To shape the future of forests –

an activity-oriented

ecological educational work with pupils

German-Michael Hahn
Rudolf Steiner University College Norway
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Summary

Within the compass of the master thesis in hand the activity oriented ecological educational work with school classes is looked at in the first place. It is looked for possibilities of further development of ecologically oriented training. It is the pupil, as the future citizen who has to carry responsibility for his forest. But the important competence of responsibility has first to be learned. (HUGO 2005).

It is the concern of this present work to describe the ecological educational contents that are to be worked through in the forest and to make it comprehensible for the teachers in its practical accomplishment. The conveyance of these educational contents should be brought to the pupils in possibly living images. Optimally constructed educational contents can be described as living images (BRIERLY 2005). A characteristic sign of these living images is their own activity. It leads to the fact, that the principles and competences, learned in the forest can be transmitted on to other life- and work realms.

With a doubtless existing competence of the young people in the high tech area, personal experiences with nature as a basis of life has been lost. This fact could be attributed on the one hand to a lacking nutrition out of the garden, as also to the missing contact with nature in general. This modern nature-distant way of life can be met by authentic experiences. Authenticity can be experienced by the pupils in the forest. The exercise of responsibility, the thinking in long term spaces and the experiences of sustaining acting can be demonstrated exemplarily at a forest organism.

A further request of this master thesis goes towards the educational aim of sustainability. By bodies of the United Nations a decade of education for a sustainable development was decided that should be realised in the years from 2005 to 2014. The aim of education should facilitate the further development of a world-society that is not based on sustainability and to motivate the citizen of tomorrow to a lifestyle of learning sustainability.

At the background questions which weave through this work like a red thread the metaphor of a tree can become a leading picture: out of the progressing development of a tree trunk comes about the shape of its top and its ramifications:
The **trunk-question** that evolves out of that is: How can out of the control circuit of the forests a sustained thinking, feeling and willing be assessed?

Out of my experience so far one has especially to pay attention that with the pupils first the faculty of observing has to be assessed. Only after a patient learning of a sufficient intensity of observation divers facts can be detected in nature and by this the path for a life long learning can be opened for the pupil. Only then can he transfer what he learned on to other fields of life. The regular cycles of the forest are therefore so exemplary, because the cycles of substances are so exactly tuned upon each other, so that no waste products exist.

How should a forest educational measure look like, in order to sensitize the capacity of observation in such a way that the activity of thinking, that follows afterwards leads to a wide spread forming of judgement? How should an ecologically netted thinking concerning the forest be built up and laid out in a meaningful sequence?

The newly developed 12-parted program of modules shows the cyclic course of growth of a tree from the tree seedling to the looking at the forests and trees. So the archetypal image of the tree life from becoming to the decaying was used as a mirror picture of the human existence. The pupil learns to get to know a variety of ecological connections between forest, landscape and man. The own created expression of: **observing forest tending** is a term not used up to now among experts, which should define these processes of learning, guided by cognition in the tending of the forest. Out of this a deep satisfaction of a meaningful, individual work attitude can result which I gathered from my observation up to now at the action orientated ecological educational work with pupils. This leads over to the emotional level of experience.

Now follows the second ramification of questions which aim at the feeling level and asks, how the action oriented, ecological educational work should be built up so that a meaningful completion of the intellectual gain of knowledge can happen.

The pupils can experience themselves as an important actor and present a visible result of shaping. The pupils feel the normative strength of work and the deep satisfaction which springs forth from the fact of finally be taken serious and to develop oneself into an equal
partner. From my own experience pupils get simply enthusiastic, when they are allowed to do something meaningful and prove their energy. This again leads to the central concern of this masterthesis that priority into its action orientated ecological educational work.

A third ramification concerns the learning of responsibility that leads to the competence of action. The question arises: Is it possible to derive from the just mentioned refinement of the gift of observation a tendency of development to a responsible acting?

Finally we reach the centre of this master thesis, the action-orientated ecological educational disposition, an education for responsibility. An optimal furthering of the total ecological complex of a forest organism is achieved when a balanced mixture between an indispensably important, ecological far reaching, long term reflection takes place. On the other hand we have to develop as well a single internal, long term economic aim. In times of climate change, it is indispensable to carry out risk scattering and to aim for a climate-tolerant mixed stands in which single tree species could totally fall away, without seriously endanger the mixed forest as a whole.

In the above mentioned questions we move constantly between the processes of exact observing, of thinking, of judging out of rich knowledge, of sensible experiencing and combining and of responsible acting. All this educates the pupil to a reflecting process of change that was transferred by the creator of the concept of learning responsibility and sustainability.

Finally it has to be illuminated, if the organically developed module system corresponds to the demands of action orientated, ecological, educational work and in which direction completions could be taken. The action orientated, ecological, educational work can lead to new possibilities of development and learning concerning the fields of sustainability and responsibility. It remains to explore to what extent a transfer of above mentioned practical learning processes into personal everyday life of the pupils takes place. For that a greater need of research exists that could be investigated further with the possibilities of questionnaires respect. interviews. A further inclusion of the action oriented education work in the actual curriculum would be desirable as well as on the field of therapeutic and curative education.
Looking back to the path of development towards the modules demonstrates a method of the science of experience. (BAARS 2007). There also a progressing, reflecting process of cognition is described that points to a tight binding of developmental projects in the daily professional praxis and evaluates the results of common work processes. Through many requests from different schools to have guided tours in the forest, a certain experience came about. With the experience of learning by doing the central element that pupils shape the forest, developed this special kind of wood pedagogic.

Further observation took place in September 2004 – 2007. It existed of a ten days forest practical with a 9th class with 29 – 36 pupils. As actual field study in February 2007 a one week forest practical has been arranged for a 12th class with mentally handicapped pupils. For these pupils certain building stones had been chosen out of module programs.

Especially it has to be pointed at this occasion at the connection of ideas of the learning modules which wants to motivate for a networked thinking, feeling and acting. The combination of the learning content in the modules was carried by the holistic picture of the forest that should be anchored as an extensive symbol.

A simplification is often in danger not to be taken serious by the respective experts. On the other hand it has to be indicated out of the meta-level that it is not so much the question to convey exactness, but the holistic picture of a forest and the inherent basic ecological mood. The mentioned complex networked basic mood exists in a permanent becoming and decaying of single trees, that are embedded into a potentially eternal whole and are forged together to an entire connection, a forest organism. The long life of the forest trees contains through the human becoming and decaying a learning connection that comes about nearly by itself:

One can argue that it is the archetypal laws of life which start in a small seed and can overcome the actual being estranged of a today’s pupils life. The replanting of young trees can solve as a symbolic gestalt the secret of young people, who ponder over their connection to an often enigmatic co-world and look for their future tasks of co-operation and shaping. The care of an unpenetrable-looking young forest helps with the competences of shaping and the self-consciousness to be allowed to do something meaningful for society. The occupation with animals of the wilderness creates zones of contact that re-animates the buried possibilities of turning to the strange creature. The shaping tendency of middle-aged forests opens creative spaces of fashioning that mirror inexhaustible reserves of the young soul. The personal attention at the caring of the single trees opens tending accesses to the quiet, strange
being of the trees that can be followed by an initial character and long term friendships. So, therefore the forest practical accompanies on a higher level the life of a tree, until it reaches the age of adulthood. Here the pedagogical focus is laid on the various possibilities of the usage of forests. It is conveyed that outgrown forests are not any mass of disposal of a never satisfied wood industry, but that an alternative, long term thinking caring with old trees can open a dignifying future perspective.

At hand of these examples, possibilities and shaping spaces are opened, that show the way to a development of sustainability. Also controversial areas of themes and apparent contrasts, as the theme of hunting of populations of wild animals are not spared, but are presented in an ecological networked way. The thereby imparted theme of sense-perception seemed to be so important because the so-called objectivity of our sense-perceptions is not really existent.

Numerous positive feedbacks let the question arise about the best possible conditions of the action oriented learning: the enthusiasm of the forester and the forest worker, who work in the forest are the important qualification and cause the immediate flaring of the spark of enthusiasm in the pupils. The pupils love it, when they face the natural authority of the world of work. They are longing for being finally taken serious and to belong to. They feel intuitively the value of work and its normative strength.

**Preface**

To fashion the future of the forests - this work in hand arose from a process lasting two decades which one generally describes as life- and professional experience. These experiences are like a garden, which treated carefully and patiently brings forth fruits. These fruits usually do not turn up at once and a lot of experiences have to be developed further and changed.

On the occasion of a holiday journey to Norway I learned that at the Rudolf Steiner University College/Oslo development studies for natural and environmental education was in the process of establishment. The module – system practised there made it possible for me to take up the studies lasting two years as a second job. The variety of topics and speakers made it possible for me to look at my professional life from an extended point of view. I could
follow up new ways in the reflection of my previous activity and lay down these considerations in the final master thesis.

My gratitude is primarily for the teachers and school classes that took the risk to spend a working day in the woods. The enthusiasm of the participating pupils and teachers was a continuous incentive for me, to further investigate educational forestry. A thank-you goes to the Widar-school/Bochum which has been doing a two weeks’ forest practical with their horticultural teacher Christoph Tober at Würzburg each year from 2004 - 2007. My third thank-you goes to the spiritual father of the forest practical, Mr. Ekkehard Wroblowski from Kassel, who may hereby be befit by our warm wishes for recovery.

Many thanks also to the teachers, David Brierley/Oslo and Bo Dahling/Karstadt/Sweden. My special gratitude is for my personal attendant Aksel Hugo/Oslo, who did not get tired to do justice to my abundant questions in innumerable nightlong conversations. Also a thank-you to Gunther Gebhard/Stuttgart, who contributed ideas to the Waldorf pedagogic. I thank Mr. Richard Steel/Föhrenbühl that he has come with his Camphill pupils to Würzburg. Ton Baars/Kassel I thank for his extensive readiness for conversations concerning the research disposition of the science of experience. Helga Voß and Thomas Streiner I thank for their help in translating into English. Last, but not least I thank my children, who became my masters on the experimental level and had to test a lot until a variety of activities on hand could be developed in the woods.

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German-Michael Hahn
Title

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I. Introduction

The idea of an action orientated, ecological, educational work reminds one of an expression by J.W. von Goethe, who said that nature is the only book, that offers on all its pages a real content. This potential could also be available for the pupils of today. The everyday life of children and youths happens for the main part indoors, which are built and therefore nature, the forest, can not be effective.

The environmental movement of the 1980s gave the nature of the forest its expression: the forest is for us the last big system of natural runs of life, although nearly all trees die by motor saws before they have lived their biologically possible life up to the end. A forest is the more also a place for human beings, just because of the excess of their demands and the obsession of wood harvesting of their economists. The forest teaches us, that monotony darkens the spirit and endangers life to a high degree, for only the mixed forest, which is formed by young, middle aged and old trees on the same spot, is serene and steadfast at the same time. The forest teaches us also humanism, because it shows that the perfect and the crippled can live side by side and that the ill serves the whole organism in an indispensable way: the same as in man the illness nourishes existential thoughts, so nourishes a tree, which is ill at its core a great number of bacteria, fungi and insects that live from the dying biomass or serve other animals as food. Man, who only thinks of the increase of his material goods, will be abandoned by thoughts, worthy to be thought and the mere forest of yield is left by the higher animals. (STERN 1989)

So, it is the long living trees which can make us experience the measure of time and can convey to us the long lasting existence in the hectic of everyday life. It is the steadfastness of growth and the eternity of being that is proper to the forest and which we need so urgently. Forests and trees are able to function as symbols, to take on unobservable ways in the labyrinth of everyday and to transcend the nearly endless existence of a tree life.

1. The ecological educational work of a forester

A forester looks mostly after great areas of forest in which he counsels private and public forest owners, in a way how they could tend the best to their forests. Sometimes these forest areas are situated as islands in the extended fields and the population has hardly any contact
to the local forests because of the modern way of life. To tend to the forest means besides the planting of young trees also to fell trees, so that the neighbouring tree can grow better. So the forester is the link between the forest owner and the sawing mill and is mainly responsible for the organisation of the wood harvest and the activities concerning the wood selling. As the public forests are obliged by law to exemplarily, a certain engagement concerning the ecological educational work is expected. Thereby requests form divers groups of the population have to be considered: communal groups, the mayors, environmental groupings, self-aid institutions of the forest owners, kindergartens and schools. In this master thesis the ecological educational work with school classes is looked at in the first place and looked for possibilities of further development of ecologically orientated schooling. It is the pupil, as the future citizen who has to carry responsibility for his forest. But the important competence of responsibility has first to be learned. (HUGO 2005).

2. The actual situation of youth, environment and education.

The educational scientist, natural sociologist and physician Rainer Brämer has asked in the context of his Youth report nature 2006 young people as concerning their everyday relation to nature. The material of dates is based on 2200 interviews and diagnoses an enormous lack of nature competence. Eight out of ten pupils think that it is forbidden to take beetles, frogs or worms in your hands, which one could declare as a sign of a new idealisation of nature. Nature has become an unknown and untouchable ideal place. (BRÄMER 2007, 57)

This empirical assured analysis about the relation to nature of young people is covered by the knowledge which is also experienced in the actual pedagogical work in the forest. Many young people are taken by a virtual world which brings with it a stimulus satiation in form of media-graphic displacement activities with a lack of experience at the same time. With a doubtless existing competence of the young people in the high tech area, personal experiences with nature as a basis of life are lacking. This fact could be attributed on the one hand to a lacking nutrition out of the garden, as also to the missing contact with nature in general.

This modern nature-distant way of life can be met by authentic experiences. Authenticity can be experienced by the pupils in the forest. The exercise of responsibility, the thinking in long term spaces and the experiences of sustaining acting can be demonstrated exemplarily at a forest organism.
The trend towards educational measures in the forest is still strong and the most different forest projects are more and more used because of the system immanent learning potential (www.waldschulheime.de/ www.wald-forst-holz.de (wood pedagogic)). Concretely different needs are asked for which reach from a half day visit in the forest by a kindergarten group up to a ten day’s working operation by upper school classes. The requests of the teachers lie mainly in the deepening of curriculum contents of the theme: forest (e.g. 3. age group elementary school) or an epoch on handicraft ( e.g. 3. age group Waldorfschool). Later the working out of a surplus of strength (e.g. 7. class secondary school) or the judgement of a juvenile court for social work leads to a therapeutically guided working operation in the forest. In the upper school classes it is asked for gaining a complex knowledge out of real professional fields as well as the excessive activity in an environment that is not immediately economically profitable. In this way the pupil is taken into a clear activity that asks for his personal input.

3. Questions concerning an activity orientated, ecological education

Out of personal experience from decades of guided tours in the forest with pupils a research motif for an activity orientated, ecological, educational work in the forest came about. At the same time by bodies of the United Nations a decade of education to sustainability was developed that should be realised in the years from 2005 to 2014. The aim of education should facilitate the further development of a world-society that is not based on sustainability and to motivate the citizen of tomorrow to a lifestyle of learning sustainability. (German Bundestag 2004)

The main question that evolves out of that is: How can out of the control circuit\(^1\) of the forests a sustained thinking, feeling and willing be assessed?

Out of this trunk-question different ramifications come about: At the background works like a red thread the metaphor of a tree. The tree can become a leading picture: out of the

\(^1\) control circuit: several e.g. of the soil ( processes of change of organic substances), of the trees, (metabolic processes and formation of substances), of the climate ( processes of breathing and the air pollution prevention). Is something missing here?
progressing development of a tree trunk. Out of there comes the shape of its top and its ramifications

How should a forest educational measure look like, in order to sensitize the capacity of observation in such a way that the activity of thinking, that follows afterwards leads to a wide spread forming of judgement (key competence)? How should an ecologically netted thinking concerning the forest be built up and laid out in a meaningful sequence? It is the question to learn to understand the forest in order to learn by this to think independently. This questioning corresponds more to the pedagogical-didactic basic knowledge that should be conveyed.

The second ramification concerns the field of feeling and asks how the action orientated, ecological, educational work with its broad spectrum of activities could flow into a lifelong learning and represent a meaningful complementation to the intellectual acquisition of knowledge. How is it possible to trace out the complex organism of the forest?

A third ramification concerns the learning of responsibility that leads to the competence of action (key competence). The question arises: Is it possible to derive from the just mentioned refinement of the gift of observation a tendency of development to a responsible acting? This question corresponds more to pedagogical-methodical challenges which have to be met by forestry-pedagogical measures.

Finally it has to be illuminated, if the organically developed module system corresponds to the demands of action orientated, ecological, educational work and in which direction completions could be taken.

4. Which method has been applied in order to develop the questions and modules?

The path of development towards the 12-fold system of modules came about out of a great number of guided school events in the forest and originated from a density of up to fifty classes per school year.

It started in the early 1980s with the then usual imparting of knowledge in the forest, in which the forest should function as the enlarged classroom. Every year a new theme was decided on
which would be conveyed at the so called day of the tree. The pupils were happy about the change of wallpaper; to change the classroom against the much more interesting environment of the forest. Often the guided tours were arranged according to the principle of different stations which means: a repeated change to various places in the forest took place. Thereby I could observe that the enthusiasm of the pupils was especially high, when the element of moving – the walking – came in.

One day I got some bow saws with which a selective taking out of trees in the young forest was done. This practical activity was very popular, for beside the element of moving the legs that of the working arms and hands was joined. This element of dynamic, personal shaping of the forest by the pupils leads to an enthusiasm that had not been nearly observed before.

As a third step a linked thinking unfolded through the fact that the pupils did not leave the sawn down trees lying in the forest, but put them up at the wayside into compost heaps – new life spaces came about through the hands of the pupils.

By this a thought of nature protection was put aside: that nature would do much better without human influence! The contrary occurred: by the active doing of the pupils jewels came about, the pupil became the active fashioner of his environment.

Through their steering intervention the pupils furthered especially wild fruit trees, as: Cherry pear, nut and kinds of sorbus, like: s. torminalia, s. aria, s. domesticus and rowan. In this way the pupils got to know the aspect of nutrition which the wild fruit trees have beside the main fruit bearing tree species: oak and beech. With this a wide field of ecological links was named which especially concern the realm of insects and birds. Modern concepts like biodiversity were at that time not in everybody’s mouth.

A combination of the just mentioned measures at the border between forest and fields lead to intensive measures of shaping the edge of the forest which were introduced by and by. With these examples the poorness of species on agricultural spaces becomes especially obvious and could in meaningful pedagogical work units be imparted.

A further amelioration of empty fields could be achieved through the creation of ecological stepping stones in form of field trees and new afforesting. The personal planting of shrubs and
wild fruit trees will be a remaining experience of biographical dimension and the pupils gets in contact with the idea – yet to be formed – of home.
At the end of the 1990s I got to know the forest practical which is carried out by 9th classes in a two weeks time at the Waldorfschule in Kassel. At that different forest works were done with a quarter of the class: the planting of trees (spade); the foresting of young stands (bow saw/ axe); the trimming of middle-old trees (pole saw); and the building of walls out of brushwood (Benjes hedges) or individual tree tending.

Mostly they were morning or one-day events with school classes of all kinds. The adapting of the activities by the school classes to the needs of the forest owners lead to a great number of further activities, as e.g. burning of trees that were prey to the bark beetle, the building of hunting seats or the shaping of forest edges.

Through the reflecting principle of learning of the master course of study at the Rudolf Steiner University College in Oslo/Norway I got the possibility to realise a holistic research disposition. It comes out of an organic process of growing and unfolds out of observation and reflection to a now present project of development. The eco-system forest which is organised in circuits should be met with a similarly circuit organised didactic wholeness. The modules start with the seeding of trees and accompany the developing life of a tree. The great number of modules was divided according to the phases of age in a tree life. Thus the pupil learns to know the dimension of the factor time which normally lies outside his horizon of experience. He gets to know sustained acting that condenses via the level of feeling into the later thought and anchors in his thinking. Thus in the constant change of possible actions a continuous exchange between the levels of the forest and the learning of the attached contents occurs.

Corresponding to the different contents the highest flexibility is given. This concerns on the one hand the question of the pupils’ age group which is addressed in the respective modules, on the other hand the building stones in the single modules that can be flexibly adapted to the respective needs of the school-class, the season, the forest owner or the respective zone of the woodland.

The module principles came out of the ideals of learning by Plato. He developed the idea of imitation and repetition as decisive factors of learning (DAHLIN 2005). The 12-fold module program differs from the often practised event pedagogic through a deeper level of
experiences. The event pedagogic offers in itself true single experiences, but it misses the linking with the complex structure of the forests. Through the action orientated ecological educational work, the pupils gather essential experiences from the world of work linked to the forest, which leads to their own further development. The competences which are gained thereby can be transformed later onto other areas of life and work (see Chapter III.1 event pedagogic and responsibility).

As actual field study in February 2007 a one week forest practical has been for a 12th class with mentally handicapped pupils. For these pupils certain building stones had been chosen out of module programs. Fortunately after the storm Cyrill (18. January 2007) important work had to be done, that did not ask for an immediate achievement and could be put back for the forest practical.

Further observation took place in September 2004 – 2007. They existed of a ten days forest practical with a 9th class with 29 – 36 pupils and concerned another module composition and also another forest owner.

In order to scrutinize the long ecological educational work and its pedagogical aims, all the work steps contained in the modules were talked about concerning their didactical and methodical contents. (see divers sub chapters of the modules).

Looking back the path of development towards the modules demonstrates a method of the science of experience. (BAARS 2007). There also a progressing, reflecting process of cognition is described that points to a tight binding of developmental projects in the daily professional praxis and evaluates the results of common work processes. The method of experienced science as described by ton BAARS/Kassel exist s of six elements of process:

Element (A): The knowledge that lies in learning by doing.

Element (B): Reflecting doing and perception of patterns - I am starting to perceive laws and test them at the reflection.
Element (C): Perception of shape and a building up of a living flowing shape (Gestalt) (Goethe) - perceived own lawfulness becomes a building in which ever more eventualities can be added to.

Element (D): forming of concepts/ Aha-experience/brainwave- external sudden happening fill unclear empty spaces, something becomes now clear.

Element (E): Adequate deeds, respective unexpected not planned action - I work with the newly inaugurated system and in doing the newly required (ability/ fact/building) hardens.

Element (F): systems that work – the system works generally without faults and first beginnings towards neighbouring spaces form themselves, which are recognised as *newness*.

An extensive description of the above succession of processes is to be found in the chapter to module 2 (2.5 Discussion according to points of view of science of experience).

**II. The developmental project: forest practical in 12 learn modules**

Forests need again visionary farsightedness. They are not any mass for disposition by the wood industry, but also sensible learning spaces for following generations. To the one-sidedness of a virtual networked society of information could be sided the authentic project of experiencing a forest practical. The electronic fascination can be opposed by the motivation of being and becoming of our natural bases of life. In acting the pupil experiences his will of shaping, that thereby is trained in various ways. The experiences that happen then are yet not exactly to organise. They are according to their uniqueness an event in each personality of the pupils. In this sense they are also not to be domesticated towards definite pedagogical aims.

*Learning sustainability* can be conveyed as a cognitive-linear formation of thoughts as well as cyclic running action-oriented processes. With that important spaces of development, e.g. a possibly far reaching education of the growing-up personality of the pupils, their personal contact with nature and the most various sense- affects are forged together to an action-oriented process of cognition. These processes open ideal, practical and sustainable possibilities of development.
The newly developed 12-parted program of modules shows the cyclic course of growth of a tree from the tree seedling to the looking at the forests and trees. So the archetypal image of the tree life from becoming to the decaying was used as a mirror picture of the human existence. The pupil learns to get to know a variety of ecological connections between forest, landscape and man. Evening lessons widen the horizon up to the viewing of related fields of knowledge, as animals of the forest, hinting, world-wide losses of woodlands and cultural-historic knowledge of tree and landscape. In great parts of the learning modules it is the question of the specific start of an action-oriented ecological educational work. The work at hand possesses an exemplary character and can be adjusted to the respective pedagogical and ecological situations and developed further.

The reader presented with a repeating series of points of view:

1. Modular lesson: A working day with a school class: under this respective starting heading a whole daily action dominated field of learning is described which helps the pupils to come to praxis-oriented processes of cognition. The 12 learning modules can also be presented singly or in different sequences. They can, according to the respective challenges of the pupils’ age be simplified, changed or built out.

2. Evening lessons and record book: under these ongoing chapters, suggestions are offered, the contents of which were possible in an evening lesson. Thereby it is clear, that a pupil, tired from the unusual work, brings only a certain capacity of learning with him that should time wise not be overstressed. That in the evening individually arranged record book serves the stabilisation of the processes of cognition gained in the day and should get a fixed part of the course of the day. With joined work sheets and photos can it advance to a mirror in the process of memorizing of the respective experienced forest practical.

3. Further possibilities of deepening work: these regular headings complete the under 1. described modular lessons. According to the pedagogical situations the single parts can be exchanged with each other. It can also invite to a longer stay at one theme, if. Out of the didactic causes a deepening of a learning module seems advisable.
4. Background information for teachers and list of materials: these ongoing chapters serve the deepening of the respective themes for the teachers. They complete the respective modular theme and motivate to self-study. It is pointed to the relevant literature that contributes towards a deepening occupation with the respective themes. In the sub-chapter materials the objects are listed which have to be procured at the practical transfer of the learning module.

5. Chapters of discussion: These serve the illumination of the respective practical surrounding and are discussed under the various superior points of view (e.g. ecologic, scientific, pedagogical, etc.). With the study of these 12 discussions the reader can acquire an overlook about this work. Together with the chapter final discussion and ways to the realisation of sustainability he is informed about the direction of the aim of the master thesis in hand.

For the imparting of these ecological connections, a simplification of the complex forest ecological knowledge is necessary, so that the pupil respective the growing adult learns to understand natural scientific knowledge at clear examples. This transfer of the know-how found its lingual expression in the descriptions of the learning modules that need a possibly imaginary, practical character. One method of imaginative contents of education is described by David BRIERLEY with the expression of living images and enables the pupils and teachers thereby for an interactive course with educational contents (BRIERLEY 2005).

As an example of a living image you will find a quotation in the following. This principle is continued in the entire masterwork between the respective modules:
Illustration 1: forest partition Eichhall under 400 years old oak trees. Forest Partenstein, Bavarian state forests.

Believe me,
Because I have learned it,
You will find more in the woods
Than in books.
Trees and stones
Will teach you
What no Master will tell.

Bernhard de Clairvaux, founder of the order of the Cistercians; Approx. 1200 AD (Wood chapel near Ebrach State Forest)
1. The origin of the forest – A magic is inherent in every beginning (mod. 1)

The agenda 21 is the concept of action agreed on by the great environmental summit meeting of June 1992 in Rio de Janeiro of the welfare of man and nature, which the heads of the governments of more than 170 states signed from developing countries to industrial nations. Germany also has confessed to this agenda 21, to its aims and therefore also strives for an ecological and social reorientation of the society for the 21st century. According to the motto agreed on: globally think – locally act, the environmental protection shall be integrated into all social, cultural and economic development under consideration of the regional income. The great spatial cover of the agreement is an essential basis for the construction of networks and partnerships. (WALDEN 2001, 38)

If the pupils shall be led to the teaching contents of sustainable development, it is indispensable to make contact with the roots of our basic life conditions. If we use the example of the worldwide available mineral resources, it becomes clearly obvious that not sustenance, but massive destruction-processes are at work. It is very hard to discover experienceable examples of sustainable development or to integrate into the weekday for the pupils.

This is not so with archaic production-forms. Example: in horticulture, farming, landscape ecology and forestry only what was sown before can be harvested. A key experience for learning sustainable development has moved into an available proximity with that: the seed! A magic is inherent in every beginning . . . (HESSE 1961, 199).

The tree sown usually survives the pupil that sowed it a multiple times over, so that at this work the pupil is dipped into a reality which is strongly projecting into a future reality. It is dipped into a sphere exceeding the personal life and relating us to that which corresponds to the post-materialistic change of values and gives the pupil the existentially necessary confidence in a sensible future. Because: Only, what was sown before, can be harvested later!

1.1 Modular lesson: A working day with a school class

An excursion is carried out at the beginning of the day which leads to the nursery of the wood.
The inspection of the young tree-seedlings under the crown roofs of their tree mothers and the old tree veterans as such are always an experience. The temporal aspect of old trees gets understandable for the pupils most easily, if every pupil is reminded of his own family. He is introduced to the order of generations which goes back up to the great grandparent generation. This also forms an interesting conversation background which can connect the parents with the teaching contents of their children at school. At home it demands only a few stories and a look at old photos with the parents.

In case the principle of the seedlings under old trees (in forest language: natural rejuvenation) should be locally not available, one could also inspect an area of wood felled 2-3 years ago (technical: clear cut/ bald area). However, this has the disadvantage that only in exceptions a large number of species can be observed. Clear cut areas have the disadvantage that only cold-resistant pioneer tree species (birch, asp, willow, larch, spruce, pine) can usually proper. Sensitive climax-tree species^ beech, limewood, grove beech elm and cherry freeze to death in the harsh steppe climate of a deforestation.

Next we should be visiting 3-7 years old trees to be able to inspect the growth events taking place in the near future, The pupils are taught to look for the little transition zones (ring bulges) which indicate one year's growth zone and the next. With coloured paper tapes every pupil can indicate these transitions on his individually chosen tree. So they are trained in observation and learn to calculate with the factor time. This is an essential training feature since the factor time has an existentially necessary meaning in the realm of sustainable development. Many environmental problems are put off because no real relation to the factor time exists. Depending on the grade of pupils, the human relations corresponding to the factor time can be deepened by further examples. (GEBSER 1995, 9f/ GEISSLER 1993, 8f/ WEHMAIER 2000, 7f).

Another working step is the collecting of tree- and shrub seeds. Depending on the season the wild fruits wrapping the seed and the seed capsules can be studied here. This can convey the advantage and meaning of a large number of species inhabiting a locality to the pupils. If only monoculture forests are around, you can get samples or the respectively missing natural type spectrum by bringing in fruit bearing branches fetched from other places. At the same time
the importance of the local genetic potential is brought home to the pupils (technical: autochthony\(^2\)).

The next working step consists of treating the raw seed which must usually get separated from its flesh/seed covers before it can be sown. By means of simple techniques like soaking in water and following pushing them through sieves or rubbing them with sand, to get the seed cleaned.

Finally comes the thrilling moment, when the pupils sow trees themselves, usually for the first time in their lives. To find again the trees sowed, a simple marking system offers its services. Approximately 30-50 cm long roof slat pieces being cut with the help of a frame saw are sharpened with a hand axe. A bundle of such wood pieces and a small hand axe are taken along in the rucksack. Every pupil is equipped in addition with a waterproof felt-pen so that he can write individually on his roof slat. For example he writes down his name, the tree name or a wish for his tree on the roof slat. If he has arrived at his sowing place, he first puts up his slat by driving it into the ground. This prevents the tree seeds from being sown on a rocky piece of ground, where they would dry out next summer. After the layer of loose humus is removed (mor\(^3\)), the seeds are put in the mineral ground and covered by a few millimetres of soil only.

### 1.2 Evening lessons and record book

Important thing lie also hidden in the evening lessons which offer the chance to teach a not anymore willing to work pupil. At this time looking back at the working day an artistic net of memories can be woven. In short remarkable sentences the really important things are written down and illustrated with postcards, photos and own pictures. By this the pupils learn to reflect their actions. This makes them able to exercise future-orientated ways of acting and thinking.

In this learning module the first thing after the process of sowing the happenings in the seed will be talked about. After the taking in of water follow the impulses of growing of the first

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\(^2\) autochthony: describes the respectively local genetic origin which forms the local and climatic memory of an area about an age long consequence.

\(^3\) mor: humus that is not connected with the mineral soil which consists of parts of plants.
shoot, that always grows in the direction of the centre of the earth. Often, only after months the second sprout grows, which pushes through the thin cover of earth upwards in the direction of the sky. In the vernacular it says: Always towards the sun! Is that right?

If it were like that the sprout would grow in the morning in direction of the East, at midday towards the South and in the evening direction west? And there would be no growing towards the North. Then there would be only crooked trees. But all the trees usually grow straight towards the sky, vertical to the centre of the earth. But there is a wandering with the sun in the realm of the flowers, which follow the daily course of the sun and the way back at night. In order to await the rising sun in the East. This should be talked over with the pupils.

A further area of knowledge is the realm of the roots of a tree, which remains usually hidden, but is full of surprises. Who knows that the root bark of a birch tree is red. At this point the different types of roots can be talked over:

trees with a **tap root** can be watched very well in their youth. It is especially the oak (quercus div.), where the root sprout starts to grow immediately in order to get into the earth by late autumn. Then it pushes vertically into the soil and sprouts in the time free of frost without interruption in order to reach a depth of 1 meter until the time of the first sprouting oak leaf (in June of the following year). The root mass then compounds fifty times the weight of the seed, before the chlorophyll starts to get active with the first two small leaves.

After this the types of trees are discussed which have **roots in form of a heart**. A good example for this kind of trees is the lime tree (tilia div.) as it imitates the form of its leaf also in its crown and as well in the growth of its roots.

Finally there will be talk of the trees which have **shallow roots** that prefer stony ground. There the roots move like a snake in order to anchor in the crevices, to stabilise the tree e.g. the pine (picea abies.). Furthermore it could be talked of what happens, if such a rock specialist has to grow in the deep soil (genetics!), although it could root much deeper. If there happens to be much storm, the roots will be torn off and with the time suffer a strong destabilisation until finally it will fall at a future storm.
For the upper classes the theme of the tree roots can also be treated more scientifically (see illustration 2). Than the pupils train their ability of interpretation graphics:

- At the pine tree (picea abies) the main part of the fine roots are found in 30-50 cm deep. As a specialist for rocks its coarse roots wind snake-like over the surface of the ground. Therefore they are also called flat rooter.

- Beech (fagus sylvatica) and the oak tree (quercus robur) are rooting with their fine roots in a depth of 40-70 cm. Tendentially the broad leaf trees have a higher intensity of rooting then the conifers.

- The fir tree (abies alba) pushes its fine roots down up to 110 cm deep, reaching by this a stringer rooting as the pine. This shows at storms, when the fir trees often are victims of.

- The alder (alnus glutinosa) reaches the most intensive fine rooting, when it has reached 70cm of depth. In contrast to the afore mentioned species of trees, which reach their maximum of fine rooting in 30-40 cm depth, is it able to reach also in 110 cm depth a greater intensity of roots than the other tree species. Therefore it is at home at the courses of brook and river that tend to erosion.

- To sum up in this diagram is shown, that a mixed forest can make use of a higher potential of soil horizons and is therefore ecologically and economically superior to pure coniferous forests. It is therefore that mixed types of forests should be preferably planted.
Closing off one can tell according to the age group a short version of the story of the famous French shepherd, who changed a stony, barren plateau back into a fertile landscape run through by various brooks. (GIONNO 1996, 7f) This fairytale of the French shepherd guides one at the end of the day to archetypal, character forming aims: that of learning responsibility (HUGO 2000) and the communication of sustainable development (MICHELESEN/GODEMANN 2007, 20f.).

1.3 Possibilities for further deepening work

For children impressive experiences in nature can be prepared on the window-sill (in the classroom); so e.g. also the pre-germination of walnuts. A great number of sensory perceptions are offered to the children, if we simply lay nuts into glasses with water and put them at the window. Every day they need thorough care and fresh water to avoid them rotting. The nuts that have been dried up during winter get saturated with water up to the double of their dead weight and grow big and heavy. Finally the walnuts burst open and – oh wonder – the germ shows. . . . It is absolutely necessary in handling living substance to regularly care for it. Have we taken something living out of its natural environment, in order to watch it, we are responsible for its further existence. This is very important in order to teach children the high ideal value of everything living – of unfolding life. . . . It is of particular significance that we help all small plants that we paved the way for by our care, to come to a specific further existence. In this way a first consciousness of responsibility as well as an elementary basic understanding of the relations between tree, forest and man can grow in the children. (WALDEN 2001, 28)

In autumn it would be possible to make jams or fruit-juices out of the wild fruit which surround the tree seeds, which of course would only be produced in small amounts (small glasses). This has the advantage that the pupils could take something home and in this way the parents could be involved in the contents of teaching. There is also the possibility to mix the mush of wild fruits with liquid honey and by this- not being preserved – have it keep, even if only for a short time. In doing this the loss of vitamins by cooking is avoided and a new feeling of taste is conveyed.
In winter there is the possibility to bake a cake out of sweet chestnut flour and by this to remind of the olden days, in which men had to get through the meagre winter by means of their provisions. Also the acorns could be milled and soaked in water in order to bake pancakes from it.

In spring respective blossom-juices could be produced, that are put together with sugar and water and which would be ready for consumption after two or three days. By the way they could be tested in form of a taste-guessing evening.

In summer the late blossoms (elder) and the first berries (straw-berries) can be made into juice, jam or be prepared in pancakes.

It would very well fit into this module the well-known project of a school-garden. Why always grow radishes and salad with the pupils? – How would it be to arrange a tree-seedbed with the pupils? With this the thought of a school-garden could be enlarged. It would even be better to lay out a real small tree nursery at the schools!

The important difference to gardening exists in the different light ecology, which young trees need during their up-bringing. If we look into a forest in which grow young seedlings under old trees the difference becomes obvious at once! In the daily course of the sun the crown shadow of the old trees wanders from East over South to West and covers the seedling with a subtle interchange of half-shade and half-light. Thereby the young trees are animated with the help of their apical dominance⁴ to invest possibly the wholly available energy of growth into the growing of the top shoot. The result is that the young plants branch relatively little and grow mainly crown-shafty⁵. If the tree seedlings grow in full daylight, they should therefore be shaded. This leads to relatively young slim trees which in 1-2 years reach a height of 20 – 40 cm and can be transplanted into the forest. But after one or two years the young trees have to be lined out in order to get satisfactory possibilities of development. This procedure is similar to the pricking of the seedlings in gardening and can also be used for cultivation in containers. This method has the advantage that a school class is able, also in summer, to plant

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⁴ apical dominance: plant hormone, that steers the growing potential of a tree sprout and leads to a strong or weak growth of the tips of the sprouts.

⁵ crown-shafty: which signifies a sprout or a young tree, that grows in one axis and prefers to let grow the middle terminal sprout.
trees in the forest and do other activities like mixing of potting compost. The disadvantage lies in the necessary, regular watering of these potted plants (organise watering during school holidays!)

While planting the container-trees one has to take heed, of planting under soil level and to get rid of the spiral roots.

Another essential reason to integrate a tree-nursery into the school garden is the raise of fruit trees, the fruits of which serve the human nutrition. This would be a further-reaching idea, because at the occasion of respective birthdays of pupils a self-raised fruit-tree could change place into the parental garden. In this way a further connection of educational content and the parents would have been established. Furthermore an important aspect to keep old species of fruits which were saved into future by our forefathers would be possible. Thereby also old cultural techniques, like getting and budding fine grafts, the raising of so-called root-stocks from the wild ancestors of our fruit trees could again be build into the know-how of the next generation.

1.4 Extended teacher knowledge and list of material

In the action of sowing plants lies hidden a mythical deed out of the human history of development. Following the epoch of our hunting ancestors and the time of the nomads (grazing animals) came the time of settling down, of clearing parts of the woods and the regular growing of food plants.

This archetypal acting is anchored solidly in the movement of the school garden of the Waldorf school.

However the growing of fruit trees, shrubs or trees of the forest is relatively rare, because the temporal horizon is not far reaching enough. In sowing trees the pedagogical trick is the time span which reaches far above the personal life of the pupils and guides them step by step into the learning responsibility.

A further pedagogical field of instruction lies in the observing attitude, when searching for tree-seedlings on the forest soil one has to stoop. An astonishing variety of forms one can discern at the first small leaves. Mostly one can not discover the later final leaf configuration which makes it difficult to discern the tree seedlings but enforces the ability of observing:
Also by watching the seeds contained by tree fruits one can observe an attitude of wonder, when the overwhelming wealth of nature is brought to the pupils’ consciousness. Further literature concerning wild fruits can be found in: (ECKERT 2000, 11f).

Also the ‘genetic pool’, known from the genetic engineering gets in form of local and climatic memory of our respective home tree species (in forest language: autochtony) a much more positive significance than the manipulative character of modern genetic engineering.

Through individual labelling of the seeded trees the pupils get a personal relation to the living being of the tree that leads not only into the future and to a later remembrance of the done activities. It has also the advantage, that at a week-end they can show their parents, where they have worked. Pupils love to present, what they have accomplished. Further literature for treating this theme in form of stories, especially in elementary school one can find in: (KLEIN 1992, 20f/ WALDEN 2001, 25f).

**List of materials**

Before starting a forest practical the pupils have to be instructed to wear appropriate clothing while working in the woods:

- instruction that even in bas weather the work in the open will be done;
- warm clothing by the ‘onion peel principle’, e.g. according to the kind of physical work the clothes which are worn in layers on top of each other, could to be adapted to the respective warmth and cold and sweating.
- Walking boots with a leg that protects from spraining the ankle.
- rubber boots with two pairs of socks (for changing in rainy weather at lunch time).
- rain trousers and -jacket and -hat.
- working gloves as well as plaster.
- Small hand hooks and shovels.
- good spirits from the part of the teachers and the helping parents!

In addition to the morning excursion it has in case of mono-cultures to be cared for that in order to be able to present the potentially possible local variety of trees and shrubs some fruit bearing branches should be collected in the near or far surroundings of the place of excursion, so that a supply of seeds can happen with the pupils.

It has as well to be ensured in case there are no trees with deep hanging crowns to get a supply of seeds some trees will be felled in order to win seed supply. At this occasion the principle of logging could be mentioned which is the motor of forest tending as well make sure that the neighbouring trees which are staying have enough light and air. (see also modules 3,5,7,9).

1.5 Discussion about forest ecological aspects

The process of the agenda 21 that was initiated by the United Nations 1992 in Rio de Janeiro intends an ecological- social new orientation of the world community under the motto: global thinking - local acting. The concept of a sustained development of the world society should through the UN-decade of forming sustainability that runs from 2005 – 2014 and should also be anchored in schools and be developed further.

This demonstrates that an ecological sustainability can not simply be put aside. It ought to be analysed in its phenomena and be integrated in existing systems. This makes one think of a saying by Aristotle, who declared that the whole is more than the sum of its parts. The philosopher recognises by this that a complex with-each-other of ecological systems is perceived as a phenomenon that asks for space, that necessarily possesses more value compared to single entities. This phenomenon contains as well to analyse the binding element

\[\text{motor of forest tending: this metaphor explains a tending principle in forestry, which means the tending through the neighbouring tree: is a tree taken out, so the neighbouring tree, that stays, is furthered. As these proceedings repeat themselves often in the life of a tree it is called motor of the forest tending.}\]
of systems that consists of influencing and penetrating each other and therefore has an evolutionary character.

Ecological complexity can become our exemplary teacher of states, processes and systems, if we only want to penetrate them with our thoughts. Therefore it counts in future to learn the multi-layered biological systems. The modular construction of this master thesis is adapted from the ecological connections of the forest organism and shall serve as basis for the action orientated ecological educational task. The learning modules start at the hour of birth of a tree, when the seed begins to germinate. This is the beginning of a whole row of regular circuits which can be slowly conveyed to the pupils in this way.

**Warmth ecology:** The forest areas which lie in the northern zones of the earth in the permanent frost zones of the polar regions, form a warmth shield for the underneath lying moderate latitudes and their forest regions. The actual deforestation of the woodlands in the taiga will lead, because of the difficult climatic starting position to the fact that there can not grow a young forest again because the warmth layer of the old trees is missing. The natural seeding of diverse tree species is closely linked to the question of warmth. Also in the moderate latitudes exist at a free space, normally enclosed by forest trees at the different expositions (north-, east-, south-, or west side) always different growth conditions for the following forest generation; species of trees that are sensitive to cold (fagus sylvatica, carpinus betulus, tilia div.) grow rather at the north side spoiled by the sun, whereas pioneering tree species which are insensitive to cold (betula pendula, populus tremula, salix alba, picea abies, larix div., pinus sylvestris) will find their best growing conditions at the south side which lies in the shade of old trees as well as in the centre of a bold area. At the east side in the afternoon warmth wild fruit trees will settle more often (species of sorbus and prunus) whereas the west side which lies in the afternoon shade will suffice the demands of (acer div., fraxinus excelsior and ulmus div.). This can be shown to the pupils in the course of an excursion of natural seemed young forests and corresponds to long term experienced scientific observations.\(^7\)

**Light ecology:** The daily and seasonal course of the sun unfolds different effects on the growth of forest and fruit trees. The wandering shadow of sheltering trees leads to results that can be explored by the pupils themselves and be respectively presented. (crown shafting at shading respective tendency of ramification at full lighting that are produced through apical dominance hormones).

\(^7\) experienced observations: look at chapter 2.5 (modul 2)
**Water ecology:** From experience it is known that in mainly deforested regions the still existing *left over forests* have an effect of attracting rain falls during thunderstorms. This has to do with the water evaporation which causes an effect of cooling down the earth atmosphere (effects of condensation). From measurements of level of ground water it is known that the water level falls a few meters underground at deforestation which has to do with falling away of the sucking effect of tree roots.

**Soil ecology:** Transformation processes of organic substances in the mor that is not attached to the mineral soil (raw humus, rot, mull). Further processes in the humus influences A-horizon and underlying B-horizon of soils which consist of the processes of weathering of the underlying C-horizon of the first stones. Especially impressive is the showing of derangement in the soil, caused by man (*podzolization*\(^8\) and forming of *ortstein*\(^9\)) and have lead to the restriction of soil fertility. (footnotes)

**Tree ecology:** To the growth processes of the one year plants in the school garden are added the processes of substance forming of the permanent plants. Also the processes of the metabolism in the plants are being enlarged, because the carbons are put in the position of being preserved for centuries. (nucleating).

**Climate ecology:** The breathing processes in the trees as well as processes relevant to the climate (purification of the air and forests as sinker of carbon) form vast areas for learning for the following generation.

**Time ecology:** The pupils learn very practically to leave behind the own short time thinking and to embark into a thinking in long term spaces that usually is not an everyday thinking. They are put into a time stream which reaches far beyond their own life time.

In planting trees the pupil can experience in a vivid manner the connection of the above mentioned eco-systems and penetrate the cross connections. The capacity to handle these cross connections independently conceptually grows out of the competences of the ecologic teaching (*quality of thinking*).

In the personal turning to the small tree that was planted by one’s own hands and being defenceless one gets the feeling to have made an important contribution. The being attached

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\(^8\) *podzolization*: underneath the A-horizon shows a light grey bleached zone, produced by acids, that leads to a soil degradation, especially in pure coniferous forests.

\(^9\) *formation of ortstein*: between the B-horizon and the C-horizon a mixture of humus albumen forms itself that is impenetrable for plant roots and which is of black colour. It results from a strong dwindling of humus in the upper soil, which was caused by wrong methods of working the soil in earlier times.
to the living element of nature is an important basic feeling, in order to come to a personal felt responsibility for creation. (quality of feeling).

The pupils are able to learn through instruction and imitation a qualified planting of a tree. Out of the understanding and the feeling of responsibility grow the inner impulses, to fulfil oneself in being active. (quality of doing).

With these explanations the conclusion is given to the introductory question to what extent a sustainable thinking, feeling and doing can be laid into the pupils out of the feedback cycle of the forests. This reminds one of the theses of Aristotle, who differentiated several forms of knowledge: phronesis (sensitive acting), poiesis (purposeful doing) and episteme (dynamic understanding).
Epigramm

Science is analysis and dissection; it stays at the surface of its object. But love penetrates into the inner core of the object, experiences and animates it: it is your mission to animate the forests. Should not to this end the quality of love … be well befitting the man of the forest? The task of the forester is anyway also of creative nature and he, too, is an essential preparer of the future. Only with the heart do you penetrate into the secrets of the forest. It is the love for the woods that finally conveys you the vivid perception of its special life. (BIOLLEY in: RITTERSHOFER 1999, 4)

Illustration 4: Spruce, explanation of growing and form (ULRICH 1984, 109)
2. The planting of mixed forests rich of species and their edges (module 2)

The idea of deciduous forests is centuries old, but the forests which are planted by men are mostly mono cultures. The reasons for this, so say the owners of the forests, are calamities like storm, insects or fire or economical ones. Mostly there exists a cognitive knowledge about the advantages of a deciduous forest, but factors like an easier availability of a certain kind of tree or the indolence to get on the way to a consultation lead to the apparently economical way into the mono culture. A wide spread reason for a monoculture is an excessive high game stock, which hinders the kinds of deciduous trees to grow up. Also damages through rubbing from the antlers wearing animals of the forest are often deadly for rare wild fruit trees\textsuperscript{10}. Also the thought: \textit{all will be well} or the thought of the \textit{short money} the optimal interest yield of the staked capital is a not underestimated factor for the decision, to plant rather a mono culture of a quick growing kind of coniferous trees.

Paradoxically certain species of deciduous trees, e.g. Wild cherry (\textit{Prunus avium}) are quicker growing and are grown up to be harvested in a shorter time. The grade of self providing with the European cherry reaches for Europe about 15%; the biggest part has to be imported from other continents. Even with a consultation on the scene the proprietor of the forest decides rather seldom in favour of unknown and rare tree species. This knowledge of the species of trees should be better imparted in future.

The fact of planting trees with pupils offers the possibility to train and anchor a new kind of attitude for the next generation by planting a mixed forest. We work according to the motto: one has to dare the impossible, so that the possible succeeds!

2.1 Modular lesson: A working day with a school class

First an introductory excursion is offered, leading to a mixed forest. There the advantages and disadvantages of such a wood will be extensively talked about. Then in comparison to this another forest stand near by will be looked at, consisting of a monoculture of coniferous trees. Also there the advantages and disadvantages of such pure stands will be discussed and possibilities of transformation will be thought about. Even if it is not possible for the moment,

\textsuperscript{10} wild fruit trees: wild ancestors with small fruits of our species which are cultivated to have big fruits: \textit{sorbus aucuparia}, \textit{s. domestica}, \textit{s. torminalis}, \textit{prunus avium}, \textit{pyrrus communis}, \textit{malus sylvestris}. 
out of certain reasons to change this mono culture, it is important for the pupils to work out ideas of shaping together, which give the feeling to be able to act in future and not be bound to a decision once taken.

The second working step will be to inspect thoroughly the piece of woodland which will be replanted. The reasons, why in this case a measure of planting has become necessary and why not wait for the natural seeding of already existing old trees will be discussed: mostly it will be the case that there are no appropriate species of mixed trees available, which would provide seeds. Sometimes there is also a felled area, which was caused by a calamity (like storm, insects or fire) or by wood harvesting measures. It also can be the case that an older mono culture is so thinned out that an under plantation with a new wood generation has become necessary.

Then the young trees, bundled and put into the earth near the plantation will be looked at together with the pupils. It seems to be wise to speak extensively about the differences of the various trees, which are not always recognisable for the pupils; otherwise there will be the danger of confusions at the real planting.

At the next working step it will be spoken about the procedure of planting in which the young trees will be set. The easiest way to understand is the method of planting with a spade, because it is a method that will not deform the roots. Important is that the root does not get into contact with any loose humus otherwise there will be the danger of warming-up processes for if humus disintegrates warmth comes into existence which is harmful for the roots. The pupils are taught to rather put the plants a bit too deep that the sensible root collar will not be exposed to heat or sun which will dry them up. Are the roots still quite small the planting can also be done with a cross-blade hoe\textsuperscript{11}. It guaranties a quick progress in the work, but can only be used from the 9\textsuperscript{th} age group on it being a question of strength.

Then comes the great moment when the pupils get handled their buckets containing the young trees covered with a wet cloth and the planting starts with the help of an expert. Each pupil gets also yellow blank labels, on which their name or a good wish for their trees can be put down. In this way a personal relationship with the living being tree comes into being that will grow far further beyond the own life. Repeatedly it has been mentioned that before the real

\textsuperscript{11} the cross blade hoe: because it exists of two metal hooks opposite each other
planting the layer of humus at the planting place has to be removed, so that the roots do not get any contact with it (process of warming!)

2.2. Record book and evening lessons

First the natural forest communities which are present in a certain area, are talked about. This applies also to the various zones of altitude, because it is a great difference, if one is on a rough, sub-alpine zone of the picea abies, in the moderate zone of mountain mixed woodland or in a frost endangered hollow site, where the cold air can not flow off. It makes also a difference in the same site, if we have to do with a south- or north slope. Further on it is not irrelevant, if there exists a stagnant or flowing water or a periodical overflowing at a certain time of the year. (LEIBUNDGUT 1982, 16f)

Now follows a more intensive look at the trees which were planted at that day. The pupils learn a lot about the ecological consequences of the change of the tree species initiated by the tree planting. (illustration 5). They can learn about the consequences of the leaves falling in autumn and the positive effect on the development of the soil (formation of humus, activation of the soil organisms and natural fertilising). So they understand that every act has its consequences that can also have effects in a positive sense.

*illustration 5: layers of a forest eco system (AFL/VOLK 1987, 12)*
2.3. Possibilities for further deepening work

The edge of a forest which is built up in different levels is the visiting card of the owner of the forest. Therefore a second activity would be the planting of bushes at the boundary of the wood, which would be shaped. This zone of transition is normally very rich of species and offers itself very well for a plantation (see illustration 6a and 6b). By this a gradual transition from agricultural areas to the wood can be reached. As there is usually no agreement possible with the agricultural owner, small bulges could be created by felling trees, in which a new generation of bushes could be planted.

Illustration 6a/ 6b: number of species in different zones of an edge of the forest

(AFL/VOLK 1987, 34)

If there exists a school tree-nursery there could be also a plantation work done. This kind of work allows the one to two years old young trees, which stand still very tight in the seedbed, more place.. They now need more light and air to grow quickly up to 20 – 40 cm high in order to get out into the woods.

2.4 Background information for teachers and list of material

The planting of trees is an almost archetypal activity. Already in Genesis it is mentioned: And Godfather planted a garden in Eden . . .

Pupils have an extreme urge to move and are happy to do something meaningful with their long arms and legs. Also pupils of the classes 1 – 4 are able to go with their small toy shovels and plant trees in the forest. They only need help when there is strong layer of soil vegetation
(heather, berry bushes, grass). Important to have are buckets so that the small amounts of soil that are dug up do not disappear in the humus and no soil is left over for the root. They are especially pleased, when after work they can put their names at the freshly planted small tree. It would be wise to plant the border of a forest only with older pupils, because in this case it will seldom be planted on a soil free of vegetation. Just the mantle of the wood possesses with ecological variety a high pedagogical potential of education. In working breaks many cross relations can be shown (butterflies, wild bees, caterpillar flies, small mammals, culture of feeding leaves, cattle meadows, climate protection, wind streams, increase of dew precipitation, calms, etc.).

At the planting the first physically untrained pupils reach their strength limits. One should counteract this phenomenon with short breaks of approximately 10 minutes. It is enough to eat an apple or have a quick drink.

It is very interesting after having planted to make first exercises of visualisation. How will the tree look like in a ten years time? What will its height be? In which way will he branch or ramify? It is then a good example to have a look at trees of that age nearby. This trains the ability of imagination and the pupils get used to take into their horizon of experiences the factor time.

For older pupils this concrete visualisation can yet be continued towards a superior, world wide train of thoughts concerning the planting of trees:

The world wide loss of woods progresses to an incredible degree. On one hand it is the zones of the rainforests which out of poorness are being destroyed. Over ten thousand of various tree species are at home there; to say nothing about the many unexplored medically effective substances that represent a treasure still to be lifted by civilisation.

Highly endangered are also the taiga forests of the Northern hemisphere, which are being destroyed in flagrant ruinous exploitation. Here the danger is that because of the permanent frost zones, after the removal of the protecting warmth mantle of the trees a restocking of forests is not possible.
It is an idea of the European Union (EU), that the rich, further developed countries could on their own territories afforest certain areas to counteract the worldwide losses of woodland with their unexplored effects on the climate. Naturally this has to be discussed and agreed with especially sensible nature reserves.

Afforesting offers a unique opportunity independent of competitive companion trees to plant tree species expansively which are not competitive and therefore often rare. In this way there are opportunities to plant certain trees which are usually not existent, as a try-out and so to explore the suitability for planting in a field study. During my professional praxis some of such projects have been carried out, which are worth seeing.

A further worthwhile section is the CO₂ bond in the forest, which can assume considerable proportions and thereby become effective for the climate (see internet: Peter Burschel: cue CO²)

List of materials:
- spades, buckets, cross hoes, garden scissors (root cut).

2.5 Discussion of points of view of the science of experience

This method of exploration comes out of the Qualitative Social Research (ROSENTHAL, 2005) and has been developed further by Ton BAARS/Kassel for the agricultural sciences (BAARS/DEVRIJES 1999: BAARS 2002/ 2005/2007, 44f). It starts from the idea that the ways of perception in natural sciences and those of practical exploration unfold themselves in different degrees either in the foreground or in the background together or alternating. In this way greater phases of innovation become possible that offer an irreplaceable tool for the practical professional exercise. This method of exploration follows a process of six steps which is reflected on hand of the steps of coming about of module 2 as follows:

Starting element A: The knowledge that lies in acting

Through professional experience of many years and guided tours with school classes by the time an inner picture came about that the citizen of tomorrow is able to fashion already today his local forest, in which he gets at least once in contact with the planting of trees/brushes. This pedagogical new territory has been accepted by the pupils and teachers with great
enthusiasm. Perhaps, because by means of a label the own name could be attached, which was quite a challenge for the pupils of a first class. At the next weekend the freshly planted young trees were proudly presented to the parents: Look – I planted it – this is my tree/brush!

In contrast to natural science which occupies itself with the facts of theoretical cognition, the experimental science fights in an existential way for the practical facts, that make a thing work. This includes the often stony way plastered with many disappointments and errors until a narrow path is developed which leads then finally to the long wished for success.

POLANYI (1961, 428) speaks of tacit knowledge that is not gained philosophically, but happens through different courses until a passable, understandable and repeatable success has been acquired. The in the following chapter mentioned competence of acting leads to the experimental knowledge which is achieved by doing and acting. It is teachers and pupils who enter together a way of experience to bring new things into their homeland in order to shape the future and to embark into a qualitative process.

Follow-up element B: Reflection of action and perception of patterns
By the frontal teaching in the classroom theoretical knowledge is imparted which is also called second hand learning. The school researcher Peter STRUCK points to the fact that listening is not a good training method. 40% of the girls and only 10% of the boys are in the position of learning by listening. This leads subsequently to the actual facts that 72% of the boys do not reach the final exam of the extended elementary school and 95% of the boys in special schools for maladjusted and learning disabled. (STRUCK 2008, 2)

In contrast to this the experimental science is first hand learning. After a just practised activity the reflection follows which ponders over the exact conditions of success or failure. The author entered into an active learning process and developed the capacity of thoughtful penetration and of insight. Through the observation of the trees planted by the pupils the conditions of taking root or not shows up.

The pupil learns through trial and error, the apprentice through flexible imitation of the strategies of different masters. Only the master develops his individual, own creative methods that are his personal sign to be recognised by. The works of the famous gothic carver Tilman
Riemenschneider (1460 – 1537) mirror even after hundreds of years his unique mastery in portraying the human physiognomy.

The physician Helmut KIENE speaks of a positive causal knowledge that the master derives from the uniqueness of a pattern or a corresponding image. He controls his own measures, reflects them and comes to the certainty of cause and effect in the single case (KIENE 2001). Important types of patterns are herewith the pattern of space (e.g. a complex and unique plot in the forest) and the pattern of time, that make a recognition possible and so lead to a individually disposable causality.

**Follow-up element C: The building up of a living flowing form (gestalt) and the cognition of forms**

Goethe developed during his natural scientific exploratory activities in the world of plants the concept of the flowing form (gestalt). It means that at the observation of living systems a natural course of subsequent aspects appear, a so-to-say characteristic, but flowing form. In botanic one speaks of succession, if a different course of subsequent aspects appears. It can be of a seasonal repetitive nature (e.g. characteristic aspects of flowering in a meadow) or undergo different long lasting rhythms. They show themselves through patient observing and reflecting which not seldom carry fruit only after decades. These observations condense to assured knowledge on the realm the science of experience which functions like natural laws, only that they are not yet assured in a mathematical way. These significant facts can be checked and be passed on and lead sometimes in the process of passing on to the next experimental learner to experiences that will be talked of in step D.

The one who learns from professional experience in the forest finds himself in a constant change through the working of the seasons and tries to listen to the laws of the developing life of a young forest. With the years out of this a living cognition of the gestalt develops which is recognisable although there exist different forms and out of which an appropriate reaction springs forth. The master is in this case able to differentiate in the living always again the occurring exceptions from the regular processes. Exceptions confirm the meta-rules (higher range), to which all natural processes are subject to.
Follow-up element D: Formation of concepts through an Aha experience and brainwave

The philosopher Rudolf Steiner speaks about the concept as a gift out of another world and that afterwards suddenly an understanding of a thing exists; one should be able to wait for this intuition and be prepared for it (STEINER 1915, 152). Sometimes one searches for years for a solution of complex connections and without doing apparently anything, one grasps the essential of a new connection which was not accessible before. Sometimes it is a single word in a technical discussion which apparently has nothing to do with the subject and suddenly one sees something concrete and evident which is described as an aha-experience. The grasping of a concept in a flash the phenomenologist HUSSERL describes as *eidetic reduction*\(^\text{12}\).

In the found concept the essential is expressed.

An example at a guided tour with a Chinese forest delegation should tell such an Aha-experience: at the fare-well I got a visiting card (home address) from a Chinese forester. I was surprised and suddenly there was the certainty that the just presented edge of the forest with its differently broad mantle of brushes and the salient wild fruit trees really demonstrates the *visiting card* of this communal forest visible for everybody. Well-shaped forest edges containing a great variety of species and distinguishing themselves through a high biodiversity, are seldom to be found and therefore to be called exemplary. Therefore they can be considered as *visiting card* of a forest owner or a forester.

The before mentioned metaphor contains a conceptual fact of understanding. Sometimes it is also the instinct, the flair or a feeling, that lead further.

Especially pupils often tell quite openly about brain-waves. Concerning the planting trees, I remember a pupil, who didn’t put her little tree deep enough, so that a part of the sensible root neck looked out of the earth. Therefore I explained to her, how every year we had to gain the ability of our skin becoming bronze and it becoming darker and less sensitive with the climbing sun in springtime. But, if now the skin of the root which never had seen the sun is suddenly exposed to the sun that this could be its death. Then the pupil became radiant and said, that this would be the same as if a bookworm should get on in the forest. We both had to laugh heartily.

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\(^{12}\) *eidetic reduction*: means a reduction of experienced back to the essential. Thereby it is an essential rule of the thing and the world, that they can be contradicted – they do not exclude the possibility to doubt them.
Now we have to differentiate between two spheres, the one of the master and the one of the apprentice: the apprentice learns controlled from outside (under the eyes of the master, through his hints and the imitation of his actions).

The expert of experience learns as master through a net of cognition controlled from inside which is pointed at in the six steps of the range of processes.

**Follow-up element E: Adequate or not planned, right action**

The expert in experiences who got in contact with the essential new thought, acts now corresponding to his accumulated professional experience and puts his new acquired knowledge into action. In his book *Synchronizität* JAWORSKI writes that there is always a right moment for an adequate action that comes about that the expert sees through a situation that has not happened before and acts correspondingly in the right way and up-to-date. Meant is by this the fact, parallel to **element D**, that there exists a flash like, right acting, that only in reflecting rises as something rightly done. Instead of grasping the right concept (in thinking) the understanding of the situation by the master expresses itself in such a way that in a momentous action he has done the right thing. (JAWORSKI 1996, 213)

Out of this just mentioned example it followed, to direct the focus of perception more towards these visiting cards of the forests, their areas of the forest edges and to get active taking out old trees which can be missed, setting up Benjes hedges (see module 4) as well as the planting of shrubs. Not by chance, but by adequate acting the forest edges are shaped in future.

**Final element F: Systems that work and new things**

In forestry one often speaks of the iron law of locality and means by that the respective facts of nature localities which have to be absolutely considered. Every landscape has e.g. its own climatic extremes, which lead to the fact that a functioning system of usage is not applicable a few kilometres further without suffering wreckage. This sensible ability of adapting Niels RÖLING calls the soft side of knowledge (RÖLING 2000). These systems which are personally acquired, gains the one who knows his profession masterly and sees through laws. His system functions in the praxis, even if all rules are not always conceptually seen through and understood. Although it is a subjective perception his experimental knowledge can be passed on to colleagues and is therefore useful, although it is not proved by natural science.
An example: Through subtle observation it becomes obvious that the tree species of beech and oak tend to form raw humus and their foliage has an unfavourable C/N relation. So, in future more trees with easy rotting leaves should be planted (hornbeam, linden, ash and maple). An essentially better destruction of leaves can be observed, when fruit bearing trees are being used. The fall of leaves of prunus avium, pyrrus communis, malus sylvestris as well as of sorbus aucuparia, s. torminalis, s. aria, s. domestica, and castanea sativa is so quickly sucked into the earth by earthworms that with an active earth life (form of humus: mull) in spring there would be no autumn leaf left, also not from oak and beech. This amelioration of the form of humus by the participation of fruit trees can be considered as something new, that a forest ecosystem in the whole functions better. (FLUCKINGER 2000)
Epigramm

Nature can never spend itself;
In its depth there lives an infinite freshness.

(HOPKINS 1995, 7)

Illustration 7: New grange (Populus tremula) (WACHTER 2003, 23)
3. The observing wood tending in young forests 0 – 20 years (module 3)

(Or the other possibility: watching wood careing ???)

The idea of the mixed forest is already centuries old. Nevertheless the last federal stocktaking of woods stated for Germany an alarmingly high percentage on mono cultures of coniferous wood: 27% of the woodland (BMELF, 2002). The question is in which way these ecologically instable situations could be influenced in a positive way.

The green classroom of the forest could serve as an ideal place of learning for pupils and future adults – as exemplary place of study for the practical learning of the principle of sustained yield, to be sustainably active, of learning to think in connections at the living organism: wood.

The pupils work in the observing wood tending in the forest, the learning by doing and in this way are transferred from passive absorbing to an active creative element. A personal feeling that their capacity for work is needed and that with their help a transformation of the environment becomes possible. The active will of creation raises the pupils’ deep interest in their more and more connected world around them. So they learn to develop responsibility for the directly comprehensible doing.

So in the long term an active shaping of the own living space is encouraged and a concrete modelling of own life plans is pointed out. Especially the work with the living shows the necessity of a lifelong learning and being active, as with the well tending of natural systems there will never be an end.

Nursing a young forest which contains from seedlings to 3 m high trees can always only happen step by step, for otherwise the result would a too strong destabilisation, even the uncontrollable breakdown of a whole part of the forest.

3.1 Modular lesson: A working day with a school class

In the morning we start off with an excursion which introduces the theme and which leads to the prepared work places. On hand of a piece of young wood the forester shows the well tended exemplary areas of the forest which had been previously of the same kind. By discussing the differences the comparative perception of the pupils will be trained. An
untreated area, where nothing has been changed, is situated just near a part area that has been
tended to one-sidedly. All three areas are separated from each other with clearly visible
coloured ribbons, so that every pupil is able to differentiate them.

An example to make this clear: It could for once be made clear on a trial area that e.g. all the
broad leaved trees would be taken out, so that only coniferous trees are left over. In the
contrary a second neighbouring area would be tended in such a way that the coniferous and
deciduous trees would be growing alongside each other. Just besides is situated a third
unattended stand.

Then the advantages and disadvantages of every single version would be systematically
discussed and worked out. The dangers of the coniferous monocultures, which by mistake are
called economic forests, are talked about. The final result would be the insight that nature
works the most effectively, when the possible increase of wood develops in the secure system
of a mixed forest.

The second step exists in getting to know a safe knowledge of the tree species. It is impossible
to care for a young forest without having a notion of the different kind of trees. For this at
least one lesson is needed as well as a small note book in which the pupils can put the
respectively gathered pins and leaves. These will be dried and pressed overnight in order to
arrange a small tree herbarium. The dry leaf will be stuck in and be marked. A copy of the
winter shape of the tree completes the short characterisation in to a small tree book. Besides
there comes about a souvenir to remember the forest practical. Decisive is the fact to find the
rare tree species for which a little walk around is needed to make in order to point them out.
Later on they will be freed from too frequent neighbouring trees. So they get the opportunity
to be also still present in a future forest. In this way one is able to engender in the course of
several tending interventions with a relatively small number of rare tree species to get to a real
mixed forest.

The third step consists of repetitive visits of the above mentioned comparative tending areas.
This time the sight is drawn towards the spacious allocations of the young trees and the need
of space of the various tree species is talked about. A spruce needs more distance to the next
tree as a pine tree and a deciduous tree needs even more space to its neighbour. The most
distance need the birches and the larches and therefore the different needs of space of the trees have to be considered.

In a fourth working step the bow saws are distributed and in groups of two off to work! But before that the safe handling of sharp tools is talked about as well as the respectively practical posture at work. The aim is to establish a possibly mixed young forest that, besides an assumed economical potential, also possesses a high ecological and aesthetic value.

Every group has got garden scissors with which to cut off the often existing concurring second crown shoot (in forest terms: twin stem). This work can also be done at four meters high trees by bending them carefully down. By this a considerable increase in value can be reached as well as a respective high number of qualitative high class timber (in forest language: elite trees).

After this extensive introduction the teacher forms groups of two and work starts. At least one, better two instructors are at disposal to answer the pupils’ questions. It goes without mentioning that the function of example of the attendants exists in the fact that they themselves join the work!

A special case are still or flowing waters. In this case it is useful to aim for a stand of lowland forest. Respective tree species will be consequently tended to, even if they do not promise *phenotypically* special qualities. Moist forests are rare and therefore especially worth fostering. Especially the bacterial und fungal microbe life, that develops in the moisture binds otherwise infectious germs at these zones and leads to a healing of agricultural fields. (STEINER 1999, 190). Also here the respective additional planting of rare lowland trees species as alder, hornbeam, ash, water cherry, elm (*Alnus glutinosa, Carpinus betulus, Fraxinus excelsior, Prunus padus, Ulmus div.*) are applied landscape tending.

It should also be assured during this cultivation of this young forest – module that the basic capital of a forest always lies in its soil condition. The actually in Europe predominant method of wood felling by means of a harvester entails often lasting damages for decades at the basic capital: the soil. Erosion and the wash-out of the soil are often approved of. Old logging roads always ran along slopes with a slight gradient and therefore the wood logging was connected with less damages. At a final excursion in the afternoon these things can be made clear.
3.2 Evening lessons and record book

Every wood growing happens according to natural laws. These orders are called successions and are the same in wide areas of the Northern moderate latitudes. (see ill. 8)

*The biography in a natural forest*

**Non wood area**

Wood will grow if there no factors which hinder it, naturally through a range of stages the most important are:

A touch of aggressive species of light demanding trees with pioneering character

**Beginning of wood stage**

+ uniform, little mixed

Rise of more demanding shade trees

**Passing stage**

mixed (two or multigrade)

Early form: **light trees**

Late forms: **light- and shade trees**

Light trees disappear

**Degree of density forest**

of shade trees with the tendency to uniformity, in the degree of density stage one differentiates the following phases:

**Optimum phase**

stable structure, little transplanting, +(-) uniform

growing liability organic and inorganic damages

**Phase of ageing**

loosened stand composition

slow desintegration of old stands with beginning regeneration, in troupes and groups

quick, +(-) complete breakdown on large areas by wind, fire, insects, etc

**Phase of culling**

leftovers of old stock and mixed regeneration of shade trees beside each other very unequal

**Phase of disinteration**

leads to coming about of +(-) marked bare areas

*Illustration 8: Successions in a natural forest (HAHN from: ALF/VOLK 1987, 15)*
3.3. Possibilities for further deepening work

Now the question arises what to do with these many natural materials which result out of the work with bow saws and scissors? Here are some examples:

Out of the fine birch brushwood relatively simple abrasive firm brooms could be made which will train skills and a memory of old cultural craft techniques. A possible bad weather job could also be the producing of wild wood furniture (BRIDGEWATER 2002, 8f; MACK 1992, 97f). Each pupil saws the trunks into pieces approximately as they are needed. The material is then made into bundles and provided with a name tag in order to be transported. With the help of a wood drill, screws and screw drivers a small designer furniture comes into existence of a highly aesthetic message. Each part of a chair could be individually formed by leaving small twigs or branches so that each pupil can produce a piece of furniture with a personal touch.

![Illustration 9: My own chair](image)

If there exists an agricultural business with life stock a further welfare effect of the trees can be used: the getting of fodder foliage. The leaves of certain deciduous trees (willow/ash/mountain ash (Salix div./ Fraxinus excelsior/ Sorbus aucuparia)) are fed as high quality mineral fodder and thereby serve the animal health. (MACHATSCHECK 2002, 5f).

The aforementioned natural pedagogical activities could also be put into regionally and supra regionally culture historical connections and be used for the purpose of public relations. They also serve to maintain old cultural techniques and do no get lost on their way through the generations.
A special case are the gaps in the forest, where no natural seeding has taken place. These gaps could be used for planting rare, on the respective forest area not present species or wild fruit trees. In this way especially margins at roads or pasturages could be upgraded for ecological and landscape-aesthetic interests.

### 3.4 Extended teacher knowledge and list of materials

A special case represent the sometimes usual clean cuttings and their negative consequences:

On these felled areas one can observe a massive natural seeding of birch, asp and willow (the so called light trees). On such an area one has to interfere otherwise these light trees are growing too strongly.

But it is irresponsible to fight the birch trees like an illness and to fell them until finally there exists only a pure stand of coniferous trees which is neither ecologically not economically meaningful. This ancient principle of tending runs counter to the modern process orientated methods of forestry.

A clear cut caused by a human wood harvest is the imitation of natural catastrophes as storms, gradations of insects or fire. The wood organism reacts at such over knocking happenings with the seeding of the fast pioneering trees. The wood protects the sensible soil possibly widespread against erosion and extreme climate temperatures.

Birch, asp and willow (*Betula pendaula, Pupulus tremula, Salix div.*) could be called light sense organs of our soil organism and is therefore entrusted in our *observing wood tending*.

With help of the plant kingdom the earth turns to the manifold influences of the cosmos and with help of the trees it stretches itself towards these powers as far as possible. In this context one can understand Rudolf Steiner’s remark when he speaks of the tree bark as the chapped-on earth (STEINER 1999, 180). So, if we tend to the bark of our trees (take off mosses and lichens) we do not only turn to the individuals but to the earth organism as a whole.

How does one deal with the plenty existing bare areas in the way not to get pure birch forests?
First of all we need a spiritual change of mind that is prepared to go the way from confrontation to co-operation. We have to take these species of light trees as a kind of a first work forest that the earth organism needs in order to prepare the way to the forest of the future through it. In the climatic protection of these light trees our more frost sensible species of mixed trees (e.g. red beech, hornbeam, ash, cherry tree, oak elm, maple, linden tree) grow much better and they get above all a more favourable form and quality.

How then go the way from a clear cut(bare) area forest to a mixed forest?

The question is to convey to the pupils the capacity of sensing the space on that forest area. We look together for areas where young trees grow and where especially many kinds of mixed trees grow (aforementioned species of mixed stands) as well as mountain ashes, pines, spruces, and larch trees. There the birches, asps and willows are sawn off on a diameter of 5 - 15 meters in order that these mixed trees get in future enough air and light. According to the principle of a check board these thin birch bare areas are now selectively thinned out and run through with groups of divers species of mixed trees. In this way an irregular leopard pattern comes about as birth place of a mixed forest, created through the pupils’ hard work of their hands, who by this learn to look to the future. With the help of visualising exercises (marking with ribbons) the further stage of the forest development for the following decades will be explained to the pupils.

Decisive is of course the regular repetition of such tending interventions. They should be repeated at the latest every 5 – 7 years, otherwise the fast growing species persevere and the results are mono cultures.

Information about wood tending of young forests (MAYER 1980, 186f; RITTERSHOFER 1999, 102f)

**List of materials**

- arrangements with the local forest owners for the consideration of the planned priorities of tending;
• choice of appropriate areas of young wood by versed instructors (forester/ wood guard/ teacher/ instructed parents;
• preparation of respectively appropriate exemplary areas;
• gloves, dressing material for light cuts, camera for snapshots;
• bow saws, garden scissors; small record book and pen;

In the beginning it is talked about the safe handling of sharp tools and pointed at a practical body caring work posture (e.g. hold back straight; lift with knees bent; saw in a kneeling position, etc.)

3.5 Discussion under the point view of the main questions

The main question is to what extent out of the regular cycles of nature a sustainable thinking, feeling and acting can be laid out in the pupils. Out of my experience so far one has especially to pay attention that with the pupils first the faculty of observing has to be assessed. Only after a patient learning of a sufficient intensity of observation divers facts can be detected in nature and by this the path for a life long learning can be opened for the pupil. Only then can he transfer what he learned on to other fields of life. The regular cycles of the forest are therefore so exemplary, because the cycles of substances are so exactly tuned upon each other, so that no waste products exist. These processes can be worked out with the pupils in the thinking-, feeling-, and action orientated educational work in an imaginative way and then be transferred to other areas of application. An example: In the industrial society the question of waste is only partly solved and there exist hardly any cycles of substance. To demonstrate this emotionally perhaps a visit to a rubbish tip/ incinerating plant could be envisaged. In the personal confrontation the pupil is immediately in contact with his personal feeling level which reaches much deeper layers of our being human. Out of the combination of thinking and feeling impulses for action come about that from my experience can lead to a marked joy of working with a respective imparting.

The first ramification of the just treated main question is the tender furthering of observing and thinking processes which should develop into a sufficiently grounded capacity of judging. The pupil, who finds himself first in the phase of imitation, in order to see himself later as the centre of all being, is by this lead out of his egocentric way of view and is confronted with the outcome of his acting. This is also the main point of learning, observing work attitude which
should be conveyed through this module of tending the young forest (observing, thinking process, forming a judgement and reflecting actions). After working steps of a multistage training in observing of nature events he becomes himself active and shapes a part of nature. Out of the reflected acting develops in the course of the master work the *observing forest tending* which is the result of a process learning on the part of the pupils that had been guided in a way of the science of experience. The own created expression of: *observing wood tending* is a term not used up to now among experts, which defines these processes of learning in the tending of the forest. Out of this a deep satisfaction of a meaningful, individual work attitude can result which I gathered from my observation up to now at the action orientated ecological educational work with pupils and which leads over to the emotional level of experience.

Now follows the second ramification of questions which aim at the feeling level and asks, how the action orientated, ecological educational work should be built up so that a meaningful completion of the intellectual gain of knowledge can happen. The pupil can experience himself as an important actor and show a visible result of fashioning. The pupils feel the normative strength of work and the deep satisfaction which springs forth from the fact to finally be taken serious and to develop oneself into an equal partner. From my own experience pupils get simply enthusiastic, when they are allowed to do something meaningful and prove their energy. This again leads to the central concern of this masterwork that priority into its action orientated ecological educational work.

With that we reach the third question that is concerned with the action out of responsibility. Every action in the forest contains long time spaces of effects of once done or missed action. An example: too dense and not cared for young forests hinder each other in growing and lose their variety of species. In contrast to that a tending intervention in the right moment leads to an optimal furthering of the forest organism. But also the other extreme can be damageable: monocultures are always the result of a one-sided, intensive forest tending impulses that have happened in favour of supposedly more economic tree species, e.g. Spruce (*Picea albies*) or Pine (*Pinus sylvistris*).

An optimal furthering of the total ecological complex of a forest organism is achieved when a balanced mixture between an indispensably important, ecological far reaching, long term reflection as well as a single internal, still to be fixed, totally economic aim is developed. In
times of change of climate, it is indispensable to carry out risk scattering and to aim for a climate-tolerant mixed stands in which single tree species could totally fall away, without seriously endanger the mixed forest as a whole.

In the above mentioned questions we move constantly between the processes of exact observing, of thinking, of judging out of rich knowledge, of sensible experiencing and combining and of responsible acting. All this educates the pupil to a reflecting process of change that was transferred by the creator of the concept of learning responsibility Kurt Hahn after the disastrous World War II into his successful reform pedagogic (Hahn 1958). The therewith combined trains of thoughts shall be considered further in the chapter of discussion in module 8.

The action orientated, ecological, educational work can lead to new possibilities of development and learning concerning the fields of sustainability and responsibility. It remains to explore to what extent a transfer of above mentioned practical learning processes into personal everyday life of the pupils takes place. For that a greater need of research exists that could be investigated further with the possibilities of questionnaires respect. interviews. A first answer to this is given in the discussion to module 5 as far as it could be gathered from the available literature. The aim is to motivate the pupil to a life long, active and reflected process of learning which belongs to the tools in a changing society.
Epigramm:

With increasing knowledge
The animals will be nearer to men.

When they are then already so near
Like in the oldest myths
There will be hardly animals anymore.

CANETTI (ANL 1995, 70)

Illustration 10: Study of a fox, work by a pupil, anonymous 1999
4. The animals of the forest (module 4)

Some years ago in the Bavarian capital Munich a public opinion poll has been done in a pedestrian precinct with the question for the citizens which local flora and fauna they would know. They were asked to name five of each kind. Over two thirds of the people were not able to answer this question. At a further inquiry they could name a great number of animal and plant species which are growing in foreign countries. Wide spread Interviews with pupils we could find in a new nature-report of 2006 (BRÄMER 2006, 9f).

This shows essential facts of modern humanity: Apparently there is only little contact to the domestic flora and fauna, whereas through television and tourism a rather cosmopolitan knowledge is acquired, but which offers only a marginal permanent emotional contact zone.

With this module it should be corresponded to the plentiful existing need too follow the strong yearning to get to know the sensing animal soul. It follows a turning to the unknown wild creature towards which a strong emotional contact should be built up. Modern researches in environmental psychology show that it is not correct, to lead back later environmental acting to what one learnt as knowledge of nature. It is the task of the environmental education to enable the pupils’ own becoming and to offer him on the way of environmental education an interesting field of experimenting. (WEHNER 2007, 13).

4.1 Modular lesson: A working day with a school class

The day starts with an excursion into the wood, at which it is looked for as many a life signs of animals as possible (final excursion inclusive: calls of the owl!) This excursion should be lead by someone who knows the place so that a greatest fullness of animal species can be presented. The following examples are possible:

To show an anthill, at which the different kinds of life forms of ants that live in colonies could be talked about. *Formica polyctina* permanently found new colonies, whereas *formica rufa* lives more rapacious and lives in single nests. The strongly rapacious mode of nutrition should be mentioned and the existing rather vegetarian production of honey dew, which is
produced through the caring of the tree specific ‘lachnides’\textsuperscript{13}. It does not mean to lighten up the whole biology of a species, but show ‘Aha-effects’ (honey) and to explain not such known biological facts.

Viewing of an old tree with several woodpecker holes and which is possibly infested with fungus (fomes fomentarius). Also trees, that are only 20 cm thick (populus tremula, tilia div.) often show several holes one above the other (hint at artificial nesting holes). The instructions will start with explaining about the kinds of woodpecker that make holes and about singing birds (Passeriformes) as well as wild pigeons (columbidae) and species of owls (strigidae) which participate of this social house building. Finally it will be pointed out that also wasps (polistinae) and hornet swarms (vespa div.) will lodge in such holes as well as swarming honey bees (apis melifica) will move into natural holes. In the contrary they will hibernate in the so called winter cluster whereas with the wasps and hornets only the queen survives.

Next one will talk about animals that live in puddles or in a forest pool. There exists the earth toad (Bufo bufo) that lives most of the year in the wood and when spring is near it moves for mating and spawning to a small water. For the earth frog (Bombina variegata) with the yellow belly even a puddle is convenient for the raising of its young ones. Also the metamorphosis of the dragonfly (aeschna cyanea) should be talked about as it first in its development needs a rapacious existence in the water, whereas later she lives as an imago in the air. It is also an impressive aim for an excursion to visit species of wild ducks (anas div.) which often breed in the forest soil in well camouflaged nests - one can also go and see a nest of last year. The species of birds that live in the reeds should be addressed, too.

It there is running water nearby it should also be included. In this context one should refer to the respective specific species of fish. Also the most rare species of crabs as well as the river pearl mussel with its interesting biology is worth mentioning. This is also the occasion to talk of the consequences of the general acidification of soil and waters for the animals that depend on it and of the counter measures as calcification (have small laminated posters in the rucksack). In case there is a clearing in the forest the species of mammals that graze on it

\textsuperscript{13} lachnides: respective tree specific bark lice, which tap the saps of the ‘inner fibrous bark’ from the one year shoots and excrete them again. Ant and bees ‘harvest’ these excrements as honey dew. They contain many healthy secondary plant substances (antibiotics, minerals, phytohormons, vitamins)
should be talked about. This theme should not be missed with regard to module 8, as some
species of animals tend to over production and therefore the theme of hunting has to be an
integrated part of every forest instructions. First the view has to be focussed on the two main
differences of nutrition: the vegetarian mammals and the one that live on them: the
carnivores. But it is not easy to show these mammals to the pupils. The easiest way is on
hand of their tracks, which can be found on moist soil (puddles!) or in the snow. A further
possibility would be the excrements of these mammals which one would certainly find
somewhere on the way the excursion takes. Another possibility are the traces and places of
browsing, which one can show everywhere in the forest vegetation up to 2 meters high.

Also a plucking (of a bird), met accidentally on the way should be used as an occasion to say
some words about birds of prey. A plucking is a place where there are feathers spread about,
that belonged to a bird that has been hunted and eaten by a bird of prey. At this occasion one
can point at the old form of hawking which is still practised today.

Around midday a bee shed – if nearby – should be visited. The time at midday offers the
advantage that one can open the beehive without disturbing the bees too much. In this way the
incredible inner order of the be colony is presented to the wondering eyes. For especially
fearful pupils one should have handy some protective hoods which the teacher has with him in
his rucksack. The different inhabitants (working bees, drones, the queen, wax moths, bee
wolf) will be discussed as well as the different substances (beeswax, resin, honey) and the
inner outfit of the bee house. Very impressive is also to bring a loaf of bread with a knife and
a glass of honey that the present beekeeper brings with him and that is eaten together.
(eventually tasting of various kind of honey). A common meal together is an archetypal event
out of the human culture of the hunters and gathers and strengthens the experience of
community and the feeling of togetherness. Finally the therapeutic possibilities of the so
called arbitherapy (STANGACIU 2004, 13f) is mentioned which exists of various bee
products used for treatment of different illnesses (bee poison, gelé royale, pollen propolis
and wax). Also the swarming of a bee colony which demonstrates its natural regeneration and
propagation should be brought to the pupils through a vivid description by the teacher. And if
at the same time one can hear the rushing of a swarm in the air then this belongs to the
archetypal experiences which one would wish every pupil.

14 carnivores: beast of prey like mammals (e.g. bear, fox, lynx, wolf)
To conclude one can look at the well developed wood biotope that has got at least partly a well developed hedge. Here then one can have a look at a bird’s nest in a bush (which if necessary has been put there in advance). Also a nest of a singing bird that breeds on the earth will be shown if possible. This will be put at the end, because afterwards a working task will be to build an artificial hedge. During the building of the hedge one will talk about – in a break – about the total metamorphosis of the butterflies as they are living mostly at the edge of the forests.

To my experience the most intensively one can talk about animals if it is linked to measures of arranging a biotope. Every deed will not be forgotten (e.g. the laying out of a wetland habitat, butterfly meadow).

The two ecologists from the Netherlands Heinrich and Hermann Benjes have brought a very effective idea into the world, in that they have developed a new method of setting up hedges. It has been practised for many years and it is extremely popular with the pupils. This principle of benjes hedges can be applied on a field, at a forest edge or as well in the midst of the forest. The method is very simple and exists in putting up layers of branches and tree trunks and so build up a kind of wall like building. These isle biotopes have the effect of circulation corridors and pedestrian zones for diapeds, quadrupeds, hexapeds and octopeds as well as our feathered friends, the birds. Important is that the adults, who accompany the group also join in with the work so that a good working atmosphere exists. When a few meters long piece of hedge, 1 m broad and 2m high has been put up (see illustration 11a), one can think about together with the pupils, which species of animals could find refuge in it.

After that one explains the central idea of the Benjes principle (BENJES 1994, 5f): the birds that breed in the hedge excrete while raising their young ones seeds of bushes and so out of these seeds grows in the course of years a hedge which is rich of different species (Ill.: 11b).
At the end of this working unit the pupils are handed a copy showing the activity zones of wild animals (ill. 28) that live in such a hedge:
4.2 Evening lessons and record book

These lessons will be dedicated to the question that is seldom taken notice of:

How can we imagine the sight of animals and what is the difference between our human sense of sight.

With this a field of knowledge is addressed that with the help of slides and the latest results of research work could be presented in a relatively interesting way and fit into our actual visual time.

With this we reach a phenomenon that human perception is not as much objective but that it relates to specific interests. This entails that e.g. a huntsman is more occupied with the loving care of the free living wild animals, whereas on the same area the forester who is as well qualified in hunting matters observes the excessive damages on tree seedlings of the forest vegetation and therefore has a more extensive sight of things.

In the other hand wild animals have developed in the course of evolution their specific abilities of observation which they need to survive in the wilderness:

- With birds it is proved that they possess a perception for ultra violet light that surpasses the human one: the peel of ripe sloes (*Prunus spinosa*) reflect the UV-light so strongly that they nearly appear as bright as the blossoms in spring. This facilitates the discovering of the food of the singing birds (*Passeriformes*). Birds of prey detect a good mice (*muridiae*) population at the UV-adsorption of mice excrements and urine.

- Mammals that feed on plants do not experience the world as colourful as we human beings do. Especially the colour spectrum of yellow-orange and red is not visible for them. They have only two types of eye- uvulas which causes a colour perception between blue-green and yellow. Human beings have three of those types of eye uvulas and possess the entire rainbow spectrum. The result is that wild animals can not differentiate between green and red.

- Birds of prey (*acciprididae, falconidare*) do dispose of a six times better eye sight than ours. A higher density of optic nerves as well as a build-in telephoto lens in the eye gives them the possibility to view in the middle of their field of vision even a mouse from 500 m high.
- Birds of prey perceive up to 150 pictures per second, whereas we from 30 per sec onwards do not see accurately anymore. But they are able at a 300 km/sec flight to fix with their eyes a swallow (*hirundinidae*) that flies also very fast and hunt it.

- A singing bird on the contrary is specialised to recognise also slow advancing martens (*mustelidae*) or cats in time. They are able to recognise movements of only 15 angle grades/h.

- Carnivores and human beings have equally disposed and adjusted fields of vision to look ahead and with a large two-eyed field of vision they can very well estimate distances and by this fulfil a central predisposition for effective hunting.

- In contrast to them the plant eaters have their eyes strongly set sideward and therefore they can also see carnivores that sneak at an angle from behind. The hare (*lepus capensis*) or the snipe (*scocopacidae*) even see in a 360 degrees panorama without moving their head.

- In the morning and evening hours of dawn animals see much better then men. As most of the plant eaters and carnivores are active during night, the background of the eye reflects the remaining light like a phosphorescent glow-worm. Through the reflecting tapedum lucidum faint light is amplified which is made perfect through big pupils and a high part of rod cells. In hunter’s jargon these eyes of wild animals are also called *lights*.

As second part of the lessons it should be talked about the world wide loss of the variety of species and as a historic impulse the person of Francis of Assisi should be mentioned who can be called one of the ancient protectors of nature and species.

After the lessons there should be still offered a night excursion for interested pupils. Out of experience it is very impressive to listen in the dark to the eerie sounding calls of owls (*strigidae*), roes (*capreolus capreolus*) and other wild animals. Also warning sounds of birds are surprising and it is very informative for the pupils to get used to the dark with the time. Pupils are often quite astonished how well the human eyes get used to the dark and how much one can still see. After a while one even gets the feeling that it has become a little lighter, indeed. But these perceptions are only be able to reach without the use of torches, which should be better left at home.
4.3 Possibilities for further deepening work

A further possibility to continue the theme about animal is the finding and marking of hole trees\textsuperscript{15} and trees with eyries\textsuperscript{16}.

At this activity one can divide the pupils in groups of two and appoint them parts of the forest, well marked off from each other. As marking sign could serve the red/white blocking-off ribbons made of plastic used at road works. They keep for some years and facilitate the finding of the marked trees and also protect the trees from being felled by mistake. For further working tasks the pupils get folding rules (callipers) in order to measure roughly the diameter in breast height and write it down. Out of that a measure protocol can be drawn up that shows the special local needs of the species of birds breeding in holes. Respective dates of the discovered eyrie trees of birds of prey will be set up. This work serves besides the sharpening of the sense of observing also the training of orientation in the country and improves the ability of imagination of space and thinking.

If there is appropriate space available or a teacher has well worked in advance then there could also be build artificial nesting holes out of wood. A richness of forms allows very individual solutions. Also with the colouring of the bird houses further individual ideas can be realised. It is necessary to provide appropriate material for the fixation so that this project can come to an end and the bird hole is also really fixed in the wood (WALDEN) 2001, 49f).

A further possibility could be the manufacturing of a feeding place for wild living animals. They are of less ecological necessity than rather give the possibility to watch the wild animals at their feeding. In a simple case bird feed boxes would be possible.

\textsuperscript{15} trees with holes: trees with subtenants that live in tree holes made by woodpeckers.

\textsuperscript{16} trees with eyries: trees with uppertenants have their nest in branch forks in the crown area.
Perhaps there would also be the possibility to build a wooden bee house in cooperation with the local beekeeper. The oldest beehives were found in holes of standing tree trunks which was a centuries old cultural technique. One can excavate short pieces of tree trunks of one or two meter length with chisels which finally would be a little jacked up and be covered with boards (see illustration 13). Information on this special field in (HINTERMEIER 1994, 33f/ WALDEN 2001, 86f).

Illustration 13: A log bee house (WALDEN 1991, 90)

In some places it is possible to get insight into a local research project for the rebreeding of rare wild animals. This is also interesting because some of these animals can be observed in a back-to-nature preserve which extremely popular with the pupils.

It would also be an idea to observe especially frequent butterflies in their phases of evolution, their metamorphosis. This would need a small cage for breeding butterflies or a former aquarium that is closed on top with gaze and an elastic. But one has to define exactly the caterpillars and have the necessary weeds for feeding at hand nearby, so that an emergency pupation will not happen and an infertile poor exemplary of a butterfly will hatch (further see also module 11, element of air; afternoon part).

4.4 Extended teacher knowledge

The animals of the forest are as a theme of exemplary importance, because they offer an emotionally attractive entry into a connecting thinking. There is the overflow of the green nature and a potential of the most various animals that live of it – a brilliant possibility to come to a system thinking. This is also the central thought of an ecological basic view, the idea of an interdependence of living creatures that thereby can be imparted to the pupils.
The practice with life traces of wild animals (trails, feeding places, excrement etc.) trains the ability of observation and wakes up for the unknown creature in the wild. The hint at Francis of Assisi is necessary so that thereby the strong emotional connection to the animal soul gets a supra personal guiding figure who on the one hand has a strong aspect of the past, but on the other points positively to the future.

A further subject is the confrontation with the theme of human perception and the objectivity linked to it that collides very strongly with the respective spheres of interest. If one throws light on the theme from the point of view of the animal physiology a certain distance to the acquisition of conditions for one’s finding of objectivity is conveyed. Concerning our human perception the phenomenon is interesting that certain species of animals only appear at a certain season (e.g. the wandering of toads in March). Rarely anybody thinks about the fact, where this kind of animal passes the other eleven months of the year, according to the motto: *Out of sight – out of mind!*

To the theme of perception belongs also the ability of orientation which more and more gets lost through that the generation of growing up children and pupils far from nature. One can already partly observe panic attacks when – at a school excursion solid ways are left. An exaggerated fear of illnesses has spread and represents a further hindrance that man learns to occupy himself with his necessary foundations of existence. To learn this orientation in the country is important because the complex interplay of the results of observation and the feeling for space help the pupil to get to know the country. The marking of holes and eyries trees is therefore a possibility to link a whole lot of observations on a limited part of nature in a meaningful way.

Important is also the example set by the adults which accompany the pupils. If the adult is joyfully present at the building of a Benjes hedge the pupils will willingly cooperate. But if the teachers are talking to each other und are concerned about their clothes, then a right atmosphere will not come up and the spark of enthusiasm will not flash over. In this way teamwork can not be trained or is even be hindered by an unmotivated attendant.

Literature for the teacher’s further instruction concerning the themes of animals can be found in: BOTTERBLOM 1997/ BUCH 1986)

**List of materials**

- Note-book, pen, bag for gathering natural materials, gloves
- Materials to build nesting aids and feeding equipments

**4.5 Discussion about points of view of curative education/special pedagogic**

After the life of the handicapped people had to undergo in the 1970s an often painful process of adaptation in the *normal world of economic life* there happened in the meantime a change of paradigms (EBERWEIN 1996,468); which ended in the 1990s and about which a doctor active on the field of curative education, writes:

*The present diagnostic praxis has an obvious trend towards defectology, in order to detect images of symptoms becoming more and more differentiated and their classification. In contrast to that, one misses generally to include into the judgement and the observation of the child with a handicap that what is positive that these children carry into our social situation. The curative teacher recognises soul activities amongst the handicapped children, that can be of high value for our society and some of which are fading away in our civilisation. We think of the measure of sympathy and thankfulness, human interest, will of learning and free work impulses among these people that we experience of being exemplary* (MÜLLER-WIEDEMANN 1994, 54).

This here described change of perspective shows a whole range of human emotions, if the path from the defectology until to a contemplation of abilities is walked. Also BENKMANN (2001, 90) postulates the now finally reached subject reference and partnership vis-à-vis the former patient and object reference that was an every-day habit in curative education.

A fruitful pedagogical co-operation functions especially when we meet each other as human beings with the same rights. In the meeting from individual to individual changes of learning
and healing are hidden; for the handicapped person as well as for the ones who look after them. In unbiased co-operation with handicapped people there lies a great potential for the own self-development. These treasures are waiting to be found and to work with them.

Karl KÖNIG, the founder of the Camphill Movement used the expression of reversed integration to indicate that our society needs to perceive the tasks and achievements of the handicapped for our further development and to transform them (KÖNIG 2000).

A newer concept builds on the perspective of power (empowerment; THEUNISSEN 2002) and means by this the regenerative pool of forces that grows out of a co-operation of cared-for people, their relatives and experts. JACOB/PALMOWSKY (20012, 450) describe the special pedagogic as a dialog of experts, in which as fourth group of persons still observant scientists join.

If now a path to a practical co-operation is trod one should pay attention to sufficient possibilities of development that leads to a self-consciousness and to an as independent felt human dignity. The centre piece of this action orientated ecological education work in the here focussed area is the concrete practical employment in the working world of the forest. So it is therefore possible to come to a richly faceted and experience-intensive discourse also in this sector with the handicapped. In order to be able to give individual support at theses border-crossing activities, it is favourable to dispose of the basic knowledge of curative education and to ensure a sufficient personal staff.

Through my co-operation with handicapped growing-up children I was able to learn in long years of experience which action orientated educational impulses are possible in the forest with handicapped pupils. Handicapped persons long to be as useful as all other people and want to give their courageous contribution to the life in community. But this communal acting needs people, who further these impulses to a development towards independence and self-determination.

*It is very important to carefully fashion the transfer from school-time to the life as an adult. Just into this time falls the confrontation with the own handicap and the wrestling with a certain ability of judgement vis-à-vis life. The understanding, slow taking towards the*
experience of work is of great help. But work understood not so much as means of earning one’s own money, but looking at the needs of others. (ARNIM 2000).

This can lead the view of the carer to all growing and unfolding processes, how nature offers them plentiful. A forest practical is for pupils and teacher an intensive course in perceptive activities.

The learning module the animals in the forest works with the movement related learning impulses, that can complete meaningfully the more cognitive style of the everyday school. The important is the plunging into the sphere of the living of the animal kingdom, that the pupils usually only experience when they are allowed to live at home with animals. It is e.g. a good start in the forest if the pupils as an entry are allowed to tell about their pet at home. Then it can in a clever way be mentioned, what a great responsibility is connected with the fact to care for a pet. Mostly it comes up that adults always again look that these animals get a good treatment (water, food, movement). But just in the emotional sympathy towards the animal the children surpass us adults and can become our teachers.

The wild animals in the forest ask for a quite different way to get in contact with them. The accents should contain the education for a sustainable development as suggested by the United Nations. At the environment summit in Rio 1992 the convention of biodiversity was drawn up. Beside the sustainable usage or the genetic diversity of different eco-systems and the multitude of their species the advantages which grow out of them be rightly distributed.

An essential train of thought with this is the approach for participation which says that the concepts of development that are ordered from above should be replaced by a participation of the most different social groupings. This means also the integration of handicapped people, who want to also contribute essential things to a meaningful, action orientated shaping of their environment.

Sustainable acting is only possible with true, inner engagement, as the boundaries of growth have been transcended and a culture of renunciation should be developed. To renounce means in this case that wild animals should not be disturbed, because to be able to see them in the wild. This entails that the living conditions of the wild animals should not get worse through our visit, but that they are even ameliorated.
So the fashioning of biotopes, in which certain animals should get better living conditions is the key concept which sustainable learning can bring about. The intention is the event-connected entry (e.g. the sitting on a high stand in the evening) that flows into an active fashioning of living spaces. The animal kingdom living in the forests is worked into different modules, as this always offers a good entry into connected ecological knowledge:

- In module 5 (chapter evening lessons) the connection between the number and the respective and the therewith connected deficit of tending was treated.
- The content of information, described in module 6 (chapter: evening lessons) about the animals that live in rotted tree trunks is only one of the many examples, how animals that live very hidden can be made accessible for the pupils in an attractive way; it goes without saying that such a dead wood object should be shown in beforehand.
- The content in module 8 that describes the necessity to hunt single species of wild animals is an example to try to span a bow from protecting to using the wild animals.
- In module 9 (chapter: evening lessons) the connection between the number of bird species and differently shaped forest biotopes is shown (page ). Especially species of shrubs raise the capacity of biotopes extremely, even if in main stand the pinewood dominates. Mixed forests with many broad leaf trees are expectedly rich of species.
- In module 11 the fact of endangered species of butterflies in treated with the help of a worksheet. It is always the question to convey to the pupil that it is not protection of species which the aim, but that an appropriate biotope exists or has to be established, so that certain animal species can settle there. (hint to the species of butterflies which are connected with the tree species of *sorbus aucuparia, salix div. populus div., betula div.*.)

Out of own experience rows of examples can be mentioned how even FFH-Natura 2000 model species\footnote{FFH-Natura 2000 model species: obligatory EU- direction for FLORA-FAUNA-HABITAT (FFH) demands of certain spaces of living in the forest for the long term conservation and development of the therewith linked species of plants and animals.} that are relatively rare and are classified as a characteristic species for the quality of a living space and which appear again in former empty fields (relatively near to the forest) if a respective living space is created for them (e.g. *bombina variegate*).
Epigramm:

An owl with its sharp hearing, its wakefulness and its half outgrown beak, set once majestically down on my window sill: I felt then, how its great yellow look planted something strange into me, a deep, quiet, a mad freedom; my heart laughed as the bird flew up with its soft wings. (BJORNVIG 1995, 17).
5. The shaping of young woodlands of 20-50 years (module 5)

At an excursion for the Union of the forest engineers from Weihenstephan (VWF) in the Austrian federal forests (ÖBF, Krems, Juni 1999) it involuntarily was demonstrated what in the European forests becomes more and more the habit: a harvester worked itself up a very steep mountain forest slope. There was neither a marked track for the engine to keep nor were the trees marked on the left and right side on the trail which should be taken out. The conductor of the engine was a mechanic without forest training. This example shows a structural deficit in handling the European forests: the necessary know-how for the cultivation of the woodlands gets so far thinned out and rationalised that many works in the forests are done by unlearned workers. The problem is above all that through the improper wood tending the destabilisation of the wood stands are caused which then will be victim before the time by storms and bark beetles.

At an excursion in Denmark of the German Forest Association the next step of rationalisation was presented: the GPS supported navigation and selective taking out of the trees by means of a harvester which has the advantage that in a following step no living person has to wait the harvester. The logging of the forests will be carried out fully automatic by satellite monitored engines. George Orwell’s 1984 would not have dreamed of it!

What then have these problems to do with the training of pupils? My point of departure is the thought that the necessary care for our woodlands should be common knowledge of each citizen in the respective country. As the necessary trains of thoughts have to be imparted this knowledge could be anchored in the school education. In this way the citizen of tomorrow has the possibility to grasp with a critical mind and judge the actual handling. So he can cooperate in the shaping of their local forests.

A second thought would be the transfer of a training in the effective use of energy. It is a known phenomenon that in various town districts in Europe it is by now forbidden while building a house to install a second chimney usable for solid burning material (wood, coal). The most neutral environmental form of warmth production in winter is proved to be the fuel wood - it is the only one that grows again without external supply of energy (counter example: agriculture/ fertilizer/ pesticides). In this way the citizen of tomorrow is put into the position to win the necessary energy wood in the local forest him/herself. By this effective
method of getting energy the forests will be cared for and guided into a people orientated future instead of leaving it to anonymous high technology.

Wood engenders relations and forms homes and carries strong emotional qualities in itself!

5.1 Modular lessons: A day with a school class

At an introductory excursion fundamental ideas for the tending of the forests are presented. Especially in the 20 – 50 year old forests one meets often the locally worst state of tending. At a closer look there are psychological reasons. On the one hand it is very extravagant in these mostly overcrowded pole crop forests to bring a tree to fall and with a high work effort to gain small amounts of wood. On the other hand it is necessary to mark and saw a systematic net of clearing roads for transporting the wood. Furthermore these wood stands have been started in the foregoing generation and it is profoundly human to have hereby the respective faulty decisions in front of one’s eye. It is apparently easier to perceive the former misjudgements than to think of the streams of that time. It is overlooked that often undiscovered pearls in forms of single intermingled rare trees exist that can be fostered with verve.

The aforementioned thoughts are of course new to the pupils, but help to intellectual steps of development. The pupils are able to perceive that generation conflicts are a general phenomenon and can work out for themselves as more neutral standpoint. It is conveyed: each generation stands on the shoulders of the foregone one and there is no way out to work on, to build on that and fashion a new what has been left to us.

The introductory excursion leads now to a wood lot which is stocked very densely and therefore regularly cries for the axe, in which trees have urgently to be taken out. It is explained that each tree needs its specific space for growing in order to be able to grow. A parallel train of thought can point to the classroom that contains also only one school class and everybody need their space to be able to work concentrated.

While walking along one can ask, complete and deepen the respective knowledge of the just present species of trees; for without the exact knowledge of each tree species one can also not decide on the required space of standing. After this follows the central aha-effect of this presentation:
One looks at a ca. ten times ten meter large area on which wood tending has happened. This ought to be done in beforehand by an expert. To underline this intervention the places of the trees that were taken out can be marked by red-white stakes in order to demonstrate the cut down trees. Now every tree that has been taken out will be discussed and it is conveyed to the pupils that there must be a reason for every taken out tree.

As a further possible effect of demonstration would be a rather rare variation of wood tending tradition: some foresters leave for reasons of consultation some small uncultivated areas of 10 – 20 diameters in order to show to the respective forest owners untreated zero zones\textsuperscript{18} in the course of excursions. This in an excellent way to demonstrate the activity of the local forest tending people. And the possibility comes about to praise and estimate the special work of tending which happens secretly.

A next step of the excursion would be to move into one of the uncultivated wood lot which often has a stake like character. With the help of a gradual scheme of assessment a spatial ability of conception is worked out which is needed by the pupils for the practical take out of single trees.

Now a way of viewing is introduced which fashions group structures: First one looks for a well conceived example of a tree with a regular middle axis (in forest language: elite tree) which will be marked with a dark green plastic ribbon, that is especially elastic and does grow in. Now the pupils are instructed to watch the crown of this tree and to decide which neighbouring tree presses this future tree the most in the crown region. This presser gets a yellow paper ribbon in order that it can be sawn out later on. Then follows a five staged system of examination that one will not find in any textbook and which goes back to old traditional knowledge of wood tending. This makes sure that this elite tree after its partly free positioning is very little endangered. These five stages are expressed through the terms: stability, vitality, quality, rarity and piety and are explained directly on the place to the pupils as follows (ALBRECHT 1996):

\begin{itemize}
  \item stability
  \item vitality
  \item quality
  \item rarity
  \item piety
\end{itemize}

\textsuperscript{18} zero zones: untreated wood plots which serve of comparison of before and after
**stability**

is the first criterion which has to be considered and takes heed that after the presser has been taken out, the elite tree does not suffer a loss of stability.

**vitality**

The tree that has to be fostered has to make a vital impression and has a crown canopy that is able of development, which means that it has to have a continuous centre axis. If there exist some axes (in forest language: a twin stem or a bouquet like crown) there is the danger of breaking apart. A vital crown is also necessary that the existing gap in the neighbourhood can be filled again.

The criterion of vitality has to be restricted, when it is the question of a rare tree species that often quite suppressed as an in between – or under crop\(^\text{19}\) leads a poor existence. They often need a careful round about light\(^\text{20}\) for decades until they are able to grow into the main crop.

**quality**

The fostered elite tree has to have an even stem quality as well as a fine branched crown structure. The supreme sign of quality is the before mentioned central axed form of the stem. Again it is spoken about axes and the difference is made between two different forms of branching:

the V-crotch has as identification a bulge like thickening between the parting axes which leads forcibly by the time to a breaking apart.

The U-crotch has no bulges and is not in danger to break apart and can be left as it is, if the piece of stem is at least 5 m long.

**rarity**

This ordering characteristic in wood tending puts its attention on perhaps existing rare tree species, that stand very near together and are necessary to obtain the aim of a mixed forest. It therefore is important to convey the necessary knowledge of tree species.

\(^{19}\) in between stand/ under stand: living trees which have got no connection to the upper crown parts and therefore have to get on with indirect light.

\(^{20}\) round about light: to begin with at the north side of the tree, then follow in 5 – 10 yearly distances at the west side and finally in the sunny south side increasing benefit of light.
piety

This final characteristic is concerned with the yellow marked presser that has to be taken out and shall prevent that by the sawing off something irretrievably is lost.

There is for example a tree with a woodpecker hole which through the felling would make this biological police of the forest homeless by robbing them of their lodging. Just these kinds of birds which live in holes are an important link in the biological defence of damaging insect populations.

In the praxis of the schoolwork in the forests it is advisable to copy these five characteristics on a small piece of paper and hand them to the pupils before they start sawing themselves.

The just mentioned selective characteristics set the basis of later, richly structured and differentiated stands. By concentrating on the taking out of single direct pressers of the crowns of elite trees comes about an untouched staying of collective formed of co-reigning und understanding trees. This has the advantage of selective and aim orientated activities.

After a short further walk the presentation of an expert near soil felling of a tree with a bow saw (axe) and fall kerf technique is shown:

With chalk the three work steps for a secure felling are marked at the tree rind and presented to the pupils ( illustr. 16):

The first cut with the bow saw is setting up the bed of the fall kerf sole that always points in the direction of the felling.

The second work step can be done with an axe or a bow saw and exists in the setting up of the fall kerf roof. Working with an axe one has to pay attention out of reasons of prevention of accidents that the wooden stick of the axe while hacking has always to be below the metal – in this way the pupil is protected and can not hurt his leg. Anyway it is advisable to hack in a kneeling position.

illustration 16: details of tree felling (LBG 2006, 3)
Work step three exists of the real felling cut that begins 5 cm high at the opposite side of the tree. It is absolutely necessary that a small holding between the bed of the kerf and the felling cut stays and ensures controlled felling of the tree (hinge effect!) The always present team colleague is responsible for the call: **ATTENTION** and for the watching of the fell area so that by no means any person can enter unobserved this felling area (LBG München 1997, 7; 2006,2). In dense wood stands a right falling of trees is only possible by means of a felling lifter\(^{21}\) a turning hook or a fell lever cart\(^{22}\). Mostly the freshly cut trees lean after the felling cut on a neighbouring tree (in forest language: a hanger) and can not be brought to a fall. This is the point at which it must be pointed at a favourable fashioning of the ergonomic work situation, in order to exert at every physical work the respective work routine in such a way that the spine is saved and painful lumbago is avoided.

### 5.2. Evening lessons and record book

In this age phase of a forest the numbers of species sink down to a minimum. (illustration 17)

\[\text{Illustration 17: potential of development of different living spaces in the forest (AFL/VOLK 1987, 30)}\]

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\(^{21}\) **felling lifter**: a metal lever that causes the tree to fall by means of laws of leverage

\(^{22}\) **fell lever cart**: *wheel barrow* with which the use of the leverage law causes a tree to fall in a controlled way (pedagogic to touch). Can be used by two pupils in a team.
This is often caused by too great a density (darkness) and the inadequate tending. Through tending activities this can be corrected.

A further subject matter could lie in the environmental impact assessment of different energy sources (coal, oil, wood, biogas, solar) whereby the ecological favourite wood is easily (SMELF 2000).

As further object matter: Grave factors which weaken the productivity at heavy physical work (not enough sleep, smoking, alcohol).

### 5.3 Possibilities for further deepening work

Having energy wood ready for sale as the result of work for the class purse.

Finding a buyer for the fire wood is an important fact for the indirect mediation of the worth of work and the estimation for the work of the pupils.

Producing of brushwood waves or wave wood for an existing or still to build wood stove. These bundles were the express firewood in the olden days. On this way the stone stoves that were used to bake bread were heated in no time. The left over branch wood is bound in ca. 20 cm thick bundles, cut into stove length and dried under roof.

A self made wood stove is a good possibility to enthuse the pupils for old cultural techniques. A breakfast with self baked rolls which still have the smell of ash and fume belongs to the archetypal adventures of our cultural development. The most simple version exists of a rack made out of willow that has been woven by the pupils and which serves at the later fire space. Doing so it should be paid attention to mark the dimensions of the baking area with baking trays so that they fit properly in afterwards. This baking space will then be filled out with willow branches, stuck into the soil so that later on this dome shaped vault can be sealed with clay. Then starting from the soil stone row after stone row of the oven is improvised by means of a simple wooden board sealed with clay and an improvised chimney opening cut into the back part for the hot smoke gas to escape. After having removed the door board the fire can be lit in the vault of willow network that by and by is stronger stoked. After a two hours fire there is so much heat stored in the wrapping up coat of stones that the remaining embers and ash can be taken out with a shovel. Then one or two trays with the baking ware can be put in.
After that the door board is put in front of the oven opening and secured with stones so that it can not fall over. If there are still not tight spots at the board they can be repaired with clay. In this way a simple stone oven can be build directly on the ground. While constructing it one has to pay attention that no inflammable objects in the direct surroundings (WALDEN 2001,62f).

5.4 Extended teacher knowledge

A systematic learning of a planned, individual acting at dangerous activities (tree felling) and together with the motivation for considerable acting and socially trusting cooperation with a team colleague as well as also absolutely necessary neighbourly attention for the further felling groups that work nearby is the central learning content of this forest tending module.

Eventually life saving prescriptions for the presentation of accidents and agreements have to be learned and applied. The knowledge of the human head will be conveyed that is as sensible as a raw egg!

Interesting is a whole bundle of sense perceptions that are bound to the work of felling:

Sensations of smell:

Starting to saw a tree one smells the streams of sap in the area of the bark at broad leaved trees it is the smell of various herbs that even can be appetizing. With coniferous trees one has the etheric smell of resin that is quite different with every tree. During baking time in a wood oven an intensive smell drifts through the countryside in the wind sheltered zone that especially in nature is felt to be something special.

Body consciousness:

Experiencing physical borders as well as the tarring of efforts and overstrain. The knowledge of the effect of short breaks at hard physical work to increase the efficiency (after 10 – 20 min. work ca. 5 min break) is mostly lost. The perception of wellness after meaningful physical work has to be valued anew.

List of materials

Different coloured ribbons for marking of paper or plastic; white chalk, bow saws, axes, felling lifter with a cant hook, felling lever cart (photos); cords for bundling wave wood or material for wild wood furniture.

5.5 Discussion of pedagogical-didactic questions

After the discussion of wild-ecological aspects in module 4 should now in module 5 fundamental pedagogical-didactic questions be treated.

Pressing pedagogical actual demands, as:

- Children learn well, if they recite the subject matter, they learn very well, if they explain it to each other and they learn the least by listening.
- Schools have to be workshops for learning instead of institutions of instruction.
- Instead of knowledge, capacities and connected thinking should be conveyed.
- Curriculum should be changed to learning by mistakes and learning by acting.

let us sense that different learning objectives, learning contents and learning methods for advanced learning should be found. The above mentioned statements were pronounced at a workshop in Würzburg in February 2008 by the pedagogue and school scientist from Hamburg, Peter Struck, who works together with the brain scientist Manfred Spitzner (STRUCK 2008, 2).

These statements correspond with the experiences I made at the action oriented ecological educational work in the forest. In the selective taking out of single trees the pupil is motivated to visualise the further growth of trees which lies in the future and therefore plunges into a future-relevant acting. In this way he acquires step by step different competences which he will need a whole life in order to manage existence.

The pedagogic defines a whole bundle of competences. For this it uses the didactic, the science of teaching and learning. The term didaskein comes from the Greek and contains the concepts of: learn, exercise, instruct, teach. The didactic contains perceptions from sociology, psychology, pedagogic and the green sciences that should be imparted all together. By this both practical and theoretical knowledge get a chance and processes of understanding that can be used, are furthered (KILLERMANN 2005, 11-22)
Through the action oriented ecological education work the pupil should be put into the position to gain a whole compendium of competences. Exemplarily for this learning module: the fashioning of young forests the connection of professional competence, methodical competence, social competence and action competence should be shortly described:

The professional competence is especially instructed by selective processes of the removal of trees. This goes parallel with the specific training of the gift of observation that concerns on the one hand the knowledge of the tree species that should be conveyed as well as a hierarchically structured course of decision which trees are actually to be sawn down. The thereby imparted multi-layered processes of decision can also be of importance for the pupil in later life.

The strict course of steps in the felling of a tree is contained in the methodical competence. At divers works with trees the learning of a systematic course of part works is necessary for the success of the whole – at the tree felling even lifesaving and therefore comprehensible for the pupils. The methodical competence is also defined as the ability of learning, thinking, planning, justifying and evaluating (ANTES 1997, 18f).

The third important competence is described as the social competence and is grounded in the capacity of cooperation and communication as well as the readiness for risk, responsibility, conflict and empathy (ANTES 1997, 18f).

These mentioned concepts count as educational aims for an autonomous development of personality that knows possibly few fears. They have their source in a self-gained treasure of experiences that is put together out of uncountable small experiences of success. All the learning modules of the action oriented ecological educational work have been chosen in that way that step by step they should lead the pupil to successes of work and empower him in his self trust. At the same time every work happens always in a group that furthers the pupils’ sensitivity among each other and makes them experience the ability of teamwork.

On this way we come to the core of this chapter of discussion:
Out of the combination of the three above mentioned competences comes about as central content of the action oriented ecological work that has been developed in this research work the so-called key qualification: **the competence of acting**.

The pupils becomes able to act, when he disposes of enough social, methodical and professional competences (ANTES 1997, 18f). The professional competences result from the co-operation of the respective experts and the teachers. In the course of the different modules it is shown how the afore mentioned network of competences at the action oriented ecological educational work is effective and finds its harmonious tuning. Of importance is also the phase of reflection that is realised by the teaching in the evening and the setting up of the record book and diary. At the close of the day it happens by itself to prepare the participants for the works in the forest the next day. Out of the exercising of the above mentioned competences of action different trials of learning result which are felt to be as personally effective learning processes. The experiences of learning connected therewith will be stored as capacities and represent the link to the every-day suitability of the just acquired experience.
Epigram

The width of a landscape invites the eye to traverse it. And with the same measure in which the look widens, also the soul has to stretch out to the new horizon. I would urge everybody, to mount a hill in autumn, to look into the distance and to experience these new distances around. He will feel, how also in himself a widening happens.

(BORLAND 1995, 11)
6. Individual tree care at the standing trunk (module 6)

Everywhere in this country the standard cultures of our old orchards are in a miserable state (the fruits grow in the supermarket!). Often they are overgrown by moss and lichen and therefore are in a half vital state. If one considers that mosses and lichens can store ten times of their own dry weight, then it becomes clear which evaporation cold the trees have to put up with. A fruit tree overgrown with moist lichens and mosses blooms less, has hardly any fruit and just vegetated along. When these heroes of old days will be freed of such epiphytes\(^{23}\) then they recover again soon and will please everybody. Also with a controlling cut the growth of the fruit trees can be vitalised or inhibit. The cut in spring shortly before the leafing has the effect of fostering the growth, especially in the second year after the cut. The summer cut between St. John (24.6.) and Michaelmas (29.9.) has a damping down effect and is the form of cutting after which the fruit tree can heal up the cut wounds the easiest and surest.

In the forest the trees are very high and so we need aid to be able to step in a tending way. One could certainly work with rope techniques\(^{24}\) which is not recommendable with many pupils because of the long time of instruction. Hereby a system of staking ladders (by DIESTEL) can serve well. The pupils are in safety by a mountaineering strap, but standing on the ladder rungs and are therefore ready for duty even after a short training period. Why now use these things that could be perhaps a bit dangerous?

The modern management training, the so called *high rope gardens* are very in in order to anchor subsequently missing abilities in the field of teamwork.

*A high rope garden* exists of a system of poles which are attached to each other through various ropes, rope ladders and rope bridges. The leaving of the ground and the climbing at mountain walls was up to now only accessible to a small elite of mountain climbers. In the high rope garden it is possible for practically everybody to explore this airspace to experience

\(^{23}\) epiphytes: plants that grow on trees

\(^{24}\) rope technique: the climber hangs at a rope, that is wound around a branch in the tree crown. A high measure of motility is given by this, as one can change from one place to another like a pendulum.
hereby the dependencies, if one leaves the own metier and penetrates into foreign spaces. With that one experiences the own, often somehow narrow spaces of experience. One sees the fellow human being in a new perspective and experiences through the securing work at the rope the positive development, if there is a real teamwork. Lonely fighters are often surprised which potentials the action contains which is orientated to a common aim.

So it seems to be possible to introduce these climbing techniques also in the activity oriented educational work in order to put in the herewith attached pedagogical potential of experience.

6.1 Modular lessons: A working day with a school class

In this module the lessons start with work in the morning in a room that is furnished with tables or workbenches. These solid tables are needed for fixing a rough piece of wood with a clamp. Out of this work piece there will come out an ergonomically formed short saw which is necessary for the own need to do the tending work at trees. To produce oneself a tool is a process that nowadays is hardly usual and becomes an unforgettable experience. It is nice a recollection of the forest practical if one can take something home. On the other hand it can accompany the adult pupil many years of their life.

The out of the hard wood prepared rough shafts that will hold the saw blade are individually shaped according to the personal hand physiognomy and made ready for use with a bought saw blade.

Afterwards it is a day in the forest in order to learn something about the tending of single trees and about various techniques of caring a tree.

The first step is to take out dead branches (up to two meters high) whereby the newly fabricated short saws are made use of. Dead branches are at all seasons stress for the tree:

In winter they function as a bridge of cold, as the dead branch leads the outer temperatures unhindered inward into the trunk. But the tree has to assure also in winter a minimum of circulation of the sap streams for his assimilation that only runs on an energy saving cycle so that he has to warm up this cold led inside the trunk in order to hold his sap streams running at a degrees near under zero.
In summer the sun radiation warms the dead wood up until fifty degrees Celsius that is also taken into the trunk and has to be compensated. In the wooden body the tree tries, even at the greatest heat to keep at 20 degrees Celsius which means clearly spoken that he has to put on the way by means of streaming root saps a strong cooling down.

Hereby we help the tree, if we take away these warmth and cold bridges, and saw the dead branches off along the tree. This work has first to be trained, as on the one hand there should not be left any branch stumps (clothes pegs!) that need several years until they are healed by the tree. On the other hand the stumps of the branches should also not sawed off too deep as otherwise the cambrium will be hurt which entails also a long time of healing over. Thicker branches show with a so called branch collar where they want to be sawn off.

When this work has been learned in sufficient quality the first pupils can be introduced to the prepared climbing belts to do the same work in lofty height. The learning of the tree tending climbing measures by means of rope secured staking ladder systems is an especially favoured work object with all pupils. Also timid pupils learn by the example of their fellow pupils working above them and with the time they trust to overcome their objections.

The taking away of dead branches from well disposed elite trees serves the long time health of single trees as well as the cultivation of branch free valuable wood. This step aims at very far into the future and serves the pupils as well as the forest owners.

It goes without saying that in order to prevent accidents when the pupils are climbing, there must always be an adult present equipped with a climbing belt. He can give a helping hand and has a complementary rescue rope. This will be with an auxiliary cord be pulled over the treetop and can so rope down an injured person, if necessary.

6.2 Evening lessons and record book

In an old mouldering tree there are living a number of animal species that are treated at that point. So we discuss with the pupils the border between the tending of the trees and conservation:
Illustration 20: Dying old oak tree as a living space for many kinds of animals (AFL/VOLK 1987, 31)
Biotope 1: lichens (lichens) and mosses (bryophyte) as epithytes.

Biotope 2: a big hole that was first habited by wood damaging insects (hymenoptera div.), then by wood decomposing fungi, then build out by woodpeckers (picidae) and after these other kinds of birds and small mammals (skiuridae) moved in.

Biotope 3: sieve like, perforated rind, that is undermined by the bark beetle.

Biotope 4: worm and pupa of the eremite and the oak glass moth, that live underneath the bark of still living, but slowly dying trunk part.

Biotope 5: moulded and by woodpeckers (picidae) enlarged branch collar (bats (chiroptera) and screech-owl (strix aluco).

Biotope 6: bark pockets and moulded wedge as a baby chamber of the tree sleepers(dryomis nitedula) and other gliridae.

Biotope 7: hole of a woodpecker (picidae) or a hornet (vespa div.) nest that exists in the trunk.

Biotope 8: in dry sunbathed dead branches nest wild bees (apoidea div.) and wood wasps (urocerus div.).

Biotope 9: in lying, mouldering oak wood develop the larva of the stag beetles (lucanus cervus) and oryctes nasi cornis

Biotope 10: in the dust of thin twigs develop the larva of flies (syrphus selenitus) and midges (tipula div.)which are an important basis of nutrition for singing birds (Passeriformes) and bats (chiroptera) (survey according to VOLK 1987, 31).

Trunks of dead trees that are lying around are considered an exaction by some visitors of the forest, because here valuable raw material is wasted this rightful feeling is understandable in times of high energy costs. If we change sides of view and look at the ecological environment of rare, wood decomposing species of beetles (stag beetle (lucanus cervus), oryctes nasi cornis, eremites) then dad wood becomes valuable living space and basis for food for many
species of animals and plants. This conflict shows a deficit of information which is avoidable, if experts leave their ivory tower and enter into a public communication about aims.

6.3 Possibilities of further deepening work

Introduction into the tending of the bark (bark, rind, conducting lines for assimilation: the inner fibrous bark, cambrium, the ways for mineral salts and water: xylem) At the bark tending mosses and lichens are being taken off and with that moist doors for fungi removed.

Introduction into the root tending (types of roots: tap root, heart- shallow-, sinker root systems, strangler roots). The applying of the root tending on the forest and the finding of examples (stilt trees\(^{25}\) in the forest (as well as an excursion to that). At the root tending the first 5-10 cm of the cover humus is cautiously taken off and the pupil gets hereby a subject teaching about the various types of roots. Diagonally growing strangle roots are cut with the short saw and offer a special view on tree physiological processes.

Trunk putrefaction (physiology, reasons effects, treatment and practical tree surgery).

6.4 Extended teacher knowledge

In this learning module a training of overcoming oneself and the courage forces as well as experiencing physical and mental borders takes place.

Further on an expansion of existing condition borders and training of the borders of being not afraid of height that had been accepted up to now is tested.

On the ladder a training of dexterity with restrained moving space takes place (work on ladder rungs).

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\(^{25}\) stilt trees: when a tree sprouts and grows on a mouldering tree trunk and therefore shows a part if its roots above the soil, he stand like on stilts.
The practising of root tending as a start into the personal relationship between tree and man can be experienced.

A recently appeared book of an American judge (LOUV 2006) of a juvenile court effects by his stirring statements: Saving our children from Nature-Deficit Disorder! Enable them to have a last youth in the woods:

- It reminds us of our roots as gatherers and hunters and with it combined the basic pattern of flight or to get involved and fashion the situation.
- It is spoken of the longing to mount a hill and take in the long look of nature. And that climbing in trees is the same as to reach this overview that can heal us very quickly.
- Even pictures of a natural part of a landscape brings about after only five minutes a considerable lesser muscle tension, of the pulse and the stress level.
- It tells of 49% ascent in consuming psycho pharmaceutical medicines that has been stated in the time between 2000-2003 at children in the USA. They could be put down, when the poor relation to nature was stopped. The enjoyment of nature is preventive medicine par excellence.

This small look into a plenitude of details leads finally to the fact, that the most simple is the truth and it puts man into a bad mood, that the truth is so simple. (LOUV 2006).

**List of materials**

rough wood for the self made hand saws, saw blade for the short saw with Japanese dents (price: Euro 7,-).
Staking ladder system (DIESTEL)
Sharp brushes and spatula for bark – and root tending.
A square mallet and a corner chisel for the taking away of moulded part of wood.

**6.5 Discussion about the experienced-pedagogical observations on hand of the ladder-supported tree tending.**

To climb trees while tending at the standing tree is on of the favourite learning modules which I did up to now with pupils. It happens mostly only from the 9th age group on, because then the usually used climbing belt size for adults can be used. (This tree tending measure has also been tested with younger pupils which was also successful, but climbing belts for
children were needed). Up to now there was mostly aversion against the climbing of trees with pupils out of security reasons; which is understandable, as long as only rope climbing systems are used. These are not appropriate for one-day events, because the getting used to them would take too long. According to my experience the alternative to the work with ladder supported climbing is so secure that the pedagogical advantages surpass the possible dangers so far, that they are controllable. The estimation of the risk is yet a personal question and no forest owner, forester or teacher should go further than he himself radiates absolutely integral feelings of security. Out of my experience the imparting of feelings of security is very important so that the pupils are able to handle these extraordinary challenges in an adequate way. Young people love border experiences and come through the adrenaline rush in those areas that they are so longing for. The great advantage of the ladder supported systems is the own decision of the young person, how far he is confident to climb up. Every two meters he decides, do I want to stack an other piece of ladder or is it enough. (see photos in the appendix). While working and experiencing the pupil can slowly reach the boundaries of his physical, emotional and mental capacities without getting into trouble. Mostly one can observe a growing joy of working and initial faint-heartedness changes into deep felt enthusiasm, when the pupils can train their forces of courage and present the results of their tending to the instructor/guide at the moment when they reach the ground again. Pupils describe the climbing up to 20 meters high as being the most eminent experience of the forest experiences.

ANTES (1997, 12) tells what that means: when do we tell of an experience? Surely not, when we have a cup of coffee with a friend or read the newspaper in the morning. An experience touches us direct and of a relative uniqueness. We all know experiences that we talk about even after years. But without a risk we will hardly experience anything; and in the word courage (in German: Wagemut) for a risk the weighed courage is contained, to try a calculated risk. Between weighing and the courage stands the tension, to go towards the goal, without neglecting the necessary attention. The English word adventure means in its Latin root: that what comes towards one and expresses thereby the personal future relation. By this it becomes clear that the term experience contains the levels of reason, feeling and activity. As we are in the understanding of the developmental psychology predisposed as generalists the human being has the talent to acquire many possible capacities. Only thereby our balance remains and therefore also our contentment. The experience is a holistic phenomenon and corresponds with the need of the human being to develop thing further.
According to my experience the natural, in former times practised cultural technique to climb trees (to pick fruits, to gather seeds) has become so rare that this can be learned by the pupils of the 21st century best in the forest. The most important is the connection of the calculated risk with the pedagogical and ecological significance, that at the normal event pedagogical happenings is only partly present.

Interesting would still be a short glimpse at the so-called difficult pupil, who disturbs mainly in the classroom. In the forest the contrary can be experienced. Different conversations with teachers on the occasions of divers workdays with school classes in the forest aim at the same direction. Teachers are always again astonished how very much changed just the difficult pupils are at the work in the forest. They are described as: like changed and show social and methodical competences that nobody would have thought them to be capable of.

VESTER 1978 in: ANTES (1997, 17) explains this changed attitude of pupils as follows: this blocking circuit in the class-room is broken at the stay during an event pedagogical happening outside which especially is caused by the totally strange situation and surrounding.

This is supported by the declaration of STRUCK, who stresses that learning needs the very fine shaped change of stress and relaxation. After a math lesson should follow sports; after a German lesson music; after physics a theatre performance (STRUCK 2008, 2).

We can sum up that the most effective forces of an experience-pedagogical happening lies in enthusiasm. It is nourished out of long term perspective. And perspectives feed out of long spaces of time, in which the trees can be our road-signs.
Epigramm

The judgement of nature
is quiet, slow,
but severe.

Anonymus (ANL/GOPPEL/HERINGER 1995, 16)
7. The tending of middle old, 50 – 100 year old forests (module 7)

A middle old wood stand (50 – 100 years old) without a regular tending is like a school class that meets in the morning for the school start and is then told that the teacher is ill. The forming strength of the teacher is missing who intended a further learning step with the pupils. That means, a forest is developing much more purposeful under the forming hand of man. He fosters rare tree species which otherwise would disappear because a neighbouring tree would take light away from him. He fosters especially straight shafted trees in that he takes out crocked, strongly branched or too early separating tree crowns in the neighbourhood. He stabilises similar aged parts in that he educates stronger and more stable single trees. Through fostering and forming interventions the vitality of the single trees are finally increased.

The magic word is the intention of family structures (in forest language: selection forest26 which means that trees of different age and different thickness are standing beside each other. According to the newest federal forest stocktaking unfortunately only 9% of the German woodland are build up in sandwich or selection form. (BMVL 2002, 27) Because trees can not be transplanted in this grown up age one has to guide the light invasion. With these regular (light pillars) by taking trees away (in forest language: selective logging) decision is made about the further development of the remaining trees. Already dominant trees can be inhibited in their growth by further continuous density. On the other hand they can get through the taking out of neighbouring trees an even better possible development. Suppressed trees get offered – starting with the north side (sun!) – piece by piece space for development of their crowns, without having to endure damages of stability.

The aim of the lesson exists in acquiring knowledge for a wood tending encouraging structure that leads to a graduate building up of a forest: thick and thin trees that stand over and under each other in the most intimate mixture (AMMON 1951, 160f).

26 29 selection forest: in forest matters the most demanding form of forestry that harvests only a few tree trunks. In the missing spots come about light pillars that enable the growing of the next forest generation. This building up of a forest is very stable against damaging influences (increase of insects, gales, snow breaks).
7.1 Modular lesson: A working day with a school class.

The day starts with a morning excursion to a relatively dense 50–100 year old forest which lies well to reach at a forest road. This has the advantage that a school class has sufficient space to observe together the upper crown parts of trees. If there is clarity about further developmental possibilities for a certain single tree, then in order to reach a common learning effect, the tree can be felled.

Before that the five criteria of assessment (stability, vitality, quality, rarity, and piety; see module 5) are repeated. They make sure that by the taking out of the tree no damages of the surroundings and of the whole stand happens.

It is important during the process of felling that after the setting up of the complete fell kerf (undercut and roof) the school class has to leave the felling area before the real felling cut. They have to await the falling of the tree from a secure distance (two tree lengths) (see steps of felling, module 5). The in between time can be filled with the instruction of the various tree species.

After the tree has fallen the break ledge and other details at the tree stump (in forest language: stock) are inspected and possibilities to ameliorate the security of tree felling are pointed at. As a next step the free space of the former tree crown is also inspected which gives the possibility of judging the before and the afterward.

Before now all the pupils will fell their tree in groups of two, the absolutely necessary rules of preventing accidents (the minimum distances from the felling group) and the acting in a case of rescue (telephone number, meeting point with the rescue vehicles, etc.) are practised.

Now it is looked at the trees which are going to be felled and they are marked with paper ribbons. Important hereby is that first the tree which is to foster is assigned and afterwards the tree to be felled with a respective different colour. This fosters the orientation of the aim that while working in the forest has always to be in mind.

The felling happens along the forest roads because there it is the easiest to fell trees. On the other hand the security distances between the pupils who are occupied with the felling of the trees is easier to control. The pupils have also an easier orientation concerning the tree felling
of the neighbouring group. Working in groups of two, teamwork is practised and the separated groups of pupils form a good spacious order and guaranty a secure work execution. Before the felling the ways are to be blocked from both sides, so that no walkers are endangered.

After the felling the trees are freed from the branches. This can be done either with a bow saw or with an axe, depending on the thickness of the branches. For that it is a must that the secure handling of the axe is demonstrated to the pupils. An important detail hereby is that between the pupil and the blow with the axe there has always to be the tree trunk. Thereby it is impossible that the pupils can hurt himself by an uncontrolled axe blow. This entails that the pupils has continuously to climb over the trunk and change sides, which is bit complicated but security is highest requirement.

When the work of trimming the trunks is completed, then follows the instruction about the use of the trunk wood. E.g. boards can be made out of them. For that the pupil has to know which saw mill will buy these trunks and which measurements are wished by this wood buyer. Or the trunks are not thick enough and are used as paper wood. Also the paper mills want to have certain lengths, so that a lorry can evenly be loaded. There is also the possibility to measure the timber into a certain length that there could be build a log- or garden house with them. But therefore it would need the exact measurements of a carpenter, who could used these logs. The left over wood is finally sawn into fire wood, which is mostly stored in 1 m pieces. In the end after several years of drying it will be sawn into smaller pieces to fit into the stove.

If there should be felling done in the middle of wood stands the pupils would need help in bringing down trees which are hung up in the crowns of neighbouring trees: a felling lever and a block –and-tackle system.

7.2 Evening lessons and record book

The evening lessons repeats and consolidates the learned subject matter and condenses it in possibly short form. Thereby it is easily possible to convey also emotional learning contents, that are brought as copies by the teacher and can be joint to the record book. So, one avoids the danger to have too one-sided styles of reports. How shall we connect pupils with emotional contents? Look at that example:
“In wood time is enclosed. The time during which the tree grows. The lifetime, before it is felled. The years of ripening and drying, until the cut timber is ready to be processed. The time, the craftsman or an artist takes to shape something out of it. And the time, the finished object serves men. Therefore a violin has to be played a long time before it has developed its full tone. Therefore a baroque piece of furniture is alive because the cabinet maker has put his time, his care, his being into it... The thick oak plate of a dining table that for ages has bee standing in a kitchen: it contains the stories of the house and its inhabitants. The school bench, the church bench, the working bench: they are witnesses of sorrow and joys, of hours, weeks months, and years. Wood is open. It takes in and gives away. It saves time, history and stories.” (SPRING 2005, 132).

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The evening aim of condensing can be corresponded in an excellent way if special structures support the recognition of the material learned in the daytime. The following sketches represent the further development of the principles of stock keeping under consideration of sustainability. (illustration 22).

Illustration 22: Keeping of family structures in a deciduous forest.(AFL/VOLK 1987, 34)

Thereby mental and spacious penetration of the thought about the building up of family like structures ensues: selection forest principles (AMMON 1951).
7.3 Possibilities of further deepening work

Simple conditions for felling exist also at the transitions from forest to field. Also here a creative exercise is offered to shape the wood edge in an irregular way. One can form inlets and isles like cuts along the forest edge that leads to a meandering like the course of a river. It is ideal if near the forest edge growing wild fruit trees could be free standing and could unfold the next spring its flowering splendour and in autumn its coloured foliage (COCH 1995, 15f/ HAHN 2003, 34/ AFL/WEIDENBACH 1991, 90).

![Illustration 35: Keeping the forest edge of middle old forests (AFL/VOLK 1987, 35)](image)

The left over branches can be piled up as Benjes hedge that can also laid out in inlets. In this way there could be created very various forest edges which look like small gardens (WALDEN 2001, 45).

Sometimes it is pedagogically advisable that pupils are led to physical border experiences. For that the competent and precise handling of heavy timber felling presents itself. Heavy trees can also been sawn without mechanical help. For that a two hand cross-cut-saw is needed (illustration 33).

![Illustration 33: two handed cross-cut-saw and an oak slab.](image)

Is it wind still also the heaviest tree can be felled. To protect them from falling small branches the pupils should always wear helmets.
7.4. Extended teacher knowledge

If one thinks of a longer period of felling trees with pupils, after the felling with bow saws the pupil can be introduced to working with a motor saw. But it has well to be weighed, if it is pedagogically meaningful to go this way of wood harvesting, which is very effective, indeed.

But one has to have in mind that with it a high potential of danger has to be put up with. Not to mention the stress by noise, which the pupil hinders to get into contact with the animated nature. On the other hand there exists a great enthusiasm for all that has to do with engines, that also has to be considered. However for a sufficient instruction of handling a motor saw by ten persons plus a woodworker as instructor a time space of two working days has to be calculated; for a class with thirty pupils six work days have to be calculated! Only after this time a secure handling of a motor saw can be confirmed and the real felling could be started.

In the here relevant field of felling of light wood the instruction of motor sawing would be learned under special consideration of the fell lever technique which asks for a different kind of cutting than the felling with a bow saw.

Besides, considerable costs have to be allowed for, caused by a safety clothing (safety shoes with cut protection and metal tip, protective trousers, a warning waist coat safety helmet with a protective eye patch and ear protection, non slip safety gloves).

At a possible decision in favour of a motor saw, it has also to be mentioned that the teeth of a chain saw moves at full speed with 400 km/h, whereas a form I racing car speeds along on a home stretch with 300 km/h.

Information about the care of middle aged forests see (MAYER 1980, 208/ RITTERSHOFER 1999, 188).

List of materials

Coloured paper ribbons for marking trees. Red-white plastic bands to close ways for tree felling; chalk to mark the fell cuts on the tree rind; bow saws, axes, block and tackle system, fell lever cart; safety measures: helmet, gloves first aid box.
7.5 Discussion under the point of view of the age groups

In the following age specific questions shall be sketched in short statements that concern the entity of the 12 modules.

The elementary age group (6-9 years)

In the elementary school the in all activities playful zeal should be taken into account. In this age group it is not so much the question to convey cognitive interests of the forest than more the perception via active co-operation. In this the good example in the way how to be active is very important, as the pupil in this age group has a learning capacity that refers to people.

The theme of the forest can be treated in the elementary schools in Bavaria under the themes of our own theme and at the occasion of the day of the tree. The annually recurring teaching unit our own theme offers the possibility to turn to a theme that is accessible for the pupils and important for their life, independent of the curriculum. It should be so fruitful from the point of view of the subject matter and correspond with the pupils’ actual interests (CURRICULUM 2000, 104, BRAND 2006, 62) Therefore it exist pedagogical free spaces that integrate the action orientated ecological education work in the lessons of the elementary school. For example the in module 4 recommended building of Benjes hedges is already successfully feasible with elementary age groups. Also the common carrying of long, thin trees (module 11) is pedagogically meaningful, because it is for the pupils a communal challenge, to manage such a transport together on their shoulders. The crowning final is mostly a fire (module 10). Especially in the rain a fire is an appreciated help concerning the variety of perceptions. One can observe that generally the children are in a good mood, despite of the rain.

In Waldorf schools similar points of connection exist: e.g. in the epoch of handicraft.

The point here is to show a realistic and holistic job description and to have the pupils experience it in form of self-exerted activities, e.g. the job of the forest work:

- Sowing out of tree seeds (module 1)
- Planting of young trees (module 2)
- Felling of young trees with the help of a bow saw (module 3)
- Similarly could be presented a woodwork specialist, a working horse or a timber bob.
The middle age group (10-13 years)

At the age of ten to twelve years dramatic changes in the growth of the body, in the physiology and in the soul life of the children occur. To go into detail at this occasion would go too far (see further KRANICH 1997). The pupils enter a phase that entails an extreme thrust of development. At the end of the middle school one is confronted with physically fully developed young ladies, whereas some boys appear to be small and nearly childish. To be physically developed or not should not be misleading about the fact that on the emotional-spiritual level there exists at the same time an underdevelopment. The physical stretching of the limbs entails a loss of the childlike ease and one is confronted with clumsy and lame figures. This shortcoming of feeling unwell in one’s own body is a good occasion to go with a class and work a day in the forest.

The natural surroundings of the forest bring about a stimulation and an encouragement of the manifold activities of our senses. The forest is an ideal environment through which all the senses are enlivened whilst the surroundings are explored by work activities. Theses have at the same time a harmonising and calming effect on a strained nervous constitution. It is known that the support of the coordination of the senses offers good impulses for the development of the I of the pupils. Is the development of the I positively influenced, ameliorations concerning disturbances of movements of the pupils take place. To acquire profound abilities during such a practical time in the forest brings with it a deep and connected knowledge as it is not possible with only a short stay in the forest (e.g. a walk) By practical educational work operations sufficient participation as well as a training of the will activities of the pupils are always involved. It can therefore be regarded as a training of practical intelligence.

In this context so much could be said, that at this time essential impulses can be given for a further healthy maturing of the personality. The soul of a young person, which is ever more left to itself and the need to understand the world by own thinking, brings danger with them. There is the tendency to occupy oneself too much with oneself and the world is only understood in relation to the own experience. If there is no conscious pedagogical help, very often an egoistic emotional state is the result. This can and should be counteracted by awakening the interest in the outer world. If this does not happen in the classroom, but in the forest, with the direct meeting with the plant and the animal kingdom and the enthusiasm of the expert, then this is of a special value.
From my conversations with teachers of horticulture the thought emerges always again to reflect on the work in the glasshouse in winter. As the heating of glass houses in winter is difficult to combine with the education of sustainability, the change of the horticultural lessons into the forest would be an environmental alternative. With a certain talent of organisation forest areas can be reached by public means of transport which would contain a further environmental aspect.

The upper age group (14-17 years)

For class 9 most of the requests from teachers for an activity orientated ecological educational work in the forest. For this period of life possibilities for practical training are offered more frequently to the pupils. May the reason be that the last waves of puberty, which the adolescents have to go through or the difficulties of discipline with which the classing are struggling these days. It was always clear that the teachers had made a good choice with the physically demanding work in the forest. There were hardly any frictions between the pupils and the work with the trees disciplined the surplus of energy.

The puberty of a 14/15 year old adolescent has reached a stage, when the physical maturity is finished and the newly formed soul situation has reached the point when the experience turns up: I am equal to the adults. The young people want to integrate themselves into the world of the adults as having equal rights and being responsible although they do not manage that a great deal. Discipline is recognised and accepted as a means to orientate oneself in the world, but only if it can be understood.

After the sixteenth year of age puberty is finished and the time of adolescence starts. Now quite different questions and interests sound in the young person. How are the connections in nature, between men, between men and nature? Big questions mature in the depth of every soul and answers look for their way. Out of the total situation of practical training in the forest it is directly understandable, in which manifold ways just these mentioned questions find an answer through the activity and the direct experience.

In the forest one can always and again state that it is the normative power of work that enthuses the young people. It is the tree and the forest that become the teachers. (see quotation Bernhard. de Clairvaux).
In the 9th and 10th age group the horticultural lessons that happen in the Waldorf schools contain still some further information: The work with permanent shrubs and trees starts that found their correspondence in the increasing hardening of the human skeleton. The adolescent is confronted with the life duration of the plants which points into wide time spaces. With the ennobling (grafting, budding) of fruit trees, he got the human task to continue creation. He learns to take on responsibility for the care that is necessary with such cultural techniques. This task wins a completely new dimension in the light of the manipulative character of the genetic technique. The herewith connected questions of health and illness are treated in a herb garden. At the same time the vision of quantitative increase of proceeds can be treated that always goes at the expense of quality. Quantitative and qualitative sceneries are also the content of the agenda 21 process, that should flow into a sustainable thinking, feeling and acting.

**The professional training age group (18-21)**

Mostly they are international workshops in school/semester holidays, which run such a project like training in sustaining development in the environment of the forest: project of mountain forest ([info@bergwaldproject.de](mailto:info@bergwaldproject.de)): international youth community services ([info@ibg-workcamps.de](mailto:info@ibg-workcamps.de)) div. highschools.

In his survey of 2200 pupils in grade 6 and grade 9 the educational scientist Rainer Brämer found that 60% of the pupils never had been given any opportunity to engage in practical agricultural or forestry work. The survey also showed that understanding of nature all in all were shallow and fragmented (BRÄMER 2006, 162f). This leads to a necessary lack of consciousness and skills of judgements related to natural resource management. It is understandable that later, as an adult, he or she will lack these skills of judgement. The resulting problem complex clearly also indicates the needs of also rethinking and reshaping pedagogical approaches of adult enviromental education.
Epigramm

Illustration 25: Albert Mueller, To a missing person, (Myth wood 1990, 19)
8. The chase as an integral part of wood care (module 8)

*Hunting of all kind should happen there where it is meaningful. At the hoofed game chase* the meaningfulness lies at hand because we need more urgently then ever the forest with all its functions for society, the ecology and the economy. . . . Our society, the hunters included, are on one accord that the chase on singing birds that is habitual in the Southern countries of Europe is of no meaningful use of wildlife animals and therefore has to be rejected. Where there is no real reason e.g. to prevent damages and the idea of the usefulness is only marginal or does not exist at all anymore the chase is degraded to a mere pleasure hunt. This pleasure hunt which means that the hunt happens only because of the pleasure that is tied to it is in the 21st century not acceptable anymore and therefore to refuse (KORNDER 2001, 7).

Even if there are huntsmen whose requests are doubtful, one should not overlook, that the exertion of hunting is an indispensable part of the forest tending:

Pleasure gain out of putting wild animals to death counts as a atavistic inclination which is outdated through the human understanding of the co-creature animal. Hunting be as antiquated as slave trade and children’s work. . . . Basic perceptions hostile to the hunt spread more and more in the circles of animal protectors. . . . Nowadays these voices are also heard from the (rustic) wood owners which feel themselves expropriated as a result of over caring of cloven-hooved animals in their woodlands and now from their side deprive the hunters of their right of chase and care (SPERBER 1994, 102f).

In the following it should be tried to objectivate a bit the emotional theme of hunting:

Conflicts caused by the change of the countryside.

Our landscape has enormously changed in the last fifty years in the course of the transforming from an agrarian to an industrial state and the globalisation of the markets. The agriculture has been rationalised and mechanised. Hedges and solitary trees have been cleared away, fields enlarged, wetland drained, water canalised. The number of wild animals species e.g. hares (leporidae), heath hens (*tetraoninae*), partridges (*phasianinae*), have been drastically reduced

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hoofed game chase: chase of cloven hoofed animals as e.g. elk, stag and roe.
hunters in field territory have hardly hunting joys. Often there is only one kind of animal left
for them: the roe. Many roes (*capreolus capreolus*) can well live in maize- and cornfields.
From autumn till spring they have to return into the forests. The numbers of roes mounts
drastically in autumn and the damages of browsing increase enormously. (MEISTER 1999, 85)

Hunting as a service
If the principle Forest before Game will be realised and if hunting really becomes a service
for society then it should stand up for some changes. The Research Commission of the
German Bundestag writes to this theme: in front of this background a change in the praxis of
hunting and caring in the Federal Republic of Germany is necessary. In this way it has been
guaranteed that the stands of clove-hoofed wild animals have been reduced to an ecologically
tolerated measure that ensures the capability of the forests for a natural rejuvenation and
counteracts the damages caused by game. (MEISTER 1999, 88)

Hunting and society
Today the necessity of a natural silviculture is denied by only a few people in Middle Europe.
Scientific investigations concerning the negative efforts of the cloven-hoofed wild animals on
the next forest generation draw a very uniform picture. And the number of citizens increases,
who reject hunting in the now practised form. For centuries now hunting has put itself above
the wishes of the greater part of society. The representatives of hunting interests possessed
then and do so today the political power and enforce their decisions against the resistance of
the wood owners. The ritualisation (cult of trophies), the independence of the behavioural
patterns (observation instead of hunting) hamper and prevent a change in thinking and acting.
The interests of the perpetrators dominate the field. The interests of the people concerned
(damaged forest owners) are not perceived. (SUDA 1999, 7f)

About the pain of the dying of the forests (selective browsing by the cloven hoofed game) it
has become very quiet, too quiet(!) as I think. The hunting exists in an absolutely quiet area of
social perception, and this is a great disadvantage. The shady side of this non-perception is the
non-knowledge about:

The purpose of hunting
It plays a key position at the regulation of the free living species of cloven-hoofed wild animals and the lack of public interest of it leads to states as we find them in nature today everywhere in Europe:

In many places the species of broadleaf trees\textsuperscript{28} that are susceptible to browsing animals are so repressed by the plant eaters that monotonously formed coniferous forests come about. These facts that I observed for decades have been confirmed by the latest dates of the Federal Forest inventory (BMVEL 2002) according to which 27% of the German wood stands exist as coniferous monocultures. Also the statistically secured inventories on browsing by game, surveyed for twenty years, result in the fact that former richly mixed rejuvenations in broadleaf wood areas finally exist only of pure copper beeches (little attraction for browsing). According to my observations for two decades in twenty-one local district forests also culture areas that are fenced in, can not stop this decrease of species through selective browsing, as after taking the fences away the wild fruit trees are destroyed by male animals carrying antlers while rubbing off the raffia of their antlers.

Who scrutinizes closely the woodlands in the South of Norway will have to notice the considerable damages by wild animals at the forest vegetation. At the time of the Vikings the wide spread oak forests were harvested for reasons of ship building. After that the forests of the taiga invaded the woodless lowlands. Elks, stags and roes are especially browsing the valuable broadleaf species as \textit{acer pseudoplatanus/platanoides}, \textit{fraxinus excelsior}, \textit{prunus padus} and \textit{sorbus aucuparia}. But these are in the minority in the expanded areas of coniferous forests. Only at the agricultural farms and in the places one can see the broadleaf trees are still existent and can flourish. Geology, soil development and flowering plants indicate enough nutritional values and also the long decades of growing stock of pine and spruce contribute to a change of crop in the direction of broadleaf trees. (see module 11, cap. 11.3)

On the other hand it happens that the often practised regeneration by clean cutting brings with it an advantage for the so called pioneering species. These pioneers grow also under extreme conditions of the steppe and do not need a mild forest climate in order to seed naturally. After a clean cut birch (\textit{betula pendula}), asp (\textit{populus tremula}), and willow (\textit{salix alba}) seed naturally as broadleaf pioneers. In their shade the coniferous pioneers as larch (\textit{larix div.}),

\textsuperscript{28}valuable broad leaf trees: hornbeam (carpinus betulus), ash (fraxinus excelsior), cherry tree (prunus div.), oak (quercus div.), elm (almus div.), maple (acer div.) various species of wild fruit trees (sorbus div, and others).
pine (*pinus sylvestris*) and spruce (*picea abies*) develop. After those the aforementioned demanding broadleaf trees would spread. Through selective food intake of roe (*capreolus capreolus*), deer (*cervus elaphus*) and elk (*alces alces*) these kinds of trees are browsed such a long time until they are overgrown by coniferous trees and then because of lack of light are pushed into the lower story and disappear (genetic depletion).

Wild animal ecology as an educational content

It would be a new task for education to take up to show scientifically well guaranteed connections between connected systems and to transfer them consequently which would lead to the fact that the educational content of wild ecology and its connection with the landscape would be integrated in the curriculum.

Thereby the adolescent would come into contact with the roots of their path of evolution, because the roots of our culture have been the hunters and gatherers. In the active dealing with the environment the growing-up adolescent learns to know the example of an order given through creation that always considers the whole. The forest and its animals can become a textbook and master of its own self-education.

What a majestic sight is the eagle (*aquila chrysaetus*) circling over the mountains that suddenly stoops down and captures a marmot (*marmota marmota*). The eagle does not hunt out of lust, but because its young ones call for hunger in the rock crevice. The bear (*arctos ursus*) does not hunt out of boredom, but because of the nearing of the half-yearly winter-sleep he has to put on layers of fat. And also the pack of wolves (*canis lupus*) hunts for hunger and brings about selection and rejuvenation at the vegetarians that exist in excess in the wilderness. Also the lynx (*lynx lynx*) as the biggest local hunting cat hunts only in short, offensive attacks and a well conditioned elk calf (*alces alces*) will be able with a respective reactivity and its much longer legs to take to its heels. If it would be ill, it will fall prey to the hunter, because the animal population needs these natural selection processes for its long term healthiness.

Man as the crown of creation has eliminated these necessary regulating beasts of prey like wolf, bear and lynx to a great extend and finds himself now confronted with a vast number of wild living vegetarians. Elk, stag (*cervus elaphus*) and roe (*capreolus capreolus*) propagate all
over Europe and profit of the lack of these regulating animals of prey. Whether he likes or not the one who eliminates these animals has to take these tasks.

8.1 Modular lesson: A working day with a school class

In the morning we start with an excursion in order to get to know the living spaces of roe, stag and elk. With the help of a copy that had been distributed (SCHULZ-KÜHNEL 1983) and on which the trails of the most important animals are marked, we start looking together for these animals. We go and look for areas in the forest, in which there are places on the ground and at water courses where the imprints of the wild animals could be found. In this way the pupils learn step by step to train their forces of observation which then at further outdoor activities concerning the hunting are enlarged. On hand of browsing traces at the vegetation the pupils learn to get to know the habits of eating of roe, stag and elk. Roes are rather active at certain points while taking in their food, whereas the stag grazes more systematically (like a cow).

A central point of instruction at the theme of wild animal ecology is the observation of these animals. Here now is the difficulty how to go practically about the observation of wild animals with a whole school class?

This becomes possible through common building of hunting seats (see at the end/ Camphill) to learn wild animals observation with a school class.

If there are a few of those hunting seats it is possible to use the hours of dawn in the morning and evening for a common observing with a school class. But it is necessary that at such common undertaking an adult expert has to be present. The pupils are made aware to wear respective warm and rain proof clothes.

8.2 Evening lessons and record book

As basics for lessons one can refer to the practical book for biology teachers (SCHULZ-KÜHNEL 1983) that has been especially written for the theme biology and hunting.

Foresters occupy themselves rather with the exploration of the interrelationships between the ecosystem forest and the animal species that live in it, especially the cloven-hoofed game. A minor browsing is tolerable and planned in an intact ecosystem. If the ecologically acceptable
measures are exceeded (Illust. 26) then an ecologically orientated hunting has to happen. The
hunt has to judge and regulate the interrelationship between the ecological laws of the forest
and the effects in the wild.

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Illustration 36 shows us the results of an excessive stock of wild animals that destroy their
own food basis. This damage could be observed all over the middle and north european
forests.

8.3 Possibilities of further deepening work and list of materials

In every region there live animal species that are endangered by dying out. These species can
be presented by the teacher and got to know in their claims to living space. Through a
respective shaping of certain parts of nature there can tending measures of biotopes be done.
There can e.g. on prepared areas seeds of wild flowers be sown out in order to offer new
living spaces for butterflies. The same shrubs could be planted at the boundary of a forest in
order to establish new life spaces for bird species breeding in hedges.

There is as well at many places the possibility to visit projects of breeding and returning
animals to nature (e.g. mountain hen (*tetrao urogalus*), beaver (*castor fiber*), wild cats (*felix
catus*).

8.4 Extended teacher knowledge and list of materials

Hunting in the modern world is to be understood as a service for the free living nature. In
informing the pupils a careful profound information has to be anchored that entails the
biotope management of all free living species of wild animals Also the world view of Saint
Francis to guard creation and to take on responsibility for it fits into these training activities.
Hunting and nature conservation
A modern understanding of hunting has to have a wild-biological ecological foundation. Starting from the idea of a serious wild biology the killing of wild animals is seen as necessary where wild species are not anymore capable to regulation by themselves on a level that is compatible with the culture of the country. This is only the case with the clove hoofed game. Hunting periods and methods are to be limited in that way that the wild animals are only little disturbed. A feeding is also to refuse as well as the controlling of potential carnivores. The central point for the tending is the guarding and fresh shaping of the living spaces. Herewith the main common field of tasks of hunting and nature protection is outlined. The special engagement belongs to the endangered wild species like owls (*strigidae*), birds of prey (*accitipridae*), lynx (*lynx lynx*), snipe (*traoninae*) and wild cat (*felis catus*) (SPERBER 1994, 107f).

list of materials
Copies of animal trails, pine poles, hammers. nails, saws.

It exists a journal that treats the theme of the relations between ecology and hunting (ÖKOJAGD, see literature table). Books about the theme of hunting ecology ca be get through: [www.ökojagd.de](http://www.ökojagd.de)
Themes at basic ideas and the practical hunting are treated in: (BODE 1990/ HESPELER 1988)

### 8.5 Discussion to points of view of learning responsibility
Remembering the own time of transition from the adolescent to the adult shows concretely the conflict between feelings of freedom and the beginning pressure of responsibility that had been caused by the complexity of the starting connected thinking. Connected thinking means to find the transition from linear to cyclic thinking. All human acting entails consequences that can be visualised, extrapolated and be exercised before they happen. It is as far as for the future necessary competence, as one is able to imagine already at the beginning of an action what the end will be and thereby arrive at a cyclic thinking.

We would like as well to direct our attention to the fact that the growing-up generation can be lead out of their isolated isle existence in kindergarten and school with the aim to create a new
social culture through a co-operative network of knowing and capable co-human beings (WALDEN 2001, 11).

To create social culture is necessary in order to invest the pupil with social competences, so that he can step by step find his way into the connected structures of our post-industrial society. The pupils should sense their social integration at possibly many connection points. Social integration is a complex phenomenon and corresponds with the need to perceive things in a holistic way. Yet this stands in a huge difference to great parts of the well-planned and rational arranged reality that more and more is dominated by medial connections that makes believe of a social integration.29

The reform educator Kurt Hahn worked at this social integration as he developed in 1958 the therapy of experience (HAHN 1958). This puts the learning through concrete action and practical living relations in the foreground. For this Kurt Hahn presented the following list of priorities of educational and learning tasks:

- forming of the character through an education towards responsibility through responsibility.
- forming of intelligence through concrete acting with practical relation to life.
- formation of knowledge as risk and trial; see pedagogical province (Goethe 1789) in which as places of experience regions are chosen which are hostile towards human beings with high potential of challenge, as the sea and the mountains.

A further development of this reform pedagogical beginnings by Kurt Hahn are to be formed under the international concepts of outward bound and united world colleges. All these forms

29 Did the Spartans (city state in antic Greece) put the possibilities of learning and education of the individual completely under the utility for the state . . . so the contrasting assessment of the Ioniens (city state in antic Greece) who gave absolute priority to the education of the individual before the need of the state and society . . . Therefore the synthesis like holistic idea of Plato fascinated, who started from the thought that education directed towards a beautiful soul was also an education in the interest of the state: the good mood of the soul, reachable by the right mixture resp. integration of gymnastic and music in the education, would further bravery and prudence (BAUER 1987).
are valid under the guiding principle of education to responsibility through responsibility continually up to now (ANTES 1997, 16)

The popular concept of a pedagogic of experience that have been under the label project adventure (PA) theoretically grounded and put into praxis at public schools, have their roots also with Kurt HAHN. PA got in the 1970s the status of a national model character of the U.S. Office of Education and was practised in the most different types of schools (FEIERABAND 1997, 107).

Also for the activity oriented ecological educational work this aim of learning responsibility has a high priority and offers plenty of fields of exercise in the different modules.

For the learning module the chase as an integral part of tree care following points of discussion result that have to do justice to the principle of learning responsibility:

- change of landscape and its consequences for the animal population (BLACKBURN 2007, 33/ LIECKFELD 2006, 224f)
- loss of the spectre of robbery (bear, wolf, lynx) which served al a regulator for the herbivorous (ÖJV 1997, 37f)
- loss of the species of mixed trees by browsing through game: the actual loss of species of mixed trees in the initial phase of wood stands is an ecological disaster (ÖJV 1999, 62f).
  By means of a statistically grounded inventory, the problems of browsing can be quantified and qualitatively judged in its consequences. (BStMLF 2008, 2).
- Impairment of soil protection function in heavy sloped mountain forests that entails a not admissible damage of future functions of stabilisation (mixed forest) (LEIBUNDGUT 1982, 184f).
- change of the function of climate protection as through the loss of the generation of young forests a grassification and a always furthered thinning out of old tree stands takes place. (ÖJV 1999, 23)
- forest protection through fencing; the possibilities and boundaries:
  possibilities: in times of the change of climate young forests rich with species should possibly be able to grow. So, also rare species can contribute to the stabilisation of the eco-system.
• boundaries: in regions rich with snow in the highlands and high mountains fencing is not possible, because every springtime the thaw tears away the fences (change of thaw- and frost phases).

• forest protection through measures of fashioning biotopes e.g. at wood edges and humid areas.

• forest protection through hunting as a possibility of regulating the herbivorous to an ecologically tolerable measure. The hunt needs a new ecologically adjusted model that does justice to its all-social integration. Hunting is not a free time fun, but serves future oriented ecological reasons. The too low intensity of hunting that happens outside of the social perception has far reaching consequences for the many forests that should be brought to the public consciousness.

It should be striven for the conveyance of possibilities to socially integrate pupils in divers environmental protection groupings which aim towards elements of measures of shaping biotopes concerning the wild living animal kingdom (e.g. guardians for ants, working pool for natural forestry, mountain forest project, union for bird protection, union for nature protection, Greenpeace, ecological hunting association, UN biotopes reserves). Also a free ecological year at one of the just mentioned groupings can be used to deepen the knowledge and for social integration.

Finally it should be looked back to the initially put main question. It says: how far can out of the control circuits of the forest a sustainable thinking, feeling and action be grounded?

The next forest generation is according to recent scientific knowledge is subject to quite a pressure of browsing by the wild living herbivorous (BStMLF 2008, 2f). As this fact lies in an absolutely still area of social perception the ecological losses caused by it should be brought into the open. The processes of becoming conscious are linked with a patient work of informing, before the emotionally controversial theme of hunting can be brought up. Hunting should be regarded in future as a necessary service for the ecological resources of our forest eco-systems.
Epigramm

Slowly through the rapid time, blows a breath of eternity

BITTLINGER 2007

9. Pupils fashion old, more than 100 years old woods (module 9)

In many places of the world one should put up big signs at old trees saying: SOS! The fight Julia Butterfly Hill had with the Californian ‘Maxxam Pacific Lumber’ wood industry became world wide famous in order to achieve consciousness for the saving of the splendid Redwood stands. Although by clean cuttings land slips were caused the respective ministries allowed further clean cuttings despite contrary expertises – according to the principle: After us the Flood! In December 1997 the twenty year old Julia B. Hill climbed in this area of land slides a huge thousand year old mammoth tree and lived on it uninterruptedly for 738 days on it (HILL 1997, 11f)

Illustration 28: A 600 years long tree life came to an end in 1907. (Thuja plikata)(ANDREWS 1984, 43)
In contrast to the primeval forests of North America (illustration 28) in Europe there hardly exist anymore such age phases of forests in order to be able to show really trees of old age to the pupils. At best in urban parks exist still older solitary trees but these grow so vigorously because of their free standing and an excessive crown development that through tree chirurgical measures they have to be hindered to break apart. In forests the trees grow rather upwards like columns because of the light concurrence of neighbouring trees and do not form too large crowns, that is why they can become much older seen from the side of their biological age.

The letting grow of the forest for its own sake in order to let it become grown up and let it live through its phase of old age does in reality not take place. Therefore we do not know at all an important part of the life of the forest. Parts of the European forestry harvest a forest when the average wood increment per square dimension has overstepped a certain maximum of an increment normal distribution diagram. This means at a close explanation of mathematical increment modules already the end of a ca. fifty year old life time of coniferous forest. Mostly the trees are harvested by means of a harvester in order to link up again with a new plantation at the quick growing phase of adolescence. The adulthood, not to mention the phase of old age of a tree life never becomes visible! Do we really know what trees and forests could be like?

The main theme of this learning module consists in the answering of three central questions which are the basis of all living systems:

- Who are you? (present aspect: actual stocktaking or the respective part of the forest)
- Where are you from? (past aspect: recognition of former forestry)
- Where are you going to? (future aspect: concepts of the ecological further development).

In this module activities will be done with the pupils as they are normally done by the foresters in charge: the valuation and taxation of wood stands and the written formulation of the further measures of wood tending (in forest language: forest management).
9.1 Modular lesson: A working day with a school class

At the beginning of the day enlarged copies of a hiking map are handed out to the pupils about the area that will be walked. If it is raining the maps have to be protected from the rain by a transparent cover. We walk to forest plot that in the course of the day should be intensively inspected. First we will walk the length of the boundaries of the forest region we want to describe and mark it with red-white roadwork ribbons so that no pupil can lose orientation. It should be an area on which exist an initial forest (0 – 20 years old), a young wood (20 – 50 years old), middle-aged (50 – 100 years) as well as especially over hundred years old stands. After the pupils have been shown the various parts of the forest a headquarter will be fixed and marked visibly by red-white bands. There the forester and the teacher are waiting in order to assist, if there is unclearness. The pupils then get several work tasks in the course of the day:

to sketch into the map the places of the various old parts of the forest.
to fix the average timber stock of the part of the woodland.
to set up criteria for the actual tending of these stands.
How did the tending of woodland look like in the past?
Measures for the future improvement of actual stock structure.

**Drawing up of a forest map**

The pupils walk the approximately 0,1 – 0,5 km² (10 – 15 ha) big forest area in groups of two and mark the places of the different aged part of the woodland with the following coloured pencils in their map copy:

- yellow = over 100 years of age
- red = 50 – 100
- blue = 20 - 50
- green = 0 – 20

Convenient for the perimeter of the area are existing forest roads and tracks.

*The headquarter* as starting point for this walk and is marked on the map as a first thing by everybody.

For this first walk a time limit of one hour and a half is agreed on after which one meets again together at the headquarter. To remember it a signal by a French horn could also be arranged.
There should be at least two adults present so that always one of them could help the pupils in the countryside if there are questions.

Then the best possible sequence of such an orientation walk is explained: first of all one walks the boundaries of the area and marks with coloured lines the changes concerning the age of the wood stands. Then one takes two approximately rectangular diagonals through the whole area in one’s stride and marks with coloured points the changes in the existing wood ages. On hand of the coloured lines of the border one can state where one has come out at the opposite side. After two diagonally to each other lying walks one walks the boundaries of the stands between the differently aged wood parts and hatches thereby with various colours the respective part on the map. By doing this the ability of the pupils’ spatial estimation is trained and a piece of the forest nature has been made clear. This systematic which has been just explained to the pupils will now in a second sequence of walks put into praxis with a new theme.

At the end each group gets handed a coloured copy of the right solution set up by the forester.

**The locating of timber supply**

Depending of how advanced the time is, a common snack around a small fire will happen in the headquarter. If it is raining a big tarpaulin should be put up and out of pieces of wood and poles simple bench like should be built.

Now the pupils get handed so called dendrometers, that enable a selective counting of the amount of timber presently standing in the forest. They exist of a simple 10 cm long piece of metal that has got a window. With the help of a cord one looks at an arranged distance through this metal window and counts in an angle of 360° degrees the trees which appear in the window. With help of copied tables every pupil is now able to convert the square meters of tree areas, that appeared in the dendrometer into timber supply. This procedure is exemplarily presented at the headquarter until every pupil gets approximately the same result. This number is then inscribed in the respective wood areas on the coloured drawing that has been made by the pupils and is rounded with a circle.

Then it is agreed upon a further one and a half hours until each group has made a survey of the existing timber stock in the area. Per stand there will be three different measurements
done in order that the pupils learn that every measurement can always be only a spatial snapshot.

The hardly measurable timber supplies in the young woods are first not mentioned, so that the pupils themselves while measuring can think of it. For the timber supplies in the forest there are scientifically measured values which go back to the years 1900 – 1960. With those the dynamic growth of wood stock can well be demonstrated to the pupils. (SMIN.ELF 1990, 3f)

If one notices that midday is reached that part can also be left out in order to come to the more important part of the wood tending measures ( aspect of the present, of the past and of the future).

**Setting up of wood tending criteria (aspect of the present)**

The point is here to know the necessary forest tending measures directly at the object in the wood areas of different age and to be able to formulate them in writing. Each group gets handed a cord of 40 m length that has got a knot every ten meters with which a special area of 100 m² can be marked off. Then the pupils get explained the necessary tending measures on hand of all four different age stages of forest development. These exemplary areas get well marked and the necessary tending according to their age is discussed. Then the pupils are asked to mark on site with coloured ribbons the trees of the different stages of development. Especially good trees get green bands, whereas the ones which impair them are marked with a red ribbon.

We start with the over 100 year old stand, as they do not allow so many possibilities of choice. After a quarter of an hour one gathers and together one walks the different marked tending plots and the pupils explain to the listeners their tending propositions. In an instructional discussion eventual mistakes are corrected through questions for better understanding and faulty marking is corrected. It is important to allow the pupils only fifteen minutes time for own decisions and to restrict the following discussion time to not longer than forty-five minutes, so that there will be no problems of concentration. In case some groups of pupils will not have the chance to speak up, they will get the opportunity in a following second phase.
After the 100 year old stand the pupils mark the 50 – 100 old one which is red on the map. Short introductory mentioning remind of the essential points of the walk in the morning, at which the tending of all four forest development stages had been shown. A short visit of the accentuated exemplary stand revives the memory. One should not forge to arrange a recreation break every one and a half hour in order not to overstretch the pupils’ concentration capacity.

Now follows the treating of the tending concept for the 20 – 50 year old forest region. The younger the wood part gets, the higher is the number of trees on one hundred square meters and the more difficult get the challenge for a qualified forest tending. The in the map marked exemplary stand is repeatedly discussed and the 100 m² parts are rounded with the cords. Helpful are small pieces of paper with the pupils’ names, pinned to the trees, so that the parts can be found again.

Finally follows the tending of the youngest wood parts that belong to the initial phase of a forest. Of this kind there are especially many trees assembled on an area of 100 m². Respectively high is the difficulty to formulate principles to tending and to fix them to the trees. Nevertheless it should be resisted to the temptation to work longer on it than 15 minutes. Most of the time takes the following revision that should in this case also happen with every group. Not to forget the breaks to foster concentration.

At the evening lessons the respective tending principles in the different stages of forest development will be again repeated and written down. At that occasion the activities of the day will be assigned to the three afore mentioned basic questions of living systems. (Who are you? Where are you coming from? Where are you going?

How did the forest tending of this region look like in former times? (aspect of the past)
At this point the pupils’ abilities of observation shall be trained. In the course of the past day they walked the forest region several times under different angles of view.
Where are fresh or old tree stumps to be seen?
Are somewhere stems with straight sawn ends lying around?
Are perhaps forgotten or mouldered heaps of burning wood to be found?
Are there somewhere old lanes full of water?
Where are birches (*betula pendula*) to be found in the stands?
Now one tries to estimate, how many years approx. ago loggings happened. Birch trees grow only on former felled areas and are a sign for a certain form to treat the forest which entails a revolution like change of generation.

**Measures of a future improvement of the stand structures**

Hereby it should be made clear to the pupils that after a look at the past also a look to the future of a forest can be cast:

How will it develop further?

Can this development be guided positively by certain measures?

Which trees are missing at present in order to form a future mixed forest?

In the course of an instructional discussion at site stand by stand can be talked about and found out which ideas the pupils have got for the future of simple forest regions. The question of a mixed forest could be illustrated on hand of a final excursion, to let them see the beauty and productivity of a mixed forest. At this occasion it will also come up the question of hunting treated in module 8. Perhaps the final planting of deciduous trees (ball plants) could be a nice close of the day. These single planted trees could also be protected from browsing by game through parts of a hurdle fence.

**9.2 Evening lessons and record book**

The evening lessons have the task to fix the knowledge which has been gained during the day and to establish thoughts that go beyond. Each forest measure has effects on the animal and plant kingdom. The highest number of species and individuals show the mixed forests rich on deciduous trees. Especially bushes foster the number of species. (Illustration 29) This is an important argument, in order to show the pupils the necessity of a to the future directed, fashioning oriented forest treatment.
The knowledge that were gained during the day can be joined in the record book.

The next step is the short formulation of the tending criteria for the different aged forest development stages. They can be taken from modules 3,5,7,9 (present aspect).
After that the observed signs from the past are put together (past aspect).

Finally the future possibilities for an improvement of the local situation are fixed (future aspect).

Finally it shall be reminded of the three questions (Who are you? Where do you come from? Where are you going to?). Especially thoughts of transfer would be desirable and should be pushed forward. The transfer of the three already mentioned basic questions of living systems up to the personal questions, which live in the young soul would be worth striving for.

9.3 Possibilities of further deepening work

If in such an old forest it should be worked more than one day; further activities are possible that should deepen the knowledge of old forests:

- to plan spatial development (lanes convenient for timber transport adapted to the countryside)
- A mathematical going through the timber stock (professional: full tally up: measuring of all trees (on chest level) on a piece of forest.

**Planning the spatial development**

Now it is the point to teach the pupils that forest tending is always combined with the necessity of wood harvesting. But timber can only be transported out of the woods by special vehicles. In former times this hauling was done with the help of cows or horses. Sometimes there exists still such a hauling horse and this would then be the occasion to demonstrate this very old co-operation between animal and man. Mostly the animals have meanwhile been replaced by respective tractors and special trailers. These need a certain net of forest roads which have to be laid out in a meaningful way.

This setting up of the development lines for wood harvesting is discussed together with the pupils. For this purpose an already existing forest path turning off the forest road will be marked with yellow paper ribbons. Mostly there exist only a few paths that is why it has to be well considered where there is a possibility for a trailer to go in spite of brook courses and rocks in the country side. Respective trails are marked with yellow bands on trees and those that are in the way are signed with red ribbons. In this way bit by bit a possibly old and not so dense standing forest plot is marked.
What is to do in a dense young standing? In this case a yellow rope wound up on a cylinder and a compass are used as means to get through a country side which is difficult to oversee and to be able to transfer from the map the best set up into the countryside. For this purpose it is explained to the pupils in which way the map is adjusted to the direction north and then gets the compass number for the there marked direction of the setting up.

**A mathematical going through the timber stock (technical: full tally up)**
The measuring of forest regions is a welcome possibility to give a practical example for maths lessons. The pupils are provides with so called callipers in order to measure in approx. breast height the diameters of trees. The measured trees are put down into a list and marked with chalk so that they are not measured again. The result is the well known curve from the normal distribution by Karl Gauss (mathematician who discovered that all biological systems in their number of individuals incline towards a bell like distribution).

**9.4 Extended teacher knowledge and list of materials**

*This was logging* (ANDREWS 1984, 20f) offers good insights in the timber harvesting activities of the often huge seeming trees of the harvested North American First Growth Forests (look back to illustration 28)

There exists a journal for the long term treatment of the forests: the long lasting forest. It is a well understandable specialised journal for natural forestry and appears twice a year (DAUERWALD; see list of literature).

There exists also a book service that has books on stock which can not be got anymore about this form of the long term forest treatment: [buch@anw-deutschland.de](mailto:buch@anw-deutschland.de).

The working group of natural sensitive forestry (ANW) acts since 1992 also under the name of PRO SILVA EUROPE that has been founded as a European holding company.

In the discussion article follows a representation of the philosophical basics of the idea of organism. This organism idea is up to today not come to a standstill, as the following quotation shows: Every obvious organism that meets us as an object has in the moment of observation to fulfil the conditions of a system. One ought to be able to describe the outwardly to be discovered facts and their course of efficiency. But if we see in that what we call organism (a human being, a plant or the earth) something different as a pure mechanism, which can be thought of being complicated and regulating itself, then we go back to experiences that cause us to differentiate various sorts of systems. . . We grasp that what we really understand by organism, when we notice how concepts challenge and complete each other and form a unity in our thinking. As pure inner experience is this spiritual sight as sort of inversion of the outer perception at which everything must exist besides each other and demonstrate the general in a special form. In the variety of the forms of appearance the view can be guided on to this general, so that can become more extensive what one calls abstract under the name of organism. A holistic cognition of nature starts with the expansion of such experiences on the way from the sense appearance to the inner view and turns then, guided by it, the view again back to the sense appearance. For the view of that which one understands as an organism, both these ways have to be experienced, because it is essential to notice in the concrete case in one’s own thinking in which relation of action stands that what had been seized in the idea to that which one has perceived. In this way the process of cognition is understood in the sense of a metamorphosis. This becomes as demonstrated beforehand, a way of recognition to understand life. (BOCKEMÜHL 1992, 203)

**List of materials**

40 m cord, note book, colouring pencils, paper ribbons (green, red, yellow), dendometers).

**9.5. Discussion about the basics of long term methods of forest tending**

The organism idea is the centre of long term methods of forest tending which Alfred MÖLLER formulated at the forest academy Tharandt/ Germany around 1910. He was hoping that with it forestry would enter a new epoch. His view directed towards a biological wholeness of the forest aimed at a maximal possible variety of usage for the common good of all citizens. His central thought was, that he rejected a wood production per area unit ,
directed towards the highest rentability (soil rent theory\(^{30}\)). He demanded an enforced keeping of growing stock of standing old trees. Stronger trees are the backbone of the forest that has to fulfil many over economical functions (genetic memory, bird protection, water economy). That what brought him at that time the reproach of being a dreamer, is today actual nature protective relevance. His statement then about the concept of forest being would today be called forest ecology. It sees in the forest a uniform living being with innumerable many organs which all work together and are with each other in an interchange. In the space between the highest crown tips and the most outspread root ramifications in the soil can this being be found and everything that is in this space, lives and weaves, is part of this organism. This forest being is thought to be of eternal durance. It lives, works and changes. (MÖLLER 1922, 93).

Out of the idea of organism developed three centres of gravity of work of a long term treatment: the principle of the mixed forest, the principle of the natural regeneration and the keeping of growing stock.

- **Principle of mixed forest:** it contains the creation and keeping of stands possibly rich of species that correspond to the respective places of standing (site, climate, soil). A clean cutting forbids itself, because besides a sinking of the ground water that minimizes the wood growth, always entails a loss of frost sensitive species of mixed trees (look also at modules 1, 2, 3, 5, 7, 11).

- **Principle of natural regeneration:** out of the seeds of old trees a young forest grows. Great attention has to be paid to the exertion of hunting, so that the loss of variety of tree species is kept to a minimum (also included at modules: 1, 3, 5, 7, 8, 10, 11).

- **Keeping of growing stock:** the best old trees stay as genetic memory in order to propagate. Strong dimensions further the forest aesthetic (look also at modules 1, 9, 11, 12).

\(^{30}\) Soil rent theory: its founder Robert Pressler taught 1840 – 83 at the forest academy Tharandt this profit maximization of forestry which entailed a massive wave of growing monocultures of coniferous trees.
A big progression brought also MÖLLER’s dynamic view of tending, keeping and increase of the productive forces of the soil that he called *life filled spaces*. They should through the planting of soil tending tree- and shrub species as well as increment of humus be entrusted to our special attention. From MÖLLER also stems the strict belief that a complete deforestation is murder at the forest organism, because it kills a beneficial soil life world that recuperaes only after decades.

The research couple Annie H. and Raoul H. Francé formulated in 1957 visionarily: *a local deterioration of the climate is always to be apprehended, if the forests fall . . . After the destruction of the forest follows an increasing turning into steppe of the whole landscape. Everybody can persuade himself of that. Everybody feels it at his own body that the winter are becoming more stormy and also poorer of snow, the summer hotter and lesser of rain. The impoverishment increases and becomes on its part the cause of sinking soil yield* (FRANCÉ 2007, 349).

With this quotation we have arrived at the actual climate report of the World Climate Council IPCC\(^31\) that with a minimal of warming up of two degrees Celsius for the next hundred years, forecasts a loss of living space for the Middle European main economic tree species spruce (*picea abies*) and pine (*pinus sylvestris*). It is completely unclear, with which species of coniferous trees a phase of substitution could be entered.

Despite a permanent failing of coniferous monocultures the yield dominated thinking of the forest people has never stopped. Often wrong agricultural ways of thinking (explanation for cost-effective cultures, minimal tending energy, highly mechanical harvesting procedures) are transferred on to the forest. This is astonishing at the sight of the fact that the world wide 1,3 thousand millions ha of agricultural areas face three times as much forest area (FAO 2007, 141). With this the forests with their climate relevance and the capacity of generating energy are far superior to an agriculture with an energy using input.

Irmgard Heck points in her work to the theme: *ecological thinking as didactic dimension and school task* in the direction that the school has the task of forming a life-consequential behavioural disposition of the pupils. This entails that the schools of the future have to initiate

\(^{31}\) IPCC: Intergovernmental Panel on Climate Change
an ecological way of thinking. Thereby the schools can fall back to experiences that have been gained in an ecological praxis for long years (HECK 1978, 262ff).

A positive political signal came from the 5th Conference of Ministers for the protection of the forests of Europe that took place from 5-7 November 2007 in Warsaw. The MCPFE\textsuperscript{32} ascertains an exemplary role of the sustainably cultivated forests of Europe that especially play an important role in the reduction of the change of climate as well as in the provision of energy and in the water household. Through innovative and effective pan-European contributions a further enforcement of the UN – Forest Forum (UNFF) should be reached. For autumn 2008 a pan-European week of the forest under Norwegian guidance should underline the importance of the forests and by this reach possibly wide parts of the civil population. (SCHNEIDER 2008, 136ff)

Out of the control circuits of the forest organism further questions can be suggested.

The questions put in this learning module at the time \textit{gestalt} of a forest stand ( Who are you?/presence; Where are you from/past; Where are you going to/future) can lead to innovative processes of thinking. Also the cartographic fabricating of a forest map as well as the formulating of the goals of tending aim at abstractive contents, observing ones as well as cognitive ones.

A second kind of question touches the level of feeling and asks how the action oriented ecological education with its broad spectrum of activities can manifest a meaningful completion for the intellectual knowledge to acquire? E.g. the learning processes that train a special orientation in a strange area, are by experience tightly linked to the level of feeling. Initial frights are changed step by step to an existential feeling of facing up to the strange in the landscape and to be able to overcome oneself. The training of the self consciousness is always also linked to the enforcement of the feeling life.

\textsuperscript{32} MCPFE: Since 1990 it serves on the governmental level as platform of discussion for important European forest themes. It furthers the sustainable cultivation of the European forests and is with 46 nations as well as outer European observers a important international forest organisation that also takes in external imaginations and experiences of NGOs (Non Government Organisations).
The third kind of question concerns the learning of responsibility that leads to an action (action competence). E.g. the pupils are put into the position to learn out of their observations to judge the forest situation. They fashion a description of development for the future tending of differently aged parts of the forest. They train themselves in formulating and the representing the facts worked out by the team.
Epigram

The forest does it differently. It has realised the third case, that you can not find in living together. For it, life community is neither socialism nor reigning. And charity it does not know. But - helping each other and adaptation. And its justice is selection. (FRANCÉ 1922, 28)

Illustration 30: GIACOMETTI: the wood; „magic of trees“ Basel (Beyeler 1999, 95)
10. Clear cutting and fire as destruction principles of the Earth’s forests. (module 10)

Daily there disappear worldwide wood areas of unimaginable extend because there still exist structures that support the short sighted maximisation of gain.

In a conversation at an international silvicultural conference in June 2006 in England I talked to an English forester who had trained in Bangalore/India. He reported of a decisive experience of his application at an Institute for World Forestry for that he had to elaborate a recommendation of treatment for a tropical primary forest. After he had presented his sensible suggestion he was told that the right answer would have been to cut this forest clean and to deposit the proceeds of the timber at a bank so that it would bear optimal interest. A usual interest yield would be much more secure than to build on further timber increment which perhaps could even not be realised.

This example shows the entire dilemma of a thinking which is not directed by the principle of sustained yield.

Or with other words:

Every purse crash shows that huge amounts of money can become worthless overnight whereas an organically grown forest would enjoy a continual increase of value because it grows day by day. And even, if it is thrown down by a storm, if a catastrophe happens so to say then its products in form of timber is still usable and not without value.

The pedagogical trick exists in the fact to practise these wood destroying activities with the pupils themselves, so that they out of the self-experienced level of being can be guided to an impulse of protecting and preserving.

_A well understood pedagogic should convey to the pupil images and later also conceptions that carry in them the motif of self-overcoming to help them gaining trust in their hands. It should in its various forms respecting in which way and in which age the child understands, proclaim that man has the possibility and the order to confront the shortcoming of nature as does the artist with the bloc of stone. The growing human being does not gain out of cold_
knowledge and mechanic training of capacities the trust in life, but that motivated to creative doing and filled with soul enforcing images understands that there is a way from the creature to the creator – the possibility to overcome the mere suffering of the world and its laws and to contribute to its beautification. . . . In its own taking place the individuality frees itself from its conditions . . . because in adolescence the question culminates: Am I only a small wheel in the world, powerless and exchangeable or am I needed in this world? (KÖHLER 1999, 54)

10.1 Modular lesson: A working day with a school class

In exceptional cases there will be the possibility to carry out a clean cutting together with the pupils so that the experiences of this doing stays quite lively in the soul. There are e.g. regions where a natural regeneration of former existing human habitations has happened. These could have been former village places which at the time of the plague have died out or former alp spaces where not before long cattle had been held. There are initiatives to open such places again which would mean a pedagogical motivation of learning for the pupils, for it connects this subject with the present and its demands to understand the world by doing. So a one day action or several days could be passed with the pupils to carry out such a laying open of a place that was populated by human beings.

At an excursion first eventual stone foundations of houses in nature will be shown and the feeling will be visualised how it would have looked like, when there was a free space there.

Next a tree growing at the south side of the house will be felled, so that the next day the course of the sunlight can be studied: at what time in the morning touches the first sunbeam the house and when does it disappear? Then a tree at the west side of the house will be felled in order to be able to explore the course of the sun in the afternoon.

The same will happen at the morning side in the east of the foundations. From east to west the enjoyment of the sun will be raised in form of a lemniscate (geometrical form of a lying 8) and always further increments of the light space will be achieved. In this way the pupils will experience the coming about of the feeling of space that is created as a mirroring of their active hands. They experience also the direct confrontation of their acting with the reality of a caused wound in the forest organism and are learning to assess one against the other and become conscious of the results of their deeds.
The felled trees are freed from branches and fires are lit, in order to burn the branch wood and
the brushwood. Hereby the pupils come into a new level of experience (illustration 31).

*illustration 31: usage of resin on old pines (Pinus sylvestris) (SPRING 2005, 126)*.

Already at the felling process it smells of resin and green needle wood or aromatically
scenting of broad leaved wood. When then the fire flares up it is fume and smoke that lead to
strong smell experiences, (illustration 32) Then is added the experience of the heat by the fire,
that can be experienced as an elemental force. Hereby also etherical oils are freed and the
whole work spaces are filled with different fragrances. Out of experience these activities are
very popular with the pupils because they unlash strong sensual stimuli.

*illustration 32: fume and smoke*

For lunch it is especially attractive if the teacher gets out of his rucksack an old pan and eggs
and then fries on a *Sweden oven* a proper lunch. In a slice of bread a ca. 5 -7 cm hole is cut
and then put into the greased pan. Is the pan hot enough then an egg is beaten into the baked
bread crust and is fried in a few minutes. The egg bread can after a short moment of cooling down be eaten by hand without problems. Per pupil two eggs are needed so that they are satisfied. The *Sweden oven* exists of a dry pieces of wood trunk of ca. 50 cm length which is crosswise sawn and is provided shortly before the lower end of the trunk with a three edged fire space. In this a small fire is kindled with left over wax and wood splitters that by and by sets the whole cross formed trunk into fire. One can then easily test, if the pan is ready to be used.

The common meal belongs to the archetypal experiences of our former hunter and gatherer culture and enforces the feeling of community and belonging together. The above mentioned meal can also be done with pancakes at activities of several days. The teacher needs only an empty jam glass, as well as a bag of milk and one of flour, some salt, sugar and resins to have packed in his rucksack. In the jam glass everything will be well shaken and baked in the hot pan filled with grease. Also potatoes wrapped in foil and baked directly in the campfire give a tasty meal together with a sausage conserves or lard. For cooking in foil approx. 30 minutes have to be counted without the time for wrapping the potatoes. After that one tries with a pocket knife, if there done. In the embers of the fire they also have to be turned over with a stick, otherwise they will char on one side. Further nature recipes are to be found in: (HELM 1978, 172f/ HENSCHEL 2002, 24f).

In the extended discussion of clear cutting and fire the theme can be abstracted in order to come to talk about the worldwide destruction of huge wood areas. In the principles of both blessing and curse are hidden and it is up to man who decides, if his deeds have a healing or destructive effect on the earth organism (illustration 33).

*illustration 33: fire impressions*
10.2 Evening lessons and record book
Mentioning of exemplary worldwide initiatives for the salvation of the forests of the earth:
www.greenpeace.de.

Showing the differences of certificated forests and their principles of forestry:
- FSC (international label for the marketing of wood areas sustained managed and produced wood products with social minimum stand standards).
- PEFC (European (-international) counter label with minor standards than FSC)

At all present problems in the world wide wood systems it should not be forgotten to furnish the pupils with possible modes of attitude which would result in a natural treatment and processing of the wood and its products. An inspiring source for the theme of the age old life of man with the wood and timber conveys how we can behave in future in order to treat the wood and timber in a better way. (THOMA 1996, 12f).

10.3 Possibilities of further deepening work
According to the season it can be decided, if one would consider to pass the night in sleeping bags in order to plunge in a deeper experience of the phenomena of local activity.

Long term observation of changes of the flora through experimental areas after a clear cutting or a fire in the forest; fencing of part areas in order to show nitrogen eater (e.g. epilobium, raspberry and blackberry) that otherwise is eaten at once by wild animals.

Excursion into former wood fire area (Ruan, Fyredal, Telemark, Norway) where old fire catastrophes are to be seen. The reforestation after fires can be shown as well as relics of the foremost wood generation spared by the fire

10.4 Extended teacher knowledge and list of materials
Insofar the main question answers itself: How can out of the control circuits of the forest, thinking, feeling, and acting be disposed, in the following way: the forest is an organism that finds itself at the same time in a continuous becoming and going and by this experiences a certain character of eternity. Sustaining growth happens at the same time as falling apart of
bio-mass which, according to the respective climate happens in seasonal pushes or becoming and passing away. The rotting of dead wood (branches, trunks) and leaf- and pin strew equals a slow burning process that in the fire is accelerated.

There are different objections to the use of fire with pupils:

Firstly there is the argument of imitation that especially younger pupils could succumb to. My checking back with teachers showed a different picture and mostly it was stressed that the theme of fire with the work in the wood had been disdemonized and was put in the sphere of life-practical level of perception.

A further argument comes out of the climate debate that overstresses the role of the climate gas CO\textsuperscript{2} and denounces the fire per se as an oxygen eater and carbon dioxyd producer. Against it one could say that only the building wood as still wood manifests itself as reducer of carbon and works easy on the climate. The forest breathes daily in and out and rotting wood produces as a slow motion fire the same CO\textsuperscript{2} as burning wood.

The third doubt stems from the eco-system research and says that fire is only at home in the northern, boreal areas of coniferous forests of the earth. Also in the mixed forest of the lowlands is the increase of competence for the pupils to estimate as being important only the dead wood of 20 cm onward should be kept for the wood disintegrating insects (oryctes nasi cornis, stag beetle/lucanus cervus).

Finally it could be opposed that the danger of fire which got our of control through carelessness that could perhaps cause even a wood fire, is so great, that therefore one better renounces of this effective risk of the fire? With a sufficient protective band that was cleaned of growth and loose bio-mass there exists only a small and calculable risk. In he evening the fire has to be put out that usually is done with a spade and covering with soil, in order to hinder an eventual nightly flying of sparks.

One should not loose out of sight that our woodlands become more and more sensible through culminating pollution. The discussion about the dying of forests in the 1980’s showed that too apocalyptic images of dying make rather insensible than lead to a process of awakening. But this process is indispensable if we want to prepare the pupils for a life in the world of adults.
A reference book for this process is the book: *Dying forests – a question of consciousness* (BOCKEMÜHL1984, 8f).

**List of materials**
Tools for felling and fire.

**10.5 Discussion under the point of view of fields of sense-experience**

The learning module *clear cutting and fire* reveals itself especially as a field of experience of pedagogical interests, as widening of the perceptive ability, training of the sense organs as well as the orientation of experience.

From the pedagogical point of view one can say that many children know warmth and fire only in form of radiators and happens mostly in high-tech devices which run with gas and oil. The active getting involved with the elemental phenomenon of fire is a connection with reality which can be a counterweight to the medial realities of being pupil today. In the active occupation with the fire, external power potentials realise themselves, that are experienced by the pupils as highest possible climax of sense perceptions. The *magic* of fire is used in order to enthuse the pupil and to lead him into processes of work that carry an archaic power in them. The aesthetic of fire reminds of archetypal pictures, leads to elementary experiences and motivates the sense activities in a special way (smelling, hearing, seeing). The fire of work is the positive counter image to the destructive power of the fire, if it destroys a house or whole landscapes.

Our sense life has a special meaning, because it can just only be developed further through the sense organs. Only out of the existential contact zone of true sense experiences result characteristic possibilities of furthering of various fields of sense experiences:

- At the example of hearing: wet wood burns with other noises (hissing, snarling, singing) than dry wood (crackling, rustling, explosion).
- At the example of smelling: the fresh coniferous twig smells of ethereal oils and wet wood causes a biting smell and burning eyes.
- At the example of seeing: different colour qualities of the flames, flight of sparks and others more
• Also a strong emotional access to the sense stimuli of the fire can be observed:
• The gleaming of pupils eyes at the sight of the fire seems as a happening of retrospection and re-discovery of inner depths.
• A fire can be experienced as a centre of common acting.
• The self activity of the purifying fire that consumes naturally the ill, is experienced as process like reality. The field of experience of our holistic organised sense perceptions leads to an independant work, inside as well as outside.

*The pedagogue and artist Hugo Kükelhaus formulates: that, what exhausts us is that we do not use the possibilities of our senses and our organs, is their switching off and suppression. . . *That, what builds up is unfolding. Unfolding through the dealing with a world that challenges me in the whole. (KÜKELHAUS 2007, 29)

His life work is to be seen in a permanent exposition in Essen/Germany and is called: *field of experience towards the unfolding of the senses.* There the widening of the human ability of perception as a basic need of all human beings. Lively forces of movement of physical phenomena make the pupils experience, to perceive themselves as an individual of experience of a developing sense organism. This brings about a meaningful counterweight to the rationality of our society and shows the way to the intuitive, that lives in each person. Kükelhaus motivates to pay attention to the other that lives between the things, between thumb and forefinger, between tongue and palate and the word *intelligence* has its root in that, what has to be learned to recognise *living between the things.*

His intentions can be put in to the following quotation: *the development of man is optimally furthered by that environment that ensures a variety of well dosed stimuli. Without paying attention to the question, if this stimulating world is built of physical or social relations and factors – the variety of the environment is the vital condition.* (KÜKELHAUS 2008)

According to my experience a working fire happening in the forest, where e.g. a fagot of conifers contaminated by the bark beetle is burned, is already in preschool age an enthusing and basic experience. Also the adolescents of the 8- 10- agegroup, who are bursting of overshooting forces are getting respectful and quiet, when they are facing an up to 5 m high sea of flames. This eventful, hygienic effect of the fire that eats in no time the material contaminated by insects and serves therewith the health of the forest, is important, in order to
get to know on the one hand the blessing as also the curse of the fire (forest fire, house fire). Especially at pedagogical events in the forest, that happen in the rain, the beneficial effect of the fire, that dries the wet clothes, is estimated. Finally the meal cooked on the fire is an archetypal event that reaches far back into the ancestral history of mankind.

In summing up a learning of experiences ensues up to the responsible acting that puts the power of the fire into the service of leading human work tasks and deducts from the fire an effective resource of sustaining acting. The fire should be experienced as an integral metaphor and anchor itself deeply into thinking, feeling and acting of the developing being of the pupils.
Epigramm

The one, who can look at nature and internalise it, finds in it strength reserves, that for the length of his life will not exhaust. Not only outer beauty is part of it there also reigns a metaphorical significance in all natural happenings; in the yearly migration of the birds, in the tides with low and high tide, in the folded leaves of a flower bud, that waits for spring. In this ever repeating refrain of nature lies something immensely healing – the assurance, that after night follows dawn and after winter a spring.

(CARSON 1995, 12).

*illustration 34: Edvard Grieg, lyrical pieces, Heft X, Opus 71 Nr. 63, Edition Peters 3100a*
11. The forest as an organism - The further development of forest conservation (module 11)

Where does the forest conservation stand today? Champions from the South Germany, e.g. the Bavarian directors of the forest offices Biebelriether/ Meister/ Sperber have managed in the last decades that also into public forests came a conserving element concerning the exploitation of old forests. They managed that the clean cutting of large areas of old stands would only happen selectively and hesitantly (LIECKFELD 2006, 119f/ MEISTER 1999, 68f/ SPERBER 2005, 11f).

In the past of old forests lies the idea of an organism that came from the German idealism (from the philosophers Fichte and Schelling) and looked at the forest as a being. The trees as immortal element of growth and exhaling the character of eternity – would they be able to press ahead with the modern ideas for the forest conservation?

These ideas at the observation of the forest under the point of view of the teachings of the elements could be presented to the pupils:

"Nature is offered . . . as a space of observation that the participants can learn to see, hear, taste, smell, and touch. They are instructed to:

- perceive trees in a differentiated way,
- change the angle of view,
- sit at a brook and listen and finally catch with the help a sketchbook the individual impressions in nature, or note present associations in any form". (SUMMERER 1992, 27)

11.1 Modular lessons: A working day with the pupils

The day starts with a lesson that intends an intense observation of the four elements: earth, water, air and fire; this serves chiefly as a basis for the following excursion in order to sense with these elements in the forest and to find them. These four elements were designated by the Greek philosopher Empedocles as the roots of all things. They came into being through the dynamic argument between the basic forces of love and quarrel. Wood is therefore a mixture of these four basic elements which in the context of a lesson can be very clearly conveyed to the pupils.
In order to leave the European scene and to enlarge the horizon the five elements of the old China shall also be presented to the pupils. In this context emerges besides the already known European elements of earth, water, and fire, as fourth and fifth elements wood and metal. Easily explainable is this other view, when we put the question of the origin of matter. Ying and Yang as the original principles of creation brought forth five effects of forces which according to their activity were arranged as earth, water, fire wood and metal.

So the European point of view of the elements orientates itself more at matter, whereas the Eastern view of the elements pursues more the contemplation of the forces. At the following forest excursion it is important to come into contact with these five elements earth, water, air, fire and wood and to learn to perceive them profoundly (SPRING 2005, 16).

To get to know the element earth we walk to a terrain to a demolition at which through a forest road or a quarry the underground has been laid open. Perhaps a fresh cut has to be made with a spade to be able to see the mostly existing richness of colours of the underground. It is conveyed to the pupils how out of the deep lying rock, by penetrating humidity and by frost bursting in winter an everlasting decomposition of the stones results. Through the always continuing principle of reduction finally a grain size comes about that is called soil.

Now the existing layers of the soil are closer observed: in the A-horizon one finds the mor\textsuperscript{33} of the forest trees and the humus particles worked in by the animals of the soil. In the layer underneath, the B-horizon lies humus in finer spreading but which does not have a dark brown colour anymore. In this area we are in the zone of rooting of our forest trees. Whereas this layer of soil is characterised by a middle brown tone, the underneath lying C-horizon is only weakly rooted and often of a light brown colour (PETRI 1980). By this observation the pupils should be brought in contact with the inorganic dead – the rock – as well as with the living – the tree roots. The living principle of the root penetrates the still principle of the rock. In the zone of penetration of different things always something new comes into existence, in this case: humus, the becoming alive of something that was still in beforehand.

\textsuperscript{33} mor: the loose humus which is not attached to the mineral soil and which exists of rotted plant residues.
At this element of earth can also be explained that the basic capital of the forest lies always in its soil conditions. The in the moment in Europe prevailing mode of motor mechanical wood harvesting often brings with it damages lasting for decades at the basis capital soil. Erosion and soil washing out are often taken for granted. Old forest roads for the removal of lumber always ran with slight gradient along the slope. Therefore the removal of the lumber with muscle power (man and animal) was in the past connected with only slight damages. With examples in site these things should be demonstrated.

To get to know the element water, a not too big flowing water will be gone to. Out of boards that had been brought along is build as quick as possible a small dam. Through this activity that is very popular with the pupils they have achieved to produce a small lake. Now they throw slowly small pieces of paper into the still zone of the lake in order to watch the current. It becomes clear that the water is able to get active even against the current. It is similar with the trees: even against gravity fifty or hundred meter high trees are able to transport the water that has to evaporate up the stem to the most distant parts of the tree crown.

To get to know the element of air we go with the pupils to an area of wind throw of clear cutting. There we find mostly at the east end of the area at the edge of the neighbouring forest some newly overthrown trees. On hand of the direction in which the trees have fallen and of a compass we find out the direction out of which the storm has blown. Then by means of a bow saw the fallen tree is separated from its roots and the school class is positioned in the way that the tallest pupils are standing at the upper end of the tree and opposite at the lowest end the shortest ones. Also the teacher has to get into the row according to the height. Now the tree is lifted up together and carried on the shoulders out on to the nearest forest road. One has to be watchful that the stem towards the root is not more than 15 – 20 cm thick so that the task is manageable. For the success of this action the commandoes which were arranged by everybody are responsible and have to be talked about at length. The smallest pupil, who goes in front has got the responsible task to probe with his eyes the area in order to steer the huge worm. This is in opposition to the lower rank in the hierarchy that the smallest pupils in the class hold and which leads to a common experience of learning.

Through the walking on uneven areas each pupil gets transmitted the experience of common power, even if the individual effort changes constantly because of the changing unevenness.
Finally the tree is been decorated as a common piece of art at the forest road and even perhaps jacked up a bit in order to be seen still a long time as a marked achievement.

This leads over to the Eastern element of wood that should now be looked at. Wood is the thriving, always growing element that has been ordered the colour green. Now we let the pupils experience the greenness. As in all living plants there are in the zone of growth of the trees, in the cambrium which lies under the rind (illustration 35), the chloroplasts, which are the carriers of the chlorophyll, the leaf green. Now the pupils are given short pieces of living young wood, cut with the garden scissors, from which they take off the rind with their fingernails or small pocket knives. Then they meet the zone of chloroplasts, that work like small power stations and transform the sunlight into sugar, starch and aromas.

Illustration 35: A growth picture of the cambrium zone with a cover of frozen water. (SPRING 2005, 44)
Now in a well open area a headquarter will be set up and the pupils disperse singly in the area in order to find out more about the colour green. They get the order to look in nature for as many shades of green as possible and to collect them. They should then find a quiet place, where they can put these objects together into a symphony of green and then paint them. They have with them a painting pad and different coloured pencils so that they can explore their sensations and express them. They also get the task to express these associations in writing and note them in their small notebook.

In the meantime the teacher kindles a campfire in the headquarter at which at the end the element of fire can be experienced. Here shall then first the lunch be prepared at the fire as described in module 10. A meal prepared at the open fire is always an exciting experience and fascinates at once.

In the afternoon the elements are again picked up and more activities are launched:

In order to deepen the principle of earth an anthill is looked for to show the pupils the enormous efforts of these state building insects. For the greatest part of the state lives underneath the earth. If there is none around one can observe the forest soil at any possible area. The soil is touched with the hands, accurately looked at, taken apart on a white sheet of paper, the structures of disintegration are minutely examined and micro-organisms are discovered. To perceive the wood soil with the senses, to recognise it as becoming and decaying at the same time, is the first access to the soil also as the basis of fertility. Hardly anybody can imagine how many millions of micro-organisms are living in one cm³ of soil and that these are the prerequisites for every fertility. To develop the access to the soil anew, to sensitize for the soil tending as the most important task of agriculture is an essential goal of ecological instructural work. (SUMMERER 1992, 27)

After that an artificial anthill (wood compost) can be build in sufficient distance from a living one. Thereby the mor that mainly exists massively under coniferous trees is collected into buckets whereby the bare hands function as rakes. A few branches, loosely laid out on the soil form a small air cushion under this heap that can be up to 2 meters high. The warmth processes that happen through the decomposition obtain a much better result of implementation as if the mor decomposes with low temperatures on the entire area of forest soil.
Further examples for the treatment of the element earth can be found in: (Kniebe 1993, 94f/ Walden 2001, 52f)

Too deepen the principle of water there could be build an artificial swimming island on a nearby small lake as a possibility of nesting for water birds. For that there will be nailed out of boards an approx. one m² big panel with a small nesting place on it. As decoration one could also nail on it a ca. 1m high fir tree which had been freshly cut. To fix the island in the middle of the water a ca. 5 meter long plastic cord is attached to it. At the other end it is wrapped around a big stone which is put at the edge of the isle. With the help of another longer cord the isle is now pulled down from the platform and so the small island has got an anchor. Afterwards one can try to hit the island with small flat stones that skip over the water and is big fun. Is there no lake reachable on foot the afore mentioned brook can be inspected. Bases for a determination of water quality open a further possibility to a differentiated perception of nature. Who as an adolescent has noticed the micro-organisms in a brook the rivolo ammarus pulex, plecoptera, aneylus? Such determinations of water quality are a nature experience that animates to inspect brooks more intensively. Biological determinations have in the last years found entry into the youth work, because they are an ideal medium to sensitize for nature. (Summerer 1992, 28) The teacher has only to have one magnifying glass for three pupils ready in his rucksack which are then distributed.

Further ideas for the demonstration of the element water can be found in: (Kniebe 1993, 24f/ Walden 2001 44f)

For the deepening of the principle of air a part of an area which is possibly sparsely overgrown can be cleaned of all branch material. This should be best heaped up in form of a fagot wall all around the area. This principle of a Benjes hedge is extensively explained in module 4. Thereby a protected inner space comes about on which also all smaller branch material is racked off, until the impression of a bed is reached. Then the teacher takes out of his rucksack a wild flower mixture for butterflies which will be talked about extensively on hand of a determination book. Especially the relationships of different species of butterflies (ill. 36) to certain wild flowers anchors in the pupils the connected thinking (please look also to ill. 37 and 38). Connected thinking can be trained especially well at ecological connections.
Blue butterfly (HESSE 1961, 161)

Wings a little blue butterfly
Blown by the wind
A mother-of-pearl shower
Glitters, shimmers, dies.

So with moments sparkling,
So with blowing by
I saw happiness wave at me,
Glittering, shimmering, dying.

Illustration 36: Sky-blue butterfly (REICHOLFF 2000, 66)

Further possibilities of representing the element of air are to be found in: (KNIEBE 1993, 65f/ WALDEN 2001, 55f)

To the deepening of the principle of wood: The sensitizing for nature is also possible through the inexhaustible details of nature that should be perceived more profoundly and motivate for individual expression. On hand of pieces of rind, which have been brought along, mushrooms, moss, ferns, leaves, pieces of wood a concentration up to meditation of micro structures is urged in the youth work. These pieces of nature should with the help of drawing, plastic, and graphic means be transformed, so to say brought to expression and be interpreted. Thereby it is not the question of drawing nature, but to recognise and interpret it. The one who has for one or two days tried with a fine pen to break down for them self the structure of a rind and shape it, who has occupied himself with the rhythms of nature in lines and structures or has formed in clay the state of surface of a root, he will get to know the form, diversity and uniqueness of nature and discovers tensions, order and harmony in every movement. These exercises for seeing differentially, to feel with rhythm and dynamic in nature are experienced as a personal nearing to nature and as visual and manual sensitizing. Even if the graphic or plastic medium is felt for some as deterrent, because it reminds of the drawing or painting lessons at school, such barriers will be soon taken down through the discovery of structures and lines in the process of understanding and transforming. (SUMMERER 1992, 28f)
The principle of fire can be taken up again at the close of the day (illustration 37) by the kindling of a campfire in the dark. With common singing to a guitar long lasting memories and experiences of community can be built up.

*Illustration 37: glowing fire (SPRING 2005, 124)*

Further possibilities of representing the element of fire are contained in: (Kniebe 1993, 84f/Walden 2001 59f).

### 11.2 Evening lessons and record book

The connected thinking can be trained especially well at ecological connections (Illustr. 38):

*Illustration 38: endangered butterflies in different living spaces (AFL/Volk 1987, 195)*
The ecological importance of certain food plants for the state of caterpillar of divers species of butterflies is a widely not known fact. In the following it shall be shown for some species of trees:

- **sorbus aucuparia**: basis of food for 26 species of insects and birds.
- **betula div.**: basis of food for 160 species of insects and birds (a.o. Camberwell beauty (*nymphalis antiopa*) and ?
- **populus div.**: basis of food for 67 species of insects and birds (a.o. (*apatura ilia*), great kingfisher (*limenitis populi, nymphalis antiopa*)
- **salix div.**: basis of food of 500 species of insects and birds (a.o. (*cerura, smerinthus ocellata, nymphalis antiopa*) and divers ichneumonoidea)

A small section of the very complex structure of food chains shall be shown at the example of the species of salix div (illustration 39):

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**Illustration 39:** butterflies and their parasites at salix div. (ALF Schweinfurt 2008, 2);

**SW** (Schlupfwespen – the eggs are aplicated inside the caterpilers);

**BW** (Brackwespen – the eggs are aplicated on the caterpillers).
In the course of the evening one will return again to the theme about the elements. This time one will talk about the connections between the geological starting situation and the soils and plants that develop out of it.

With this it is pointed to the plant sociology that offers the respective indicator plants for all plant species. A hint to these flowering plants could then be mentioned in passing in the following work days. An example:

The plant sociological connections can allow a view into past times: e.g. _anemone nemorosa_, the wood anemone (illustration 39), exists in Middle Europe only in forests with deciduous trees/beech trees and is missing in forests of coniferous trees. In the region of Fyresdal/ Telemark/ Norway it is blooming abundantly in May.

*Illustration 39: anemone nemorosa/ wood anemone under birch trees (JENSSEN 2006, 17)*

This is an indication for the fact that in former times much more deciduous trees were involved in the initial stages of the stands. A further sign for forests rich of deciduous trees is the occurrence of _lathyrus vernus_ (the spring-plat-beau) that also exists only in forests of deciduous trees in Middle Europe. A more exact plant sociological registration of the spring-geophytes could yet bring to light more information.

A atlas of flowering plants linked to types of woods is to be found in: (WALENTOWSKI 2004, 44f). These indications to the local occurrence of flowering plants sharpen the gift of
observation of the pupils and the *clear power of judgement* that result of it. (GOETHE in: BORTOFT 1995, 13)

### 11.3 Possibilities of further deepening work

A further possibility is the including of the resource of creativity and art. In this case the natural material that has been collected in the day can be used for collages which in quiet corners in the school house or at walking paths enjoy the passing visitors in the forest. Ideas are contained in the following literature: (STÖCKLE 1981, 10f/ STÖCKLE 1989, 9f)

In the following mentioned literature one can find a great treasure of ideas for extended fashioning of nature. It is in fact a compendium of ecological insight in different working steps to fashion the idea of forest organism, farm and landscape:

“I only moved from one University to another, from the University of Wisconsin to the University of the wilderness wrote John Muir (1838 -1914), conscience of the environment and prophet of the wilderness of the then young United States about the most important change in his life.

Me, too I had a change in mind when I took my students in August 1955 from the University into the wilderness culture of the belligerent Sepp Holzer for ten days to the south slope high above Remingstein, near Tamsweg in the Lunggau/Austria, between 1000 – 1500 above the sea, overflowing with life.

First I had mistrusted the stories about the Krameterhof – scepticism is my profession- natural scientists can be very prepotent, if one confronts them with too much original...A many sided professor (Rudolf Habison), who shot every now and then a roe and caught a fish at Holzers had brought me together with a very clever as well as obstinate mountain farmer, who instead of complaining, was full of ideas, who terraced the steep slope and changed it into a shimmering staircase of ponds, pools and water ditches. (over thirty), who planted fruit trees instead of coniferous plantations, who had his own small water power station, who built beautiful bloc houses for the guests, who was experienced in various game preserves and even bred Newguinee parrots and Amazona aestiva which could bring 10 000 shillings (727 Euro) each. Holzer is a nature observer from childhood on, who had understood that variety (instead of simplicity) is the insurance of biological systems and also founded the economical health of his business on it” (HOLZER 2003, 9).
11.4 Extended teacher knowledge and list of materials

A more recent enlargement of the idea of organism around tree and forest can be found in a book of the KARL–SCHWEISFURTH-INSTITUTE for evolutionary biology and morphology by the university in Witten/Herdecke/Germany. It deals with the natural philosophy and nature scientific concept of Plato and Aristoteles as well as Goethe as the founder of morphology as a natural scientific method. Further the picture of the plant in thought and word of Paul Klee is dealt with as well as objects, pictures and symbols of the plant by Josef Beuys (HARLAN 2002, 17f). Therewith the idea of the organism of tree and forest are expanded by important special fields.

The more it seems to be important at the huge variety of written exercises in experience of nature, only to use those that one has oneself tried and lived through. If one misregards this, so, in my experience, missing authenticity and missing enthusiasm of the pupils endues. Other authors deal with this too: “Who in the youth work wants to structure experience of perception of nature and creative access to nature, he should not only open one of the many recipe books, but open first his own perception for the variety and uniqueness of nature. Always when co-workers compile games of nature experience out of books without relating them to themselves or having rewritten them, experience of nature becomes cramped. Nature is not individually perceived, but is offered as prestructured experience. Who in the youth work wants to open spaces of natural experience, should first of all discover own accesses to nature together with others; to relate the many ideas out of hand- and action books about nature to oneself and one’s access to nature and then structure spaces of experience and not plan them. Eco-rallies, eco-memories or other games should be developed by oneself and not be offered under time pressure as a short term brightening up in nature.” (SUMMERER 1992, 29)

List of materials

spades, buckets, boards, compasses, bow saws, note books, white sheets of paper (DIN A 4, crayons.

11.5 Discussion about aspects of the formation of wilderness

Formation of wilderness is not only a new educational concept in the nature protective movement, but also a modern philosophical direction, that manifests a necessary counter
movement to the continuous widening urbanisation of the human beings. The formation of wilderness can manifest an important future educational content, because it strives for a possible balance of actually predominant economical relations. More and more people get into a material mind-crisis, because the loss of values, caused by the overstressing of technical status symbols (car, TV, PC, handy) is hardly to be balanced. Man has on the one hand estranged himself from his natural bases of life, but on the other hand he needs that nature yet which belong to his basic necessities (ZUCCHI 2004, 11f).

That nature belongs to the basic needs of our school children, could always be noticed at the open enthusiasm, when pupils were allowed to pass a day in the forest. It is not only the forest that seems to be of importance which comes to the open in the following research result:

In an examination of the school way of Swiss pupils of an elementary school in Zürich/Suisse, it became obvious that natural areas, as flower beds, bushes and trees have an eminent importance for children. It is interesting in this context that they have a much greater importance than their relative part on the entire school way between home and school (CIVELLI 1992, 12). This fact can be confirmed by the memory of the own youth.

Looked at it this way, the forming of wilderness stands before an important task, to bring back the concept of nature, too much coined by civilisation, to its real archetypal nature. This archaic nature contains a dynamic that everybody can observe himself, when he goes outside. In the oldest German national park, the Bavarian Forest in the south-east of Germany nearly 2000 ha of highland forest died, which happened after an increase of the bark beetle, caused by the windthrow in 1984, when over a million m³ of fallen trees were allowed to stay lying in this forest. Parallel to the real natural storm, a storm of indignation broke loose in the local population, because it was hardly bearable for the there living citizens to be confronted with such a huge dying as an integral state of all living. The director of the national park at that time Hans BIBELRIETHER brought it to the point by coining the slogan: Let nature be nature! Thereby he observed that forming the wilderness touches our deepest depths and manifests a socially controversial psychological risk. Under the point of view of an imparting of values, wilderness educational experiences win a new dimension of self value of nature (BIBELRIETHER 1992, 13).
The wilderness pedagogue Gerhard TROMMLER formulates that the *bewilder*ing of the civilised human being means an approach and meeting with the entirely *different*, that leads in and around its own life. This wilderness, not created by us, is a stubborn progressing process. It demands of us to accept our innermost as process and thereby enter into a co-existence with the wilderness (TROMMLER 1998,87)

When should such things happen, if our children pass their time only still in spaces that are built and in green that is urbanised? A confrontation with the wilderness of the forest can create the necessary *other time* that can be tracked in this archetypal nature. This tracking leads to a deep satisfaction that appears, when we have been outside. On the other hand a deep fright on the part of the children could be observed, who got partly in a panic and fright, when they left the ways. This can be seen as a possible consequence of the nature remote way of living, but reminds also of the basic fright of man as supposed by different authors:

- Wilderness is for the one awful, strange and unwelcoming and for the other beautiful, peaceful and sublime (DIETRICH-GRAF 1996, 28):
- Wilderness represents the menacing of man through the natural forces (TREPL 1998, 28):
- Wilderness awakes an immense increasing longing to meet and (re)embed into nature (SEEL & SICHLER 1993, 28)

The longing for the meeting with the wilderness is also used by the public relation industry that even sells nature remote products, as e.g. the biggest computer mess Cebit 2008 with the slogan: *The IT branch becomes green.* This visual meeting with nature (laptop on a flower meadow in front of a wild mountain panorama) makes believe a not existing contact with nature. Building of wilderness should not only be visualised, but also be *communicated*. It should be experienced by the pupils as a *communicative process*. This can be especially impressive experienced in the eco-system of the forests, as the living space of the forest can be further developed into a *space of communication*. The personally experienced *communication* (e.g. meeting with the elements) aims at an emotional content of consciousness that anchors itself in the level of feeling. The pupils are thereby the actors and communicate the surrounding of the wilderness. They further each other in observation, discussion, analysis, moderation, participation, information and presentation. So, they go the way towards own creative learning processes, which later can become a life long learning.
Epigramm

I am looking at the tree.

I can take it in as a picture: staring pillar in the impact of light . . .

I can feel it as movement - and the dark growing itself . . .

I can classify it as a species and observe it as an exemplary . . .

I can . . . only recognise it as expression of the law . . .

I can evaporate and eternalise it into a number, to a pure numerical ratio . . .

But it can also happen, out of will or grace in oneself, that I, looking at the tree, am involved in the relationship to him, and now he is no IT anymore . . .

All that, what belongs to the tree is within it, its form and its mechanic, its colours and its chemistry, its conversation with the elements and with the stars . . .

One should not weaken the meaning of the relationship: relationship is reciprocation .

So would it have a consciousness, the tree, similar to ours? I don’t get to know it . . .

I do not meet the soul of the tree and no dryade, but only itself.

(BUBER 1984, 159)

Illustration 40: figure of ancestors, 17th or 18th century, Africa, Basel (Beyeler 1999, 157)
12. Tree and Man – culture-historical contemplations (module 12)

The forest incorporated once in our culture the temporal imperishable like mountains and decayed masonry. In this traditional form of consciousness the forest was given to the human beings as walking in space and historically in life time. In comparison to this the human life seemed to be an episode. Many of us put still today the comparatively short time span of their life abstractly in comparison to the time periods of forests and trees that override the generations and centuries and concretely to the experiences with certain forest regions which they get to know in their life. The destiny comparisons: human life – forest – tree are today nearly unavoidable. . . . And eternally sing the forests. At this point a change of the collective consciousness is today unmistakable. The forest as nature is seen today quite as unchangeable and as part of the historical world. . . . The certainty about the continuous changes of society and its institutions belong today to every day life as well as the changes of the landscape. Everybody knows: day after day thousands of hectares of woodland are cut down in many places in the world. . . . The effects of this dramatic change of relation towards the spatial surroundings are a central – but not yet recognised by science and town planning – life historic problem of orientation in our culture. (LEHMANN 1999, 93)

12.1 Modular lessons: a working day with a school class

On this day the focus shall be put on an art oriented process of cognition of the pupils. The art oriented research meets the being generalist the nearest which came about in the history of development of man.

An historical perceptible change concerning the relation of man to nature came into being with the publications of Jean Jacques ROUSSEAU (1912-78), who with the slogan: Return to nature wanted to free the human being again.

A hundred years later it was David Henry THOREAU (1817-62), who continued this work by making the effects of civilisation and technique responsible for the loss of the directness of life. He tried to find his way to the roots of being during a three-year-stay in a bloc hut at the Waldensee. He wrote beside his famous description of life in the wilderness (THOREAU 1979) still many essays, out of which his efforts as a public enlightenment are perceptible. One of these essays shall be the motto of this day:
“I would like to speak in favour of nature, in favour of absolute freedom and wilderness – in contrast of freedom and culture in the bourgeois sense – and would like to look at man as an inseparable part of nature and not as a member of society. I would like to take an extreme standpoint and that with decisiveness, for there are already enough fighters for civilisation: the priest, the school committee and all the others.

In the course of my life I got to know only two persons who had a complete command of the art of walking and had a natural talent for wandering, a word that goes back to the church latin pelegrinus (the stranger who goes on a pilgrimage to the Holy Land). He, who although he seems to do so, never pilgrims on his walks to the Holy Land, is more or less a tramp and vagabond; but he, who goes to look for the holiness of the country, is a pilgrim in the good sense, that I mean. Some argue, the word pilgrim means in the original sense: being a stranger, not to be at home – which to put it positively means, that such a human being, who has no home is everywhere at home. This is the secret of successful walking. Who always sits still at home, can nevertheless be the greatest tramp; but the pilgrim that I mean, vagabonds as little as a meandering river which is constantly anxious to take the shortest way towards the sea . . .

We have found out that we exert this noble art (of wandering) here nearly alone, although most people in my town, as far as one can believe in their statements, would sometimes love to go for walks like I do, but they are not able to do it. No riches can buy the necessary leisure and independence that in this business represents capital. Both one is only given through the grace of god. To be a wanderer, it needs a calling . . .

I believe that I guard my physical and spiritual health only by passing daily four, but usually more hours, strolling absolutely free of all demands of the world through the woods and over hills and fields. And what, so I certainly will be asked, am I thinking doing this? . . . And yet, I am, I admit, astonished by the steadfastness and especially of the moral insensibility of my neighbours, who for weeks and months, even for whole years from morning till night lock themselves in offices and workplaces . . . Bonaparte spoke of the bravery at three o’clock in the morning, but this is nothing compared with the bravery that one needs at three o’clock in the afternoon to start in good spirits besieging the own person with whom one has already passed the whole morning . . . I ask myself why in the streets of my town at that time – lets say between four and five o’clock in the afternoon, when it is too late for the morning newspaper and too early for the evening one – one does not hear a great explosion which scatters the
uncountable, old fashioned, tame thoughts and ideas in all four winds in order to air them, by which the evil would be cured . . .

But the walking of which I speak of, has no resemblance what so ever with those so called exercises, e.g. the swinging of dumbbells . . . ; it is nevertheless the most important action, the adventure of the day. Who wants exercises, should go and look for the sources of life. Someone swings the dumbbells to foster his health and at the same time these sources splash in far away regions, he never explores.

By the way one has to walk like a camel, that, how one hears is the only animal that ruminates while moving on. When a visitor begged William Wordsworth’s housemaid to show him her master’s study, she answered: this was his library – his study was outside!“ (THOREAU 2001, 5f)

According to the motto of this day will be passed with walking from morning on. One only needs to look at the arms and legs of the pupils – man is a being of movement!

We pack the day store and start off on the journey with the aim to meet ourselves what we have a small notebook for with us to write down our thoughts.

The walk should be planned in the way that it leads in a big circle around the fixed place where the class usually stays. This has the advantage that with bad weather the way home can happen easily. But it is also an adventure to walk for some hours in the rain.

In the course of the day short sequences of poetry about ‘tree and man’ are inserted that can be found enough of in world literature (DAECKE 2005, 7f/ LEHNER 2004, 5f/WALCH 2002, 5f).

This should lead the pupils unnoticed to the point to write themselves such a poem in their notebooks in the afternoon.

Highlight of the day is a place in which the pupils pass some time by themselves in nature in order to meet their own thoughts about nature of trees and to write them down. Half an hour before the ‘happening’ the pupils should be pointed at the following composing of an own poem so that their spiritual potential can prepare itself for it. In this way a more concentrated mood comes into being. For these aims a fairly open area should be available, where visible
for all a coloured marked headquarter is arranged, in which the teacher will be present and where the pupils will reassemble again. It should happen in the afternoon and time should play no role. Perhaps a small fire could be kindled, a fact which underlines the sufficient time.

All this should not happen too far away from the accommodation, as the evening classes have also to be considered.

**12.2 Evening lessons and record book**

In the evening lessons the point is to speak about the mythological roots of human relations with trees.

On hand of texts out of the different eras of human cultural development, the pupils should come into contact with their roots.

The note before last into the record book will be the copy of the above mentioned text of THOREAU about walking.

The end poems will be the written by the pupils which are copied in beforehand, so that each pupil can also take the poems of his co-pupils home.

It should be tried to place public presentation of the poems in the feuilleton- department of the local newspaper/ school newspaper. They are always looking for modern poems. Here an example from Basil Mc Farlane/Jamaica (born 1922):

**The final man**

This is the final man
Who lives in twilight
Who is twilight
Always
Birth and death perceive
In a feeling
To look forward and backward
With one eye
See the whole
Know the truth
Understand the world
And be without world:
In this light, that is no light,
In this time, that is no time,
Be and be free:
That is the final man
Who lives in twilight
Who is twilight
Always.

12.3 Possibilities for further deepening work

Visiting of an open-air-museum / museum village that shows the old farm culture of past centuries. The there build up ages old wooden houses out of thick old tree trunks offer a good possibility to experience life feeling and the dimensions of earlier, often very majestic old tree giants. (illustration 41)

Illustration 41: tree trunks of the olden times (SPRING 2005, 105).
A further excursion can also be undertaken in order to look at a very old tree giant in the region.

A further final activity could be the planting of alley trees or memory trees etc.:

*On the 28th August 1831, his 82nd and last birthday, Goethe was on the way with his two grandsons. From his carriage he showed them an oak tree, with which he was personally acquainted since sixty years. Respectfully the travellers greeted the tree. Two days later the poet made himself drive again to Martinroda/Thuringia/Germany so say personally goodbye to this tree and companion of his life. Goethe’s personal relationship to trees stretches back to his earliest childhood. On the day of his birth his grandfather had a pear tree planted in his own garden as a life tree.* (LEHMANN 1999,98)

Furthermore it could be possible to guide the final excursion of a practical week high up on a mountain in order to experience the feeling of freedom and the overall view after a week of effort. Further ideas for this field of themes can be found in: (BENNINGSFIELD 1981, 5f)

A favourite final project also is the planting of a living building – as an assembly place for pupils – a place where community can come about. It can become a place of memories, for some until the time of Atlantis, when human beings lived in houses made out of trees (KIRSCH 1996, 104)

12.4 Extended teacher knowledge and list of materials

This module is in a special way suitable to bring to the surface the artistic access to the own language. But one should resist the temptation to utter whatsoever valuations or praises about certain pupils. The total view of the common achievement of the class shows a rich picture of the momentary soul configuration of the pupils.

*Ecology can not be restricted to nature- and environment protection, also not to environment friendly behaviour. Ecological pedagogic that we have learnt from our adolescents, builds upon relationships between single human beings. Everyone should be seen in his life situations, his own history has to be respected as well as his fears, feelings and capacities. We have learnt not to look at the world and the human beings in the way we like them to be, but*
to try and perceive them, to recognise them and to understand them. And then develop new ideas and go new ways. . . . With the time we learnt to become stiller and more composed, to show the young people, that first of all they as persons are important for us. . . . Really formative experiences contrast with our everyday life. The greatest opportunity to change one’s thinking and learning offer therefore in the youth work holiday leisure times, weekend trips, seminars included. . . . Already the fact to pass the time together in a different, possibly natural surrounding, to make experiences in and with nature, to get to know each other in a different way, because the restrictive, everyday, usual frame falls away, is enough that children and adolescents become more open for ecological questions. . . Common experiences in nature like to sleep in the open air, to swim in cold brooks, waterfalls or waves of the sea, mountain climbing. . . . and other adventurous experiences in nature are deeply forming experiences that one cannot buy. The most beautiful thing in our pedagogical experience is always again to be able to observe which influence such nature experiences have on the vividness of the adolescents, and the most on children. It strengthens their joy of life and therefore their sensitivity, their feeling for themselves and for nature, their creativity and also their openness and their consciousness for connections. Without these experiences we would never have enough energy and calmness for the hard work in everyday life. The source of strength and the example for eco-pedagogic is nature. Nature experiences are often the only opportunity to bring ecology nearer to the young people. (GLÄSER 1992, 35)

There is also the possibility to treat in the course of the day the relationship of man to the untouched wilderness. The orderliness which lives in the wilderness makes it possible to mirror the wild inner conflicts of the young soul (illustration 42) an with that to order it. (RUSKIN MILL 2005)
Finally still a contribution to the theme of walking that completes THOREAU and mirrors modern feelings of our actual being:

The CO\textsuperscript{2} - emission on a hundred kilometres is minimal, the oxygen intake intensive. To go on foot is certainly not the most comfortable way of moving, but in any case pleasant and rather ‘lasting’. After all the muscle power is a renewable energy. It feeds of again growing raw material.

We are beings of movement. To walk is inserted in our genes. 99% of his time on the blue planet homo sapiens was about on foot. Hunting and collecting, carrying and fleeing. The upright gait assured his surviving also in a hostile surrounding. The foot, the pace, the radius of four, five kilometers per hour decided over the human measure of space and time. The upright gait and mobility of the head opened the scopes. We see the space and look forward. Up to the horizon. We look upwards – to the sky, to the stars. There have always already been in all cultures of the world forms of walking that did not serve economic reasons, but the peace of mind.
Man of the 21st century walks on average 0.4 to 0.8 km on foot daily. Ca. 90% of our time we stay in closed rooms. We move, sitting in vehicle cabins and navigate – also sitting – through the virtual spaces of the internet. At the same time our life tempo accelerates. Activities, work processes, experiences run quicker and more hastily. The combination of racing acceleration and fatal poorness of movement is not good for us. This we notice daily.

The old art of wandering is today an objection to the dictation of acceleration. Walking in the landscape takes the tempo out of the course of everyday life. The flowing movement in the open replaces the paralysed sitting. The slow, steady flow of impressions replaces the medial downfall of images. Navigating in the countryside we form our sense of orientation, the ability to decide on the position, to fix aims, to keep the overview and to hold the course.

Walking on foot one can see better, said the painter Paul Klee, who knew much about looking. Of course the space in which we move is not only a field of vision. We feel, smell and hear it. We feel it under our feet, completely. We perceive its mood and voice our feelings into it. This we cannot do through the windscreen.

He, who starts off on a walk exchanges the thermal comfort of the bureau towers, supermarkets and flats with the fresh air of the woods, the fine-dust loaded air of the conurbations with the stimulating climate or the coasts and mountains or the gentle climate of the highlands. To feel solid, soft, elastic soil under one’s feet. To learn again to let one’s gaze wander calm and free. To hear a brook murmur, to smell the flowering landscape. All this one can still have on the way through the country. Who experiences consciously the splendour of colours of the forest in autumn, uses the colour scale of the designer software more sovereignly. Without the direct experience of the passable environment the perception of the visible global spaces stay superficial. It is not only the question of the careful intercourse with nature, but also of the ecology of the senses.

Trend explorers talk of the exotic of the vicinity. Is it the charm of the landscape, which existed once – and in this special character only here – is it still effective? The small seized, richly structured, colourful patchwork carpet of the cultural landscape, the very special light in the sky, the aroma of the seasons? Our landscape has changed more in the last 50 years than in the 5000 years before. On order to discover how beautiful it can still be it needs a slow nearing. The chalk rock of the isle of Rügen, Goethe’s hut in the Thuringian forest, the rock of the Loreley above the river Rhine, the cloisters of the isle of Reichenau in the Lake of Constance and all the other places of remembrance of our culture one should better not try to
reach from the visitor’s parking places, but from the depth of space. Walking paradieses one finds where exquisite nature has liaised with exquisite culture.

The happiness of walking one cannot buy. It does not depend of the function clothes of the retorts of the chemical industry; also not of the certificated and foolproof marked premium way. More essential is and stays the transparency for the impressions from the outside and - last not least - the openness for the sound of the inner voice.

Walking contains many things: joy of free time, soft nature sport, cultural tourism, social life. Everything has its own right. I plead for a light footed, free roaming, discovering walking. I am interested in the upwardly open scale of possibilities. The flowing transitions, where the experience of walking flows into a new experience of nature and culture and of the spiritual. Where the art of walking passes over into the art of living and its core: self-experience and self care. Where, while walking the day dreaming sets in – and the search of the sense. A successful walking motivates for life: that strides widely. (GLOBERS 2006)

List of material

Walking outfit, notebook, (coloured) pencils.

12.5. Discussion of artistic aspects in the action oriented educational work

In module 12 the focus is put on an art oriented process of cognition of the pupils It shall be reminded of the famous quotation by Friedrich SCHILLER, that man is only there wholly man, when he plays. Each human being has respective to this different spectrum of talent his favourite kind of art, in which he feels at home. Of course, he has not also got everywhere a talent to exert this or that form of art, but also in the penetrating of works of art can lie a great gain of experience. Important is at the exertion of an artistic action, not to plan a too short a time window. If there is not enough time, one can not link on to the creative potential that offers this inexhaustible richness of ideas which is so typical for art. It is the art that can offer the reservoir of ideas for quantitative and qualitative processes of cognition. Yet ideas can not be planned, but they have to happen.

So a natural existing boundary of art-oriented processes lies in the point of an event that can not be planned. An inspiring moment full of poetic, a brain wave, these are the radiating
events, for which one often has to wait a long time. All the artists tell of these tormenting times in their lives, that with their inner richness show themselves only often years later in retrospective. Artistic processes are highly subjective. It should be reminded of the fact that

*the fish has to swim against the current, in order to reach the source.*

Art imparts the staying in movement that carries in itself many impulses of healing in order to manage everyday life. It softens hardenings that happen naturally, if too much fact-oriented acting is needed. Art oriented processes hold a middle position between the quantitative and the qualitative necessities of life, as it is shown graphically in the following:

![process of cognition](image)

*process of cognition which comes out of an quantitative perception or beings art oriented perception or beings qualitative perception or beings*

*illustration 43: lemniscate-picture (HAHN 2008)*

The everyday school life swings in form of a lemniscate between these three methods of managing life. Art can contribute the necessary and happening moments and shape, change direction and expose oneself to the complementary forces. Thereby the danger of an one-sidedness in the living can be reduced.

Aesthetic education and culture mean a training of the capacities of perception. *Aesthesis* (old Greek) carries the double character of sensitive, cognitive guided perception as well as sensual, emotional feeling. The aim of aesthetic education is understood as a trial to come into a true relationship with a person and to make him able for an I – identity by means of the ability to enjoy, criticize and change the perceiving and shaping of one’s own surroundings. Through aesthetic education and formation spaces of possibilities are created for productions of unreduced processes of self-experience. Aesthetic education pursues an experienced, action-oriented and lasting learning in an relation of tension between sensitive experience and aesthetic cognition. Aesthetic education and formation assumes that children have to be
trained to look, to touch (differentiation of the fine motoric), to smell, to taste, and to talk about their experiences of materials. Shortly: children should learn to use all the senses for learning (HENTIG 1997 in: HEINZMANN 2003, 30f).

The pupils can experience in modul 12 a sense-stressed process of cognition that in its wandering exploring is action-oriented. In the digesting, more contemplative viewing of that what has been worked on, feelings and moods rise in the pupils. This can finally flow into a process of formulating that can be expressed in various forms (poems, drawings, sculpture, sound body). That what comes out of it, shows the togetherness of forest and man. Thereby it becomes obvious that the concept of ecology does not end with the biosphere, but awakes to life as an enlarged concept of art between forest and man. This resource of art opens individual, creative possibilities, the togetherness of forest and man in future – also later – to be able to use.
At the art exposition *(Documenta 1982)* in Kassel 7000 basalt pillars have been put up, that according to the will of the artist, should be followed by the planting of 7000 oak trees in the area of the town of Kassel. This project went over several years, so that Josef Beuys was not anymore able to experience the complete realisation of this concrete art project and died in the meantime.
III. Final discussion and ways to the realisation of sustainability

A project called University of Trees goes back to the artist Joseph Beuys, who with his concept of townbe-forest-ing wrote history of art. They were impressive experiences to see as student of forestry that chaos exhaling mountain of 7000 pillars of basalt at the art exposition Documenta 1982 in Kassel. Connected to it was the demand to the town administration, to plant one oak tree for each basalt pillar . . .

We students of forestry experienced for the first time a depth-ecology, in which urban acting puts the really necessary needs of a future world into the centre. This is happening today: Oliver W.SCHWARZMANN formulates as a pre-thinker of an international economical world the sentence: at this turning point it does not just happen like that, that more and more experts proclaim the age of creativity. And: the first step towards the understanding of complexity lies in the fact, to accept it (SCHWARZMANN 2008).

Therefore, what counts in future is to learn from the multi-layeredness of biological systems. But there arises the question, how we can go forward in the understanding of ecological complexity, when at the same time we have to deal with exploding streams of information. Within the compass of conversations, one can observe a strong individual selection of knowledge that is coined by the degree of attentiveness of the single person. Knowledge does not necessarily have to be stored so much personally than to be dedicated to the understanding of information, so that it can be integrated in existing systems. Personal knowledge changes into a capacity of orientation and integration, that equals, so to speak, a change of paradigm (SCHWARZMANN 2008).

This leads consequently to a cultivation of the forces of visualisation and imagination, as they are asked for since a long time by the reform pedagogues (HENTIG a.o.). The question is, how we navigate on the open sea of the World Wide Web of the unlimited information in the right way, to be able to discern the essential from the only marginally important or also the wrong, in order to progress to the creative dispositions of solutions. The UN have therefore from 2005 until 2014 dedicated the time for the formation for a sustainable development, in order to introduce a re-integration of understanding and acting.
Considering the three-dimensionality of the concept of sustainability (economy/ ecology/society) a trans-disciplined process should be started that is founded on retinity – on the entire network (BOLSCHO in: MICHELESEN/GODEMANN 2007, 149): Such a disposition has been theme in this work and been integrated in the shaping and the thematic connection of the 12 learning modules. With this important themes of the discussion about sustainability had to be left out.

In the communication of sustainability three levels of action are discerned, the evaluation of which has to do justice to respective demands:

1. In the communication inside of organisations, it becomes the central task under the head word of corporate social responsibility (OECD 2001) to establish a socially responsible acting which exceeds the pure ecological logic. Job shifting into countries with payments at the world wide poverty limit show yet that these aims are actively hindered by the top managers.

2. In the communication between the different organisations it belongs to the agenda 21-process that NGOs (Non Government Organisations) are bound in the political processes of decisions.

3. In the communication between citizens and the society lie difficult processes of discussion until the communication for a sustainable development arrives in the heads and will be realised (MEYER/STOCKMANN in: MICHELESEN/GODEMANN 2007, 359).

Other authors stress that in a differentiated, pluralistic and transnational world society the view should not be narrowed on the political space. Essentially is the question, if a cultural evolution, the further development of which should happen on the micro-sociological level. With the inclusion of participating activities on the meso-level finally influence can be taken on the macro-level under observation of the socio-material effects of sustainability. The domination of hierarchical laid-out transfer of knowledge and monopoles of decisions has to be replaced by logic of knowledge discourse that makes efforts for co-operation (HEINRICHS in: MICHELESEN/GODEMANN 2007, 72).
The organisation for economical co-operation and development of Europe (OECD) names besides the human rights and democracy, *sustainability* as one of the three central aims of future education. (OECD 2001). For the realisation of a sustainable development, not only the private, but also the public education is given a special role. All pupils should be able to acquire a reflexive knowledge and future-stable competences. (BORMANN in: MICHELESEN/GODEMANN 2007, 793).

To round up an important pedagogical disposition, it may be quoted out of the nearly 1000 pages thick *compendium for the communication of sustainability* that puts its focus on the core of the present masterwork:

In the communication for a sustainable development it is not the question of the imparting of possible many good ideas, but of the communication of a *connection of ideas*. Only in the connection of projects beyond the time imparts a picture of the world and the relation of my future intercourse with it (STOLTENBERG in: MICHELESEN/GODEMANN 2007, 791).

1. **Discussion of the connection of ideas of the forest practical**

A special concern of the masterwork in hand is the usage of the ecological-pedagogical potentials of the forest for a *sustainability oriented educational disposition*. The version in hand of a networked built up activity oriented forest pedagogic can be looked at as an extensive training towards the UN theme: education for a sustainable development.

Especially it has to be pointed at this occasion at the *connection of ideas* of the learning modules which wants to motivate for a networked thinking, feeling and acting. The combination of the learning content in the modules was carried by the *holistic picture of the forest* that should be anchored as an extensive symbol. The simplification of the often in reality difficult and ecologically hyper networked facts has been done in such a way, that the above mentioned principle of *living images* (BRIERLEY 2005) has been aimed for.

A simplification is often in danger not to be taken serious by the respective experts. On the other hand it has to be indicated out of the meta-level that it is not so much the question to convey exactness, but the holistic picture of a forest and the inherent basic ecological mood. The mentioned complex networked basic mood exists in a permanent becoming and decaying
of single trees, that are embedded into a potentially eternal whole and are forged together to an entire connection, a forest organism. The long life of the forest trees contains through the human becoming and decaying a learning connection that comes about nearly by itself:

One can argue that it is the archetypal laws of life which start in a small seed and can overcome the actual being estranged of a today’s pupils life. The replanting of young trees can solve as a symbolic *gestalt* the secret of young people, who ponder over their connection to an often enigmatic co-world and look for their future tasks of co-operation and shaping. The care of an unpenetrable-looking young forest helps with the competences of shaping and the self-consciousness to be allowed to do something meaningful for society. The occupation with animals of the wilderness creates zones of contact that re-animates the buried possibilities of turning to the strange creature. The shaping tendency of middle-aged forests opens creative spaces of fashioning that mirror inexhaustible reserves of the young soul. The personal attention at the caring of the single trees opens tending accesses to the quiet, strange being of the trees that can be followed by an initial character and long term friendships. So, therefore the forest practical accompanies on a higher level the life of a tree, until it reaches the age of adulthood. Here the pedagogical focus is laid on the various possibilities of the usage of forests. It is conveyed that outgrown forests are not any mass of disposal of a never satisfied wood industry, but that an alternative, long term thinking caring with old trees can open a dignifying future perspective.

At hand of these examples, possibilities and shaping spaces are opened, that show the way to a development of sustainability. Also controversial areas of themes and apparent contrasts, as the theme of hunting of populations of wild animals are not spared, but are presented in an ecological networked way. The thereby imparted theme of sense-perception seemed to be so important because the so-called objectivity of our sense-perceptions is not really existent. The sawing industry sees the planned putting under protection of forest areas with different eyes, as the entomologue, whose aim is the preservation of old rare species for which one needs old, ripe trees and woodstands. The getting old in dignity of trees is only often to be seen in urban parks and also here the so called duty for the traffic security hits and old trees are sawn down, because of their danger for life and limbs of the citizens. Worldwide one can observe a lack of old forests which entails obvious consequences for the dying of the rare species of plants and animals. So, the question arises, what shall be achieved for the pupils with the above developed forest practical.
2. Which condition and aims can be formulated for the forest practical?

Numerous positive feeds back let the question arise about the best possible conditions of the activity oriented learning: the enthusiasm of the forester and the forest worker, who work in the forest are the key qualification and cause the immediate flaring of the fire of enthusiasm on to the pupils. The pupils love it, when they face the natural authority of the world of work. They are longing for being finally taken serious and to belong to. They feel intuitively the value of work and its normative strength.

The higher aims of the developmental project forest practical could contain the following points:

- To get to know the forest organism as embracing life community.
- At the first place should stand the holistic furthering of the growing individuality, who through own activity, nature contact and the input of all senses is furthered.
- To experience Learning sustainability as a basic principle of the ecosystem forest.
- The joy to experience the acting during the ecological educational work in the forest.
- To scrutinize personal attitudes and endure uncomfortable things, in order to ensure the protection of our bases of life for the following generations.
- To re-discover the soul activity of wonder in the untouched nature as well as the structured nature through pupils’ hands.
- To get to know a professional field usually not easy to survey and to meet different results of work processes in the forests. (e.g. damages of the soil).
- The happiness of being in the natural environment of the forest.
- To get to know the factor time at the long living of the trees and to observe it at the forest stands of the past. To visualize the future development and to experience the present impulses of care.
- To put something against the lifestyle of consuming and terror of the media: nature experiences as an authentic treasure of experience and recapitulation.
- Leading towards the symbol tree, to which a personal relationship can be built up and that has an effect on the holistic aura of its place.
- To perceive at the growing and dying of the trees the integrated passages in the living and to get into contact with the tragic finality of all being.

It is the concern of this present work to describe the ecological educational contents that are to be worked through in the forest and to make it comprehensible for the teachers in its practical
accomplishment. The conveyance of these educational contents should be brought to the pupils in possibly living images. Optimally constructed educational contents can be described as living images (BRIERLY 2005). A characteristic sign of these living images is their own activity. It leads to the fact, that the principles and competences, learned in the forest can be transmitted on to other life- and work realms.

3. Conclusions

It is the request of the work in hand to describe the ecological educational contents which are to be acquired and to make themselves understood in their practical execution. It is quite clear, not to see the developmental project of the forest practical as terminated, but to make it subject to a continual impulse of rejuvenation. Thereby it is to be exposed to a critical quality management that flows into a respective actual reflection of just practised guides tours of school classes and forest practical. The practised action should be further developed in continuous communication with the teachers, so that a client-oriented acting stays preserved in the education for a sustainable development. For the success of a forest-pedagogical measure it is indispensable that effects of synergy of forest competence (woodworker and forester) mix and further each other. It has to be stated that the concept of forest pedagogic has not been defined and therewith a forest pedagogical competence is reserved to future forest pedagogic. It is the question of a creative professional field which should transdisciplinary be worked at, in order to obtain a best possible integration of heterogenic formulations of aims. This seems to be necessary, so that the wide spanned field of formation of a sustainable development can be successfully be worked at.

A possible development towards sustainability aims to a making conscious of mainly monetary aims in forestry that should become conscious of its responsibility for a sufficient consideration of the educational potential of forests. Linked therewith is the necessary function of wellness in urban spaces which can offer emotional support to stressed human beings of industrial societies. Through their space wise order of magnitude the forests offer eminent developmental spaces for the floral and faunistic nature protection which through a multi-functional forest care lets expect a long term increase of biodiversity. To that extent with the forest pedagogic an increase of multi-functionality of forests is to be foreseen.
Finally it should be pointed at an internationally working NGO that is well known under the name of earthkeepers and imparts innovative, built on intrinsic motivation environmental education programs. One of its key message is 4 Keys. With that four not buyable key experiences are meant which guide to four treasure cases and have to be personally worked at (VAN MATRE/JOHNSON 1988):

K = Knowledge
E = Experience
Y = Yourself
S = Sharing

*illustration 46: Live – single and free, like a tree and brotherly, like a forest.*
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German-Michael Hahn
Rudolf Steiner University College Norway
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