowers; she sits on the wooden track and spends some minutes still, then takes the camera and makes several shots of the exotic plants. She also pays attention to the falling drops of condensate and explores the world map which is situated in the greenhouse. Then she rises to the second floor and meets her little son who leaves the classroom where a lesson took place. He calls her to go through the garden and hides under the wide leaves of bushes; she makes photos of him and reads the description of exotic plants and turtles in the pond aloud, while the child explores the plants and the pond.

15.10.2014.

a) 1) 15.10.2014, 15.45 – 16.30

2) The conference room on the first floor of the building: it has the whole glass wall, so that the surrounding trees and pathways that lead from the street through the park to the entrance to the building are well visible.

3) The situation on the lesson of Animal class, participants are the children of early school age (about 6-8 year old).

4) The teacher gathers the children in the circle nearby the wall, so they are able to observe the leaf fall and the movement of the autumn trees on the strong wind. The teacher says the verse that speaks about the seasonal change in the landscape, and repeats how trees move, and children must copy the movement of tall trees on the wind. They wave their arms and look through the glass, to see how real trees move. They copy the waving of branches and laugh watching how the strong wind shakes the trees and drop the leaves.

This part of the lesson takes around 30 minutes, during that children play active games, and among them there is one game when acorns and chestnut seeds are thrown in a tube and they fall from another end of the tube, so that they resemble how true acorn fell from

the trees. Children hurry to pick the falling and rolling acorns and other autumn seeds, and the surrounding landscape that is visible through the glass walls serves as a natural background for seed gathering.

Also the teacher speaks about seasonal changes of trees, and the clear walls of the room provide the illustration of the real autumn landscape. The light is unturned in the room, so the maximum of natural light is used, but also this natural light makes the landscape visible, as if the park with trees and pathways surround the place of the class. Before the class and after this particular exercise the children come closer to the walls and through them to the park, they are obviously interested to see such a wide panorama of the landscape. The room is almost empty, except the exhibition of paintings of an exotic bird and some chairs that are gathered aside, so the children are surrounded mostly by the plain walls of the room and the landscape visible through the glass wall.

b) 1) 15.10.2014, 16.30-17.00.

2) Creativity room on the second floor of the building

3) A group of children (10-12 people) around 7-8 years, a teacher.

4) In the class of Animal ring, daytime, the landscape and its seasonal changes (leaf fall) is well visible through the spacious windows of the room. The visibility from the height of the second floor is quite good, also because the trees of the park become transparent so there is a possibility to see what happens in the park and on the streets around the school.

5) During the preparation to art class when a teacher arranges the equipment for creative exercise, the children come closer to the windows that start from the floor, so that even for the children height it is possible to observe what happens outside. The time is around 16.30, the middle of October: seasonal changes are noticeable, landscape changes, leaf fall makes the trees more transparent and from the height of the second floor the visibility is quite good. Electrical light is already switched on, but the landscape is well visible. Several children look to the windows while others move around the room. But suddenly the strong wind starts to blow, and the leaves of park trees start to fall. Those who stay beside the

window call others and the teacher to watch the leaf fall. Then a boy points to the big dog that goes on the street with its master far away, and the children notice the real life of the city from above. The children are very excited about this possibility, and even after the class they return to the windows to see what happens outside and call the parents who came to take them home to enter the room and look to the windows.

c) 1) 15.10.2014. 17.00-17.30.

2) The hall of the second floor of the building, the playground with wooden equipment, the map which speaks about the typical animals and plants of different countries.

3) Several parents with children, several pupils of different ages.

4) The students return from the classes and spend time on the playgrounds with their parents.

5) The children gather around the map, pick the images of animals and put them on the map discussing where this or that animal can live or this or that plant can grow. Parents raise the smaller children higher and explain them where to put the images of plants or animals on the map. After the classes some of the children pull their parents by hands to the greenhouse, to show them turtles and “jungles”, as they call it.

d) 1) 15.10.2014. 16.40-17.00

2) The second floor of the building, the informational plate that described the materials which were used during the construction of the Loodusmaja.

3) The pupils of Animal class – several children of age 7-8, the parents who came to meet them after the classes.

4) The corridor is lighted, and the mat with children boots is situated nearby the wooden tables and the information plate.

5) Parents are waiting for the children in the corridor, and explore the informational plate with the pieces of materials attached. After the class ended, children exit the room, show the artworks to the parents and pay attention to the installation while putting on shoes which they took off before entering the classroom. Children touch the panels of the

installation, scratch the pieces of natural materials which are attached to them, and parents read aloud the descriptions of materials which were applied during the construction of the house. Children are interested in opening and moving all movable elements of the plate, and then, leaving the building, several of them are noticed to touch glass walls or wooden surfaces and discussing wood or stone with parents.

e) 1) 17.00 - 18.00.

2) The park.

3) Some pupils of the Animal class with their parents, several other children of different ages.

4) The autumn evening is still not so dark, and children who leave the building ask their parents to wait for them in the park, while they pick the fallen leaves. During the class they made the picture by paintings leaves in different colours and making prints, and parents are keeping their works in hand, while the children pick new leaves.

5) Children describe what they did in the class and demonstrate how they used leaves as stamps. They try to find the same leaves and ask parents which trees possess them. Parents walk with them around the park and wait while the children play on the playground.

16.10.2014

1) 16.10.2014 14.00-15.00.

2) The park: the apple garden.

3) Three English speaking tourists; a mother with two little children; two teenage girls who left the building and walk around in the park.

4) The weather is rainy but mild, and people pass the garden where the apple trees of a fancy curved form are covered with lichens.

5) First three young people appear – they rise from the outer part of the park by stair to the apple garden which surrounds the Loodusmaja. They speak English and discuss the gardens and apple tree which they saw in the old part of the town. They take photos of the

apple trees and search for the fallen apples on the ground, pass in the different parts of the park by wooden or stone tracks. The people sit on the wooden benches and discuss the photos which they took in the park. Then they pay attention on the wooden house of the Loodusmaja and try to guess what it could be. They come closer to the windows of the building and look inside. Children who spend time inside the school waive hands to them.

At the same time a young mother with two children of approximately 5-6 year old walks in the park, and the boys pick acorns and leaves, ask the mother about the trees and run down the hill side to the playground. There they notice the reconstruction of a beaver lodge and get inside. Then the mother reads the information about beavers that is provided on a plate near the playground. Children play on the wooden playground while the mother keeps in hands acorns, leaves and apples which they managed to find in the garden.

Next two girls of age around 11-13 go out of the school and rise to the hill, walk under the apple trees, watch the park from the viewing platform and show each other the big crows who fly among the tall trees of the park. One of them makes photos with her mobile phone, and then they come down from the hill and leave the park with the bouquets of colourful fallen leaves.

19.11.2014

1) 19.11.2014, 14.00 - 16.00.

2) The greenhouse.

3) Several children of different ages; two families with young children or age about 3-4; a family consisting of two parents and one toddler girl; two mother who brought their children to the classes.

4) During the period spent in the greenhouse different patterns of movement are noticed: the daylight lights the tropical garden, and people of different ages explore it.

5) Several boys of age around 8-10 enter the greenhouse from the hall of the first floor: first they look through the glass wall into the garden, and then open the door and hurry to

the pond with turtles. They try to see the animals in the depth of the water. One of them picks the seat made of a piece of wooden trunk and pulls it closer to the aquarium; then he steps on it and looks on the pond from above. Other boys raise the stairs and look at the pond from the upper level of the garden; they notice that all the turtles are hiding in the water. Then the boys continue exploring the garden.

Then two families with two young girls enter the garden: they show the plants and turtles to their daughters, one of the mothers takes photos of them. Then they let the children walk along the wooden track and climb the stairs; they lead the children through the greenhouse, showing them exotic plants, make them pay attention on where they step. The girls touch the plants carefully, move big leaves and try to move the pots with plants. Then, on the upper level of the garden where the surrounding landscape is visible, two fathers pick the girls high from the floor and show them the winter outside.

Then two mothers go down from the second floor of the school where they lead their children to the classes. They walk slowly within the garden, sit on stairs and show each other the plants, discussing which of the plants that are situated here in pots they have at home, and how the plants are disposed closer to the sunny parts of the greenhouse according to the need in light. They point on the pots and try to remember the names of the plants.

03.12.2014

a) 1) 03.12.2014, 12.00 - 14.00.

2) The greenhouse of the Loodusmaja.

3) Two children of age approximately 6-7 years.

4) The midday time, the surrounding winter landscape is well visible through the glass walls of the greenhouse

5) The children looked around attentively in the greenhouse and constantly repeated: "Jungles! Jungles!" When they rose to the upper layer of the garden where the glass walls

are visible completely, they notice the landscape outdoors and run towards the walls. They turn heads from the tropic diversity of "jungles" of the greenhouse to the frozen winter park around the building and the large bare trees. They call their mother and cry: "Here is summer, there is winter, here is summer, and there is winter, why?" She comes and explains that this is summer garden inside, and here is warm, and there is winter. Then she shows them tropical plants and reads the descriptions of such tropical plants as ginger or avocado, and explains what is tropical plants that grow in warm countries.

18.02.2015

a) 1) 18.02.2015, 12.00-14.00.

2) The greenhouse.

3) Several adults with several children of different ages, two of them are toddler boys.

4) The greenhouse wooden tracks are partly covered with the parts of the plants which overgrow their places and spread some leaves to the tracks.

5) The parents teach the toddlers to walk through plants carefully. Two women follow their children climbing the stairs and going through the garden. They show them exotic plants and teach to avoid stepping on the spread leaves.

b) 1) 18.02.2015, 13.00-14.00.

2) The park around the school.

3) 5-6 children of age approximately 9-10 outside the building, several children and teachers inside the greenhouse

4) The midday time, everything which takes part inside the building is visible through the glass windows and walls.

5) Several children with sleighs are walking around the building and looking what happens inside. They stop by the glass walls of the greenhouse and look at the "jungles", show each other on what grows inside (lianas, cacti), and one boy says that he has cacti at home. Then they see the people walking inside the building and waive hands to them, those people -

teachers and children - respond to them and come closer to the glass walls, call them inside with gestures. The children turn the corner and go to the entrance. Fifteen minutes later they appear inside the greenhouse without their coats and sleighs, and the teacher shows them the greenhouse, pointing on plants and speaking about them. Then, coming closer to the glass walls on the upper level of the greenhouse, children see other people moving around the building, and waive hands to them, coming as close to the glass as possible. The boy who was telling about the cactuses shows them to his friends, and they sit on the wooden track to look at them. The teacher sits nearby and shows the plates with the names of the plants to the children.

03.03.2015

- 1) 03.03.2015, 15.45 – 16.30.
- 2) The second floor of the building, the hall. The house made of empty juice packages and other package cardboard details is constructed in the hall of the second floor, and there is a possibility to get into, to look from different points, to play inside
- 3) Several children of different age who came there after the classes or before the classes.
- 4) Children wait for the teacher or pass through the hall, stop by the house, touch it, look inside.
- 5) Children rise by the stairs to the second floor or appear from the rooms. Several boys and girls get into the house and touch the famous "Aura" juice packages that are used as bricks, and they recognise it and find the different tastes of the juice from the packages. The trademark is familiar, and children are evidently surprised how the empty packages are used. Then the children of different age, from around 5-6 to 13-15 years old pass by the house and look inside, and touch the cardboard of the packages.

Annex 3. The photos



Figure. 1: The map of the Loodusmaja building: Y-shape, the position within the park.



Figure 2: The construction which is inserted in the hill; glass walls and large windows.



Figure. 3: The greenhouse: the pond with turtles, greenery, condensate drops, glass walls and ceiling.



Figure. 4: The glass of the hall of the first floor: the exhibition which extends within the conference room; the visibility of the landscape



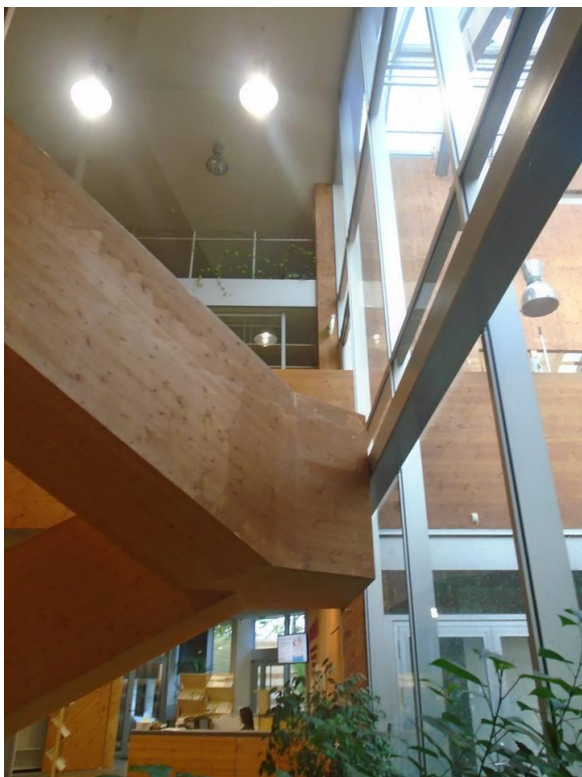
Figure. 5: The greenhouse: tracks and plants. The view from the hall of the first floor.



Figure 6: Façade: wooden wall, windows, a part of the glass wall of the conference room.



Figure. 7: Plants in the classrooms, the visibility of landscape.



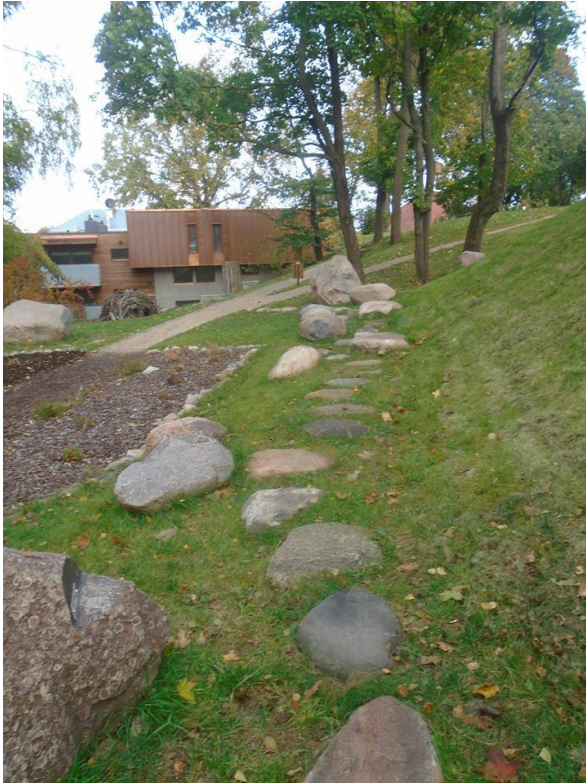


Figure. 8: Wooden interior, glass walls, plants. The wooden stairs in the core of the building, the glass wall of the greenhouse.

Figure. 9: The tracks in the park; the beaver lodge.



Figure. 10: The equipment that speaks about materials and building.



Figure 11: The cardboard house on the second floor of the building; wooden interiors and equipment.



Figure 12: The garden outdoors, the glass wall of the greenhouse.

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