Human and Nature

Nature schools Network 2011

NORDPLUS Horisontal

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Preface

This handbook is an outcome of a nature school network, in Baltic Region. The network is financed by Nordplus Horisontal, which is founded on Nordic Council of Ministers of the five Nordic countries and the three Baltic states. The network purpose among other things is to produce three courses and three handbooks in outdoor learning for teachers in participating countries.
At the UBC (Union of Baltic Cities), commission on education meeting in Tallin April 3 2009, the board decided to start working in a way of creating a network of nature schools in Baltic region. To establish the network three, one week long, pedagogical courses are arranged for teachers. One pedagogical course each year of the project. In connection to the course, course material, in the shape of a pedagogical handbook, will be constructed and distributed to the different partner institutions and participants. This is 2011 years handbook.
The courses and the handbooks will be connected to three different themes:

- 2010 Outdoor learning
- 2011 Human and nature, where nature is represented in three different biotopes: water, forest and acre land
- 1012 Pedagogies in teaching about climatic effects

2010 and 2011 the courses were held on Färsna Farm and at Erken Laboratory in Norrtälje, Sweden. Each partner in the network sends tree participants on each year's course. They also provide one lecture during the three years, and the lecture will be a part of the written handbook. This documentation is hopefully an inspiration for the network participants and also other teachers to develop learning processes outdoors.

Pleasant reading!

Susanne Jansson, susanne@naturvardsstiftelse.se, editor 2011
Norrtälje Nature Conservation Foundation, Färsna Naturcentrum, Sweden

Human and Nature - outdoor learning

The headline of 2011 years network course “human and nature” is essential in outdoor learning. All subjects in school can be connected to outdoor learning and “human and nature”. Not only biology and natural sciences. So much more can be included such as history, language, geography, physical education etc. The following chapter gives you inspiring examples of exercises that can be used in outdoor learning. The exercises are divided in three different headlines;

- Water
- Forests
- Acre land

Making primitive wooden constructions is a perfect way to give pupils inspirations in techniques. Here teachers have learned how to construct a swing lead by Anna Westerlund, Färsna Farm, Sweden.

Outdoor learning is about learning in authentic environments. The key is experiences and activities, in which pupils are “learning with the whole body” and all senses. Questions and curiosity will be captured by active teachers.

Ronny Alexandersson, biology education center, Uppsala University , reflects; “Outdoor teaching is fun, but not easy”. In a lecture during 2011 years network course he talks about the question ”what do you think about practical work?”.

- … complements and shows applications of theory, give teaching a meaning, develop understanding of scientific concepts and phenomena, gives pupils practical skills in scientific work, develop critical and analytic thinking and gives motivation for studies in science
- … rather confuse than develop conceptual understanding, and it is both costly and time consuming
- Something in between

What answer do you feel match with yourself?

Ronny also talked about why teachers in some cases skip outdoors. It is important that we listen to all arguments even if we, in our network, are totally into outdoor learning. Outdoor learning is not the answer of everything. The *combination* between outdoor and indoor is important.

Inspiring examples and methods

Water

Edible Earth Parfaits

Water is essential for all life. Water as a resource is for example used for direct consumption, agricultural irrigation, fisheries, hydropower, industrial production, recreation, environmental protection and the disposal and treatment of sewage. In Sweden, we are blessed with pure water – directly from the tap, but this is not the case all over the world.
The water that we use today is the same water that has always been on earth. There is always the same amount of water on the planet and the water does not disappear when it has been used – it is a part of a cycle. Since we use the same water over and over again we have to clean it after it has been used. If we contaminate it too much, we cannot make it pure again.
Edible Earth Parfaits

Aim and background
To teach about the geologic formations in an aquifer, how pollution can get into groundwater and how pumping can cause a decline in the water table. This activity is a fun and easy way to understand the geology of an aquifer. You will build your own edible aquifer, learn about confining layers, contamination, recharge and water tables.

Preparations
Let the students read an article or text about ground water and provide them with a "water vocabulary" (you can find an example on our website). Make sure you have all the material set up and that all students have gone through the instructions. Then start the experiment together and let the students discover and ask question as the exercise moves on.

Materials needed
Blue/red food coloring
Vanilla ice cream
Clear soda pop (7-Up, Sprite, etc)
Small gummy bears, chocolate chips, crushed cookies, cereal, crushed ice or other material to represent sand and gravel
Variety of colored cake decoration sprinkles and sugars
Drinking straws
Clear plastic cups
Ice cream scoop
Spoons
Water vocabulary you can find at www.ebc.uu.se/forskning/IEG/erken/Utbildning_kurser/Naturskolenatverk/

Inspiring and tasty!

Method

Begin to construct your edible aquifer by filling a clear plastic cup 1/3 full with gummy bears, chocolate chips, or crushed ice (represents gravels and soils)

Add enough soda to just cover the candy/ice.

Add a layer of ice cream to serve as a "confining layer" over the water-filled aquifer. Discuss what a confining layer is/does.

Then add more "sand/gravel" on top of the "confining layer."

Colored sugars and sprinkles represent soils and should be sprinkled over the top to create the porous top layer (top soil).

Now add the food coloring to the soda. The food coloring represents contamination. Watch what happens when it is poured on the top of the "aquifer." Point out that the same thing happens when contaminants are spilled on the earth's surface.

Using a drinking straw, drill a well into the center of your aquifer.

Slowly begin to pump the well by sucking on the straw. Watch the decline in the water table.

Notice how the contaminants can get sucked into the well area and end up in the groundwater by leaking through the confining layer.

Now recharge your aquifer by adding more soda which represents a rain shower.

Review what you have learned as you enjoy eating your edible aquifer.

Reflection

After the exercise you can discuss what happened in the different steps. What can be the source of contamination in Nature? How can contamination be prevented and how do the students contaminate in everyday life? There are a number of ways you can build this task to involve investigations at home and see if you can draw conclusions on how we can adapt our lives to be more “water friendly”.

Tips for the teacher

A good way to introduce the task is to let the students evaluate how much water they or their family uses during a day. See if they can find all the ways that water is used (cleaning, shower, cooking…).

Let the students sit together to see if there are any differences and why. It is important that the students understands the value of water to have motivation for understanding the rest of the task. *Warning*: Check with your students before conducting this activity to see if anyone is diabetic or lactose intolerant. Make substitutions if needed.

Activity Source
Edible Earth Parfaits was adapted from "Making A Bigger Splash," co-published by The Groundwater Foundation and the US EPA, Region VII.

Forest

Who has the most right to the Forest?

The propose is to get the pupils to think about democracy and who has the most right to the forest. Also to show that there are many different groups and species who has needs of nature in different ways and that it is important that all parts is heard.

Preparation
Give all participants one card each with different categories of plants, animals and humans who lay claim to the forest. For example orienteering people, roe deer, squirrel, politician, children, hunters or wolfs.

How much right to the forest has a wolf?

Materials needed
Cards with different animals, people and things that lay claim to the forest.
Cloth pins or something else that can be used when the cards are placed in a tree
Spruce or other tree that symbolizes the forest

Method
All participants gather around a spruce tree and think about the right to the forest according to the one on their card. The card is placed on the tree at a level that the participant finds reasonable without discussing it with group mates. High up in the tree means much right to the forest and low down on the tree means little right.

When everyone is ready and has placed their card in the tree all participants tell how they were thinking and why they placed the card where they did.
After that the leader can ask if someone wants to move some cards. An interesting discussion should take place whether the hunter has more right to the forest than a wolf, has a politician more right than a moose? What rights have a child?

Reflection
Participants can also think about who is taking care of the different parts interests? Who speaks for the wolf, child or bear?

Charcoal production and tar production

Aim and background
The forest can be used in many different ways in outdoor learning. In this exercise the pupils are introduces to forest products during the last 200 years. Charcoal and tar has been very important products and a very important source of income for people.

Material needed
Empty can (tar container)
biscuit tin with cover (charcoal stack)
Hammer
Needle
Pine wood
Axe
Saw
Safe fireplace
Gloves

Cooperation sawing a piece of pine wood, that will be chopped into smaller pieces.

Methods
Let the pupils make a hole in a biscuit tin, using a needle and a hammer. Then fill the biscuit tin with small piece of wood. Place the wood pieces standing and fill the tin as much as possible before sealing it with the cover.
Prepare the empty can by digging it into the ground on your safe fireplace. The edge of the opening of the can should be on the level with the ground.
Place the biscuit tin over the can opening. If needed – place some stones to keep the biscuit tin steady. Then it's time to make a fire all around the biscuit tin. After one hour of fire the charcoal production is ready. Use gloves and open the biscuit tin and look if there are any tar in the can below.

1. *The biscuit tin is used as charcoal stack.*
2. *The empty jar is a tar reservoir. On the picture the jar is placed in level with the ground.*
3. *One hour later. Ready products - charcoal and tar.*

Reflections

This exercise is perfect to combine with other activities. Use the fire for cocking for example. With older pupils a discussion about combustion without oxygen can be interesting. Circulation of coal in biosphere or the history connection.

Tips for the teacher

When the tar cools down it congeals. To use the tar for painting or other things you can use a solvent.

Lichens as indicators of air purity

Humans impact the nature in different ways. One of the results of this impact is air purity. People need to know some simple and fast ways to determine the air quality. If people know air quality they can start to find reasons for pollution and ways to improve air quality.

Determine the lichens

Aim

Pupils develop observing skill and learn how to determine lichens.

Preparation

Teacher show lichens (every pupil can touch them) and tell about lichens.

Useful links to prepare narration:

- What are lichens and why to study them http://nhc.asu.edu/lherbarium/lichen_info/index.php
- Lichens, growth forms of the lichens, anatomy of the lichens, interesting facts about lichens in the wildlife and peoples life http://www.lichen.com/vocabulary.html
- Morphology of the lichens http://www.earthlife.net/lichens/lichen.html
- Information about lichens in Latvia http://www.lva.gov.lv/daba/lat/biodiv/kerpju.htm

Material needed

- Different species of lichens
- Lichens identification key
  - we used this one in Latvian http://www.daba.gov.lv/upload/File/Publikacijas/NOT_Kerpji_A3-DK.pdf
  - there are one more interactive identification key in internet http://www.liis.lv/gpt/kerpjnot.htm
- Magnifying glass
- Crossword
- Paper pad
- Pencil

Lichens crossword

Method

1. Pupils look on lichens and try to identify them using lichens identification key.
2. Pupils write full species name in crossword (there are number on the lichens).
3. Teacher help to the pupils to pay attention to features of the lichens what help to determine them.

Xanthoria parietina, lichen that grew in polluted environments

Tips for the teacher

For smaller children it is better to give lichen for determination and then fill big crossword all together as it is shown in the photo above.

It will take a lot of time to find lichens and determine them and then make a crossword (about tree days). Easier is to determine lichens in limited territory around the school, but the problem is that in the city there are only some species of lichens.

Determine air purity

Aim

Pupils develop inquiry skills, cooperation skills and skills to use lichens as bio-indicators.

Preparation

Teacher tells about lichens and why they are good to use as bio-indicators to determine air purity.

Useful links to prepare narration:

- Explained why lichens are good indicators (p. 5) http://www.opalexplorenature.org/sites/default/files/7/file/OPAL-Air-Chart-web.pdf
- Simple explanations about air quality and pollution http://www.clean-air-kids.org.uk/airquality.html

Material needed

Methodology descriptions (worksheets)

Lichens identification key

Magnifying glass

Paper pad

Pencil

Descriptions and identification key you find www.ebc.uu.se/forskning/IEG/erken/Utbildning_kurser/Naturskolenatverk/

Method

Version 1

1. Pupils divide in small groups or pairs.
2. Each group determine air purity using worksheets.
3. Discuss the results, make conclusions about air purity and share ideas about pollutants.
4. Discuss what to do to make air cleaner.
5. Try to realize some ideas.

Usnea sp, sensitive to air pollution

1. Ask to pupils to make prediction about the purity of the air based on their own observations.
2. Ask to share pupils' prediction with other pupils in their group and ask for arguments to others.
3. There are several methods to determine air purity. Ask pupils to choose one or some of them to determine air quality in the surrounding.
4. Then try to identify potential sources of air pollution and do something to improve air quality, for example, make poster, make oral presentation, make drama, make booklet, make painting.

Tips for the teacher
Complementary material you find on www….Use methodology number IV for smaller pupils. For upper secondary school pupils you can use different methodologies and the compare process and result. It will better help to develop pupils' inquiry skills.

Improve air quality

Aim
Pupils develop cooperation skills, communication skills and learn to use results of their inquiries for problem solving.

Preparation
Pupils take part in activity „Determine air purity". See www. …

Material
- Results of activity "Determine air purity"
- Paper and other necessary tools for pupils projects

Method
1. Divide pupils in small groups (they can choose what they want to be):
   - Scientists,
   - Teachers,
   - Artists (painters, sculptors, handicrafts etc.),
   - Drama makers (actors, producers, script writers etc.).

Artist or drama maker?

Art and handicraft – full creativity!

2. Every group make on facts based „story" about lichens and air quality. Remember, people in scientists group must act like scientists. For example, make hypothesis, accurately record data, verify them, make conclusions, discuss and present them etc. The story of drama makers group will be drama or film.
3. Organize "conference" where every group present their result, explain idea and discuss next steps to do to improve air quality.

Tips for the teacher
It is advisable for teacher to ask question WHY? to pupils as often as possible.

Acre land

We expand the agriculture in two branches:

- Ecological, nature-friendly
- Massive, cheaper production

Following programs are all connected with ecological way of thinking in agriculture.

Wooded meadow

Introduction
Wooded meadows envolved already 4000 years ago and were related with consuming wood and later with spreading of cattle breeding. The wooded meadows in Europe are very important in all the world because of their specific difference. There is a wooded meadow called Laelatu in Estonia, where are 76 different species on $1m^2$ and this is the most unique in Europe because of that. The reason why there are so many different species in wooded meadows is that trees create a good conditions of light and humidity.

Materials needed
4 ropes (1 meter long) for every group

Creating a square from four ropes.

Method
You have to find a wooded meadow, where each group selects a random place and creates a square from 4 ropes. Each group counts all different species of plants in their square. You can also make different kind of tables where to write down the amount of different plants.

poaceae	other plants

Result

You got to know what is wooded meadow. Aquired scientifical method of research.
Homework: to find a wooded meadow in your country and to count all different species there on $1m^2$!

Domestic animals

Introduction

One reason why people started to domesticate animals was to get food (meat) without hunting. Our task is to figure out what are the things what people get from domesticated animals and what are the things they need from us to survive.

The cock at Färsna Farm

Material needed

Pictures of animals for every group (e.g. cow, pig, sheep, horse, rabbit, goat, goose, chicken, turkey)

The pig Gunnar at Färsna Farm.

Method

what do people get from domestic animals	what do domestic animals need to survive

Result

Apperception of vital needs of domestic animals and their usefulness for people.

Vegetables (farmworks)

The exercise turns the attention to circle of life of different plants/vegetables, also shows how much time and work takes to grow vegetables.

Material needed

Vegetables (e.g. cucumber, tomatoe, pea, bean, potatoe, carrot, raddish, cabbage, rape, onion, garlic), rope for making the garden, things for cooking (in case of).

Is potato a one year vegetable or a two year vegetable?

Method

1. Make two gardens: one for one-year vegetables (the ones you seed in spring and get the fruit/seed in same year) and another garden for two-year vegetables (the ones which give fruits/seeds only the year after seeding).
2. Make a working plan for garden-assistant about both gardens separately. Write there what kind of work he has to do.

Delicious vegetables is also inspiring and gives apatite!

You can also put all these vegetables in real soil and make real gardens when making this experiment with children. And in the end of this task you should all cook something from these vegetables. A good idea for discussion is where do all the extra ingredients (oil, salt, cream, etc.) come.

Human and nature – outdoor learning

Nature School Network

The course of Nature school Network 2011 turned out to be as successful as 2010. We have an even stronger network that we use more and more frequent. We all agree that we grow in outdoor teaching. Our network helps us to get perspective and inspiration for our work at nature schools. We really look forward to 2012 years course!

Partners of “Nature School Network”

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