

The Water Theme

Learning Towards Sustainable Development



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Chapter 1 Introduction

Preface

The earth, which is called the blue planet, is covered by more than 70% of salty seawater. Only about 2, 5% is fresh water of which 1% is available for people. The amount of water on earth is constant; it will never become more or less. The water circulates in a lifecycle of liquids, steam, ice and snow.

Water is a precondition for life on earth. This means that it is of great importance to protect the water against an even more insecure future with increased population, environmental pollution and an increased need of fresh water around the world. The water issue concerns not only the food production of food stuffs, drinks and plantations but also the production of consumption goods such as textiles and energy raw materials. A big part of products require water to be produced, which is named *the hidden water*. All organisms need water to survive. This affects the need of people to utilise nature resources e.g. timber and ecosystem services such as the bee pollination of crops.

Water and its use will get a considerably more important part in the future education due to the climate issue. With this program, the Nynäshamn Nature School through the project COBWEB is aiming to give inspiration through experiences, discoveries and understanding of the water's importance. Above all, the program emphasises a perspective of activities, resulting in an education of real practical exercises.

RAIN

*Humming, buzzing, murmuring
the summerrain buzz,
all the trees' wet
leaves and buds cry
drop – drip – drop
and rushing beneath
a stream in murmur and purl
a stream in murmur*

Gustaf Fröding

SWELLS ON THE SHORE

*The wide ocean swells
towards a desert island,
towards the greyish pine trees
an endless sea is surging
braking, throwing,
splashing, gleaming, turning
white whirls
falling, wide
the waves of the ocean
billowing
another wave again
splashing, gleaming
pouring struggling
billowing falling,
up, heaving seaweed, throwing seaweed
endless is the swell of the ocean,
still only in the moment rare
sometimes, when doldrums are*

The Pedagogical/Didactical Idea

The pedagogical/didactical idea of this program is based on five steps, i.e. *Experience, Discovery, Understanding, Insight* and *Action*. The first four steps are the Nature School Organisation's basic ideas about belief in the future. The steps are joined in the concept "finding the path", meaning Experiencing with all the senses, Discovering the diversity, Understanding the connections in nature and insights of knowledge about the nature's lifecycle. In this folder a fifth step has been added; Action, meaning attaining the skills and insight that give the children a desire to act.

How to Use This Folder in the Education

This program is about Water. The theme is suitable both for exploring water in the local environment and becoming aware about the global water issues. A current issue for the schools in the Baltic area is: How can we reduce our impact on the Baltic Sea?

This program emphasises how the pupils should carry out *actions* around the water issue. This will be done by the pupils experiencing and discovering and attaining knowledge through their own questions about water. By attaining knowledge the pupils will be able to estimate and make sensible choices, as responsible citizens in a global future. The underlying idea in all activities/exercises is that the children/pupils are taking part in the process.

Chapter 2 Exercises

Description

The exercises in this chapter show examples of opportunities to study the Water theme. This is done in steps in shifting environments with different purposes and methods. Some steps and text sections are repeated for the different grades, such as water ecology. **These are highlighted in green font.** Some exercises contain several steps and some of these could have been written under more titles than they currently are. As mentioned earlier it is of importance that the children/pupils participate with their own thoughts and reflections about the content in the different exercises.

Some of these work areas are included in the exercises, especially in the steps insight and action. The teacher can start with a mindmap about water. For the older pupils the mindmap can be developed into a concept map. The concept map illustrates the connections between different associations/parts about water and its resources. Water is part of complex systems and the different associations/parts illustrate how water is connected to almost everything in the life of people and organisms.

Exercises for the steps Experience, Discovery and Understanding

The goal of these exercises is to create a contact with the nature and create a nature feeling where *experiences* with all the senses strengthen the nature feeling. The experiences are often interconnected to exploring and discovering the local environment, and through this many pupils will ask questions to get the answers. To achieve an *understanding* of the diversity in nature and to see the connections will deepen the knowledge, which can then be expressed with familiarity and skills in respect to practical and theoretical aspects.

Exercises for the steps Insight and Action

The goal of these exercises is to, through nature experiences and understanding of ecological connections, achieve *insight* about people's part in the bigger context, which is established by communicating the knowledge, and evaluating and reflecting about different perspectives and standpoints. Insight and the sense of feeling can, by one's own actions, affect and change the development towards a sustainable society.

The Preschool, Ages 4-5

Preschool, Ages 4-5: Water Ecology



Play on the beach is always exciting and provides opportunities to discovery. What are the children discovering on the beach? What can they find in the water? Findings on the beach, such as stones, sticks, litter or living insects, will draw the children's attention. The water life is connected to the seabed types. Soft seabeds of sand and mud or hard seabeds of stones are different kinds of biotopes with different organisms. The teacher can start the water ecology theme by letting the children visit two different beaches.

The teacher gathers everybody in a circle and starts with a story about water, the water processes or some water organisms/some insects.

Steps:

Experience

Discovery

Understanding

Before starting the experiences and discoveries, the teacher draws the children's attention to the environment surrounding the water. How does the ground look like nearby the beach? How does the water seabed look like?

There are several ways to continue the theme. If this is a stony beach the children can collect stones and build towers or piles of stones. If it is a sandy beach the building theme can be taken for granted. Sand castles and sand houses are the most common, but try also to build a landscape with houses, rivers, lakes and deltas. There are unexpected opportunities to introduce geographical terms here while playing.



Whirligigs



Caddice/Case-worm



Water boatman

A natural continuation is to collect insects. Divide the children into groups. The teacher starts telling about the diversity of small animals on top of and under the water surface and which food they eat. The terms herbivores and predators are presented. Show about ten different animal species, using cards or photos of different insects, such as diving beetle, whirligig, dragonfly-worm, caddice-worm, mayfly-worm, water woodlouse, freshwater acari, horse-leech, freshwater amphipoda, water scorpion, various shell species, freshwater mussels. The groups get a specific place at the beach where they can use tucks and strainers to catch as many insects as possible at the waterside, around the water plants, on the water surface and on the bottom around the stones.

The small animals should be put in a big white bucket with clear water inside. It usually takes about 30-50 minutes depending on the availability of insects. After

collection, the insects and their behaviour should be studied in detail with or without magnifiers. The teacher summarises the diversity of species, big as well as small ones living inside and around water.

Finally, the teachers perform a small drama, improvising 3-5 species meeting each other in a certain circumstance, such as in the kitchen, on the bus, at the doctor's. What do they say to each other and what happens?

Preschool, Ages 4-5: The Aesthetical Value of Water



Steps:

Experience

Discovery

Understanding

Play in the sand.

You can drown here. It is water.

The aesthetical value of the water is of great importance for our wellbeing and is seen as an important ecosystem service.

The teacher shows which colours the children can use for their drawings, e.g. blue and yellow. Thereafter they use water colours and paint their experiences from the two beaches.

Ecosystem services

The microorganisms' issuing of nutrition and their decomposing of the pollution in the air, ground and waters;
the pollination of insects;
the effect of the vegetation's water regulation.

To continue the exercise the children can be painting stones, which they picked at the beach. The magnifier is being introduced, if not done before during the water ecology theme. Painting stones forces the children to observe the stones carefully. Inside water they get a darker, clearer colour compared to stones on the dry land. Are there stripes, spots, stains, ribbons or other small details that differentiate the stone from other stones? The teacher describes different kinds of stones, the name of the stones, e.g. granite, gneiss, porphyry, quartz (crystal), mica and basalt. The stone pictures should be attached/glued on a big black piece of paper.

Preschool, Ages 4-5: Water in the Children's Book



The teacher reads out loud from different stories or fairytales, about water. Examples are *Bruno the teddybear, Lisa the frog and the insects in the pond* by Gunilla Ingves, *Thumbelina* by H.C. Andersen, *The book about Stina* by Lena Andersson, *Amanda the duck and the secrets* by Elizabeth MacDonald and Ken Brown.

Steps:

Experience

Discovery

Understanding

Together they should create a saga/fairytale where an aquatic animal, such as a dragonfly-worm, a shell or a perch is the central figure. The story should contain the following parts: a description of the animal, how the animal moves and how it behaves, what it eats and in which environment it lives or where it was found. The episode takes place down in the water or at the waterside. If the animals are given names so that the children feel they have a “human side”, it is then much easier to create a story. Discuss about the continuation with the children. Which other animals are there? What happens when they meet? What do they say to each other? What happens then? How does the story end?

Communication - Democracy

Communication is a process of transferring information, ideas and viewpoints, from one point to another. Or as the simplest form: a social meeting where people talk to each other. To be able to communicate a language is required, and Swedish is an important tool to be able to participate and have influence on various decisions.

Swedish as a language is the foundation for participation in the work towards sustainable development.

Preschool, Ages 4-5: The Local Community



Steps:
Insight
Action

Pond

Build a pond on the preschool yard, dimension about four square meters. Parents, teachers and children should plan and implement the work during some working periods. By building also a water cascade with a pump, the water installations then get both a static and a dynamic surface which will generate awareness about the motions of the water.

How to build a pond

1. Imagine a place double as big as the visible pond.
2. Dig a hole of about 30-50 cm deep.
3. Dress the hole with dust foil and/or a cover rug.
4. Add water and adjust the dust foil carefully.
5. Add oxygen with a pump, ensuring circulation in the water and which leads the water to a filter, a fountain or a water cascade.
6. Sow plants and/or add insects and fish.

Preschool, Ages 4-5: Democracy and Lifestyle



Democracy – Sustainable development

Education has an important role in the aim towards a sustainable society. In the education, the process is put in focus. Through democratic working methods and contacts with the local community, the preschool and the school can contribute for the youths to achieve action skills.

The teacher starts a discussion about the usage of water in the house, e.g. for washing clothes, washing dishes or for the toilet. The water usage in the house is measured with a water gauge and all the water that is used costs money. It is important to clarify the difference between hot and cold water. For the children to comprehend the time perspective the teacher uses an exercise/activity: the teacher counts the time when the children wash their hands during one minute and three minutes respectively. How much hot water can be saved? Can we wash our hands fast but carefully? How much water is used when a person washes the hands (measure in litres)?

Steps:
Insight
Action

Let the “Save (hot)water-project” run for a month and pay attention if the water gauge makes a difference. How much money is saved? What product or service can be bought for the money?

Let the children draw hands and a tap on a readymade template which will be a logotype. Laminate the drawings and hang at the washbasins.

Preschool, Ages 4-5: The Physical and Chemical Characteristics of Water, Technology and Mathematical Calculations



Steps:
Experience
Discovery
Understanding

To discover the different states of water and their unique characteristics is often done through experiments and discussions. Start by talking about the three states fluid (liquid), solid (ice) and gaseous (water vapour/steam). The teacher draws a mindmap of the children’s experiences and knowledge about water, which will be the foundation of the theme continuation.



Steps:

Experience

Discovery

Understanding

A third experiment shows how water can be utilised in an energy perspective through technology. The assignment is to create a waterwheel with an apple, a flower stick and a couple of paperboard pieces from a milk package. The children should test their waterwheels where water is pouring, e.g. in a channel or close to a rainwater pipe when it is raining. The teacher discusses why the waterwheel moves and how to make use of/save/collect that motion energy.

An **energy source** is a nature asset or a nature phenomena that can be transformed to useful energy forms such as light, motion and heat.

Energy sources

Fossil energy sources

- Nature gas, crude oil and mineral coal. These exist in limited, however very big, reservoirs and are replenished very slowly.
- Uranium is not replenished. It is the raw material of nuclear fuel.

Renewable energy sources

Flowing/renewable energy sources are constantly replenished through the influence of the sun on the earth and nature.

- Energy of water, wind and tide.
- Solar energy – the most pure energy source
- Biomass reckons a solar based energy source
- Geothermal energy originating from the inner of the earth.

Peats – partly renewable, replenished slowly

Preschool, Ages 4-5: The Importance of Water in the Society and as a Nature Resource



Steps:
Experience
Discovery
Understanding

The teacher introduces water as food and drink. Many children do not consider that food contains water. Sometimes the amount of water may be much bigger than the children could imagine. Some foodstuffs, such as cucumber, mushrooms and apples clearly show how little food is left when the water has evaporated.

The theme begins with an experiment. Start a discussion about the thoughts of the water content in a cucumber, a mushroom, an apple, a piece of hard bread and soft bread respectively. Either weigh or measure the food products. Suggestion is to draw the shape of a cucumber on a piece of paper. How can the water be removed/disappear? What is water vapour? Is it possible to see water vapour? What is evaporation? Write down the children's thoughts about how small the cucumber will become or how little it will weigh after the water evaporated and how long time it takes. The thoughts are hypothesis, on which the experiment should be based. What is a dry place? What happens if it is not dry enough? If it gets rotten or moulded, what happens then? The foodstuffs could for example be put in a dry place above a radiator or in the oven. Together they should observe what happens, day by day.

Cucumber

- Is the most water-rich vegetable with a content of 96% of water.
- The snake cucumber is the most common.
- The cucumber plant is a creeping vine from the north of India. The wild types taste bitterly.
- The edible cucumber has been cultivated for about 3000 years in e.g. China and Egypt.



A natural continuation is to plant something edible. If the schoolyard does not have planting possibilities, then herbs, salad, cress, potatoes in a bucket, etc. could be planted indoors. A mini greenhouse hastens the germination and growth. How much water is needed for growth? Does the water stay in the plant?

Another continuation is to measure the amount of water the children drink every day. How many decilitres? Are there differences depending on the seasons? Are there differences depending on whether the children have been active or been sitting still? To visualise this, the teacher should make a table for each child. Discuss the children's ideas about water as a beverage, if they think they can survive without drinking and if they think that all the children in the world get enough water.



Water is needed to cultivate vegetables. Usually tap-water and irrigation systems are used. The teacher discusses with the children if they think they can use rainwater for something.

Make a rain gauge by a PET bottle to see how much water falls during a rainfall. At the same time, place buckets in different places. Which place gets most water? Is it at the yard, under the tree, at the house corner or ...?

All the water does not fall into the buckets, so where do they think it goes?

The importance of water to society is significant concerning the food production. For the children to attain a greater understanding it is recommended to visit some horticulture in the local community. The farmers can tell how much water is being used.

Preschool, Ages 4-5: Water in the Literature



Water song

Drip drop drip

drop drip drop.

*What is it that rains
on our umbrellas?*

*What is it that snows
down from the sky?*

Yes, water water

Just ordinary water

Lennart Hellsing

The teacher discusses with the children about all the water words they know. It can be words which are used and associated in connection with water, such as rain, umbrella and rubber boots or beach ball, pier or boat. The words should be written down to be used later when writing poems together. The teacher and the children can continue the exercise by searching for water words outdoors. For example, is wet moss a water word? The children interpret in their own way and the perspectives may change.

The theme continues by the teacher reading poems and discussing about which pictures and thoughts are associated to the poems. If the poem contains the word “rain” – can someone get the feeling of getting wet or cold? Do the children have some experience/some memory connected to rain? Maybe more words can be put on the list.

Finally the teacher and the children try to write poems together. All the words listed so far can be used for different poems. The teacher has already decided the style of the poem, and the simplest way for the preschool children is when the teacher writes down the children’s sentences, with their exciting features. It is recommended to have a title and something special or unexpected at the end, on the last row.

Steps:

Experience

Discovery

Understanding

Preschool, Ages 4-5: The Local Community



I use about ...
litres a day at my
preschool

We must save
hot water

Together with the teacher, the children make a quiz walk or mind path about water. The purpose is to hang it in the local environment – in a forest hill, beside a stream, nearby a pond and the walk should take place during the next parent meeting. A normal quiz walk can contain ten questions with 1,X,2 alternatives. A mind path is marked with strips, in this case about 200-300 meters long, where different cards have been hung. The cards contain quotes worth considering and expressions reflecting about water and our lifestyle. The participants should walk the path for about 10 minutes in peace and quietness.

Steps:
Insight
Action

Suggestions of quotes for the mind cards may be what the children themselves have emphasised in connection to the water theme. About six-seven mind cards are enough. The last card may be chosen by the teacher, and favourably if it concerns our choices in life.

Preschool, Ages 4-5: Democracy and Lifestyle



The usage of water at the preschool is emphasised in the energy-saving project. But how much water is used when we wash ourselves and bathe at home? Is there a difference compared to taking shower? The parents need to be informed about the theme. The teacher starts telling about why people need to wash and what cleanliness/hygiene means. A historical flashback about 80 years is a recommended starting point to be able to see the changes. How do the children think that old people today used to wash themselves as children?

Steps:
Insight
Action

Begin outdoors. The children assist by fetching a bucket of water. Use a vessel to pour the water into a washbasin. With a piece of soap and towel, let the children try to wash their hands, face and neck with the water in the basin. Can they imagine using the same water as the others? How did people use to do in former times? Was there a difference between the city and the countryside?

If possible, arrange an inflatable swimming pool at the preschool yard. First, everybody decides how much water is needed for comfortable bathing. The teacher marks the water level with a coloured pen. Let the children fill the pool using buckets of water and let them pay attention to how many litres a bucket contains and how many buckets are required to reach the water level. The teacher should also take the time. Discuss afterwards about how the children are feeling. Could they imagine filling the bathtub at home by fetching water? How does it look like in other places around the world?

Another possibility is to talk with the parents for them to compare shower and bath with their children. How much water is there in the bathtub if they shower and not let the water pouring out? When they finished showering, is the water level the same as when they take a bath or is it half of it, or a third? It is important that the parents show the difference. The teacher should find out how many litres are needed to fill a bathtub. How long time does it take to fill a barrel on the yard with the same amount of water? Do people, i.e. the children and their parents, manage to make the effort to fetch water the same way they used to do in former times? Is there even enough time for us to do it?

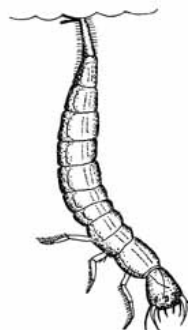
Let the children make a small exhibition with the title “water transport”. Write texts with the children and together with drawings display the theme on an exhibition screen. Is it possible to show the exhibition at the library or in the municipal building or at the water-treatment plant or...?

Primary School Grade F-3, Ages 6-9

Primary School Grade F-3, Ages 6-9: Water Ecology



Diving beetle



Diving beetle worm

Water is not experienced in the same way at the ocean, at a lake or as pouring water. Even rivers, creeks, streams and ditches have different shapes and speed, which make people getting special associations.

The teacher visits different nature types to be able to give the pupils an overview of where in the landscape there is water. Water may be big areas or small areas, it may be salty or fresh, not moving or in motion or...

The teacher gathers everybody in a circle and starts telling a story about water, the lifecycle of water or about some water organism.

Another variant is to begin with a game. Suggestion is to use the game “Who is afraid of the boogiemán?”, but changing the actors. The teacher shows a picture of a predator and discusses about which food it eats. Show also a picture of some feeding animals before the game starts. The pupils should line up in a long row, beside each other, so that they can move over to the other side of the field. In the middle is for example a diving beetle. The pupils are cladoceras (also called water fleas or daphnia), of which there are about 90 species in Sweden. The teacher describes the beetle and water fleas a bit more.

The diving beetle calls out: “Who is afraid of the diving beetle?” The water fleas shout “Not me” and the beetle answers “Then come on”. The water fleas run as fast as they can across the field to the other side, while the beetle tries to catch its food by tagging as many water fleas as possible.

They are now turned into diving beetles and the game continues until about 4-5 water fleas are left. Then the teacher interrupts the game and discusses that water fleas will always be left, since not all of them are eaten up by predators. Through the game a short food-chain has been introduced. The teacher can try other actors, such as great crested grebe with many diving beetles or a dragonfly and many tadpoles.

Refer also to the dragonfly game in the book “Outdoor learning all the year around”, page 230, by the Nynäshamn Nature School.

It is important that the pupils get inspired to explore the diversity in, on and at the water.

Steps:

Experience

Discovery

Understanding



Cladocera

Cladoceras

- Lives in fresh water.
- Has a transparent carapace covering most of the body.
- Has one eye on the head and two claws at the back.
- Has antenna, where the second pair is the organ of locomotion with long bristles.
- Eats mostly plankton, but some eat also carcass or are predators.

The pupils are divided into groups of four to five. The teacher introduces by telling about the diversity of insects on top of and beneath the water surface and which food they eat. The terms herbivore and carnivore are introduced. It is recommended to show about ten species, e.g. cards or photos of different insects, such as diving beetle, whirligig, dragonfly-worm, caddice-worm, mayfly-worm, water woodlouse, freshwater acari, horse-leech, freshwater amphipoda, water scorpion, various shell species, freshwater mussels. The groups get a specific placed at the beach where they can use tucks and strainers to catch as many insects as possible at the waterside, around the water plants, on the water surface and on the bottom around the stones.

The small animals should be put in a big white bucket with clear water inside. It usually takes about 30-50 minutes depending on the availability of insects. After collection, the insects and their behaviour should be studied in detail using magnifiers.

Ensure there is time left to end the exercise with sorting all the insects in water bowls where a card or photo with the name of the animal is put in front of each bowl.

The teacher summarises the diversity of species, big as well as small ones living inside and around water. Allow the pupils to reflect on which animals are herbivores and carnivores. Is there a difference of the animals' behaviour in the different bowls? It is obvious to notice that slow animals are herbivores and fast ones are carnivores. The term *food-chain* is being introduced. Maybe the teacher has read about a specific species and is able to tell something exciting about the behaviour or existence of the species. That is always appreciated!

Steps:

Experience

Discovery

Understanding

Primary School Grade F-3, Ages 6-9: The Physical and Chemical Characteristics of Water, Technology and Mathematical Calculations



The purpose of the physical characteristics is to introduce different materials' buoyancy to the pupils, and to see what surface tension means. The teacher and the pupils should have brought some material with them, such as bark, wooden pieces, aluminium cans, plastic bottles, etc. Divide the pupils into groups. They should write down their thoughts, their hypothesis, and sort them in two groups: floating and not floating. Each group fetches different materials to test the buoyancy. They have also brought a stopwatch with them. Then they should write down what they are discovering.

Steps:
 Experience
 Discovery
 Understanding

Group ...		Buoyancy in water	
Material	Floating	Sinking After a while – time in seconds	Why?
Bark			

The teacher discusses with the pupils about their observations and about the reason for different materials to behave differently.



During the next outdoor occasion the teacher introduces the term *clean water*, a chemical characteristic. What is the definition of the term? Is that when the water is clear and the bottom is visible or is it when there is no litter in the water or is it when there are many animals and plants in the water or ...?

Divide the pupils into groups. The groups should make *the water dirty* in a big bowl with nature material and other stuffs such as plastics, metals, glass, salt, etc. Using plastic pipes, plastic bottles, a funnel, coffee filters, mosses, sand, etc, the groups should try to purify the dirty water. It is important that the groups use a certain amount of water systematically, e.g. 1 litre, and watch the purification process using a coffee filter. The groups should save the water in a transparent jar with an attached label describing the method used. When all the methods have been tested, the groups can decide which method looks the best. The teacher discusses their results and which method seems to work best. The discussion can be continued about: Is it the water that looks clean that is the best water or are there invisible pollutions? Did the salt dissolve? Is the water purified from salt?

Steps:

Experience

Discovery

Understanding



Technological solutions for energy usage can be illustrated by letting the pupils build a water wheel beside or in a pouring stream. Before everybody walks to the stream, the teacher shows pictures of how people in Sweden used to utilise water powers, such as grinding flour in a mill.

The pupils are grouped and placed along the stream. They get some potatoes, four big plastic spoons, eight small plastic coffee spoons and two knitting needles of metal. The knitting needle is thread through the potato as a shaft and the plastic spoons are distributed around the potato like shovels. The group should try to find

the optimum place where the water wheel spans. The teacher then discusses with the pupils how they think they can make use of the motion energy and transfer it to something else. Example is to connect, from the metal needle, a generator on a bicycle wheel.

The next outdoor occasion requires sun and warmer weather. The groups should work with solar energy to discover if and when the sun heats up the water. Each group should place two dark plastic boxes and two white boxes outside. Fill about 1 litre of water in each box. It is good if the water has a temperature of about 10-12 degrees Celsius. One white and one black plastic box are placed in the shadow and the sun respectively. While the experiment is ongoing another exercise/activity can be done. White reflects the sun light while black absorbs the sun light. Two, three hours later, the groups should measure the temperature in the boxes. Where is the highest respectively the lowest temperature?

The teacher discusses with the pupils if they have discovered the same phenomena during other occasions. Is there a difference of having white clothes compared to black clothes during summertime?

Primary School Grade F-3, Ages 6-9: The Aesthetical Value of Water

Most people get a feeling of wellbeing at the sea or inside the sea. It is peaceful to watch a water mirror rippling, perhaps with some dragonflies in motion. Or the feeling of a refreshing/chilling bath on a hot summerday. The aesthetical value of the water is of great importance to our wellbeing and is estimated an important ecosystem service.

Steps:

Experience

Discovery

Understanding



The family is bathing.

Ecosystem services

The microorganisms' issuing of nutrition and their decomposing of the pollution in the air, ground and waters;
the pollination of insects;
the effect of the vegetation's water regulation.

The teacher introduces water as an element shifting in colour, motion, light, shape and contact areas together with other materials. This can be done with pictures on waves, beach zones, water circles, small and big waterfalls, water drops, etc. The discussion with the pupils can be about memories and experiences they have had with different types of water. The teacher shows also the "wet-on-wet"-technique. The pupils are given pieces of papers and water colours or aquarelle colours, and then they should go to different water environments. The teacher emphasises the importance of first watching the water and then watch how it shifts before they start

drawing. A useful colour scale is white to black, with streaks of yellow, green and red, if it is in the evening. Put frames around the paintings.



The “wet-on-wet”-technique

Wet-on-wet is the common expression of the technique to let aquarelle colours or water colours to spread on wet materials. The colours are mixed in nuances and different combinations depending on which basic colours have been used.

Consider the following:

- 1) **The paper’s degree of humidity:** Wet versus slightly humid gives strong respectively small spreading of the colour. It is not possible to only moisten the paper slightly, it is necessary to wet the paper completely and then let it dry to the correct degree of humidity.
- 2) **The amount of liquid in the brush:** Brush that is filled with liquid or dry - strong respectively small spreading of the colour. A dry brush should be filled as usual and the extra paint removed against the edge of the mixture bowl. If not enough paint is removed, use a cloth or paper to remove liquid from the brush.
- 3) **The characteristics of the pigment:** Some aquarelle pigments spread nice and even.
- 4) **The paper’s quality:** It is not about good or bad only, but quality paper of different brands behaves differently.

Another possibility is to divide the pupils into pairs and let them create an aquatic animal made of clay, gypsum or nature materials. These can be painted or glazed. To make the exercise useful the pupils must have caught insects or carefully studied insects before. The teacher introduces by letting the pupils reflect on their observations down at the waterside. How many legs, antennae, barbs on the feet, patterns on the back of the body, hair/fur on the legs, grasping claws, etc, do the aquatic animals have? The water animal should display as many biological details as possible, i.e. letting the children achieve knowledge of species and at the same time performing creative work.

When the aquatic animals have been formed/sculptured, the teacher ends the activity with a discussion about why the animals look the way they do. Are they herbivores or carnivores, and what characteristics have been developed physically in order to find food?

Primary School Grade F-3, Ages 6-9: The Local Community



In earlier themes the pupils have been reflecting on clean water, the possibilities to drink water from the tap and the amount of water they themselves drink. Based on the pupils' and teacher's questions they make a visit in the local shop.

How many water bottles are sold in the shop? What is the price of one bottle? How much money does the shop earn? An advantage is to do a tasting comparing tap water and water from various bottles. Are there differences in flavour? How does water actually taste? Which one tastes the best? Why?

Without considering the production of the plastic bottle and the transport to the shop, the teacher and the pupils can discuss what the money can be used to instead of bottled water. A mathematical exercise may enhance the ideas of the plastic bottle's be or not be.

Show pictures of "garbage mountains" of just empty water and soda bottles.

Refer to http://www.chrisjordan.com/current_set2.php?id=?view=XXX_09NNN

The theme is ended by letting the pupils draw or paint a bottle poster on an A3-size paper. The pupils should add a title to the poster, which will be the message of the picture. The message should be about reducing the number of plastic bottles.

Primary School Grade F-3, Ages 6-9: Democracy and Lifestyle



Steps:

Insight

Action

The teacher has earlier been working with water purification and discussed about: Is the water that looks clean the best water or could it contain invisible toxins? Did the salt dissolve? Is the water purified from salt?

To achieve insight about the visibility in the water and possible toxins, the teacher continues to reason about urine in the water. Urine contains large amounts of nitrogen and phosphorus which are manures in commercial fertilisers and are also part of many nutrient salts. The teacher asks questions: If people pee in the water when they swim, is the urine visible? Is the water polluted when it contains urine? Is it possible to measure the amount of urine? What are bacteria and where can they be found in the water?

A way to create understanding is to compare urine to nutrient solution for flowers you can buy from a shop. If nutrient solution is poured together with water it reminds about urine. To continue experimenting, use different nutrient solutions in water.

The teacher should contact the environmental office/environmental authority to get information about emissions, degrees of bacteria and problems with boat toilets in the sea or ocean. The pupils will be taking part in the issues of bathwater in the local environment and its water quality. They should draw posters or logotypes with expressions such as “*Do not urinate in the bathwater!*” They discuss where to place the posters and logotypes in the local environment/community.

Primary School Grade F-3, Ages 6-9: The Importance of Water in the Society and as a Nature Resource

Through the lifecycle of water the supply of fresh water in the nature is constantly renewed, at the same time as the earth's temperature is regulated through the evaporation from the oceans. Fresh water exist in the form of groundwater down in the ground and as surface water in several different environments, such as streams, creeks, running water, rivers, estuaries, mosses, mires, dikes, ponds and lakes. In all types of water environments, conditions for life are created. But people's water usage has been increasing due to a growing population and the water supply in many areas is reducing. This means that the people in world are facing the big challenge about how fresh water supply will be in the future and which new solutions are necessary to adapt towards a sustainable society.



The purpose with this exercise is to understand the processes of water and how water is used in the society. The teacher can introduce a water story about the lifecycle where the water drop "Purl" is the main actor. Alternatively, the teacher gathers all in a circle and lets each pupil reflect for a while about "What do you use water for? After a couple of minutes, let each one of them describe their reflections shortly.

The pupils are grouped and the teacher lets the pupils think about what is needed in the box/jar to make a model of a sea. Each group builds a model of the water lifecycle with different materials. Suggestion is to use a plastic box with sand and stones, which will be the seabed. Fill with water, animals and plants. Cover the plastic box with a plastic lid or foil. During the next coming weeks, let the groups notice any changes.

Finally the teacher reasons with the pupils about questions around the water processes in nature and in society. Which similarities and which differences are there? What do the pupils believe the water in the tap comes from? What happens with the toilet water which is flushed away? Do the pupils know what a water tower is, what waste-water pipes are, what sewage plant is?

Steps:

Experience

Discovery

Understanding

Primary School Grade F-3, Ages 6-9: The Physical and Chemical Characteristics of Water, Technology and Mathematical Calculations



Steps:

Experience

Discovery

Understanding

Everybody knows that when sugar is put in a cup of tea it dissolves and gives the liquid a sweet taste. Here hides one of the unique features of water, i.e. its solubility. Substances may be water-soluble or fat-soluble. An experiment is to let the pupils try many substances and see what happens.

The teacher starts by taking out ordinary products in the pupils' daily life. Make sure there is also hot water in a water boiler or thermos. The teacher briefs about the products, such as sugar, salt, olive oil, caramel, oatmeal, etc, and discusses with the pupils about which ones they think will dissolve in water and if the time differs. Their thoughts are the hypothesis of the experiment. Divide the pupils into groups. Give them some cups, glasses for them to try the different foodstuffs and notice if their hypothesis are correct or not. Discuss the solubility and the groups' hypothesis, i.e. what they thought, is the starting point.

Primary School Grade F-3, Ages 6-9: **Water in the Literature**

Water, water, just ordinary water!

Water is part of Swedish literature in many different ways. It could be part of a place description where the landscape is enhanced or as background property to the novel's events. Water may also be in focus as in some poetry, where water poems pictures memories, experiences and discoveries.

In connection to some other water study, the teacher may let the pupils play with the language. They should try to pin down, identify and create compound words. An important part is also to discover how different expressions have another meaning than what the words actually "say". The teacher tells about the meaning of compound words and examples of such words.

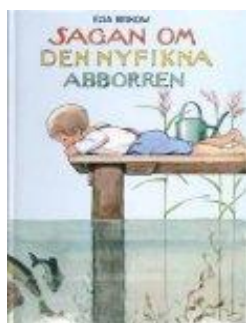
Group the pupils using for example cards of insects or plants living in water. The groups should search for compound words concerning water, such as pondsnail, seaweed, water-scooter, water-ski, water-bee, water-acari, etc. The groups return after ten minutes and demonstrate their words to each other. The teacher discusses with them if the words really exist or if they invented them and what happens if the parts of the compound words change place, e.g. water-scooter becomes scooter-water. To continue the exercise, let the pupils find their own book.

Steps:

Experience

Discovery

Understanding



When the reading period is finished, the pupils should write and draw their own water books, a tale or their own story about something happened by the water. It might be on a beach, in a boat, on a pier or at a stream.

Primary School Grade F-3, Ages 6-9: The Local Community



Steps:
Insight
Action

The pupils can make a memory-game with different insects they have caught in the water. Draw cards with the name of the insect as titles. Laminate the cards and let the preschool's 4-5 years old children play the game before they start their Water Ecology theme.



A continuation or option may be to divide the pupils into smaller groups and let them make insect books. They should then write texts and draw or make photos of the animals. The teacher decides whether the same animal is allowed in several books or not. The insect books can be used at the preschool, as start up on their Water Ecology theme.

Primary School Grade F-3, Ages 6-9: Democracy and Lifestyle



When the pupils have worked with clean and dirty water respectively, based on for example not urinating in the water, they can continue with the theme “washing water”. What happens when soap, shampoo, toothpaste, washing detergents, etc, are used?

Steps:

Insight

Action



The teacher discusses with the pupils about their thoughts. It is recommended to write down their thoughts in a concept map, a mindmap. While outdoors the teacher and the pupils should find the aquatic plant common duckweed. It is usually found in ditches and ponds where there is a lot of nutrition from e.g. farms (leakage from the fields). The pupils have been grouped. Each group should pick about 100 small plants. They should also bring a water sample from the place where they found the plant.

When returned each group pours tap water into four glasses and the water sample in the fifth glass. One glass should contain only the clean tap water, whilst the three others should be added with different ingredients from washing water. The glasses should be labelled with the content, e.g. this amount of soap, the shampoo that a person uses in the shower, etc. Twenty common duckweed plants should thereafter be put into each glass, and the glasses should be placed in a window for about 3-5 days. What will happen? The pupils should write down their thoughts/hypothesis about each glass. The following table can be used.

	Contents	What do they think will happen? Hypothesis	What happened? Time?
Glass 1			
Glass 2			
Glass 3			
Glass 4			
Glass 5			

Discuss the results and let the groups compare their results (both the glasses and the tables). What consequences do the results get? What can we do with the washing water? Can it be used? Perhaps watering the flowers or ...?

Put up the pupils' results on a screen and display them in the library or at the environmental office.

Secondary School Grade 4-6, Ages 10-13

Experience
Discovery
Understanding

Secondary School Grade 4-6, Ages 10-13: Water Ecology

Water is not experienced in the same way if you are by the ocean, a lake and pouring water as if you are by rivers, creeks, streams and ditches. The teacher visits different nature types to be able to give the pupils an overview of how different shapes of water can appear in the landscape, such as big or small water areas, salty water or fresh water, slack water or moving water or...

The teacher gathers everybody in a circle and lets each pupil reflect for a moment about *What does water mean to you?* After a couple of minutes each pupil describes their ideas briefly.

The teacher may continue by showing a picture of the earth covered by large water areas. A discussion subject could be: Can we use all the water on our planet? It is important that the pupils become inspired to discover the diversity in, on and by the water.

Catching small insects

Divide the pupils into groups of four to five. The teacher introduces by telling about the diversity of insects on top of and beneath the water surface and which food they eat. The terms herbivore and carnivore are introduced. It is recommended to show about ten species, e.g. cards or photos of different insects, such as diving beetle, whirligig, dragonfly-worm, caddice-worm, mayfly-worm, water woodlouse, freshwater acari, horse-leech, freshwater amphipoda, water scorpion, various shell species, freshwater mussels. The groups get a specific place at the beach where they can use tucks and strainers to catch as many insects as possible at the waterside, around the water plants, on the water surface and on the bottom around the stones.

The small animals should be put in a big white bucket with clear water inside. It usually takes about 30-50 minutes depending on the availability of insects. After collection, the insects and their behaviour should be studied in detail using magnifiers.

The teacher distributes questions to the pupils for them to consider, such as

How do the aquatic insects breathe?

- *The water's oxygen* through the skin, trachea gills, gills
- *The air's oxygen* through airlock, respiratory tubes, abdomen at the surface

What do the insects eat?

How do they breathe?

How do they move?

How do they act towards other animals in the bowl?

Steps:

Experience

Discovery

Understanding

Steps:

Experience

Discovery

Understanding

When the groups have been watching the insects through magnifiers and reflected, they all choose an insect which they will sketch on an A5-size paper. The detailed researches will be illustrated on the sketches. How many legs does the animal have? Are the legs furred? What does the foot look like? Does the animal have antennae? Are the mouth parts visible? The insect must be big enough to cover the whole piece of the paper. If the teacher chooses to follow-up the water ecosystem work (see below), then the sketched animals should be cut out at a later occasion.

It is good if there is time to end the exercise by sorting all the small insects in water-filled bowls and cards/photos of the animals are placed in front of each bowl.



Experience
Discovery
Understanding

The teacher discusses about some distinguished species (diving beetle, water scorpion, dragonfly-worm), species with many individuals and species with few individuals. What is the reason for that? What does the water look like? Is it clear or turbid?

The landscape surrounding the water



The teacher points out the landscape around the water to the pupils. What characterises the forest? Is the ground sloping, flat or hilly? During the discussion the pupils have the opportunity to reflect about whether the water is nutritious or oligotrophic. They may also be prepared by having considered the seven items in the table.

Lake	Nutritious	Oligotrophic	Comment
1. Surrounding landscape			
2. Surrounding forest/vegetation			
3. Beach plants			
4. Aquatic plants			
5. Animal life (rich-poor)			
6. Water colour			
7. The appearance of the beach			

Aquarium

The teacher could decide to let each pupil choose an insect to take care of, study it for some weeks at the school. This means that the teacher gets a jar with about twenty insects, which should be put in an aquarium. After the studies, the animals must be returned to a similar water place in the nature.



Mathematical exercise

When the groups have examined the insects they can continue with a maths exercise, i.e. by making a bar chart of about 10 species on a paper or on the ground using nature materials such as sticks, cones and stones.

The bar chart

The Y-axis shows a scale of a number of species from 1-20. The X-axis shows a categorisation such as number of legs or different colours or different insect groups. The picture illustrates animals with six and eight legs respectively, indicated with stones.

Bar chart

Aquatic plants

Another possibility is to continue discovering the plants in and by the water. What is the difference between a terrestrial plant and an aquatic plant?



	Aquatic plant	Terrestrial plant
Supporting tissue	The buoyancy of the water requires softer tissue	Woody, hard in order to endure wind
Water feed	Constantly	Problems of dehydration. Prevented by waxy leaves, involuted leaf edge, thin leaves etc.
Access to sunlight	Problems at the bottom. The wavelengths of light are absorbed at different depths.	Problems at shadowy places such as beech forest. Blue penetrates the deepest.
Oxygen supply The oxygen of water= 1/20 of the air's oxygen	Problems solved: - air spaces= air oxygen - lobated= under the surface the oxygen of the water - stomata on the top e.g. water lily= the air's oxygen	Only cavernous for stability
Mechanic effect	Waves, water currents, ice, wind above the water surface.	Wind, snow.

Before the groups start collecting different plants, the teacher goes through about what plants need to be able to survive (water, nutrition, sunlight, oxygen). The groups search for about 3-5 different plants in the water and 3-5 different plants further up on the beach. The pupils use a magnifier to look and try to answer the following two questions: How does the plant absorb oxygen for its own breathing? How does the plant reproduce? Let the pupils reflect about more questions.



Algae in the Baltic Sea

A simpler alternative is to show three pictures or photos of aquatic plants and terrestrial plants respectively. The species names are written on the cards. The groups should find those plants and examine them with the magnifier and reflect about questions they want the answer to.

The teacher ends the exercise with a discussion about the pupils' results. It is recommended to show a terrestrial plant with a solid stem and a floating aquatic plant with lobular leaves and feathery stem/roots. The teacher describes the difference.

Experience Discovery Understanding

A poem and picture about the Water ecosystem

The teacher may end the exercise with a poem about water. A poem by Göran Sonnevi is about the small, small water areas.

*A bit further in, unstraight upward the road,
close to the memory stone of the mission house,
the baptism stair in the stream, there was an overflow,
of a small creek, like a flowing waterfall,
of verdure, various herbs, but mostly
wild calla lilies, Missne, flowering white, unifoliate (bract),
with a green pistil cone. The water
flowed out of this, calmly, inflexibly*

A continuation of the studies of experiences and discoveries outdoors is to paint the water ecosystem with its plant and animal life. Some pupils draw and paint a pond or a lake with colours; the size of a wall poster. Everybody paints and attach aquatic animals and aquatic plants on their right place. An important question after all the time spent outdoors is: Are there animals and plants on the waterside or on the free water surface or down at the bottom water? The teacher may discuss about the term *ecological niche*.

Ecological niche

- A habitat in terms of environmental factors where a specific species can survive and reproduce using energy and nutrition
- Competition occurs between species and the niches vary in size in different areas/habitats.

Experience
Discovery
Understanding

Secondary School Grade 4-6, Ages 10-13: The Physical and Chemical Characteristics of Water, Technology and Mathematical Calculations

The water has several unique characteristics. One of them is the surface tension that can be discovered both through water studies and through different experiments.

During the water research the pupils reflect about the importance of the surface tension to the insects. The water surface has a thin layer above the lake, i.e. a surface tension. Several insects use the surface to hunt for food or to cling to, such as pond skaters and mosquito worms.



The characteristics of water

- Each end of the molecule has different charges, which makes it polar. Strong forces bind the water molecule – *hydrogen bonding*.
- The polar water molecule dissolves other polar substances without stratification – *the same dissolves the same*
- Water as solution does not dissolve non-polar liquids (uncharged molecules), e.g. water and food oil/petrol.
- The water's *heating capacity* means that it stores energy. Thus, it is not temperature sensitive.

Surface tension

Divide the pupils into groups. What happens if the surface tension is destroyed by softening liquid? An experiment is to put some water in a bowl, add some washing detergent and then carefully place a pond skater there. What happens then?



The water's surface tension

It develops at the border between water and air.

- Water molecules are bonding tightly. They need the contact surface to the air to be as little as possible.
- The surface tension allows the plants to absorb water through narrow tubes in the roots – the capillarity

Buoyancy

A continuation of the exercise can be to create something that floats on water. The teacher takes out material, such as bark, wooden pieces, aluminium cans, plastic bottles, cloth, wire, paper. Scissors, knife or other tools will also be needed.

The teacher shows pictures of different watercrafts such as ships, boats, canoes, etc. In connection to the pictures, the teacher tries to show how the technical construction was solved. In groups, the pupils discuss, sketch a drawing and then build a watercraft. Thereafter they test the buoyancy of their watercrafts. How do they float? Do the groups' watercrafts float differently from each other? Can they move forward? How come boats can float? What is the Archimedes' principle?

The Archimedes' principle/law

- Buoyancy = weight of displaced fluid.

The groups may reflect on the terms buoyancy and density. Can the terms be used in connection to the different watercrafts?

Experience
Discovery
Understanding

Secondary School Grade 4-6, Ages 10-13: The Aesthetical Value of Water

In all times water has always attracted painters to catch its colour and movements. The paintings below are made by Marie Lindgren from Gävle. With joy and happiness she has painted the landscape under the water. The collection of paintings is called "Jacques Cousteau and I". A small red diver is moving around in these underwaters. Cousteau was a photographer and oceanographer who made many famous films.



Film and paintings

An aesthetical experience could be to start with a film about the landscape and the organisms in the water. It could for example be about our own waters, such as a lake or on the west coast. By showing marine oceans southward, where the richness of colours is significantly more, might inspire more creativity. The teacher discuss with the pupils about excitement and beauty under the surface of the sea. Do the paintings have to look real? Is fantasy allowed? The pupils paint pictures based on "*Under the water surface*". Thereafter put all the pictures together as a formation resembling a pod.

Experience
Discovery
Understanding

Secondary School Grade 4-6, Ages 10-13: The Society

Have the pupils heard about the term W&S? Water and sewage have not been emphasised in the community. Some pupils do not consider where the water in their home comes from. Neither do they know what happens to the used/dirty water.



The Siphon principle

- **Siphon** is an inverted u-shaped tube used in e.g. construction technology and home-brewing in order to move liquid from one container to another. The receiving part must be at a level lower than the surface of the original reservoir. Moving the liquid can be done without a pump due to the hydrostatical pressure that arises.

Water treatment

The teacher shows a picture of a water tower or another treatment plant. While discussing with the pupils, the teacher illustrates the function and how the siphon principle works in e.g. a water tower.

Divide the pupils into groups. With a map of the municipality they should consider where the water comes from to the water tower, where the water tower is located and how the water is transferred to the households, or where the water is retrieved, how it is purified/treated, etc. They should write down their reflections, draw a sketch and try the siphon principle. The groups' ideas are the starting-point to find out how it works. Then they demonstrate their results on a poster.



Sewage

When the groups have worked with the purification process, they should consider what happens to the used, dirty water in the households or in the industry. Base the exercise on: Do you feel like drinking dishwashing water? What can you do to make it less dirty?

The pupils should reflect on different methods that they write down briefly (as follows).

Method	How to implement?	Materials	What will happen? Hypothesis	What happened?

Insight Action

The groups search for materials, at home and/or at school. They also fetch sewage water from for example the dishes, washing of the car, the shower. The sewage water must be divided in two glass jars for each type of method. Then everybody will be able to see the difference. By testing practically, the groups should decide about one or two methods, which they will then demonstrate. The discussion in connection to the demonstrations should highlighten the question about whether the cleaner water is free from “dirt” or not. What could be transparent? Will the pupils discover that salts, dust particles, bacteria, virus, hormones, etc., might not be visible? The best methods can be displayed on a website for schoolwork.

Purification using moss, sand and coal from a fireplace

- The water treatment plant of the army. It consists of a beer can with small holes in the bottom. The can is filled with moss, sand and moss as well as a stone on top to press the content. Water is poured through the “purification can”.

Methods of water purification

- Make a water analysis. What contains physical (non bacteria)? Nitrate, Nitrite, Phosphate, Ammonium, Iron, Chloride, Copper, Hardness (limestone), PH-value, Oxygen consumption, etc.
- Water filter. Which type of filter? Nitrate filter, carbon filter, humus filter or soft water filter, etc.

Dropped salt

- Drop some salt into sand. How can the salt be re-purified without grains of sand?
- Start by filtering the sand using a coffee filter.
- Boil the water so that part of the water is vapored.
- Pour the last water splash on a plate and let the water evaporate.
- What is left on the plate?

**Insight
Action**
**Secondary School Grade 4-6, Ages 10-13:
Democracy and Lifestyle**

Many market surveys are done nowadays about the attitude towards political parties, the usage of different media, the usage of the number of products in a family, etc. The question is how to plan and perform your own investigations?



The teacher starts a discussion with the pupils about the purpose of market surveys. What do they think? Their ideas are pointed out and the discussion continues about which target group a survey may be directed to and which methods can be used. What is an inquiry and how to perform an interview?

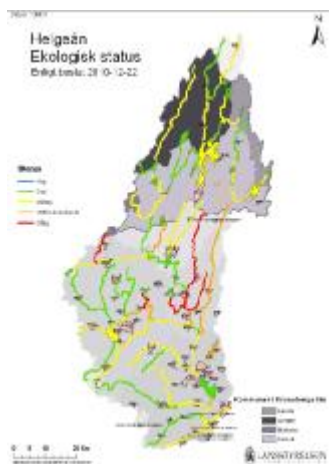
A research will be performed. Together you decide what to study and who will be the recipient: parents, older sisters and brothers, people on the street or shop assistants or other people? In the Water theme the content could be based on shower habits, purchase of bottled water, availability of lakes for swimming, visits to swimming halls and bathing houses, knowledge about e.g. water usage during manufacturing of products such as clothes (cotton) or food (rice, vegetables). It is good if the class has agreed on the target group and chooses different themes/content to map out the target group's ideas, habits and values. An alternative is to investigate a specific theme where several target groups are inquired. A decision about the methods must be taken.

Divide the pupils into groups. Each group gets a theme/content or a target group for their survey. Let them write reports and then demonstrate o each other. Finally the reports/surveys are displayed on a website for schoolwork.

Experience
Discovery
Understanding

Secondary School Grade 4-6, Ages 10-13: The Importance of Water in the Society and as a Nature Resource

The geographical terms ocean, lake, wetland, creek, river, delta, etc, are usual to mention in the beginning of map studies. Introduce a drainage area that is a wider area and which affect a large amount of people. Nowadays drainage areas in countries around the Baltic Sea are of big importance because of EU's water directives year 2000. The directive implies that five water districts are responsible for the administration of the ground water quality.



Drainage area

- Area that drains through the same waters
- Area that creates watershed towards other drainage areas
- Topographically delimited

The drainage and status of a watercourse

The teacher could make the following experiment to begin the theme: Water is poured onto a sheet of glass. The water will move around if the glass sheet is carefully inclined. If the water is coloured with caramel colour it will be more obvious. Which form, which pattern does it turn into? What do the pupils think? The teacher then compares with different watercourses in your country.

Divide the pupils into groups. They sketch a longer creek or river with tributary flows and then continue by building a model of a drainage area. They should pretend to be community planners in the municipality and to do that they have got a piece of land to exploit.



The groups choose a slope of gravel, sand and stones, and they build their own ridge. Then they pour out water from the top and let it flow downwards. How does the water flow look like? Thereafter they reflect on where to place roads, housing, industries and farms. They should also reflect on where to retrieve clean water and where to let the sewage out.

After emphasising the drainage area through the model building, the teacher and the pupils discuss about their reflections what a society needs if it is located in connection to one of the bigger flows.

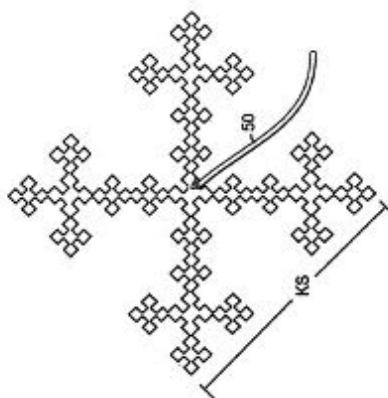
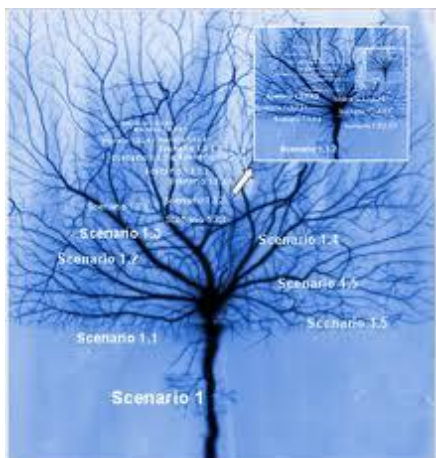
Where to retrieve the clean water? Where to let the sewage out? How does the transportation of water work in a city? Which different “institutions” are needed (water tower, pipes, treatment plant, pumps, taps ...)? Finally the pupils watch a map and reflect about: How does the drainage area in their district look like?

A continuation could be to see similarities with other drainage areas on the earth. How the water is handled affects its quality in many other places.

Experience
Discovery
Understanding

Secondary School Grade 4-6, Ages 10-13: The Physical and Chemical Characteristics of Water, Technology and Mathematical Calculations

In the nature there is a pattern that is repeated in different organisms and landscape elements. A mathematician calls it the fractal dimension.



The teacher discusses and compares the spreading of water with other shapes in the nature. Some shapes are obvious, e.g. the snowflake or the tree and its crown. To move from the real to the abstract is a possibility using the fractals of mathematics.



The fractals of Mathematics

- A **fractal** is commonly defined as "a self-similarity pattern with structure in all scales", which means that it resembles itself in the same way as a tree's branches, which have similar but smaller branches.

The pupils' assignment is to search for shapes in the nature. Since patterns are copied when watching them in a larger scale, the pupils will bring a magnifier. Alone or in pairs they search for ten nature items with a repeated pattern, e.g. pinnated leaves such as ash tree, rowan tree, spider web, bunch of currants or leaf ribs. A continuation of the assignment is to find patterns in water environments such as liquid rings, ice needles, bubbles in the ice.

The teacher continues with the theme patterns in mathematics such as sequence of numbers and algebra.

To continue outdoors at a later occasion, the assignment could be to find patterns in the nature that has been recreated in some technical machine or tool. It could be the tree block with annual rings resembling a CD-ROM or a serrated birch-leaf reminding a saw blade. How many different items have an equivalent in the technology? The pupils are divided into groups, and should during a certain time, collect the nature items and then demonstrate.

Experience
Discovery
Understanding

Secondary School Grade 4-6, Ages 10-13: Water in the Literature

The world is caught in a drop
*A rain of waterdrops
small worldparts are falling on me
each drop a small world
each one severally beautiful
Together they form rivers,
creeks, streams and oceans
together sister and brother,
the water is the sap of the tree of life.*

Water in poems is a certain theme that reappears constantly. There are several forms of poem that can be used during different occasions.

Poems using analects

The pupils choose a fragment and end with a whole sentence from different fragments to suit you. The teacher gives an example orally, that is tested in the group so that all will understand. Divide the pupils into groups. During 5-10 minutes they collect words from the surroundings. The words can be both nature items (nouns) and their descriptions (adjectives), but also what happens (verb) in the local environment/place.

Thereafter the group gets a piece of paper with fragments from different poets. The fragments can be directed towards a certain theme, in this case Water. The groups choose four different fragments and end with their own words to make at least one sentence. After these four lines they write "We are ..." and then they add a feeling they have in the group. The poems are read when all are standing in a circle. They take a step inside, on to the stage.

*Travel with the crane through the sun to the blue sky,
Like a stone the crane is falling down in the warm green grass.
On the wings the small insects rested.
We are lovely green straws of grass. (Grade 5, 2007)*

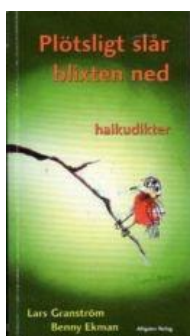
Experience
Discovery
Understanding

Fragments from Water poems

- * Towards the Nordic Seas ... (Böttiger)
- * Greedily biting ... (H. Martinsson)
- * Between the water and the beach ... (H. Martinsson)
- * Higher and higher still ... (E. Blomberg)
- * Like a stone...is falling ... (B. Carpelan)
- * In the summer grown crown of the tree ... (V. Aspenström)
- * As a green line... (B. Lindgren)
- * Sitting quietly in the rowan tree... (F. Isaksson)
- * You cape pointing out ... (A. Wohlin)
- * Here in the river meeting of the bay ... (O. Svensson)

Haiku

More ways of writing poems are to try the Japanese poetry form called Haiku. The western variant consists of three lines: line 1: five syllables, line 2: seven syllables, line 3: five syllables. The oldest and much-disputed haiku was written by Matsuo Basho, 1644-1694:



*The very old pond
A frog is jumping into
The sound of water*

The pupils write haiku based on different writers own versions. Use the first line and then write the second and third line by yourself.
Read more at the Internet; search for “haiku”.



Proverbs and expressions

A continuation is to let the pupils search for proverbs and expressions about water. The teacher can start with “What is hidden in the snow, comes up in the thaw” – what does it mean? Are there similar expressions? The discovery that words in expressions have another meaning than the normal definition usually fascinates the pupils.

Experience
Discovery
Understanding

Secondary School Grade 4-6, Ages 10-13: The Society

Poems may be a way to reach more people in the work of reflecting about the water resource and its limitation.



Book of Poems

The pupils have now worked by writing poems in different ways. They have also read about proverbs, expressions and thoughtful words around the Water theme. Layout and summing-up of the material is done so that the folder can be printed and sold in the local community. Maybe it could be given as a gift to the employees in the municipality or a Christmas gift to the families?

Insight
Action

Secondary School Grade 4-6, Ages 10-13: Democracy and Lifestyle

The pupils have earlier worked with clean water, water consumption, bottled water, water usage, not to urinate in the water, the water cycle, dirty water, drainage area, as well as water and sewage plants. This exercise concerns the algal bloom.



Algal bloom is yearly recurring, especially in the Baltic Sea, which many pupils have experienced. They do not want to swim, the water looks terrible and if they have a dog they know that the water is toxic when drinking. What is algal bloom? How does it occur? How long does it last? What is the reason? Could the yellow-green substance be used for something? There is a possibility to ask many more questions in the research about algal bloom as phenomenon.

The teacher shows a picture (such as the picture above) and lets all the pupils' ideas, experiences and questions be brought up. The questions are listed and structured in different categories. The starting point is to find facts about the municipality. The pupils are divided

into groups and they choose a category of questions to focus on a specific theme. Facts are found from sources such as books and Internet, e.g. materials from the Swedish Environmental Protection Agency.

The result is displayed as texts, pictures and maps and is put up on an exhibition screen. It could for example be placed in the library or some other strategic place such as the marina, the boatyard or in connection to harbour days.

Documentation

How can the teacher document the work?

- Write diary entries about the development of the theme, with contents, method and reflection
- Display an exhibition about the year's work in the lecture hall, the hallway or at a public place. The different exercises contain suggestions of follow-up work that can be put together as a whole.
- Spread the experiences with other teachers in networks and on websites.
Sprid erfarenheterna med andra pedagoger i nätverk eller på webbsidor

Secondary School Grade 7-9, Ages 14-16

Experience
Discovery
Understanding

Secondary School Grade 7-9, Ages 14-16: The Physical and Chemical Characteristics of Water, Technology and Mathematical Calculations

How are plants and organisms affected by chemical substances/integrations? Two experiments with washing powder and planting bulbs as well as salt/chlorine and seeds can illustrate that.



Washing powder with and without phosphate

The teacher has got sampling tubes and two different types of washing powder – one with and one without phosphate.

Divide the pupils into groups. Dissolve each type of washing powder into two concentrations, e.g. 1 dl and 3 dl seawater. Add 4 peeled planting bulbs in each sampling tube. Fill one tube with washing powder solution. Measure the PH-value. There are now two different concentrations of each type of washing powder, i.e. four sampling tubes. The fifth is a tube for control, which contains only seawater. Put the tubes in room temperature but not in sunlight.

In the groups the pupils should reflect on: What do they think will happen? They write down their hypothesis. After 5 days they should take up the bulbs and measure the roots. What is the average value in each sampling tube? The groups demonstrate the result statistically in a table and discuss it with the other groups.

Are there differences between the concentrations? Are there differences between the results of the groups and what might be the reason?

Seeds and pollutions

The other experience might show if seeds are sensitive to pollutions. The teacher starts with the environmental quality objective.



A non-toxic environment

The occurrence of man-made or extracted substances in the environment must not represent a threat to human health or biological diversity.

: /



Experience
Discovery
Understanding

The pupils continue working in their groups. They fill five plastic bowls with a layer of soil and then five glasses of seawater. In four glasses they add a chemical according to the following:

Glass A - 5 tsp salt

Glass B - 5 tsp of chlorine

Glass C - 5 tsp paint thinner

Glass D - 2 tsp household paint

Glass E - nothing.

Add a water-glass in each bowl and note the chemical inside the soil. Plant about 10 seeds in each bowl. Put the plastic bowls in a bright place and keep them wet. What do the pupils think will happen? They should write down their hypothesis.

Let the groups study their experiments and observe what happens. They should write down the changes in a table.

The experiment could preferably be studied more, with texts about the chemical usage and environmental effect in our waters.



Hormones in the waters

Another variant is to penetrate the work by investigating what hormones from contraceptives do to our waters. Is there a technology to purify the water from hormones in the treatment plants? What is the cost?

Experience
Discovery
Understanding

Secondary School Grade 7-9, Ages 14-16: The Importance of Water in the Society and as a Nature Resource

Does everybody know where the tapwater comes from and where the sewage water disappears? The teacher discusses with the pupils and shows a picture on how the water issue usually is solved in the community and what it looks like in the municipality.



The pupils make a study visit at the municipality's water and sewage plants. Before that day they write, in groups, at least 10 questions that they want the answer to. The teacher collects the questions and sends them to the information personnel who are receiving the class.

The groups demonstrate the different parts of the transportation of water in a society. Following are suggestions:

1. Purifying seawater. Why did they choose the lake's water? Is it located strategically or is it a quality issue? How is the water transported to the treatment plant? Which are the stages in the treatment process? Are chemicals added or is the treatment biological?
2. Water pipes. How is the water transported from the treatment plant via the water tower to the households? Which pipes are used? How are water leaks prevented? How is the water pumped to the households via the water tower? Can water be distributed to the households in another way than through a water tower?
3. Sewage pipes. Which pipes are used and how does the sewage system look like from the households to the treatment plant? Which are the problems? How can the system be changed?
4. Treatment of the sewage water. Which are the stages in the plant? Is the water differentiated depending on the user, e.g. the households versus the companies/industries? Where is the purified sewage water let out? Which are the possible problems that can occur in the local environment?

Each group demonstrates their results on a poster of size 70 * 100 cm. The posters can be displayed in the entrance of the treatment plant or in the library. It is also possible, if the pupils have suggestions of changes or improvements, for them to write a citizen proposition and send to the municipality and its website.

Global views

A continuation could be to see how different societies and countries have solved the problem of water treatment and sewage. What does it look like in all the world's refugee camps? What does it look like in huge cities like Mexico City or Bombay?



A simple and cheap water purifier which gets the energy from the sun only. Petra Wadström's invention could make life easier for millions of people in development countries. (Ny Teknik 2008)

Sun water technology

1. The dirty water is poured in a two-part plastic container that is turned towards the sun like a book with one side being transparent.
2. In the first step the water is filtered to remove particles.
3. After three to five hours in the sun ten litres of water has been purified just by using the sun. Microorganisms in the water, that can cause diarrhea, will die with the help of uv-light.
4. To get a better effect of the uv-light Petra Wadström has invented a way to first warm the water to 55 degrees and then circulate it in the container so that the microorganisms become more exposed to the uv-light. When the water is purified, a green light is shown.

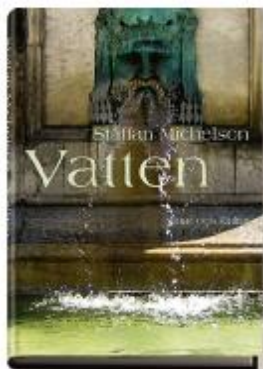
Historical flashbacks

It is possible also to add an historical perspective on how your country has developed during 500 years. Studying for example the advantages and disadvantages of the outhouse, natural fertilizer before commercial fertilizer was produced and the import of the water closet at the beginning of the 20th century, etc., could give insights about the ordinary life for people living more than hundred years ago.

Experience
Discovery
Understanding

Secondary School Grade 7-9, Ages 14-16: Water in the Literature

The book *Water* is about e.g. the art of handling water. It could also be expressed as *The cradle of the culture is depending upon water*. Water is the most natural thing for people in Sweden, who live in a country with unending water resources and totally free. The effects of the climate changes are visible for example through large land areas that are flooding and which cause problems of water treatment and sewage. Besides water shortage occurs in other dry areas, which cause political conflicts in the world. The water is supposed to be enough to people's daily needs, but also in the forestry and farming. This means that people in all times and mainly today must be able to get along well around the water resource, to regulate ownership conflicts to balance individual and common interests. The water supply must be enough for us all.



The book is also about how culture and law are interconnected. Even today the ancient legislation is maintained in legal frameworks, how water disputes are settled, how water is transported (aqueducts) to the cities and how to protect the common water supply against exploitation and contamination.

Rights and liabilities around the water supply is a hot topic. The teacher starts a discussion with the pupils by “researching” their knowledge about water supplies. They make a mindmap together. Then the pupils are divided into smaller groups where they choose their own theme based on some of the issues on the mindmap. An important starting-point for all rights and liabilities is connected to people’s need of water. Examples are: How to solve conflicts? How to cooperate? How to connect water to other areas such as food production and/or cattle management? How to solve the economical issue? How to purify water?

The groups demonstrate their work to each other. The final result is then displayed on a website for schoolwork or by writing and sending a proposal to some international environmental organisation working with water issues.

Insight
Action

Secondary School Grade 7-9, Ages 14-16: The Society

Today the media society is significantly present in people’s lives. The film is as important as texts regarding information. The purpose of the exercise is to give an opportunity to create your own water movie.



The pupils are divided into smaller groups. The assignment is to make a movie about water, with a playtime of five to eight minutes. The different groups get a title to the film sequence; such as Save water, Play with water, Clean and dirty water respectively, Water purification, Sewage water, etc.

Before the pupils start their recordings, the teacher needs to go through the time for the project. Besides, a place is needed for recording with actors giving the permission to participate in the movie (an ethical aspect). The groups also need a place and equipment for editing. The filming can be done with mobile phones or other equipment.

The different movies are shown in the class. Comments on layout and content are discussed. All the film sequences can be put together to one complete film. The teacher appoints a small interested group that will do the work. The final movie is shown in the school or at a public place in the municipality.

Insight
Action

Secondary School Grade 7-9, Ages 14-16: Democracy and Lifestyle

What do the different parties say about the importance of water in their local party programmes?

The teacher talks about the importance of being an active citizen and knowing the agenda of the municipality concerning issues that concern us all. To participate in decision-making processes is of great importance if changes are to be made.



The pupils are divided into groups, suggestion is to make as many groups as there are political parties. The parties are divided randomly and not according to interest between the groups. Together a number of relevant question formulations are made, such as “What does the party programme say about the eutrophication problem? Is the water quality issue mentioned? Is surface water mentioned and for which reasons? Bathing houses, swimming halls or other recreations – are they mentioned?

If the groups do not think that they get answers to their questions, they may see if it is mentioned on national level.

Thereafter they discuss the results they have from reading about the local party programmes. After all the studies around water resources there will probably be some issue that should/would be pointed out to the decision-makers in the municipality. A suggestion can be written directly to the parties or handed in as a citizen proposition on the municipality's website.

Panel discussion

Another variant is to have a panel discussion. The teacher asks if someone has been watching the discussion program "Agenda" on TV and if they know how a debate is performed. The actors, i.e. the parties, are appointed different roles. A facilitator is appointed, who will divide the word and start the discussion.

Experience
Discovery
Understanding

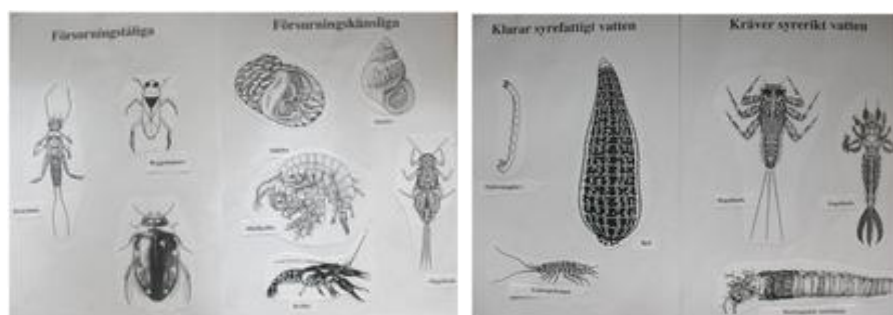
Secondary School Grade 7-9, Ages 14-16: Water, Ecology

The water quality in the local environment is affected by for example toxins, acidification and eutrophication. This affects the vegetation and the fauna, i.e. the plants and the animals. In higher grades it is relevant to point out the problems existing in the Water ecosystem.

If the pupils have not been working with water ecology during the grades 4-6, the teacher may start the theme with the following:

Water is not experienced in the same way if you are by the ocean, a lake and pouring water as if you are by rivers, creeks, streams and ditches. The teacher visits different nature types to be able to give the pupils an overview of how different shapes of water can appear in the landscape, such as big or small water areas, salty water or fresh water, slack water or moving water or...

The teacher gathers everybody in a circle and lets each pupil reflect for a moment about what water means to themselves? After a couple of minutes each pupil describes their ideas briefly. The teacher may continue by showing a picture of the earth covered by large water areas.

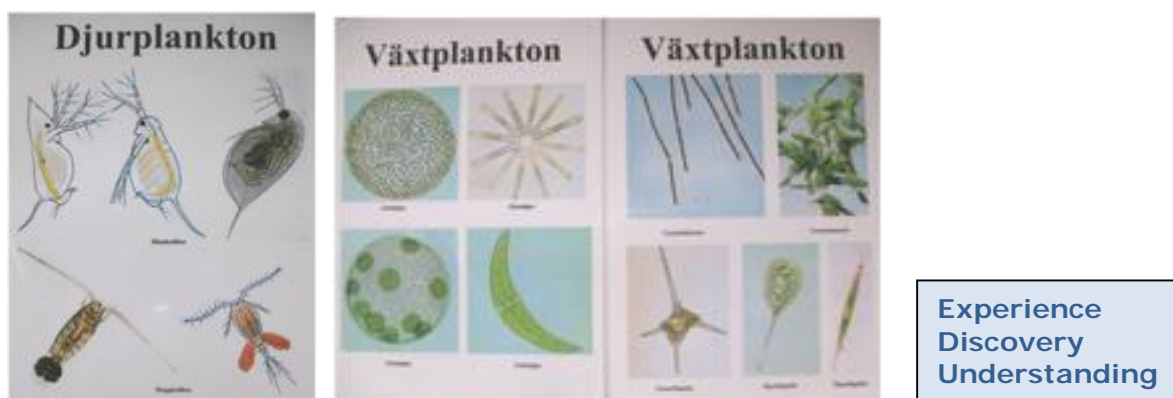


The teacher discusses about the water quality in the local environment. Acidification and eutrophication of the water affect plants and insects. Discussion with the pupils could be about: How to examine? The pupils easily mix the two terms, so it is better to separate them.

Acidification means that the water contains more acid than usual. The acidity is measured in pH-value, where 7 is neutral. Acid rains with pH-values under 5 come from burning of oils and carbon containing sulphur. The sulphur has oxidised to sulphur oxides, dissolved in water and become sulphuric acid. Another reason is also nitrogen oxides that appear at burning and it produces nitric acid in the rainwater. Metals in the ground, such as aluminium, dissolve and end up in the water and then affect the organisms. Some animals are more sensitive to acidification, i.e. at low pH-value they disappear, e.g. the European crayfish, clams, freshwater amphipoda, mayfly worms and shells. Those resistant to acidification, surviving the pH-stress better, are usually big water insects that are food for fish, e.g. diving beetles, water boatman, backswimmers and dragonfly worms.

Eutrophication means that there is too much of the nutrient salts nitrogen and phosphorus in the water. When the water gets to much nutrition the amount of organisms is increasing. Algal bloom is one example of too much nitrogen in the ocean. When organic material (algae, plants, organisms) are degraded oxygen is needed, which affects the still existing animals. They need oxygen to survive. Other insects in the lake are sensitive to the eutrophication, the high degrees of nitrogen and phosphorus. A third indicator is the oxygen supply that some species are sensitive to. Those requiring oxygen-rich water are different fly-species while barnacle, asellidae (freshwater isopods) and non-biting midge worms survive in environments deprived of oxygen.

A possibility is also to study the biodegradation process of organic material in water.



Catching insects and taking plankton samples

In groups the pupils collect insects and try to find species in respective group of acidification sensitive insects and those requiring water rich in oxygen (the eutrophication problems). With the species they can estimate the water quality. The estimation can be used later when water samples are taken of pH-values and chemical tests.

If the pupils have not earlier worked with insects and their breathing in water the teacher can give them the assignment to study and reflect how they are breathing. This gives a good understanding of the water's degree of oxygen needed for different species.

In connection to the collection the group takes samples using plankton net. It is good if the samples are taken at three different places of the water environment, e.g. out in the sea, close to the beach and close to human activity such as a harbour or drainage ditch. With the use of a stereo magnifier and/or microscope they should try to determine the species of animal plankton (cladocera/water fleas, copepods, hydrozoans) and phytoplankton (flagellates, diatoms, green algae).

Suggestion is that the groups demonstrate by drawing foodchains and/or food webs with more than two to three stages.

Redovisningen kan vara att grupperna ritar upp näringskedjor och/eller näringsvävar med fler än två till tre steg.

After the insect studies, the groups may continue with some of the following maths exercises, on paper or with nature materials:

- Make a bar chart of about 10 species
- Make a pie chart of 6-7 species with rough calculation expressed as percentage.
- Make a coordinate grid, determine the variables such as oxygen-rich water (Y-axis) and number of species (X-axis). Place the different species.

<p>Experience Discovery Understanding</p>

Plants

A continuation of studying the organisms could be to examine the plants/algae in the water. While discussing with the pupils, write down questions that could be of interest to study, e.g. What does a plant need to survive (repetition from the last stage)? The water factor is discussed based on: From where does the plant absorb water? Does the whole plant need water or ...? How does the water reach all parts of the plant? How is the water transported in aquatic plants and terrestrial plants respectively?

Other questions might be: How does the plant absorb oxygen for its own breathing? How is the plant reproducing? How are plant cells being built?

Divide the pupils into groups. They should pick plants and dye water with red caramel colour. Place the plants in the water. What do they think will happen? Let the groups write down their hypothesis. They can also write down where they think the water absorption takes place in the plant. The experiment is observed a number of times each day during several days and the observations are written down. Was the pupils' hypothesis correct? The teacher discusses with the pupils and ends by showing how the capillarity works by using a fine pipe such as the ones used for blood tests.

The teacher may end the theme with a poem about water. A poem by Lars Englund is about the ocean.

*Crispy newly fallen snow
- the foam between the stones. Burning cold*

*the water's bright tongue foiling the sand.
The shadows breezed to tart blue
moving split-second without worry, sparking and flickering out -
Breathing deeply almost getting
taste of blood in the mouth
so strong the spring air, so contracting
fresh like sloe is the breath of the ocean.*

Experience
Discovery
Understanding

Secondary School Grade 7-9, Ages 14-16: The Importance of Water in the Society and as a Nature Resource

“There are 272 rivers that are shared by more than two countries. There is no international law that governs water properly and only one international treaty dealing with water.”

Ismail Serageldin, director Library of Alexandria

The ideas were brought forward during the Tällberg-conference, which focus was to create sustainable work for the world's population. The Rework organisation supported this year's meeting, where 1800 of the world's leaders met to discuss the development work of the future.



Divide the pupils in groups. By using an atlas they look for a drainage area to a big river that runs through several countries. Suggestions are the Jordan river, Amazonas, Donau or ... Together they write down general questions that are to be kept. How many countries use water? Which are their political leaderships? Is there one or more of the big countries having more influence/power than others? Are there open conflicts and how have they been handled so far? Which products are main industries in the different countries and do they have bigger need for water than others? Are there industries polluting the water and where in the drainage area?

Let the groups demonstrate their results on a poster. Then watch the movie “Water”.



The movie Water

The movie is about the unequal supply of clean water. How the lack of clean water creates problems for whole countries and for the health of people. How we use water in farming, industry and for personal use. Water might be the reason for conflicts between countries where the water supply is scarce. The film concerns desalination as a solution of the water shortage and how to irrigate in a more efficient way.

The theme ends with a discussion about what could be done. The following quotation from the Tällberg-conference Rework could be used as basis:

“The conclusions we desperately need global and international cooperation around the formation of new policies in the area of water and waste water. This is a ticking bomb.”

Per-Olof Nyqvist, Director Organizational development at Cardo AB

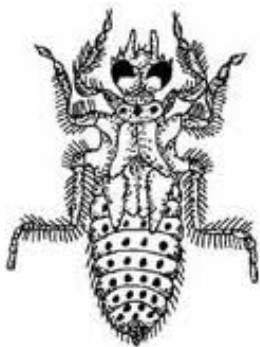
Experience
Discovery
Understanding

Secondary School Grade 7-9, Ages 14-16: The Aesthetical Value of Water

In grade F-3 the pupils worked with water ecology based on an aesthetical value.

The exercise mentioned earlier was the following: **Another possibility is to divide the pupils into pairs and let them create an aquatic animal made of clay, gypsum or nature materials. These can be painted or glazed. To make the exercise useful the pupils must have caught insects or carefully studied insects before. The teacher introduces by letting the pupils reflect on their observations down at the waterside. How many legs, antennae, barbs on the feet, patterns on the back of the body, hair/fur on the legs, grasping claws, etc, do the aquatic animals have? The aquatic animal should display as many biological details as possible, i.e. letting the children achieve knowledge of species and at the same time performing creative work.**

When the aquatic animals have been formed/sculptured, the teacher ends the activity with a discussion about why the animals look the way they do. Are they herbivores or carnivores, and what characteristics have been developed physically in order to find food?



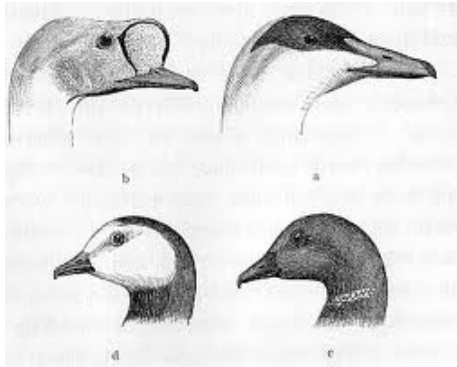
Small insects

Extend the exercise by enlarging the small insects on an overhead machine. Before the groups start they should try to estimate which scale the animal is enlarged. The pupils copy the

silhouette shown on the wall. From the picture and its form the pupils create the small insects in detail. What does the pattern look like on the body parts? Is there fur on the legs? Are the mouth parts visible?

If the teacher think that the pupils have already studied the small insects enough and consider doing something else, it is possible to work with birds or plants.

Birds and/or plants



The teacher and the pupils visit a watercourse, a lake or a pond with seabirds. They have brought sketching papers and by sitting separately they use pencils to draw the different birds. The sketches could be of the birds' details or their motions.

Another alternative is to work based on the green biomass. Aquatic plants have different shapes and appearances, for example depending on how they absorb oxygen for their growth. The pupils study aquatic plants and then try the grey, green and yellow scales and paint their own "underwater jungle".

**Insight
Action****Secondary School Grade 7-9, Ages 14-16:
The Society**

A walk in the forest with information and reflection creates an informal discussion between the participants about the future.

Bottled water costs more than thousand times the tapwater. 1 500 liter of water is required to produce ONE KILO cereals and 15 000 liters to produce one kilo beef.

Divide the pupils in groups. Let them search for information about water, water supply and water resources in the present situation. Thereafter they write down the facts on an A4-size paper, which is laminated. Hang the sheets in a hillside in the forest without striping, but close to small landscapes such as grey lichen-covered stones, rotten stumps, hanging bushes, soft yellow-green moss.

Invite another class and brief them about the Water theme. The new pupils from a lower grade walk around in pairs and read the sheets of facts. In the forest hill they sit down in groups of six and discuss what they can do concerning the water issue. They write down keywords on small notes about the possibilities of actions. The notes are put up on a poster, of at least A3-size, showing the planet Tellus (Earth).

The groups demonstrate and all the corrected notes are put up on the same poster that is hung in a public place where people are passing by.

Secondary School Grade 7-9, Ages 14-16:
Democracy and Lifestyle

As conclusion of the school's water project the pupils write an essay of the subject
"How can we influence our lives concerning the water issue/about the water resource?"



The essays are edited or shortened and compiled in an anthology, which is printed and distributed in the local society. Readers could be younger ages at the school and who are working with the Water theme, parents, teachers, politicians, and people in authority. An alternative is to display the anthology as a pdf on the website of the municipality and the school. It is recommended to contact WWF, the World Wildlife Fund, when the anthology is being produced; they might need it in their educational campaigns.

Find also materials about water at the World Wildlife Fund.

Find materials about lifestyle and ecological footprints at the World Wildlife Fund.

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